

# Santos

## **BAROSSA DEVELOPMENT DRILLING AND COMPLETIONS ENVIRONMENT PLAN**



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## Abbreviations and Definitions

Abbreviation	Description
μ	Micron
°C	Degrees Celsius / Centigrade (Degrees)
ALR Act	<i>Aboriginal Land Rights (Northern Territory) Act 1976 (Cth)</i>
ATSIHP Act	<i>Aboriginal and Torres Strait Islander Heritage Protection Act 1984 (Cth)</i>
AFMA	Australian Fisheries Management Authority
AFZ	Australian Fishing Zone
AHO	Australian Hydrographic Office
AIS	Automatic Identification System
ALARP	as low as reasonably practicable
AMOSC	Australian Marine Oil Spill Centre
AMP	Australian Marine Park (Commonwealth)
AMSA	Australian Maritime Safety Authority
APPEA	Australian Petroleum Production and Exploration Association
ASBTIA	Australian Southern Bluefin Tuna Industry Association
Appeal Judgment	<i>Santos NA Barossa Pty Ltd v Tipakalippa</i> [2022] FCAFC 193
BIA	biologically important area
BOP	blowout preventer
Cefas	Centre for Environment, Fisheries and Aquaculture Science (United Kingdom)
CFA	Commonwealth Fisheries Association
CHARM	chemical hazard and risk management
CM	control measure
CoA	Commonwealth of Australia
DAFF	Department of Agriculture, Fisheries and Forestry (Commonwealth)
DAH	dissolved aromatic hydrocarbon
dB	decibels
DAWE	Department of Agriculture, Water and the Environment (Commonwealth) (now DCCEEW)
DCCEEW	Department of Climate Change, Energy, the Environment and Water (Commonwealth)
DEWHA	Department of the Environment, Water, Heritage and the Arts (Commonwealth) (now DCCEEW)
DITT	Department of Industry, Tourism and Trade – Northern Territory Government
DNP	Director of National Parks
DoE	Department of Environment (Commonwealth) (now DCCEEW)

Abbreviation	Description
DoEE	Department of the Environment and Energy (Commonwealth) (now DCCEEW)
DP	dynamic positioning
DSEWPaC	Department of Sustainability, Environment, Water, Population and Communities (now DCCEEW)
EDO GEP Reports	Reports commissioned by a third party in relation to the Barossa Gas Export Pipeline and provided by NOPSEMA to Santos on 7 August 2023. <ul style="list-style-type: none"> <li>• Barossa Gas Export Pipeline Installation Underwater Cultural Heritage Assessment (July 2023). A/Prof Mick O’Leary, UWA.</li> <li>• Barossa Gas Export Pipeline Installation Cultural Heritage Assessment (July 2023) Gareth Lewis, GL Anthropology</li> </ul>
EEZ	Exclusive Economic Zone
EMBA	environment that may be affected
ENVID	environmental hazard identification workshop
EP	Environment Plan
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i> (Cth)
EPO	environmental performance outcome
EPS	environmental performance standard
EP Consultation Guidance	NOPSEMA guidance GL2086 – Consultation in the course of preparing an environment plan – May 2023
ESD	ecologically sustainable development
FPSO	floating production, storage and offloading
GHG	greenhouse gas
GHS	globally harmonized system of classification and labelling of chemicals
HEVA	high exposure value area
HSE	health, safety and environment
Hz	Hertz
IMS	invasive marine species
IMT	Incident Management Team
ISO	International Organization for Standardization
Judgment	<i>Tipakalippa v National Offshore Petroleum Safety and Environmental Management Authority (No 2)</i> [2022] FCA 1121
JRCC	Joint Rescue Coordination Centre
KEF	key ecological feature
kHz	Kilohertz
km	Kilometre
km <sup>2</sup>	square kilometres
LCM	lost circulation material

Abbreviation	Description
LBL	Long baseline acoustic underwater positioning array
LEVA	low exposure value area
LNG	liquid natural gas
LOWC	loss of well control
LWIV	light well intervention vessel
MARPOL	International Convention for the Prevention of Pollution from Ships
M	Metres
m <sup>2</sup>	square metres
m <sup>3</sup>	cubic metres
MC	measurement criteria
MBES	multibeam echosounder
MDO	marine diesel oil
MEVA	moderate exposure value area
MNES	matters of national environmental significance
MODU	mobile offshore drilling unit
MoU	Memorandum of Understanding
MPNMP	Marine Park Network Management Plan
NAF	non-aqueous fluids
NAXA	North Australian Exercise Area
NEBA	net environmental benefit analysis
Nm	nautical mile
NMR	North Marine Region
NOAA	National Oceanic and Atmospheric Administration
NOPSEMA	National Offshore Petroleum Safety and Environmental Management Authority
NOPTA	National Offshore Petroleum Titles Administrator
NT Act	<i>Native Title Act 1993</i> (Cth)
NTASS Act	<i>Northern Territory Aboriginal Sacred Sites Act 1989</i> (NT)
NWS	North West Shelf
ODS	ozone-depleting substances
OCNS	Offshore Chemical Notification Scheme
OPEP	Oil Pollution Emergency Plan
Operational Area	Defined as the boundaries of the petroleum production licence NT/L1
OPP	Barossa Area Development Offshore Project Proposal accepted by NOPSEMA in March 2018
OPGGS Act	<i>Offshore Petroleum and Greenhouse Gas Storage Act 2006</i> (Cth)



Abbreviation	Description
OPGGG(E)R	Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009 (Cth)
PAH	polycyclic aromatic hydrocarbons
PK	peak sound level
PMST	Protected Matters Search Tool
PSZ	petroleum safety zone
PTS	permanent threshold shift
Ramsar	Convention on Wetlands of International Importance
Relevant Person	As set out in Regulation 11A(1)(a)-(e) of the OPGGS(E)R
ROV	remotely operated vehicles
RMR	riserless mud recovery
SBES	single beam echosounder
SCE	solids control equipment
SDS	Safety Data Sheet
SEL	sound exposure level
SMPEP	Shipboard Marine Pollution Emergency Plan
SOLAS	safety of life at sea
SOPEP	Shipboard Oil Pollution and Emergency Plan
SPL	sound pressure level
SURF EP	Santos' proposed Subsea Infrastructure Installation Environment Plan
TTS	temporary threshold shift
UCH Act	<i>Underwater Cultural Heritage Act 2018</i> (Cth)
USBL	ultrashort baseline
WBM	water-based mud

## Drilling Technical Glossary

Terminology	EP Section	Definition
acoustic survey positioning system	2.1 2.2.4	Equipment that is used to accurately measure where a well is drilled in geometric coordinates, i.e. latitude and longitude.
blow-out preventer (BOP)	2.1 2.3.5	One or more valves installed at the wellhead to prevent the escape of pressure either in the annular space between the casing and drillpipe or in open hole (such as hole with no drillpipe) during drilling or completion operations. Blowout preventers on a semi-submersible MODU on the sea floor.
casing  casing string	2.1 2.3.1 2.3.3 2.3.4 2.3.6	Steel pipe placed in an oil or gas well as drilling progresses to prevent the walls of the hole from caving in, to prevent movement of fluids from one formation to another, to provide a means of extracting petroleum if the well is productive, and to aid in well control. Conductor casing is the largest diameter casing used in a well and is the first casing string to be installed. Structural casing is a casing string that is run after the conductor casing that typically is only several hundred metres below the seabed. Surface casing is a casing string that is run after the structural casing. Intermediate casing is any casing run after the surface casing and before the final production casing. Production casing is casing run into the production reservoir. <b>Casing String</b> The entire length of all joints of casing run in a well. Casing is manufactured in approximately 12 metre lengths, each length or joint, can be joined (usually screwed) to another and run in the well.
cementing (cementing of casing)	2.1 2.3.4	cement casing – to fill the annulus between the casing and wall of the hole with cement to support the casing and prevent fluid migration between permeable zones.
conventional closed-circulating fluid system	2.1 2.3.1 2.3.2 2.3.3	Drilling operations after the BOP is installed on the well head, where the drilled cuttings and water-based drilling fluids return to the MODU for treatment and recirculation into the well.
riserless drilling	2.1 2.3.1	Drilling operations prior to the BOP being installed on the wellhead, where the drilled cuttings and water-based drilling fluids exit the well at the seafloor.
riserless mud recovery	2.1 2.3.1	Drilling operations prior to the BOP being installed on the wellhead, where the drilled cuttings and water-based drilling fluids are collected at the wellhead/seabed and pumped to the MODU using a riserless mud recovery system. The drilling fluids returned to the MODU are treated and subsequently recirculated into the well. are then processed in the same way as the used for the “conventional closed-circulating fluid system”.
side-track drilling, re-drilling sections, re-spud and abandonment	2.1	<b>Sidetrack</b> To drill around broken drillpipe or casing that has become lodged permanently in the hole. <b>Re-drilling sections</b> To drill a hole that has collapsed or has other issues.

Terminology	EP Section	Definition
		<p><b>Spud</b> To a begin drilling a well. To start the hole. Also known as spud in.</p> <p><b>Abandonment</b> To permanently cease producing oil and/or gas from a well, or to cease further drilling operations.</p>
subsea vertical (Christmas) trees	2.1	Equipment consisting of control valves, pressure gauges, and chokes assembled at the top of the wellhead to control the flow of condensate and gas after the well has been completed.
tubing head spool	2.3.1	A piece of equipment that is installed on top of the wellhead that allows the well completion to seal at the wellhead and prevent any leaks from a well.
well completions, including perforating and well flowback (i.e., sampling, clean up, and flaring)	2.1	<p><b>Well completions</b> Once a well has been drilled, the next operational phase is the to complete the well. To “complete a well” is to finish work on a well and bring it to productive status. The “completion string” is the final string of casing installed inside the well. The completion pipe is not cemented into place and instead has mechanical seals top and bottom. In the case of Barossa, it has a down hole pressure gauge and a safety shut off valve that is located approximately 300m below the seafloor.</p> <p><b>Perforating</b> To pierce the casing wall and cement of a wellbore to provide holes through which condensate and gas from the formation may enter. Perforating is accomplished by lowering into the well a perforating gun, or perforator, that fires electrically detonated bullets or shaped charges.</p> <p><b>Well flowback</b> The flowing of gas and condensate from a well to remove the drilling and completion fluid from the well. This enables the well to be left with gas inside it so that when the wells are flowed to the FPSO during commissioning of the FPSO only a minimal amount of drilling and completion fluid is flowed to the FPSO. Hence the description to “clean up” a well.</p>
wellhead	2.1	<p>The equipment installed at the top of the well. For a subsea well such as Barossa, the wellhead is located at the seabed. A wellhead allows each casing string to have a seal at the wellhead that prevents leaks from a well.</p> <p>It is also what the BOP is connected to whilst drilling and is what the “subsea vertical (Christmas) tree” is connected to once the well is completed.</p>

# 1 Introduction

## 1.1 Environment plan summary

Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009 (OPGGG(E)R 2009) requirements
<b>Regulation 11(3)</b>
Within 10 days after receiving notice that the Regulator has accepted an Environment Plan (EP) (whether in full, in part or subject to limitations or conditions), the titleholder must submit a summary of the accepted plan to the Regulator for public disclosure.
<b>Regulation 11(4)</b>
<p>The summary:</p> <ul style="list-style-type: none"> <li>(a) must include the following material from the environment plan:               <ul style="list-style-type: none"> <li>(i) the location of the activity;</li> <li>(ii) a description of the receiving environment;</li> <li>(iii) a description of the activity;</li> <li>(iv) details of environmental impacts and risks;</li> <li>(v) a summary of the control measures for the activity;</li> <li>(vi) a summary of the arrangements for ongoing monitoring of the titleholder’s environmental performance;</li> <li>(vii) a summary of the response arrangements in the oil pollution emergency plan;</li> <li>(viii) details of consultation already undertaken, and plans for ongoing consultation; and</li> <li>(ix) details of the titleholder’s nominated liaison person for the activity.</li> </ul> </li> <li>(b) must be to the satisfaction of the Regulator.</li> </ul>

A summary will be prepared as required by Regulation 11(4) drawing on the following sections of this EP.

EP summary material requirement	Relevant section of EP containing EP summary material
The location of the activity	<b>Section 2</b>
A description of the receiving environment	<b>Section 3 and Appendix C</b>
A description of the activity	<b>Section 2</b>
Details of the environmental impacts and risks	<b>Sections 6 and 7</b>
The control measures (CM) for the activity	<b>Sections 6 and 7</b>
The arrangements for ongoing monitoring of the titleholder’s environmental performance	<b>Section 8</b>
Response arrangements in the Oil Pollution Emergency Plan	<i>Barossa Development Drilling and Completions Oil Pollution Emergency Plan (OPEP)</i>
Consultation already undertaken and plans for ongoing consultation	<b>Section 3.2.8.8</b>
Details of the titleholders nominated liaison person for the activity	<b>Section 1.5</b>

## 1.2 Activity overview

Santos NA Barossa Pty Ltd (Santos) proposes to conduct a Barossa Development drilling and completions campaign within Commonwealth petroleum production licence NT/L1, approximately 285 km north-northwest of Darwin, Northern Territory (**Figure 1-1**).

The petroleum activity covered in this EP includes the drilling and completions activities (herein referred to as the Activity), and is part of the Barossa gas and condensate development (Barossa Development), comprising a floating production, storage and offloading (FPSO) facility, subsea production wells, supporting subsea infrastructure and a gas export pipeline. The Barossa Development is described in the Barossa Development Offshore Project Proposal (OPP) (ConocoPhillips, 2018), which was accepted by the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) in March 2018.

This EP identifies and evaluates credible environmental impacts and risks associated with the Activity and ongoing management of the completed wells.

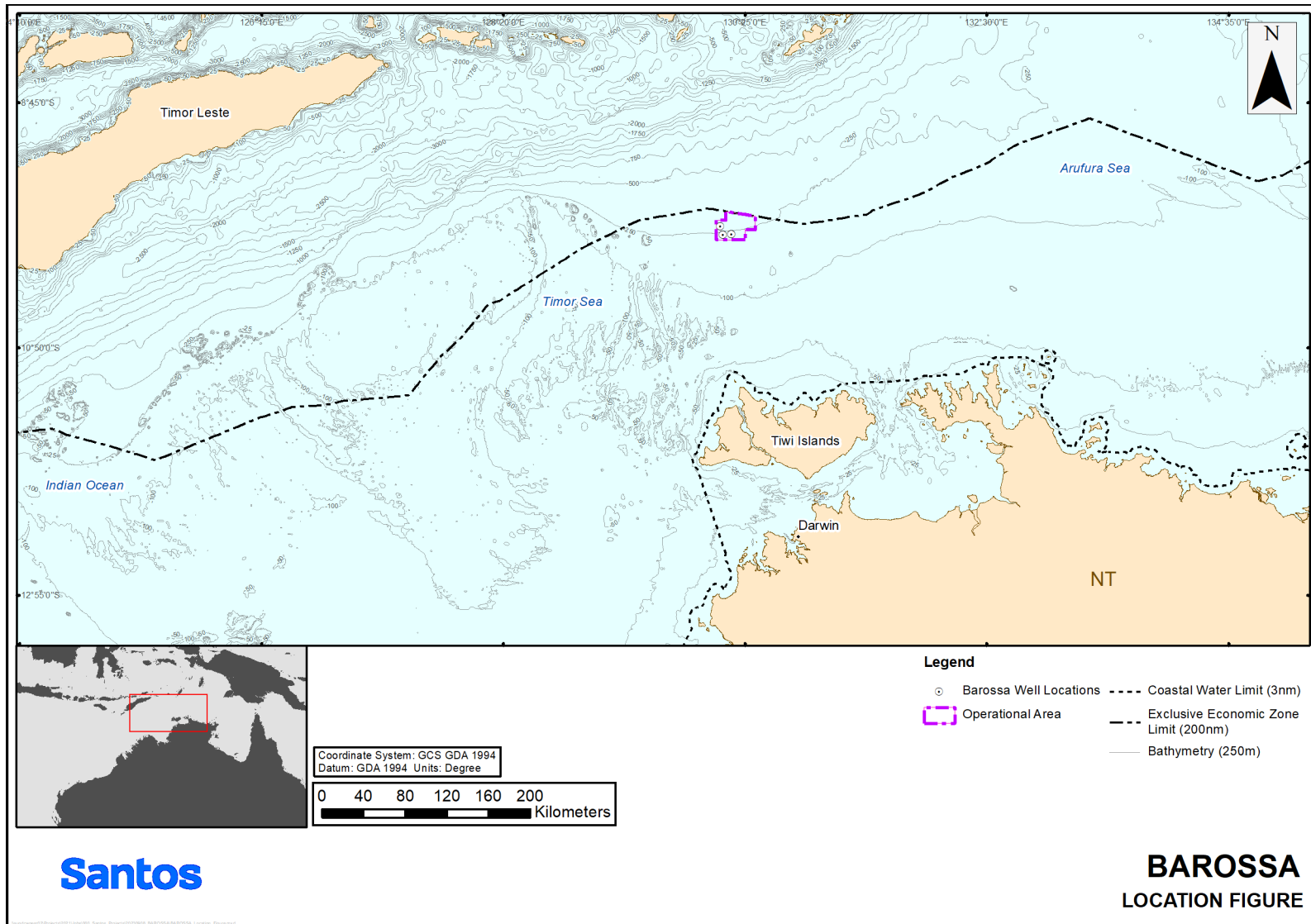


Figure 1-1: Location of proposed Activity

### 1.3 Purpose of this Environment Plan

OPGGs(E)R 2009 requirements
Regulation 10A
<p>For Regulation 10, the criteria for acceptance of an environment plan are that the plan:</p> <ul style="list-style-type: none"> <li>(a) is appropriate for the nature and scale of the activity; and</li> <li>(b) demonstrates that the environmental impacts and risks of the activity will be reduced to as low as reasonably practicable; and</li> <li>(c) demonstrates that the environmental impacts and risks of the activity will be of an acceptable level; and</li> <li>(d) provides for appropriate environmental performance outcomes, environmental performance standards and measurement criteria; and</li> <li>(e) includes an appropriate implementation strategy and monitoring, recording and reporting arrangements; and</li> <li>(f) 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 <i>Environment Protection and Biodiversity Conservation Act</i> (EPBC Act); and</li> <li>(g) demonstrates that:             <ul style="list-style-type: none"> <li>(i) the titleholder has carried out the consultations required by Division 2.2A; and</li> <li>(ii) the measures (if any) that the titleholder has adopted, or proposes to adopt, because of the consultations are appropriate.</li> </ul> </li> <li>(h) complies with the Act and the regulations.</li> </ul>

This EP has been prepared in accordance with the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009 (Cth) (OPGGs(E)R), for acceptance by NOPSEMA.

In accordance with the OPGGS(E)R, this EP details the environmental impacts and risks associated with the Activity and demonstrates how these will be reduced to as low as reasonably practicable (ALARP) and to an acceptable level. The EP provides an implementation strategy that will be used to measure and report on environmental performance to demonstrate that impacts and risks are being continuously reduced to ALARP and are at an acceptable level. The environmental management of the Activity described in the EP complies with the Santos Environment, Health and Safety Policy (**Appendix A**) and with all relevant legislation (**Appendix B**). This EP documents and considers all Relevant Persons consultation performed in preparation of the EP.

### 1.4 Environment plan validity

This EP is valid for 5 years from the date that it is accepted by NOPSEMA, or until submission and acceptance of a Regulation 25A end-of-operation of EP notification, whichever comes first.

Santos may revise the EP, using the Management of Change (MoC) process described in **Section 8.8.2**.

## 1.5 Operator and titleholder details

OPGGs(E)R 2009 Requirements
Regulation 15. Details of titleholder and liaison person
<p>15(1) The environment plan must include the following details for the titleholder:</p> <ul style="list-style-type: none"> <li>(a) name;</li> <li>(b) business address;</li> <li>(c) telephone number (if any);</li> <li>(d) fax number (if any);</li> <li>(e) email address (if any);</li> <li>(f) if the titleholder is a body corporate that has an Australian Company Number (ACN) (within the meaning of the <i>Corporations Act 2001</i>).</li> </ul> <p>15(2) The environment plan must also include the following details for the titleholder's nominated liaison person:</p> <ul style="list-style-type: none"> <li>(a) name;</li> <li>(b) business address;</li> <li>(c) telephone number (if any);</li> <li>(d) fax number (if any);</li> <li>(e) email address (if any).</li> </ul>

The titleholder details are provided in **Table 1.1**, with the nominated operator shown in bold.

**Table 1.1: Titleholder details for drilling activities**

Title	Titleholder (nominated operator in bold)	ACN	Interest (%)	Contact details
NT/L1	<b>Santos NA Barossa Pty Ltd</b>	<b>109 974 932</b>	<b>25%</b>	Business Address: Level 7, 100 St Georges Terrace, Perth, Western Australia, 6000 Telephone number: (08) 6218 7100 Fax number: (08) 6218 7200 Email address: <a href="mailto:barossa.regulatory@santos.com">barossa.regulatory@santos.com</a>
	Santos Offshore Pty Ltd	005 475 589	25%	
	SK E&S Australia Pty Ltd	158 702 071	37.5%	
	JERA Barossa Pty Ltd	654 004 387	12.5%	
				Business Address: Level 6, 60 Martin Place, Sydney NSW 2000, Australia Telephone number: (02) 2121 3304 Fax number: None Email address: <a href="mailto:upstream@sk.com">upstream@sk.com</a>
				Business address: Level 9, Brookfield Place, 125 St Georges Terrace, Perth WA 6000 Phone: (08) 6311 7610 Fax: (08) 6311 7613 Email: <a href="mailto:barossa@jeraustralia.com.au">barossa@jeraustralia.com.au</a>



### 1.5.1 Details for nominated liaison person

Details for Santos’ nominated liaison person for the Activity are as follows:

Name: Michael Marren  
 Business address: Level 7, 100 St Georges Terrace, Perth, Western Australia, 6000  
 Telephone number: (08) 6218 7100  
 Email address: [offshore.consultation@santos.com](mailto:offshore.consultation@santos.com)

### 1.5.2 Notification procedure in the event of changed details

In the event there is a change in the nominated operator, the operator’s nominated liaison person, or a change in the contact details for the operator or liaison person, Santos will notify NOPSEMA and provide the updated details.

## 1.6 Environmental management framework

OPGGs(E)R 2009 requirements
<b>Regulation 13. Environmental assessment</b>
Description of the activity 13(4) The environment plan must: <ul style="list-style-type: none"> <li>(a) describe the requirements, including legislative requirements, that apply to the activity and are relevant to the environmental management of the activity; and</li> <li>(b) demonstrate how those requirements will be met.</li> </ul>
<b>Regulation 16(a). Other information in the environment plan</b>
The environment plan must contain the following: <ul style="list-style-type: none"> <li>(a) a statement of the titleholder’s corporate environmental policy;</li> </ul>

### 1.6.1 Santos Environment, Health and Safety Policy

The Activity will be conducted in accordance with the Santos Environment, Health and Safety Policy presented in **Appendix A**.

**Sections 3.2.8.8, 6 and 7** reflect this policy, detailing and evaluating environmental impacts and risks and providing control measures with set environmental performance outcomes and standards.

### 1.6.2 Relevant environmental legislation

Relevant legislative requirements are presented in **Appendix B**, inclusive of the relevant EP sections where the legislation may prescribe or control how an activity is undertaken. Australia is a signatory to numerous international conventions and agreements that oblige the Commonwealth government to prevent pollution and protect specified habitats, flora and fauna. Relevant government departments have been consulted during the development of this EP so as to comply with relevant legislation, conventions and agreements, as detailed in **Section 3.2.8.8**.

## 2 Activity description

OPGGs(E)R 2009 Requirements
Regulation 13. Environmental assessment
<p>Description of the activity</p> <p>13(1) The environment plan must contain a comprehensive description of the activity including the following:</p> <ul style="list-style-type: none"> <li>(a) the location or locations of the activity;</li> <li>(b) general details of the construction and layout of any facility;</li> <li>(c) an outline of the operational details of the activity (for example, seismic surveys, exploration drilling or production) and proposed timetables; and</li> <li>(d) any additional information relevant to consideration of environmental impacts and risks of the activity.</li> </ul>

### 2.1 Activity overview

This EP provides for drilling and completing up to eight production wells using a semi-submersible mobile offshore drilling unit (MODU), light well intervention vessel (LWIV) and the ongoing management of the completed wells until future commissioning and production phases. Activities included in this EP are:

- + movement of the MODU within the Operational Area (including entry and exit of the Operational Area)
- + MODU and vessel commissioning and demobilising activities (e.g., equipment testing, tank flushing and cleaning, inventory management, etc.)
- + deployment and recovery of the MODU anchors and mooring lines (including potential for pre-lay anchors)
- + deployment and operation, and eventual removal, of a temporary acoustic survey positioning system
- + riserless drilling
- + drilling with a conventional closed-circulating fluid system and riserless mud recovery
- + installation of casing strings
- + drilling using water-based and non-aqueous drilling fluid systems
- + installation and operation of a blow-out preventer (BOP)
- + cementing
- + well completions, including perforating and well flowback (i.e., sampling, clean up, and flaring)
- + installation of subsea vertical (Christmas) trees
- + temporary well suspension and subsequent re-entry for:
  - cyclone response;
  - well construction sequence optimisation;
  - wellhead and subsea tree installation;
  - subsea infrastructure or GEP installation activities; or
  - to comply with a government directive
- + operational contingency activities such as side-track drilling, re-drilling sections, re-spud and abandonment
- + light well intervention
- + ongoing well inspection, maintenance and management

- + general operations associated with the use of a MODU, vessels, helicopters and remotely operated vehicles (ROVs) within the Operational Area.

A summary of the Activity is provided in **Table 2.1**.

**Table 2.1: Summary of key activities**

GENERAL DETAILS	
Activity window	Five-year campaign
Drilling and completions activities	Yes
Well intervention activities	Yes
Ongoing well management activities	Yes
OPERATIONAL ACTIVITIES	
MODU type	Semi-submersible MODU
In-field MODU no.	One MODU drilling production wells
Vessel type	Light well intervention Offshore multi-purpose Anchor handling
In-field vessel no.	Approximately one to four at any time
Remotely operated vehicles	Yes
Helicopters	Yes
DRILLING & COMPLETIONS ACTIVITIES	
No. of completed wells	Six are planned, with provision for an additional two contingency production wells
Estimated drilling activity duration	Approximately 2 years total duration Approximately 90 days per well
Estimated light well intervention activity duration	Approximately 13 days per drill centre (whether installed by LWIV or MODU)
Drilling fluid type	Water-based and non-aqueous drilling fluids
Well flowback	Yes
Well re-spud/sidetrack	Operational contingency
Well abandonment	Operational contingency
ONGOING WELL MANAGEMENT	
Vessel-based activities	Could occur anytime following well completion Short-term duration (days) per well

### 2.1.1 Location

The Activity will occur within Commonwealth Petroleum Production Licence NT/L1.

Six subsea production wells are planned to be drilled and completed around the future locations of three subsea production manifolds, with two wellheads adjacent to each manifold. If required, up to two contingency production wells could be drilled and completed (eight wells in total) due to gas deliverability

issues from a well. These two contingency production wells may be at any manifold. Proposed well locations are provided in **Table 2.2** and shown in **Figure 1-1**. The final well locations are subject to change by up to 1 km but will remain within the Operational Area (**Section 2.1.2**).

**Table 2.2: Provisional names and locations for the six planned wells**

Well Name	Latitude	Longitude
BS-03	09° 47' 50.973"S	130° 12' 26.482"E
BS-09	09° 47' 52.010"S	130° 12' 26.748"E
BS-16	09° 52' 07.785"S	130° 13' 42.843"E
BS-17	09° 52' 08.214"S	130° 13' 43.832"E
BS-19	09° 52' 07.107"S	130° 18' 06.710"E
BS-25	09° 52' 06.232"S	130° 18' 07.330"E

### 2.1.2 Operational Area and petroleum safety zone

The permit area NT/L1 within Australian Waters has been defined as the Operational Area within which all petroleum activities will occur (**Figure 2-1**). The northern boundary of the Operational Area is defined by the Exclusive Economic Zone (EEZ) 200nm limit.

Water depths over the Operational Area range from approximately 204 m to 376 m.

A petroleum safety zone (PSZ) (communicated via Notice to Mariners) will be in place around the MODU (temporary during the Activity) and completed wells (ongoing). The PSZ is defined as a circular zone with a 500 m radius around the MODU surface location and completed subsea well location.

During drilling activities, a cautionary zone (communicated via Notice to Mariners) will be in place around the MODU and anchors which may extend up to 2.5 km from the MODU. Vessels not involved with the operations of the offshore facility are advised to avoid navigating, anchoring, stopping or fishing within the limits of any charted cautionary area.

All MODU, vessel and helicopter activities within the Operational Area are considered part of the petroleum activity. Activities outside of the Operational Area are not part of the petroleum activity. These activities will be managed in accordance with applicable jurisdictional legislation.

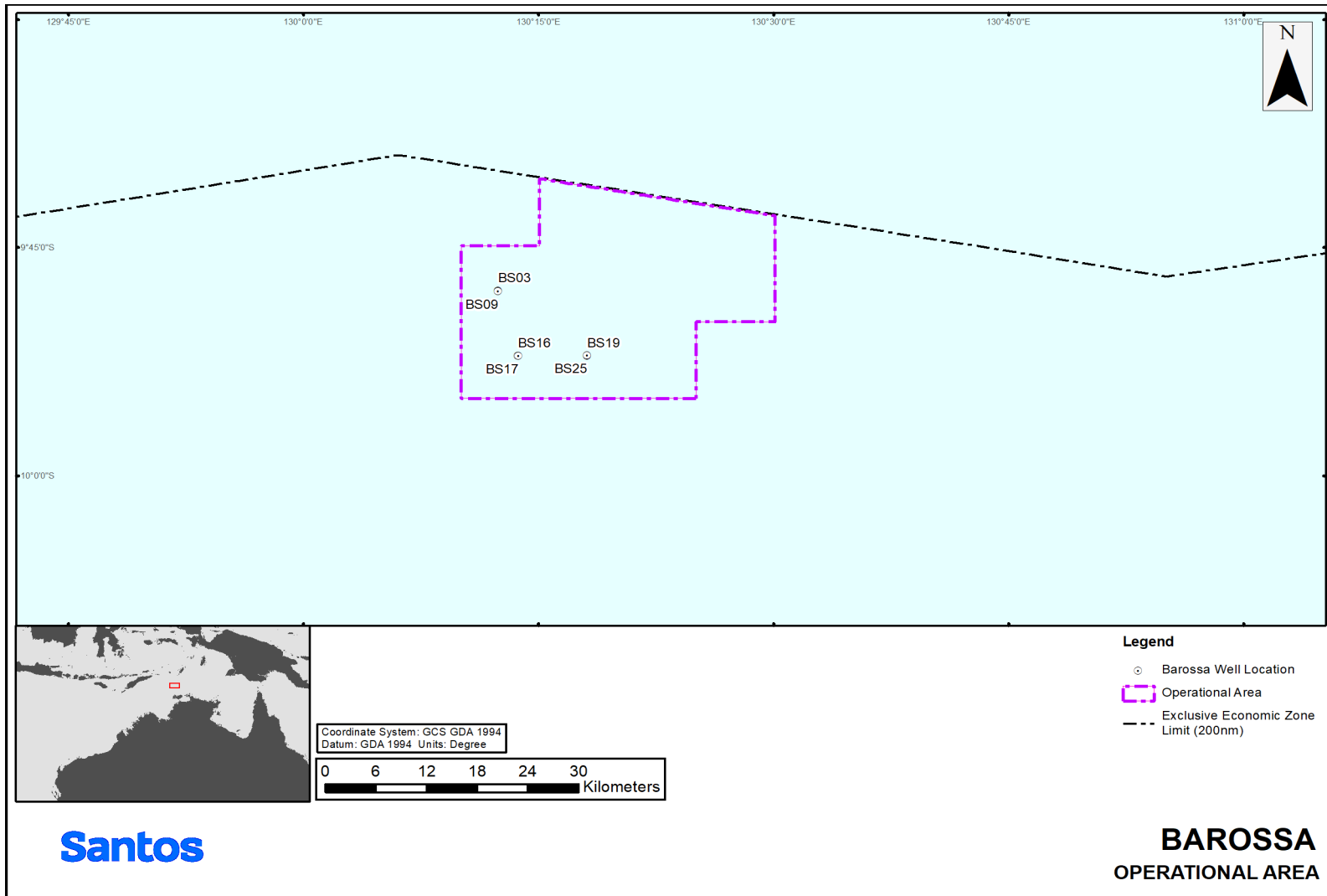


Figure 2-1: Barossa development drilling Operational Area

## 2.1.3 Timing and duration

Following acceptance by NOPSEMA of Revision 3 of this EP on 14 March 2022, Santos commenced the Activity on 16 July 2022. Following the Judgment, the Activity ceased on 4 October 2022. The Activity is scheduled to recommence in 2023, or as soon as possible, subject to obtaining all regulatory and business approvals.

This EP assumes the Activity may be undertaken at any time of year within the EP validity period (5 years). The planned duration for drilling and completion of each well is estimated to be approximately 90 days of continuous well operations (24 hours per day, seven days per week) and the total duration for the planned 6-well campaign is estimated to be approximately 2 years, subject to the availability of vessels and the functional supply chain. This activity duration includes positioning (towing) and anchoring of the MODU, drilling, completion and well flowback activities.

Additionally, subsea vertical (Christmas) tree installation is estimated to take approximately 13 days of continuous operations (24 hours per day, seven days per week) at each drill centre, whether installed by the LWIV or MODU.

It is possible that the activity duration may increase if technical difficulties or interruptions are encountered (e.g., equipment failures, weather, vessel availability or supply chain issues, etc.). The EP has assessed the impact of activities throughout the calendar year, across all seasons, to provide operational flexibility. The MODU may need to leave the Operational Area for cyclone avoidance or other operational reasons before returning to finish the Activity, although this is not planned.

Drilling, completions, well cleanup and light well intervention activities may occur concurrently on multiple wells at different drill centres. A drill centre is the entry point on the seabed for one or more wells.

Due to the deferral of the Activity, Barossa gas export pipeline (GEP) installation activities and subsea infrastructure installation activities are planned to occur concurrently with the Activity within the Operational Area. The potential for cumulative impacts from concurrent drilling and GEP activities are assessed in **Sections 6.1 to 6.7** of this EP. The potential for cumulative impacts from concurrent drilling and subsea infrastructure installation activities will be assessed in the SURF EP.

All concurrent activities within the Operational Area will be managed under an Interface Management Plan.

If the MODU needs to vacate one or more drill centres, it will either move to another drill centre and remain on standby for up to 1 month or depart the Operational Area temporarily before returning.

All stages of the well lifecycle are managed in accordance with a NOPSEMA-accepted Well Operations Management Plan (WOMP) and under this EP until the acceptance of a future commissioning and production/operations EP. Vessel-based activities (e.g., ROV operations) may occur at the wellhead locations following completion of drilling for short durations (days) as required.

## 2.2 Equipment spread

### 2.2.1 Mobile offshore drilling unit

All wells will be drilled with a semi-submersible MODU. The MODU will be towed into position by up to three support vessels.

Up to 12 anchors, within a radius of up to 2.5 km, may be deployed via support vessels from the MODU to maintain position. MODU anchors (and associated components such as chains, wires, marker buoys) are typically deployed on arrival at location but may be pre-laid before the MODU arrives. Anchors may be reset at any time (e.g., if 'dragging'). Excess anchors and associated components may be laid on the seabed for temporary storage.

Upon MODU departure from the Operational Area, anchors will be retrieved to the MODU and/or vessels.

The MODU will take approximately 90 days to drill each well. If the MODU is used for subsea vertical (Christmas) tree installation, it will spend an additional 13 days at each drill centre.

The MODU may need to temporarily vacate a drill centre to make way for subsea infrastructure installation activities. In this case, the well will first be safely suspended and then the MODU will either move to another drill centre, and remain on standby for up to 1 month, or depart the Operational Area temporarily before returning to the Operational Area.

Routine and contingency testing of the MODU safety critical systems may be undertaken during the Activity to comply with offshore regulatory requirements (e.g., safety cases).

## 2.2.2 Light well intervention vessel

A Light Well Intervention Vessel (LWIV) may be used for riserless well intervention and for installing the subsea vertical (Christmas) trees. LWIVs are dynamically positioned subsea support vessels approximately 130 m long and equipped with a main crane, auxiliary crane, moonpool and ROV hangars, in addition to a helideck and personnel accommodation for approximately 90 persons on board (POB). The LWIV will use diesel-powered generators for power generation. LWIV refuelling within the Operational Area is not a planned activity.

The LWIV will display navigational lighting and external lighting, as required for safe operations, and will operate on a 24-hour basis.

Potable water, primarily for accommodation and associated domestic areas, will be generated on the LWIV using a reverse osmosis (RO) plant. This process will produce brine, which is diluted and discharged to the marine environment. Cooling water may be discharged to the sea also.

The LWIV will also discharge deck drainage from open drainage areas, bilge water from closed drainage areas, putrescible water and treated sewage, and grey waste. Solid hazardous and non-hazardous wastes are transported to shore for disposal.

Unlike a MODU, LWIVs do not require support vessels.

## 2.2.3 Vessels

Typically, up to three support vessels will be required to assist the MODU. These vessels will likely consist of a combination of anchor handling support vessels and offshore multi-purpose vessels. The support vessels will remain outside of the PSZ, unless undertaking operational activities.

Anchor handling support vessels will be used to position the MODU in the Operational Area, move the MODU between well locations and to deploy and retrieve anchors for the MODU.

Offshore multi-purpose vessels will also supply equipment and materials to the MODU and undertake vessel-based activities such as ROV surveys in the Operational Area.

Equipment and material transfers may include, but are not limited to, crew supplies, hydrocarbons (diesel, engine oil, hydraulic fluids, base oil, grease, etc.), bulk drilling products, MODU and drilling equipment, and waste.

MODU cranes will be used for equipment and material transfers between the MODU and vessels. Bulk products will also be transferred via hoses.

At least one support vessel will remain on standby to the MODU within the distance defined in the MODU Safety Case (nominally three nautical miles) for MODU support and emergency response.

Routine and contingency testing of the MODU and vessel safety critical systems may be undertaken during the Activity to comply with offshore regulatory requirements (e.g., safety cases).

## 2.2.4 Acoustic surveying equipment

Multiple acoustic surveying systems are used during the Activity, including:

- Ultra Short Baseline (USBL) surveying equipment, primarily used for positioning of equipment associated with well construction.
- Long Baseline (LBL) surveying equipment, primarily used for positioning of wells and equipment associated with well construction.
- Single Beam Echosounder (SBES) surveying equipment, providing single point seabed measurement, to support marine systems on vessels and MODU.
- Multi-beam Echosounder (MBES) surveying equipment, primarily used for seabed surveys across an area providing detailed bathymetry data.

### **USBL and LBL**

USBL and LBL are methods of underwater acoustic positioning, with an acoustic pulse transmitted by a transceiver and detected by a subsea transponder, which returns its own acoustic signal. The two systems utilise different wavelength acoustic signals, and in turn result in different usable distances and associated accuracies.

Marine vessels will be mobilised to field in advance of the MODU arrival to install an LBL acoustic underwater surveying array of transponders. LBL systems are fitted to vessels to support installation of surveying array. On MODU arrival, an additional USBL system will be deployed from the MODU. Additional equipment associated with both systems that may be used includes surface and subsea deployed transceivers, beacons and transponders. The LBL array will be relocated to the next drill centre prior to each MODU move and retrieved on Activity completion.

Both systems are used to support well construction, providing target positions for each well, confirming final positions of each well, and monitoring positions of equipment deployed through the water column and on the seabed.

### **SBES**

SBES equipment uses a hydrographic technique measuring the two-way travel time of a high-frequency sound pulse emitted by a transducer.

SBES equipment will be fitted and operational on the MODU and vessels to provide seabed depth measurements. This equipment is required to be fitted to all vessels over 300 gross tonnage under *SOLAS – Part 1 - Chapter V – Safety of Navigation – Regulation 19 – Carriage Requirement for Shipborne Navigational Systems and Equipment*, and will be operating whenever the vessels are transiting to, from and within the Barossa field. SBES equipment is operational at all times on the MODU and vessels.

### **MBES**

MBES equipment works in the same manner as SBES, however produces a swathe of acoustic fan-shaped pulses of sound made up of many single beams. MBES equipment will be deployed on an ROV and used to survey seabed depths and condition around the well location and other locations within the Operational Area. There may be multiple surveys performed in the Operational Area, with approximate durations of 0.5-2.0 days per survey dependent on the area to be surveyed. Estimated MBES survey duration is estimated to be up to 4 days per drill centre (12 days total across the three drill centres). Once surveys are completed at one drill centre, it will be approximately six months before the MODU moves to the next drill centre and MBES surveys are performed again.



## 2.2.5 Remotely operated vehicle

ROVs may be used for a variety of activities, including:

- + seabed and hazard surveys
- + monitoring of subsea operations (e.g., cementing operations)
- + installation, functioning, monitoring and retrieval of subsea infrastructure and equipment (e.g., BOP)
- + ongoing well-management activities
- + recovery of objects.

ROVs will be deployed from the MODU and/or vessels. Each ROV requires an umbilical to provide electrical power and data and operational transmissions. The ROV will be fitted with various tools and camera systems (still/video).

## 2.2.6 Helicopters

Helicopters will be used primarily for crew change, and occasionally for medevac and equipment and material transfers. Helicopter flights are likely to occur several times a week.

## 2.3 Well construction

### 2.3.1 Design and method

The geology and geological risks are well understood as there have been eight previous well penetrations nearby.

Well sequencing may involve drilling and completing each individual well or batch drilling. Batch drilling involves drilling the same section (or sections) of multiple wells sequentially before going back and drilling the next section of each well until the target depth is reached at each well.

Each proposed subsea well is similar in design.

The conductor (42-inch), structural hole (30-inch) and initial sections of the surface hole (20-inch) will be drilled riserless using seawater and pre-hydrated bentonite sweeps to clean the hole and casings will be run in hole and cemented in place. The fluids and drilled cuttings will exit the well at seabed while drilling these holes.

The lower sections of the surface hole (20-inch) section will be displaced to a water-based mud (WBM) circulating system with well returns to the rig, using a riserless mud recovery (RMR) system. It is planned that the RMR system will be used for the 20-inch section of all wells, however if the RMR system does not demonstrate reasonable reliability (i.e. subsea pumps and control systems) or fails to meet the technical objective (to maintain an inhibited mud system in the lower part of the 20-inch interval) it will be removed or not used for some wells. If RMR is not used, this section will be drilled riserless and the WBM and drilled cuttings will be discharged near the seabed.

The plan is to drill the intermediate hole (14¾-inch) sections with WBM. The BOP is run using the marine riser system and drilling fluid and cuttings will be returned to the MODU using a conventional riser system.

Prior to drilling the production hole section (8½-inch), the well will be suspended with two barriers to install a Tubing Head Spool required for well completions. The production hole section will then be drilled using WBM with the BOP installed. Drilling fluid and cuttings will be returned to the MODU using a conventional riser system.

As a contingency, non-aqueous fluids (NAF) may also be used for intermediate and/or production hole sections should technical issues be encountered.

All wells have been designed to enable future removal of property in accordance with section 572(3) of the *Offshore Petroleum and Greenhouse Gas Storage Act 2006* (Cth).

## 2.3.2 Drilling and completions fluids

Drilling fluids are required to maintain pressure overbalance, lubricate and cool the drill bit, prevent formation damage, maintain shale stability and remove drilled cuttings from the wellbore.

WBM typically consists of 80 to 90% by volume of fresh or saline water, with the balance made up of water-soluble and insoluble additives. Additives typically used include acids, weighting materials, water-soluble polymers, pH controllers, alkalinity controllers, defoamers, detergents and contingency lost circulation materials.

Completions fluids comprised of concentrated solutions of inorganic salts, such as chlorides and bromides, will be displaced downhole once the drilling phase has been completed. These completions fluids are solids-free and used to 'complete' the wells while minimising reservoir formation damage and control reservoir formation pressures.

The estimated volume of water-based drilling fluids and completions fluids released to sea is approximately 7,700 m<sup>3</sup> per well<sup>1</sup>.

NAF consists of a base of non-aqueous fluid to which other ingredients such as emulsifiers, wetting agents, rheology modifiers, clay, lime and barite are added. The base non-aqueous fluid typically represents about 50 to 65% of the total volume of the complete mud. NAF bulk storage systems will not be released to sea.

## 2.3.3 Solids management

Drilled cuttings for the riserless conductor, structural hole and initial sections of the surface hole (and potentially the lower section of the surface hole as explained in **Section 2.3.1**) will exit the wellbore at the seabed.

Fluids and cuttings for the remaining hole sections to target depth will be returned to the MODU and treated through a solids control system prior to discharge to the sea.

Cuttings will typically be removed via shale shakers and centrifuges (as required) and discharged to sea surface. Drilling fluids will be re-circulated downhole, stored for future use or disposal, or discharged to sea surface if no longer required.

Shale shakers are comprised of a series of vibrating shaker screens. The screens are sized so that valuable drilling fluid (i.e., liquid and fine solids) passes through ('underflow') and drilled cuttings do not ('overflow'). Centrifuges may be used to remove ultra-fine solids in the recovered drilling fluid (i.e., once surface hole section casing installed). The ultra-fine solids are detrimental to the drilling fluid properties due to increased surface area and reactivity. Centrifuges do not process all the well returns. Given the large volume, it is not practicable to centrifuge the entire drilling fluids system. Hence, a portion of the drilling fluid recovered from the shakers may be sent to the centrifuges for the removal of finer particles.

Solids control equipment will be used to reduce the amount of residual NAF on drilled cuttings before discharge. The reclaimed NAF will be retained onboard and recycled into the mud system or sent onshore for disposal. NAF bulk storage systems will not be released to sea.

The estimated volume of drilled WBM based cuttings released to sea is approximately 1,300 m<sup>3</sup> per well, and approximately 440 m<sup>3</sup> of NAF based cuttings (if NAF is used).

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<sup>1</sup> Volumes are best-available estimates based on data acquired from previous Barossa drilling activities and include contingencies such as those detailed in Section 2.3.6.

## 2.3.4 Cementing

The conductor surface casing and intermediate casing strings will be cemented in place. This will provide a structural base for the well and is critical to well integrity. The majority of cement pumped remains downhole, but some volume may be discharged at the seabed (when cementing the conductor).

Some cement may be mixed and discharged at surface as part of cement unit commissioning before the start of drilling.

During cementing operations, surface cementing equipment and lines will need to be flushed, washed and cleaned with water to prevent hard setting. The residual cement and wash water will be discharged to sea after each cement job.

Cement spacer in well returns and residual surface tank volumes will also be discharged to sea during cementing operations.

Tracer dyes may be used during cementing operations for the purpose of detecting leaks.

## 2.3.5 Blow-out preventer

A BOP/Lower Marine Riser Package will be installed on the wellhead as a barrier to manage well integrity by providing a means to seal, control and monitor the well during drilling operations. The BOP is suitable for all expected conditions in the Barossa gas field and is capable of isolating the well in an emergency. It will be installed once the surface hole section has been drilled and cased.

Function and pressure tests of the BOP are regularly conducted as part of routine operations. The operation of the BOP (valves) uses open hydraulic systems and each time the BOP is operated (including testing), small volumes of BOP control fluid will be discharged to the ocean. The BOP control fluids generally consist of water mixed with a water-based corrosion inhibitor and lubricity additive. Each function or pressure test of the BOP will result in approximately 600 L of BOP control fluid being discharged to the ocean.

## 2.3.6 Operational contingencies

If operational or technical issues are encountered during drilling, the following operational contingency activities may be required:

- + Well plugging and abandonment: Abandonment of a well will involve installation of permanent barriers (e.g., cement plugs) and recovery of well casings and conductor above the seabed. Well abandonment would result in the use of additional cement which may result in the release of cement to the seabed.
- + Re-spudding: The location of the re-spud would typically be within the immediate area of the original well location, as it will need to be connected to the intended manifold. If a re-spud of a well is required, the well operations would be similar to the original well. This would result in an additional volume of cuttings and slightly increased physical footprint on the seabed.
- + Sidetrack drilling: In some operational circumstances, the option of a sidetrack instead of a re-spud may be considered when operational issues are encountered. If a sidetrack is undertaken, a portion of the original well would be appropriately abandoned by installing permanent barriers. The hole size and drilling fluids used for a sidetrack would be similar to those used in the original well, depending on the exact nature of the reason for the sidetrack.
- + Additional casing installation in intermediate hole section: If significant downhole losses or hole instability are experienced during drilling of the 14¾-inch hole, the 11⅞-inch casing string may be set and cemented shallower, a 10⅝-inch × 12¼-inch hole drilled to the original planned casing point and

a 9½-inch liner set and cemented. There will be a slight decrease in drill cuttings generated due to smaller hole size but a small increase in cement discharged to the seabed.

- + Perforating may be required if the reservoir section of casing is permeability impaired during drilling operations or the completed well does not flow as expected. Perforating operations will involve the deployment and subsequent detonation of perforating charges down hole to increase the potential flow from the reservoir to the well once producing.

### 2.3.7 Well completions

Following drilling operations, the well will be completed in preparation for production. Well completions operations include activities such as installation of a pre-perforated liner, wellbore clean-up and displacement to completions fluid, installation of upper completions production tubing, well flowback, and well suspension.

Water-based well completions fluids will be circulated through the well to confirm the well is clear of solids laden drilling fluids. Water-based completions fluids will be circulated back to the MODU and a volume of well completions fluid, in the order of 100 m<sup>3</sup> per well, will be released to the marine environment. There will be no NAF released to sea during the well completions.

Each well will be flowed back to the MODU to remove drilling fluids and impurities/debris from the wellbore. The maximum gas rate expected to be produced during well flowback is 120 MMscf/d. Well flowback will continue until pre-defined clean-up criteria have been met and the necessary production data and samples have been collected – this will notionally take 24 to 36 hours pending well and surface process conditions. Base oil will be used in the flow back, to create the under-balance so the well will flow.

During well flowback, the completions fluids, produced water and hydrocarbons (reservoir fluids) will be analysed and separated on the MODU by the well flowback separator. Flammable hydrocarbons will be flared via an air-atomized burner. The non-flammable completions fluids and produced water will be treated via a water treatment package to reduce the oil-in-water content before operational discharge.

During well flowback, water that has been condensed from the steam used to heat the fluids via a steam exchanger in the well flowback package will also be discharged to sea.

To mitigate the risk of hydrate formation, methanol may be injected into the process stream during the well flowback at rates of approximately 1 to 5 L/min. The methanol will either be flared or passed through the oil-in-water treatment package if dissolved in the water phase. A mixture of monoethylene glycol (MEG) and water may also be used for hydrate prevention during well intervention operations – if this mixture is recovered it will be passed through the oil-in-water treatment package.

Following well flowback, the well will be suspended with wireline plugs in the completion.

### 2.3.8 Subsea vertical tree installation

Once wells are completed by the MODU, subsea vertical (Christmas) trees will be installed either by the MODU or the LWIV. Installation is expected to take approximately 13 days per drill centre.

The subsea vertical (Christmas) tree and well intervention package will be function and pressure tested as part of routine installation activities. The operation of the tree valves uses open hydraulic systems, and each time the valves are operated (including testing), small volumes of water-based control fluid will be discharged to the ocean. The control fluids generally consist of water mixed with a water-based corrosion inhibitor and lubricity additive. Each function or pressure test of the subsea vertical (Christmas) tree will result in approximately 60 L of control fluid being discharged to the ocean.

During the subsea vertical (Christmas) tree installation by LWIV there will be multiple connections/disconnections of the subsea intervention package. During this process, discrete volumes of well-suspension fluid, including MEG, sea water and potentially dry gas, will be discharged to the ocean.

Once the subsea vertical (Christmas) tree installation activity is complete, the well will remain shut-in for a period until future development commissioning and production phases.

In all stages of this activity, there will be two verified barriers to any hydrocarbon zones in place.

### 2.3.9 Ongoing well management

Once the MODU finishes work on each well, the completed wells (before and after subsea vertical (Christmas) tree installation) will be managed in accordance with the NOPSEMA-accepted WOMP. This may require short-term vessel-based activities such as ROV operations. The wells will have two barriers to the environment at all stages prior to commissioning for production.

### 2.3.10 Well suspension

Standard well-suspension equipment will be available offshore to install temporary barriers for the integrity of hydrocarbon containment should well suspension be required. The following scenarios are examples of when well suspension would be required:

- suspension of drilling operations due to cyclone response;
- well construction sequence optimisation;
- wellhead equipment and subsea tree installation;
- concurrent Barossa GEP and subsea infrastructure installation/commissioning activities; or
- to comply with a government directive.

In the event drilling operations are temporarily suspended, the well will be suspended with two verified independent barriers to any hydrocarbon zones. The various suspension configurations are detailed within the NOPSEMA-accepted WOMP for the Activity.

### 3 Description of the environment

OPGG(E)R 2009 requirements
Regulation 13. Environmental assessment
<p>Description of the environment</p> <p>13(2) The environment plan must:</p> <ul style="list-style-type: none"> <li>(a) describe the existing environment that may be affected by the activity; and</li> <li>(b) include details of the particular relevant values and sensitivities (if any) of that environment.</li> </ul> <p>Note: The definition of <i>environment</i> in regulation 4 is as follows:</p> <ul style="list-style-type: none"> <li>(a) ecosystems and their constituent parts, including people and communities; and</li> <li>(b) natural and physical resources; and</li> <li>(c) the qualities and characteristics of locations, places and areas; and</li> <li>(d) the heritage value of places;</li> </ul> <p>and includes</p> <ul style="list-style-type: none"> <li>(e) the social, economic and cultural features of the matters mentioned in paragraphs (a), (b), (c) and (d).</li> </ul> <p>13(3) Without limiting paragraph (2)(b), particular relevant values and sensitivities may include any of the following:</p> <ul style="list-style-type: none"> <li>(a) the world heritage values of a declared World Heritage property within the meaning of the EPBC Act;</li> <li>(b) the national heritage values of a National Heritage place within the meaning of that Act;</li> <li>(c) the ecological character of a declared Ramsar (Convention on Wetlands of International Importance) wetland within the meaning of that Act;</li> <li>(d) the presence of a listed threatened species or listed threatened ecological community within the meaning of that Act;</li> <li>(e) the presence of a listed migratory species within the meaning of that Act;</li> <li>(f) any values and sensitivities that exist in, or in relation to, part or all of:             <ul style="list-style-type: none"> <li>(i) a Commonwealth marine area within the meaning of that Act; or</li> <li>(ii) Commonwealth land within the meaning of that Act.</li> </ul> </li> </ul>

#### 3.1 Introduction

This section describes the key physical, biological, socio-economic and cultural features of the existing environment that may be affected by the Activity. The description of the environment applies to the Operational Area (**Section 2.1.2**), and any areas surrounding the Operational Area that may be affected by the Activity. In this document the area that may be affected by the impacts and risks of the Activity is described as the environment that may be affected (EMBA), or in the case of a hydrocarbon spill, low exposure value area (LEVA) (which also defines the modelled EMBA), moderate exposure value area (MEVA) and high exposure value area (HEVA). These are shown in **Figure 3-1**.

##### 3.1.1 Determining the environment that may be affected

Stochastic hydrocarbon dispersion and fate modelling, applied to the worst-case spill scenario for the drilling activity (**Section 7.5**), was undertaken to determine the EMBA (in this case also the LEVA) as well as the MEVA and HEVA. Areas potentially contacted by hydrocarbons were determined using stochastic modelling which overlaid hundreds of individual hypothetical spill simulations from a hydrocarbon spill into a single map, with each simulation subject to a different set of metocean conditions drawn from historical records. Stochastic modelling compensates for the uncertainty associated with any single hydrocarbon spill event such that risk assessment and spill response planning are more robust and conservative by covering a wide range of possible scenarios.

The modelling considered key physical and chemical phases of hydrocarbons that pose differing environmental and socioeconomic risks, being surface, entrained, dissolved aromatic and shoreline accumulated hydrocarbons. Defining the areas that may be contacted by spilled hydrocarbons depends on the concentrations of the hydrocarbons on the sea surface, in the water column and on the shoreline.

Hydrocarbon exposure threshold values defined by NOPSEMA (2019) for each of these phases were applied to the stochastic modelling outputs to determine the areas affected by the HEVA, the MEVA and the LEVA. The MEVA and HEVA represent areas wherein contact with hydrocarbons may result in harmful impacts to biota with the MEVA being the more conservative, encompassing the maximum extent of biological impact. The LEVA represents the maximum extent of possible contact with hydrocarbons within the depth range between 0-10 m and reflects the range of socio-economic considerations for spill response planning and scientific monitoring. For this reason, the LEVA has been used to define the modelled EMBA.

Importantly, in terms of impacts to environmental values and sensitivities, the extent of a particular impact and risk may not be relevant to the full extent of the modelled EMBA, therefore, the MEVA and HEVA are also referred to where relevant in this EP. These areas are shown in **Figure 3-1** and further information about the reasons why these exposure values have been selected and how their application in defining areas relates to impact and risk assessment and spill response planning is provided in **Table 7.10** and **Section 7.5**.

It is important to note that the footprint of an actual spill event is more accurately represented by only one of the simulations from the stochastic modelling, resulting in a much smaller spatial footprint in the event of an actual spill. Modelling of a single simulation, representative of a single spill event, is termed deterministic modelling. This is discussed further in **Section 7.6.2.2** and applied in the risk assessment where relevant. Determining the EMBA for the purposes of assessing all values and sensitivities potentially affected by the impacts and risks of the Activity was not limited to the area defined by the modelled EMBA. Values and sensitivities outside but proximal to the modelled EMBA were also considered. Specifically, for this EP, Scott Reef Nature Reserve to the southwest of the modelled EMBA, has been included in the risk assessment for unplanned events given its proximity to the modelled EMBA.

Wherever the abbreviation 'EMBA' is used subsequently in the EP, this refers to the modelled EMBA (LEVA).

## 3.2 Existing Environment

This section summarises the existing environment that may be affected by the Activity and includes details of the particular values and sensitivities pertaining to the EMBA. Detailed description of these values and sensitivities is provided in the Barossa Drilling and Completions Values and Sensitivities of the Marine and Coastal Environment document (**Appendix C**) and inclusion was informed by Protected Matters Search Tool (PMST) searches (**Appendix D**), stated values in the Marine Bioregional Plans for the North Marine Region (NMR) and the North-west Marine Region (NWMR) (CoA, 2012a,b), Barossa Environmental Studies (**Section 3.2.1**) and information obtained through consultation. This section also contains some publicly available information regarding the Indonesian and Timor-Leste coast as the EMBA extends into some coastal waters of those two countries.

For the purposes of the environmental assessment, identifying potential environmental consequences and developing spill response plans, the environmental values captured by the moderate hydrocarbon exposure threshold values defined by NOPSEMA (2019), representing the thresholds whereby harmful impacts to biota may result, are also identified within the area referred to as the MEVA (Moderate Exposure Value Area) in this section. More information about the reasons why these exposure values have been included and how their application in defining areas relates to impact and risk assessment and spill response planning is provided in **Table 7-10** and **Section 7.5**.

### 3.2.1 Barossa Marine Studies Program

A number of environmental baseline studies have been undertaken in support of the Barossa Development to characterise the existing marine environment within and surrounding NT/L1. The studies have involved the collection of detailed baseline data to capture seasonal variability in the area. 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.

Figure 5-2 in the OPP shows the locations of the sampling sites and includes benthic towed video transects, benthic habitat, sediment, infauna and water quality sampling in the immediate vicinity of the proposed well locations.

The baseline studies undertaken 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. A summary of the studies considered in the development of this EP is provided below. Further detail and copies of the studies are provided in Section 5 and Appendices of the OPP.

**Table 3-1: Summary of Barossa environmental studies**

Study type	Description of study	Reference
<i>Field-based studies</i>		
Meteocean data collection	Collection of metocean data on the surface and through the water column from July 2014 to March 2015, within and in the vicinity of 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 in the vicinity of 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 in the vicinity of the Barossa field location and surrounding areas, including around Evans Shoal, Tassie Shoal and Lynedoch Bank, through the use of a specialised ROV.	Jacobs, 2016a
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.	JASCO Applied Sciences, 2016a
Shoals and shelf survey 2015: <ul style="list-style-type: none"> <li>benthic habitats</li> <li>fish communities</li> </ul>	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 Gas Export 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



Study type	Description of study	Reference
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 and undertake statistical comparison of the proportion and spatial diversity of habitats within and outside the Oceanic Shoals Marine Park.	Radford et al., 2019
<i>Desktop/modelling studies</i>		
Environmental literature review and gap analysis	Collection and collation of all available 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.	Jacobs SKM, 2014
Hydrodynamic model validation study	Data from the metocean study and derived through the deployment of drifter buoys in the vicinity of 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
Geophysical survey	This survey undertook a preliminary geophysical survey of the offshore development area and potential pipeline routes.	Fugro, 2016
Geophysical survey report	This report provides the results from a geophysical survey carried out in the Barossa Project Infield Area. It provides comprehensive details regarding the seafloor and shallow geological features in the infield project area (including the drilling Operational Area).	DOF Subsea, 2018
Tiwi Islands Sensitivity Mapping	Development of sensitivity mapping to assist with spill planning in the vicinity of the Tiwi Islands. Data was gathered based on desktop review of existing information and through direct engagements with Tiwi Island traditional owners via the TLC. The report was prepared at the request of ConocoPhillips during preparation of the Barossa Gas Export Pipeline (GEP) Installation EP.	Jacobs, 2019
Tiwi Island Turtle Activity Report	<p>This desktop report reviews publicly available literature and research relating to marine turtle activity occurring on, and around, the Tiwi Islands of northern Australia.</p> <p>A total of 19 satellite telemetry studies between 1994-2023 which tracked turtles passing through or foraging in waters near the Tiwi Islands were included in the review.</p>	Pendoley, 2023

### 3.2.2 Physical environment

The Operational Area is located within Commonwealth waters in the Timor Sea, approximately 131 km north of the Tiwi Islands and 285 km north-northwest of Darwin, NT. The Operational Area is located within the North Marine Region (NMR), which encompasses approximately 625,689 km<sup>2</sup> of Commonwealth waters from west Cape York Peninsula to the NT/WA border (CoA, 2008, 2012a) (**Figure 3-2**).

The EMBA (based on low exposure values) intersects with both the NMR and the North-west Marine Region (NWMR), as well as international waters. The MEVA is within the NMR with the majority in international waters. The HEVA is within the NMR and international waters equally.

The key characteristics of the NMR relevant to the EMBA include (CoA, 2012a):

- + a wide continental shelf, with water depths averaging less than 70 m and ranging from approximately 10 m to a maximum known depth of 357 m;
- + currents driven predominantly by strong winds and tides and a monsoonal climate and complex weather patterns;
- + Van Diemen Rise, which forms part of a key ecological feature (KEF) (**Section 3.2.5.2**), is characterised by complex geomorphology with features including shelves, shoals, banks, terraces and valleys like the Malita Shelf Valley, which provides a significant connection between the Joseph Bonaparte Gulf and the Timor Trough;
- + a series of shallow calcium carbonate-based canyons (approximately 80 to 100 m deep and 20 km wide) in the northern section of the region that lead into the Arafura Depression, which consists mainly of calcium carbonate-based sediments (carbonate sand and subfossil shell fragments);
- + the Arafura Shelf, which forms part of a KEF (**Section 3.2.5.2**) and is up to 350 km wide and has an average water depth of 50 to 80 m, and is characterised by sea-floor features such as canyons and terraces, the Arafura Sill and the Arafura Depression; and
- + cultural features including Sea Country (**Section 3.2.8**).

The key characteristics of the NWMR relevant to the EMBA include (CoA, 2012b):

- + the Indonesian Throughflow, a low-salinity water mass that is one of the major elements of the global transfer of heat and water between oceans and which plays a key role in initiating the Leeuwin Current
- + extensive areas of continental shelf and slope, plateaux and terraces including the Sahul Shelf;
- + coral reefs including Ashmore, Hibernia, Scott and Seringapatam, all of which have a high diversity of corals and associated fish and other species; and
- + cultural features including Sea Country (**Section 3.2.8**).

The EMBA overlaps international waters of south-west Indonesia and Timor-Leste and, in the event of a worst-case hydrocarbon spill, residual entrained hydrocarbons may reach the coastlines of Indonesia and Timor-Leste. These international waters (belonging to Indonesia and Timor-Leste) are broadly comparable to the Australian oceanic waters within the EMBA, with no remarkable variation in water quality parameters or significant variation in sea state conditions expected. Areas of the Lesser Sunda Ecoregion found within the EMBA encompass the chain of islands and surrounding waters from Bali, Indonesia to Timor-Leste. The EMBA also overlaps a small portion of the southern boundary of the Coral Triangle on the south coast of Timor-Leste and West Timor. The Coral Triangle (CT) is located in South-east Asia and the Pacific, and encompasses the tropical marine waters of Indonesia, Malaysia, Papua New Guinea, Philippines, Solomon Islands and Timor-Leste. It is considered to be the planet's richest centre of marine life and coral diversity (Cross et al, 2014).

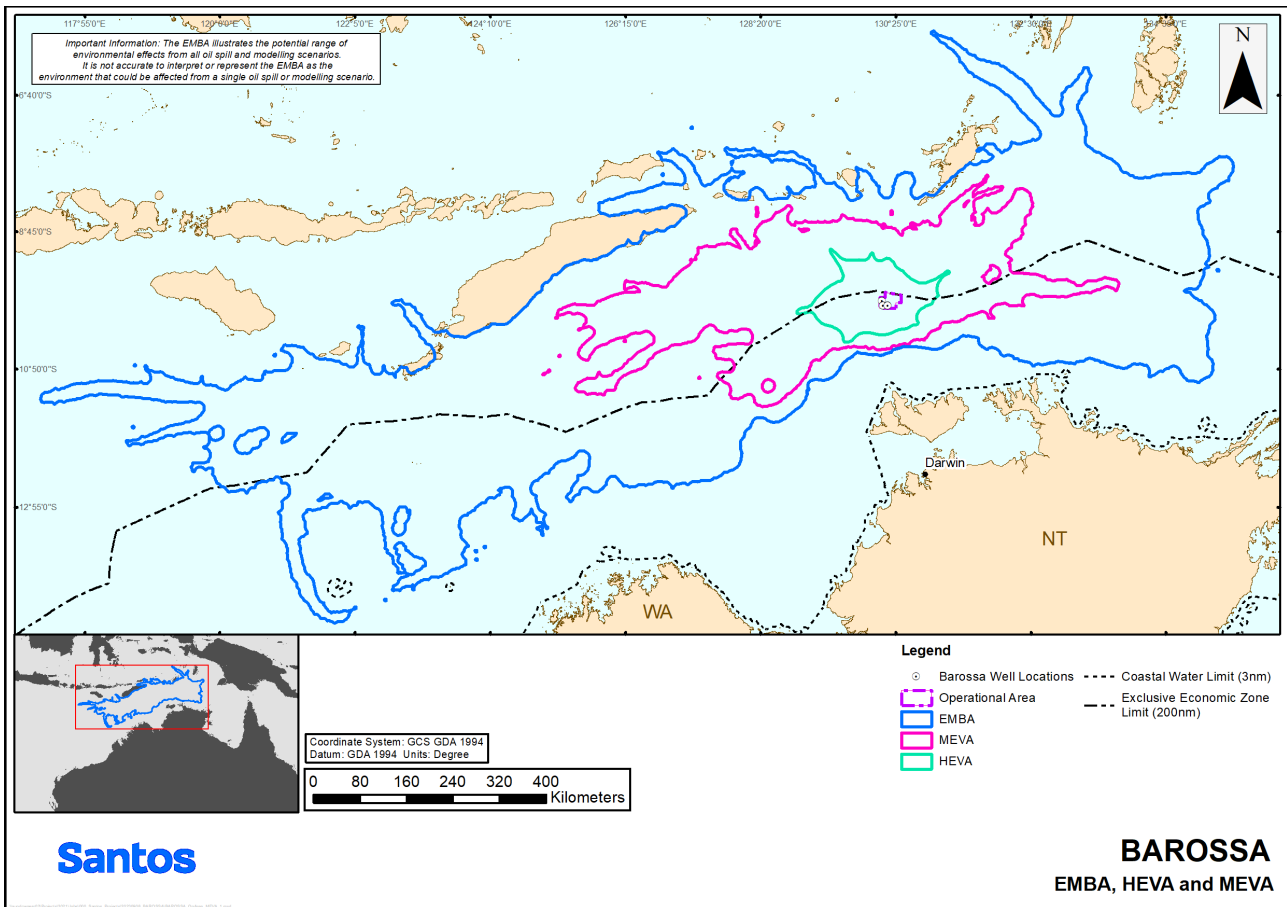


Figure 3-1: The operational area, EMBA, HEVA and MEVA

### 3.2.3 Provincial bioregions

Based on the Integrated Marine and Coastal Regionalisation of Australia, version 4.0 (CoA, 2006), the regional descriptions relevant to the Operational Area, EMBA (LEVA), and MEVA are provided in **Table 3.1** and **Figure 3-2**. Bioregions within international waters of the EMBA have not been formally classified, although the habitats within these waters have been described by published scientific literature.

The Operational Area is situated within the Timor Transition Bioregion of the NMR (Department of the Environment and Heritage, 2006) that primarily features shelf slope and plateau to the west, and canyon and ridge to the east. It includes the Arafura Shelf, mentioned previously, which is recognised as a KEF (**Section 3.2.5.2**).

**Table 3.1: Integrated Marine and Coastal Regionalisation of Australia provincial bioregions relevant to the Activity**

Bioregion	Operational Area	MEVA	EMBA
Northern Shelf Province	X	✓	✓
Northwest Shelf Transition	X	✓	✓
Timor Province	X	X	✓
Timor Transition	✓	✓	✓

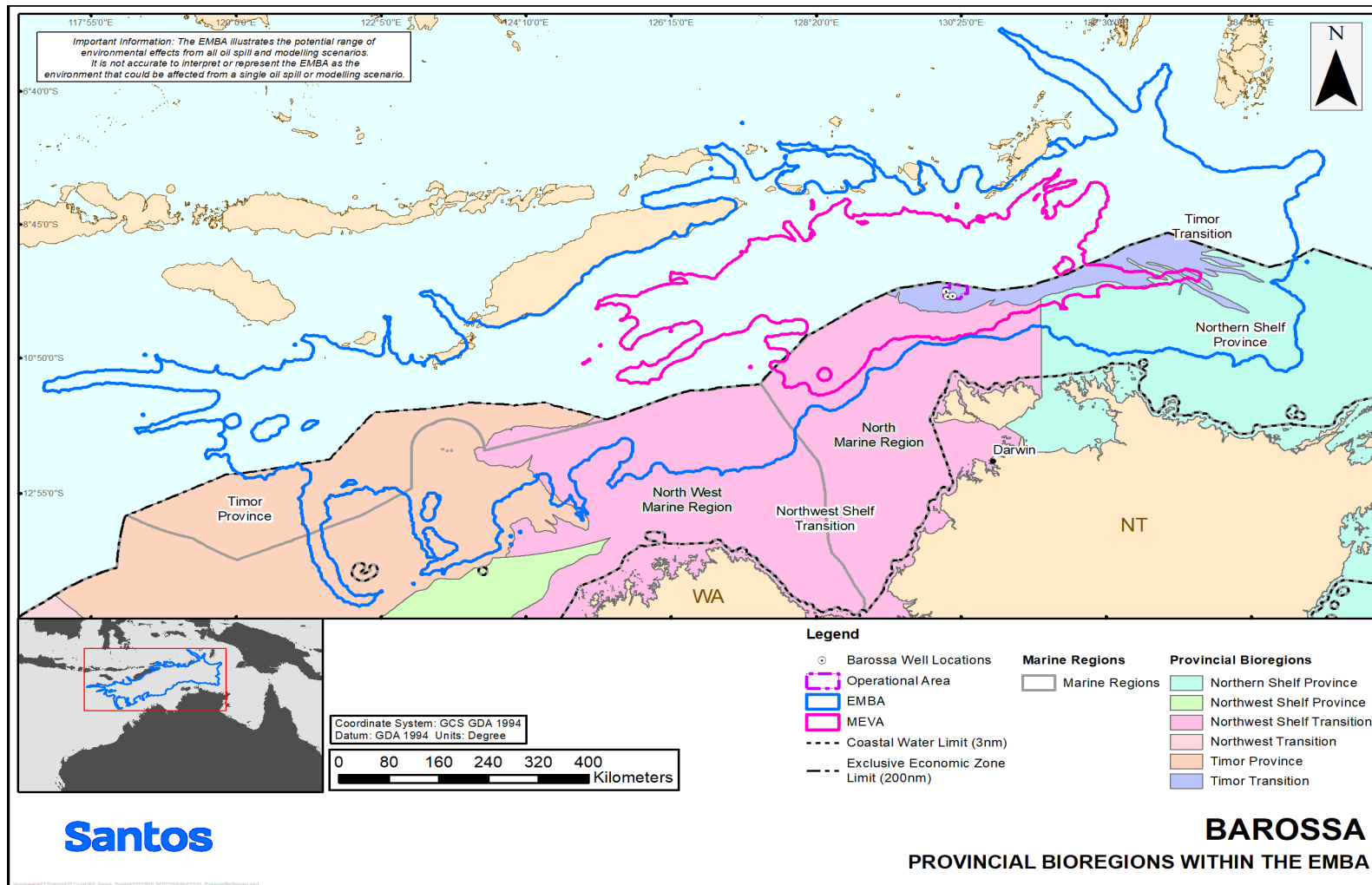


Figure 3-2: Integrated Marine and Coastal Regionalisation of Australia provincial bioregions in relation to the environment that may be affected

### 3.2.4 Benthic habitats

The water depths in the Operational Area are between approximately 204 m and 376 m. Within the EMBA, water depths range from lowest astronomical tide down to over 6000 m. Within the MEVA water depths range from 11 m to 359 m.

Based on the available information, including the bathymetry and seabed topography data derived from previous seismic surveys acquired in 2007 and 2016, geophysical surveys in 2015 and 2017, ROV footage collected during pre and post-spud surveys during exploration and appraisal drilling campaigns and from the extensive baseline studies undertaken across the area (refer to **Section 3.2.2**), the seabed within the Operational Area is generally flat and located on a plain feature that is devoid of any significant bathymetric features. The geophysical surveys undertaken also reported that the seabed was smooth and featureless with the sediments interpreted to comprise predominantly fine clayey sand (Fugro 2016). The only relic seabed features observed were slight undulating sand waves (< 25 cm in height) and widespread bioturbation (i.e. burrows, mounds and tracks) (Jacobs 2016c). The marine sediments are predominantly silty sand and generally lack hard substrate.

In general, the benthic habitats observed in these studies which included the Operational Area were typical of those expected in offshore environments and were consistent with studies conducted both in areas with similar features and in areas of a similar geographic location (Jacobs 2016c). Santos is not aware of any information indicating that the Operational Area contains any critical or sensitive habitat, nor any benthic habitats that are not represented across other areas and/or regions.

Within the EMBA and MEVA there are several submerged and emergent shoals and banks, including Evans Shoal, Tassie Shoal and Lynedoch Bank. Research undertaken as part of the Barossa Marine Studies Program (refer to **Section 3.2.1**) has included surveys of these features. There are also some notable geophysical features within the EMBA in international waters, such as the Timor Trench (a large trench also known as the Timor Trough), which may be associated with high productivity/upwelling of nutrients and thus may feature greater abundance and/or diversity of marine flora and fauna.

Shoals and Banks within the EMBA and MEVA, water depth ranges, and distances to the Operational Area, are provided in **Table 3.2**. **Figure 3-3** depicts the locations of reefs, shoals and banks relative to the EMBA and the MEVA.

**Table 3.3** provides a summary of the benthic habitats within the Operational Area, MEVA and EMBA.

The Operational Area, MEVA and EMBA overlap several KEFs which include values relating to their physical features (CoA, 2012a, b). These are discussed in more detail in **Section 3.2.5.2**.

**Table 3.2: Shoals and Banks within the EMBA and MEVA, water depth ranges, and distances from the Operational Area**

Geomorphic feature	In EMBA	In MEVA	Water depth range (m)*	Approximate distance/direction from Operational Area
Lynedoch Bank	✓	✓	From 60m to 100m	38km South East
Evans Shoal	✓	✓	From 20m to 110m	62km West
Tassie Shoal	✓	✓	From 20m to 90m	71km South West
Unnamed Shoal	✓	✓	From 40m to 80m	79km South West
Blackwood Shoal	✓	✓	From 30m to 80m	82km West
Franklin Shoal	✓	✓	From 20m to 90m	93km West
Flinders Shoal	✓	✓	From 20m to 80m	95km West

Geomorphic feature	In EMBA	In MEVA	Water depth range (m)*	Approximate distance/direction from Operational Area
Margaret Harries Bank	✓	✓	From 40m to 120m	158km West
Troubadour Shoals	✓	✓	From 20m to 110m	164km West
Money Shoal	✓	✗	From 10m to 60m	246km East
Eugene McDermott Shoal	✓	✗	From 30m to 100m	701km South West
Fantome Shoal	✓	✗	From 30m to 300m	707km West
Vee Shoal	✓	✗	From 30m to 220m	723km West
Barracouta Shoal	✓	✗	From 60m to 170m	729km South West
Woodbine Bank	✓	✗	From 20m to 140m	771km West
Johnson Bank	✓	✗	From 10m to 210m	782km West

**Table 3.3: Habitats associated with receptors identified within the Operational Area, MEVA and EMBA**

Category	Receptor	Operational Area presence	MEVA presence	EMBA presence				
				Northwest Transition	Northwest Shelf Transition	Timor Province	Timor Transition	International Waters
Benthic habitats	Coral reefs	X	X	✓	✓	✓	X	✓
	Seagrass	X	X	✓	✓	✓	X	✓
	Macroalgae	X	X	✓	✓	✓	✓	✓
	Non-coral benthic invertebrates	✓	✓	✓	✓	✓	✓	✓
Shoreline habitats	Mangroves	X	X	X	✓	X	X	✓
	Intertidal platforms	X	X	✓	✓	X	X	✓
	Sandy beaches	X	X	X	✓	✓	X	✓
	Rocky shorelines	X	X	✓	✓	X	X	✓

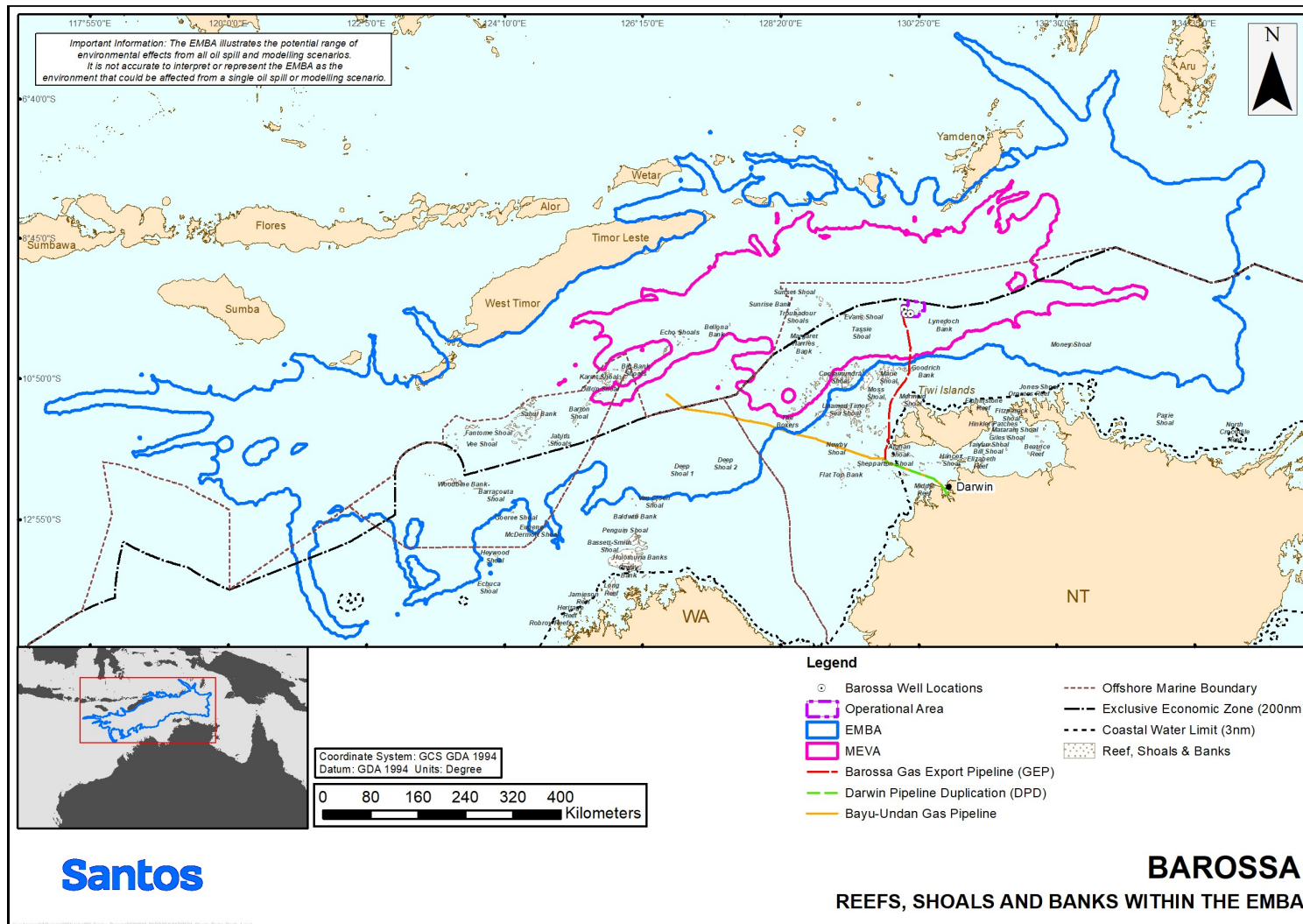


Figure 3-3: Reefs, Shoals and Banks within the EMBA and MEVA



### 3.2.5 Protected and significant areas

Protected and significant areas identified in the Operational Area, MEVA and EMBA are listed in Table 3.4 and are illustrated in Figure 3-4 to **Figure 3-6**. Note: protected and significant areas that are terrestrial and not linked to the shoreline but occur in the Australia Government – Department of Climate Change, Energy the Environment and Water Protected Matters Search Tool (PMST) search results for the EMBA have been excluded as they are not relevant to hydrocarbon spill scenarios assessed in this EP.

**Table 3.4: Presence of protected areas and key ecological features within the Operational Area, MEVA and EMBA including their distance from the Operational Area**

Value/sensitivity name	Within Operational Area	Presence in MEVA	Presence in EMBA	Distance to Operational Area (km)
<b>Australian marine parks</b>				
Oceanic Shoals Marine Park	X	✓	✓	33
Arafura Marine Park	X	✓	✓	230
Ashmore Reef Marine Park	X	X	✓	796
Cartier Island Marine Park	X	X	✓	770
<b>State marine parks, management areas and reserves</b>				
Scott Reef Nature Reserve	X	X	✓	1004
<b>Commonwealth heritage places</b>				
Scott Reef and surrounds – Commonwealth area	X	X	✓	1004
<b>Wetlands of international importance</b>				
Ashmore Reef Ramsar Site	X	X	✓	796
<b>Wetlands of national importance</b>				
Ashmore Reef Marine Park	X	X	✓	796
<b>Key ecological features</b>				
<b>North-west Marine Region</b>				
Ancient coastline at 125 m depth contour	X	X	✓	698
Ashmore Reef and Cartier Island and surrounding Commonwealth Waters	X	X	✓	765
Continental slope demersal fish communities	X	X	✓	771
Carbonate bank and terrace system of the Sahul Shelf	X	X	✓	321
Seringapatam Reef and Commonwealth waters in the Scott Reef Complex	X	X	✓	971
<b>North Marine Region</b>				

Value/sensitivity name	Within Operational Area	Presence in MEVA	Presence in EMBA	Distance to Operational Area (km)
Carbonate bank and terrace system of the Van Diemen Rise	X	✓	✓	50
Pinnacles of the Bonaparte Basin	X	✓	✓	191
Shelf break and slope of the Arafura Shelf	✓	✓	✓	0
Tributary canyons of the Arafura Depression	X	✓	✓	242

### 3.2.5.1 Australian marine parks and state marine parks, management areas and reserves

The Operational Area does not intersect any Australian or State marine parks, management areas or reserves, however the MEVA intersects two Australian Marine Parks (AMPs): Oceanic Shoals Marine Park and Arafura Marine Park, and the EMBA overlaps four AMPs: Oceanic Shoals Marine Park, Arafura Marine Park, Ashmore Reef Marine Park and the Cartier Island Marine Park as well as one nature reserve, the Scott Reef Nature Reserve<sup>2</sup> (Figure 3-2, Table 3-4).

The cultural features of the AMPs are described in Appendix C. Additionally, since Revision 3 of the EP was accepted by NOPSEMA on 14 March 2022, further information concerning the cultural features of the broader EMBA has emerged. This is addressed in Section 3.2.8.

AMPs are divided into management zones (Figure 3-4) and managed in accordance with the North Marine Parks Network Management Plan (DNP, 2018a) and North-West Marine Parks Network Management Plan (DNP, 2018b) (Table 3.5), as are the four KEFs identified in the North marine region and five KEFs identified in the North-west marine region (Table 3.4). All other features in Table 3.4 are described and managed under the North-West Marine Parks Network Management Plan (DNP, 2018b).

The applicable AMP management conditions for the activities in this EP are described in Table 3.5.

**Table 3.5: Prescription/condition from the North-West and North Marine Parks Network management plans relevant to the activities in this environment plan**

Prescription/condition number	Prescription/condition	Relevant section of EP
<b>North-West Marine Park Network Management Plan (MPNMP) (DNP, 2018a) and North MPNMP (DNP, 2018b)</b>		
4.2.9.8	...actions required to respond to oil pollution incidents, including environmental monitoring and remediation, in connection with mining operations authorised under the OPGGS Act, may be conducted in all zones without an authorisation issued by the Director, provided that the actions are taken in accordance with an environment plan that has been accepted by NOPSEMA, and the Director is notified in the event of oil pollution within a marine park, or where an oil spill response action must be taken within a	<b>Section 3.2.8.8</b> (Relevant Persons Consultation), reporting under <b>Section 8</b> and the OPEP

<sup>2</sup> Although spill modelling indicates no exposure to hydrocarbons at the defined contact values for surface, dissolved or entrained at Scott Reef Nature Reserve (WA waters) it has been included in the risk assessment for unplanned events given its proximity to the modelled EMBA. Refer to Appendix G for a summary of receptor locations where hydrocarbon exposure may occur according to modelling results.

Prescription/ condition number	Prescription/condition	Relevant section of EP
	marine park, so far as reasonably practicable, prior to response action being taken.	

### 3.2.5.2 Key ecological features

Key ecological features (KEFs) are those components of the marine ecosystem that are important for biodiversity or the ecosystem function and integrity of a Commonwealth marine area. The EMBA overlaps nine identified KEFs (**Figure 3-5**, Table 3.4):

- + Ancient coastline at 125 m depth contour<sup>3</sup>
- + Ashmore Reef and Cartier Island and surrounding Commonwealth waters
- + Carbonate bank and terrace system of the Sahul Shelf
- + Carbonate bank and terrace system of the Van Diemen Rise
- + Continental Slope Demersal Fish Communities
- + Pinnacles of the Bonaparte Basin
- + Seringapatam Reef and Commonwealth waters in the Scott Reef Complex
- + Shelf break and slope of the Arafura Shelf
- + Tributary canyons of the Arafura Depression.

The MEVA intersects four KEFs (Table 3.4):

- + Carbonate bank and terrace system of the Van Diemen Rise
- + Pinnacles of the Bonaparte Basin
- + Shelf break and slope of the Arafura Shelf
- + Tributary canyons of the Arafura Depression.

The shelf break and slope of the Arafura Shelf KEF is located within the Operational Area.

All of these KEFs are noted to have values of ‘unique seafloor features with ecological properties of regional significance’ and as supporting enhanced biological productivity and high productivity that attract large aggregations of marine life.

The seafloor features associated with the Shelf break and slope of the Arafura Shelf KEF (i.e., the shelf break and patch reefs, hard substrate pinnacles and submerged reefs of the shelf slope KEF) were not observed during the Barossa Marine Studies Program (**Section 3.2.1**), nor are these topographically distinct features evident from the bathymetry data derived from multiple surveys undertaken across this KEF.

### 3.2.5.3 Commonwealth Heritage areas

Australia’s listed heritage places comprise natural, Indigenous and historic heritage places which are either entirely within a Commonwealth area, or outside the Australian jurisdiction and owned or leased by the Commonwealth or a Commonwealth Authority. Significant heritage places are identified and grouped (by type) into lists that guide the protection and management of heritage values. No heritage places are located within the Operational Area or MEVA, however one is located within the modelled EMBA (Ashmore Reef National Nature Reserve - around 800km from the Operational Area), and one is located outside but proximal

<sup>3</sup> The Ancient coastline at 125m contour KEF is not present in waters offshore of the Northern Territory or Tiwi Islands (see Figure 3-5).

to the modelled EMBA (the Scott Reef<sup>4</sup> and surrounds Commonwealth area - around 971 km from the Operational Area).

#### 3.2.5.4 Wetlands of international and national importance

No wetlands of international or national importance are located within the Operational Area or MEVA, but a Ramsar wetland is present within the Ashmore Reef AMP and hence within the EMBA (**Figure 3-6**).

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<sup>4</sup> Although spill modelling indicates no exposure to hydrocarbons at the defined contact values for surface, dissolved or entrained at this location, Scott Reef Nature Reserve (WA waters) it has been included in the risk assessment for unplanned events given its proximity to the modelled EMBA. Refer to Appendix G for a summary of receptor locations where hydrocarbon exposure may occur according to modelling results.

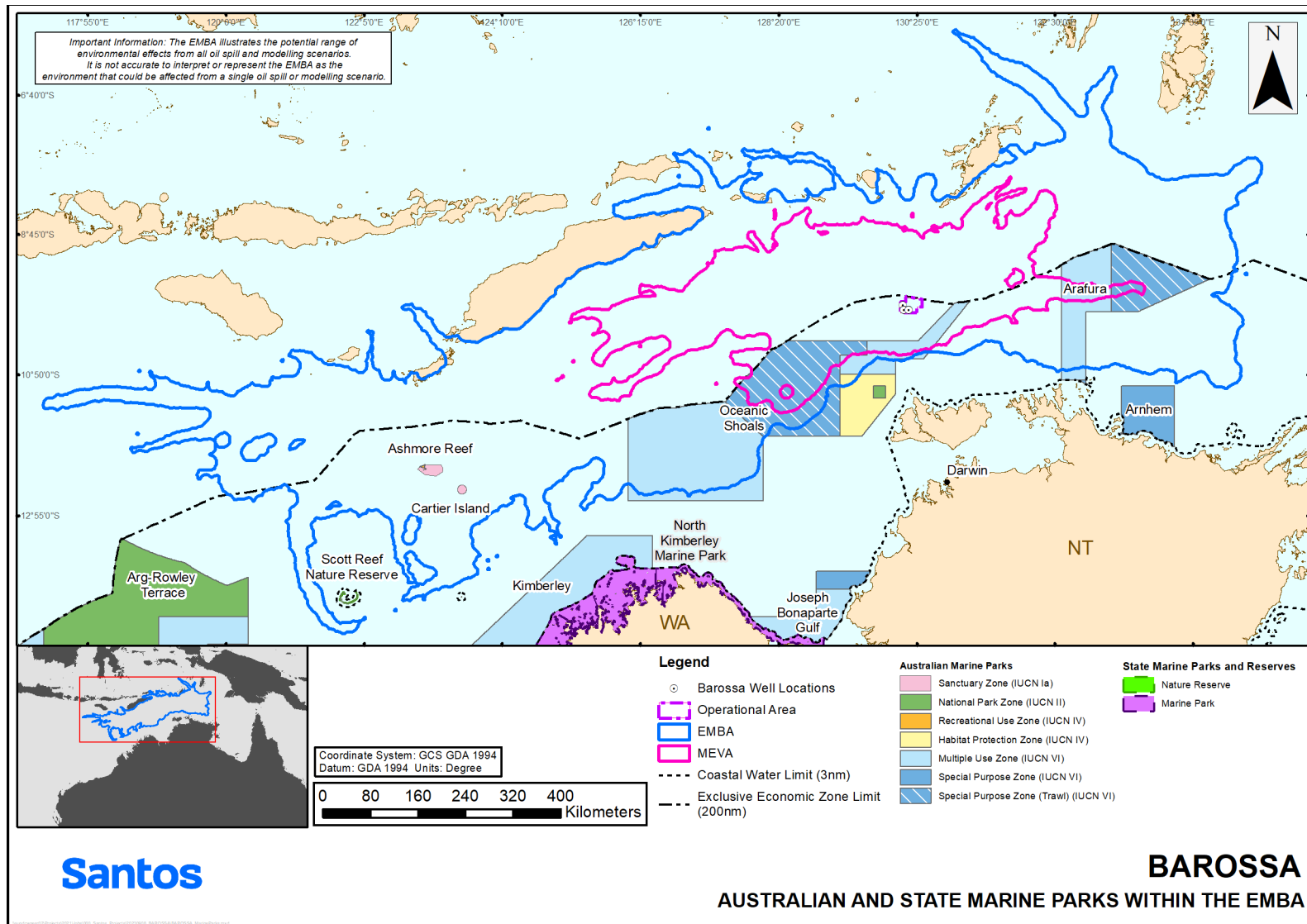


Figure 3-4: Australian and State marine parks within the EMBA and MEVA

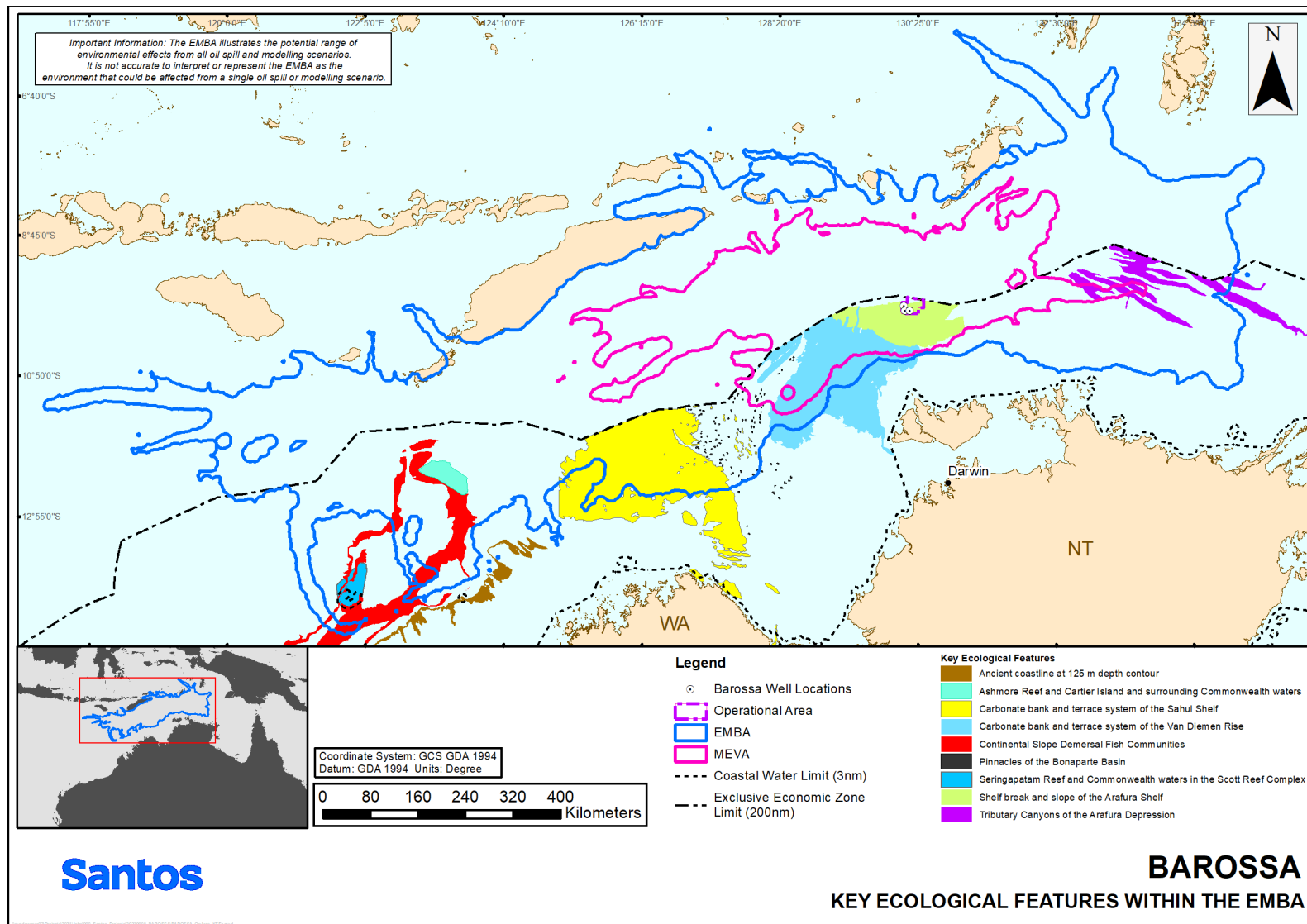


Figure 3-5: Key ecological features within the EMBA and MEVA

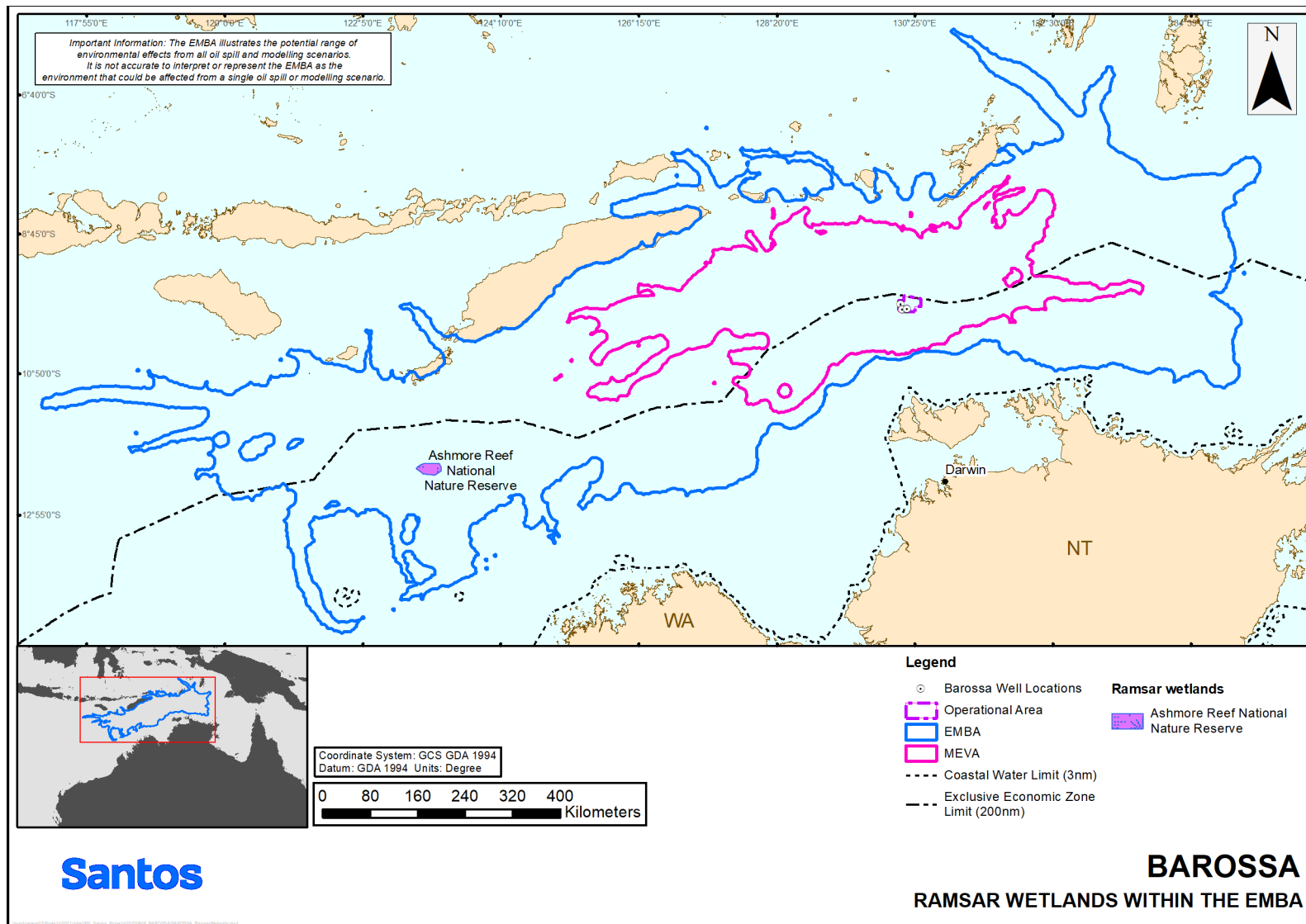


Figure 3-6: Ramsar Wetlands within the EMBA and MEVA

### 3.2.6 Threatened and migratory fauna

The PMST identified 147 species listed under the EPBC Act that may occur or are known to occur within the EMBA. Of those, 102 were listed marine species, 60 migratory species, 27 listed cetacean species, and 28 threatened species with the potential to occur in marine or shoreline habitats (**Table 3-6**).

In the MEVA, the PMST identified 114 protected species which could occur in the marine environment, comprising 74 listed marine species, 38 migratory species, 26 listed cetacean species, and 22 threatened species (**Table 3-6**).

The PMST identified a total of 92 protected species with the potential to occur in the Operational Area, comprising 59 listed marine species, 33 migratory species, 22 listed cetacean species, and 19 threatened species (**Table 3-6**).

Those species with BIAs and Habitat Critical identified within the MEVA and EMBA are also identified in **Table 3-7**.

An examination of the species profile and threats database (DoEE, 2019) showed that some threatened species were not expected to occur in significant numbers in the marine and coastal environments (within the EMBA) due to their terrestrial distributions. Species that may occur on shorelines include shorebirds, but terrestrial mammals, reptiles (such as pythons) and bird species that do not have core habitats along shorelines have been excluded. Noting that the MEVA does not reach any shoreline, these species are unlikely to come into contact with a hydrocarbon spill and therefore are not discussed further.

An additional three species, the grey nurse shark (*Carcharias taurus*; EPBC-listed 'vulnerable'), Omura's whale (*Balaenoptera omurai*; not EPBC-listed) and the turtle-headed sea snake (*Emydocephalus annulatus*; EPBC-listed 'marine'), are included in the following sections as they were reported as occurring within or near the Operational Area as part of the Barossa Marine Studies Program.

A compilation of tracking data from marine turtle telemetry studies on and around the Tiwi Islands indicates turtle foraging areas and migration pathways did not overlap with the Operational Area (Pendoley, 2023). Apart from isolated movements of olive ridley turtles towards the eastern and western outer limits of the EMBA, the tracking data indicates that marine turtle migratory pathways are largely restricted to the waters inside the 100m depth contour (waters less than 100m deep) which overlaps the outer limits of the EMBA and locations outside the EMBA.



**Table 3.6: Threatened and migratory marine fauna that may be present in the Operational Area and/or environment that may be affected (Source: EPBC Act Protected Matters Search; June 2023)**

Marine fauna		EPBC Act status	Operational Area		MEVA		EMBA	
Common name	Scientific name		Present	Particular values or sensitivities	Present	Particular values or sensitivities	Present	Particular values or sensitivities
Fish and sharks								
Whale shark	<i>Rhincodon typus</i>	Vulnerable, Migratory	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.	✓	Foraging, feeding or related behaviour known to occur within area. Overlap with foraging biologically important area (BIA).
Great white shark	<i>Carcharodon carcharias</i>	Vulnerable, Migratory	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.
Northern river shark	<i>Glyphis garricki</i>	Endangered	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.
Speartooth shark	<i>Glyphis glyphis</i>	Critically endangered	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.
Oceanic whitetip shark	<i>Carcharhinus longimanus</i>	Migratory	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.
Freshwater sawfish	<i>Pristis pristis</i>	Vulnerable, Migratory	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.
Green sawfish	<i>Pristis zijsron</i>	Vulnerable, Migratory	✓	Species or species habitat known to occur within area.	✓	Species or species habitat known to occur within area.	✓	Species or species habitat known to occur within area.
Narrow sawfish	<i>Anoxypristis cuspidata</i>	Migratory	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.	✓	Species or species habitat likely to occur within area.
Reef manta ray	<i>Manta alfredi</i>	Migratory	✗	N/A.	✓	Species or species habitat likely to occur within area.	✓	Species or species habitat known to occur within area.
Giant manta ray	<i>Manta birostris</i>	Migratory	✓	Species or species habitat may occur within area.	✓	Species or species habitat likely to occur within area.	✓	Species or species habitat likely to occur within area.
Longfin mako	<i>Isurus paucus</i>	Migratory	✓	Species or species habitat likely to occur within area.	✓	Species or species habitat likely to occur within area.	✓	Species or species habitat likely to occur within area.
Grey nurse shark	<i>Carcharias taurus</i>	Vulnerable	✗	N/A.	✗	N/A.	✓	Reported as occurring within or near the permit area as part of the Barossa Marine Studies Program.

Marine fauna		EPBC Act status	Operational Area		MEVA		EMBA	
Common name	Scientific name		Present	Particular values or sensitivities	Present	Particular values or sensitivities	Present	Particular values or sensitivities
Shortfin mako	<i>Isurus oxyrinchus</i>	Migratory	✗	N/A.	✓	Species or species habitat likely to occur within area.	✓	Species or species habitat likely to occur within area.
Dwarf sawfish	<i>Pristis clavata</i>	Vulnerable, Migratory	✗	N/A.	✗	N/A.	✓	Species or species habitat known to occur within area.
Scalloped hammerhead	<i>Sphyma lewini</i>	Conservation Dependent	✓	Species or species habitat may occur within area.	✓	Species or species habitat known to occur within area.	✓	Species or species habitat known to occur within area.
Southern Bluefin Tuna	<i>Thunnus maccoyii</i>	Conservation Dependent	✗	N/A.	✓	Species or species habitat likely to occur within area.	✓	Breeding known to occur within area.
<b>Syngnathids</b>								
Brock's Pipefish	<i>Halicampus brocki</i>	Listed Marine	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.
Pallid Pipehorse, Hardwick's Pipehorse	<i>Solegnathus hardwickii</i>	Listed Marine	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.
Short-keel Pipefish, Short-keeled Pipefish	<i>Hippichthys parvicarinatus</i>	Listed Marine	✗	N/A.	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.
Double-end Pipehorse, Double-ended Pipehorse, Alligator Pipefish	<i>Syngnathoides biaculeatus</i>	Listed Marine	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.
Bluestripe Pipefish, Indian Blue-stripe Pipefish, Pacific Blue-stripe Pipefish	<i>Doryrhamphus excisus</i>	Listed Marine	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.
Fijian Banded Pipefish, Brown-banded Pipefish	<i>Corythoichthys amplexus</i>	Listed Marine	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.
Tiger Pipefish	<i>Filicampus tigris</i>	Listed Marine	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.
Banded Pipefish, Ringed Pipefish	<i>Doryrhamphus dactyliophorus</i>	Listed Marine	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.
Girdled Pipefish	<i>Festucalex cinctus</i>	Listed Marine	✗	N/A.	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.

Marine fauna		EPBC Act status	Operational Area		MEVA		EMBA	
Common name	Scientific name		Present	Particular values or sensitivities	Present	Particular values or sensitivities	Present	Particular values or sensitivities
Pig-snouted Pipefish	<i>Choeroichthys suillus</i>	Listed Marine	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.
Hedgehog Seahorse	<i>Hippocampus spinosissimus</i>	Listed Marine	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.
Spiny Seahorse, Thorny Seahorse	<i>Hippocampus histrix</i>	Listed Marine	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.
Flat-face Seahorse	<i>Hippocampus planifrons</i>	Listed Marine	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.
Beady Pipefish, Steep-nosed Pipefish	<i>Hippichthys penicillus</i>	Listed Marine	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.
Spotted Seahorse, Yellow Seahorse	<i>Hippocampus kuda</i>	Listed Marine	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.
Western Spiny Seahorse, Narrow-bellied Seahorse	<i>Hippocampus angustus</i>	Listed Marine	✗	N/A.	✗	N/A.	✓	Species or species habitat may occur within area.
Spiny-snout Pipefish	<i>Halicampus spirostris</i>	Listed Marine	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.
Mud Pipefish, Gray's Pipefish	<i>Halicampus grayi</i>	Listed Marine	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.
Ribboned Pipehorse, Ribboned Seadragon	<i>Haliichthys taeniophorus</i>	Listed Marine	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.
Pacific Short-bodied Pipefish, Short-bodied Pipefish	<i>Choeroichthys brachysoma</i>	Listed Marine	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.
Three-keel Pipefish	<i>Campichthys tricarinatus</i>	Listed Marine	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.
Red-hair Pipefish, Duncker's Pipefish	<i>Halicampus dunckeri</i>	Listed Marine	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.
Straightstick Pipefish, Long-nosed Pipefish, Straight Stick Pipefish	<i>Trachyrhamphus longirostris</i>	Listed Marine	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.

Marine fauna		EPBC Act status	Operational Area		MEVA		EMBA	
Common name	Scientific name		Present	Particular values or sensitivities	Present	Particular values or sensitivities	Present	Particular values or sensitivities
Bentstick Pipefish, Bend Stick Pipefish, Short-tailed Pipefish	<i>Trachyrhamphus bicoarctatus</i>	Listed Marine	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.
Robust Ghost Pipefish, Blue-finned Ghost Pipefish	<i>Solenostomus cyanopterus</i>	Listed Marine	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.
Corrugated Pipefish, Barbed Pipefish	<i>Bhanotia fasciolata</i>	Listed Marine	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.
Blue-speckled Pipefish, Blue-spotted Pipefish	<i>Hippichthys cyanospilos</i>	Listed Marine	✗	N/A.	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.
Tidepool Pipefish	<i>Micrognathus micronotus</i>	Listed Marine	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.
Gunther's Pipehorse, Indonesian Pipefish	<i>Solegnathus lettiensis</i>	Listed Marine	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.
Schultz's Pipefish	<i>Corythoichthys schultzi</i>	Listed Marine	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.
Roughridge Pipefish	<i>Cosmocampus banneri</i>	Listed Marine	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.
Reticulate Pipefish, Yellow-banded Pipefish, Network Pipefish	<i>Corythoichthys flavofasciatus</i>	Listed Marine	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.
Reef-top Pipefish	<i>Corythoichthys haematopterus</i>	Listed Marine	✗	N/A.	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.
Australian Messmate Pipefish, Banded Pipefish	<i>Corythoichthys intestinalis</i>	Listed Marine	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.
Cleaner Pipefish, Janss' Pipefish	<i>Doryrhamphus janssi</i>	Listed Marine	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.

Marine fauna		EPBC Act status	Operational Area		MEVA		EMBA	
Common name	Scientific name		Present	Particular values or sensitivities	Present	Particular values or sensitivities	Present	Particular values or sensitivities
Marine mammals								
Humpback whale	<i>Megaptera novaeangliae</i>	Migratory, Cetacean	✓	Species or species habitat may occur within area.	✓	Species or species habitat likely to occur within area.	✓	Species or species habitat known to occur within area.
Blue whale <sup>5</sup>	<i>Balaenoptera musculus</i>	Endangered, Migratory, Cetacean	✓	Species or species habitat likely to occur within area.	✓	Species or species habitat likely to occur within area.	✓	Migration route known to occur within area.
Bryde's whale	<i>Balaenoptera edeni</i>	Migratory, Cetacean	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.	✓	Species or species habitat likely to occur within area.
Killer whale, Orca	<i>Orcinus orca</i>	Migratory, Cetacean	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.
Spotted bottlenose dolphin	<i>Tursiops aduncus</i> (Arafura/Timor Sea Populations)	Migratory, Cetacean	✓	Species or species habitat may occur within area.	✓	Species or species habitat known to occur within area.	✓	Species or species habitat known to occur within area.
Sei whale	<i>Balaenoptera borealis</i>	Vulnerable, Migratory, Cetacean	✓	Species or species habitat likely to occur within area.	✓	Species or species habitat likely to occur within area.	✓	Foraging, feeding or related behaviour likely to occur within area.
Fin whale	<i>Balaenoptera physalus</i>	Vulnerable, Migratory, Cetacean	✓	Species or species habitat likely to occur within area.	✓	Species or species habitat likely to occur within area.	✓	Foraging, feeding or related behaviour likely to occur within area.
Sperm whale	<i>Physeter macrocephalus</i>	Migratory, Cetacean	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.
Australian snubfin dolphin	<i>Orcaella heinsohni</i>	Migratory, Cetacean	✗	N/A.	✓	Species or species habitat may occur within area.	✓	Species or species habitat known to occur within area.
Dugong	<i>Dugong dugon</i>	Migratory, Listed Marine	✗	N/A.	✓	Breeding known to occur within area.	✓	Breeding known to occur within area.
Omura's whale	<i>Balaenoptera omurai</i>	N/A	✓	Reported as occurring within or near the permit area as part of the Barossa Marine Studies Program.	✓	Reported as occurring within or near the permit area as part of the Barossa Marine Studies Program.	✓	Reported as occurring within or near the permit area as part of the Barossa Marine Studies Program.

<sup>5</sup> In Australian waters there are two subspecies of blue whale, the pygmy blue whale (*B. m. brevicauda*) and the Antarctic blue whale (*B. m. intermedia*). It is more likely that the pygmy blue whale could be encountered given the presence of a BIA in the EMBA.

Marine fauna		EPBC Act status	Operational Area		MEVA		EMBA	
Common name	Scientific name		Present	Particular values or sensitivities	Present	Particular values or sensitivities	Present	Particular values or sensitivities
Indian Ocean Bottlenose Dolphin, Spotted Bottlenose Dolphin	<i>Tursiops aduncus</i>	Migratory, Cetacean	✗	N/A.	✓	Species or species habitat may occur within area.	✓	Species or species habitat likely to occur within area.
False Killer Whale	<i>Pseudorca crassidens</i>	Cetacean	✓	Species or species habitat likely to occur within area.	✓	Species or species habitat likely to occur within area.	✓	Species or species habitat likely to occur within area.
Pygmy Sperm Whale	<i>Kogia breviceps</i>	Cetacean	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.
Cuvier's Beaked Whale, Goose-beaked Whale	<i>Ziphius cavirostris</i>	Cetacean	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.
Spotted Dolphin, Pantropical Spotted Dolphin	<i>Stenella attenuata</i>	Cetacean	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.
Striped Dolphin, Euphrosyne Dolphin	<i>Stenella coeruleoalba</i>	Cetacean	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.
Long-snouted Spinner Dolphin	<i>Stenella longirostris</i>	Cetacean	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.
Risso's Dolphin, Grampus	<i>Grampus griseus</i>	Cetacean	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.
Fraser's Dolphin, Sarawak Dolphin	<i>Lagenodelphis hosei</i>	Cetacean	✗	N/A.	✗	N/A.	✓	Species or species habitat may occur within area.
Melon-headed Whale	<i>Peponocephala electra</i>	Cetacean	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.
Common Dolphin, Short-beaked Common Dolphin	<i>Delphinus delphis</i>	Cetacean	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.
Pygmy Killer Whale	<i>Feresa attenuata</i>	Cetacean	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.
Short-finned Pilot Whale	<i>Globicephala macrorhynchus</i>	Cetacean	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.

Marine fauna		EPBC Act status	Operational Area		MEVA		EMBA	
Common name	Scientific name		Present	Particular values or sensitivities	Present	Particular values or sensitivities	Present	Particular values or sensitivities
Blainville's Beaked Whale, Dense-beaked Whale	<i>Mesoplodon densirostris</i>	Cetacean	✗	N/A.	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.
Rough-toothed Dolphin	<i>Steno bredanensis</i>	Cetacean	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.
Bottlenose Dolphin	<i>Tursiops truncatus s. str.</i>	Cetacean	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.
Dwarf Sperm Whale	<i>Kogia sima</i>	Cetacean	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.
Australian humpback dolphin	<i>Sousa sahulensis</i>	Migratory, Cetacean	✗	N/A.	✓	Species or species habitat may occur within area.	✓	Species or species habitat likely to occur within area.
<b>Marine reptiles</b>								
Loggerhead turtle	<i>Caretta caretta</i>	Endangered, Migratory, Listed Marine	✓	Species or species habitat likely to occur within area.	✓	Foraging, feeding or related behaviour likely to occur within area.	✓	Foraging, feeding or related behaviour known to occur within area. Overlap with foraging BIA.
Green turtle	<i>Chelonia mydas</i>	Vulnerable, Migratory, Listed Marine	✓	Species or species habitat known to occur within area.	✓	Foraging, feeding or related behaviour known to occur within area.	✓	Foraging, feeding or related behaviour known to occur within area. Overlap with foraging, nesting, internesting, internesting buffer and mating BIAs.
Leatherback turtle	<i>Dermochelys coriacea</i>	Endangered, Migratory, Listed Marine	✓	Species or species habitat likely to occur within area.	✓	Foraging, feeding or related behaviour likely to occur within area.	✓	Species or species habitat known to occur within area.
Hawksbill turtle	<i>Eretmochelys imbricata</i>	Vulnerable, Migratory, Listed Marine	✓	Species or species habitat likely to occur within area.	✓	Foraging, feeding or related behaviour likely to occur within area.	✓	Foraging, feeding or related behaviour known to occur within area. Overlap with foraging, internesting and internesting buffer BIAs.

Marine fauna		EPBC Act status	Operational Area		MEVA		EMBA	
Common name	Scientific name		Present	Particular values or sensitivities	Present	Particular values or sensitivities	Present	Particular values or sensitivities
Olive Ridley turtle	<i>Lepidochelys olivacea</i>	Endangered, Migratory Listed Marine	✓	Species or species habitat likely to occur within area.	✓	Foraging, feeding or related behaviour known to occur within area.	✓	Foraging, feeding or related behaviour known to occur within area. Overlap with foraging and interesting BIAs.
Flatback turtle	<i>Natator depressus</i>	Vulnerable, Migratory, Listed Marine	✓	Species or species habitat known to occur within area.	✓	Foraging, feeding or related behaviour known to occur within area.	✓	Foraging, feeding or related behaviour known to occur within area. Overlap with foraging and interesting BIAs.
Turtle-headed Seasnake	<i>Emydocephalus annulatus</i>	Listed Marine	✗	N/A.	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.
Black-headed Sea Snake, Slender-necked Seasnake	<i>Leioselasma coggeri</i>	Listed Marine	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.
Spine-bellied Seasnake	<i>Lapemis curtus</i>	Listed Marine	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.
Horned Seasnake	<i>Acalyptophis peronii</i>	Listed Marine	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.
Black-headed Seasnake	<i>Hydrophis atriceps</i>	Listed Marine	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.
Elegant Seasnake	<i>Hydrophis elegans</i>	Listed Marine	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.
Large-headed Seasnake, Pacific Seasnake	<i>Leioselasma pacifica</i>	Listed Marine	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.
Spotted Seasnake, Ornate Reef Seasnake	<i>Chitulia ornata</i>	Listed Marine	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.
Short-nosed sea snake	<i>Aipysurus apraefrontalis</i>	Critically endangered, Listed Marine	✗	N/A.	✗	N/A.	✓	Species or species habitat known to occur within area.



Marine fauna		EPBC Act status	Operational Area		MEVA		EMBA	
Common name	Scientific name		Present	Particular values or sensitivities	Present	Particular values or sensitivities	Present	Particular values or sensitivities
Leaf-scaled sea snake	<i>Aipysurus foliosquama</i>	Critically endangered, Listed Marine	X	N/A.	X	N/A.	✓	Species or species habitat may occur within area.
Saltwater crocodile	<i>Crocodylus porosus</i>	Migratory, Listed Marine	X	N/A.	✓	Species or species habitat likely to occur within area.	✓	Species or species habitat likely to occur within area.
Stokes' Seasnake	<i>Astrotia stokesii</i>	Listed Marine	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.
Spectacled Seasnake	<i>Disteira kingii</i>	Listed Marine	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.
Olive Seasnake	<i>Aipysurus laevis</i>	Listed Marine	✓	Species or species habitat may occur within area.	X	N/A.	✓	Species or species habitat may occur within area.
Beaked Seasnake	<i>Enhydrina schistosa</i>	Listed Marine	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.
Olive-headed Seasnake	<i>Disteira major</i>	Listed Marine	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.
Small-headed Seasnake	<i>Hydrophis macdowellii</i>	Listed Marine	X	N/A.	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.
Northern Mangrove Seasnake	<i>Parahydrophis mertoni</i>	Listed Marine	X	N/A.	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.
Yellow-bellied Seasnake	<i>Pelamis platurus</i>	Listed Marine	X	N/A.	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.
Spine-tailed Seasnake	<i>Aipysurus eydouxii</i>	Listed Marine	X	N/A.	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.
Dubois' Seasnake	<i>Aipysurus duboisii</i>	Listed Marine	X	N/A.	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.
Dusky Seasnake	<i>Aipysurus fuscus</i>	Listed Marine	X	N/A.	X	N/A.	✓	Species or species habitat known to occur within area.
Black-ringed Seasnake	<i>Hydrelops darwiniensis</i>	Listed Marine	X	N/A.	X	N/A.	✓	Species or species habitat may occur within area.
Plain Seasnake	<i>Chitulia inornata</i>	Listed Marine	X	N/A.	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.

Marine fauna		EPBC Act status	Operational Area		MEVA		EMBA	
Common name	Scientific name		Present	Particular values or sensitivities	Present	Particular values or sensitivities	Present	Particular values or sensitivities
Fine-spined Seasnake, Geometrical Seasnake	<i>Leioselasma czeb lukovi</i>	Listed Marine	X	N/A.	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.
Birds								
Curlew sandpiper	<i>Calidris ferruginea</i>	Critically endangered, Migratory, Listed Marine (overfly)	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.	✓	Species or species habitat known to occur within area.
Red knot	<i>Calidris canutus</i>	Endangered, Migratory, Listed Marine (overfly)	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.	✓	Species or species habitat known to occur within area.
Eastern curlew	<i>Numenius madagascariensis</i>	Critically endangered, Migratory, Listed Marine	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.	✓	Species or species habitat known to occur within area.
Common noddy	<i>Anous stolidus</i>	Migratory, Listed Marine	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.	✓	Breeding known to occur within area.
Streaked shearwater	<i>Calonectris leucomelas</i>	Migratory, Listed Marine	✓	Species or species habitat likely to occur within area.	✓	Species or species habitat likely to occur within area.	✓	Species or species habitat known to occur within area.
Lesser frigatebird	<i>Fregata ariel</i>	Migratory, Listed Marine	✓	Species or species habitat may occur within area.	✓	Species or species habitat likely to occur within area.	✓	Breeding known to occur within area. Overlap with breeding BIA.
Common sandpiper	<i>Actitis hypoleucos</i>	Migratory, Listed Marine	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.	✓	Species or species habitat known to occur within area.
Sharp-tailed sandpiper	<i>Calidris acuminata</i>	Migratory, Listed Marine	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.	✓	Species or species habitat known to occur within area.
Pectoral sandpiper	<i>Calidris melanotos</i>	Migratory, Listed Marine (overfly)	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.	✓	Species or species habitat may occur within area.
Greater frigatebird	<i>Fregata minor</i>	Migratory, Listed Marine	✓	Species or species habitat may occur within area.	✓	Species or species habitat likely to occur within area.	✓	Breeding known to occur within area. Overlap with breeding BIA.

Marine fauna		EPBC Act status	Operational Area		MEVA		EMBA	
Common name	Scientific name		Present	Particular values or sensitivities	Present	Particular values or sensitivities	Present	Particular values or sensitivities
Australian lesser noddy	<i>Anous tenuirostris melanops</i>	Vulnerable	X	N/A.	X	N/A.	✓	Breeding known to occur within area.
Roseate tern	<i>Stern dougallii</i>	Migratory	X	N/A.	X	N/A.	✓	Breeding known to occur within area.
Abbott's booby	<i>Papasula abbotti</i>	Endangered	X	N/A.	X	N/A.	✓	Species or species habitat may occur within area.
Osprey	<i>Pandion haliaetus</i>	Migratory	X	N/A.	X	N/A.	✓	Species or species habitat known to occur within area.
Brown booby	<i>Sula leucogaster</i>	Migratory	X	N/A.	X	N/A.	✓	Breeding known to occur within area. Overlap with breeding BIA.
Bar-tailed godwit	<i>Limosa lapponica</i>	Migratory	X	N/A.	X	N/A.	✓	Species or species habitat known to occur within area.
Northern Siberian bar-tailed godwit	<i>Limosa lapponica menzbieri</i>	Critically endangered	X	N/A.	X	N/A.	✓	Species or species habitat known to occur within area.
Masked booby	<i>Sula dactylatra</i>	Migratory	X	N/A.	X	N/A.	✓	Breeding known to occur within area.
Red-footed booby	<i>Sula sula</i>	Migratory	X	N/A.	X	N/A.	✓	Breeding known to occur within area. Overlap with breeding BIA.
White-tailed tropicbird	<i>Phaethon lepturus</i>	Migratory, Listed Marine	✓	Species or species habitat may occur within area.	✓	Species or species habitat likely to occur within area.	✓	Breeding known to occur within area. Overlap with breeding BIA.
Red-tailed tropicbird	<i>Phaethon rubricauda</i>	Migratory	X	N/A.	X	N/A.	✓	Breeding known to occur within area.
Little tern	<i>Sternula albifrons</i>	Migratory	X	N/A.	X	N/A.	✓	Congregation or aggregation known to occur within area. Overlap with breeding BIA.
Wedge-tailed shearwater	<i>Ardenna pacifica</i>	Migratory	X	N/A.	X	N/A.	✓	Breeding known to occur within area. Overlap with breeding BIA.

Marine fauna		EPBC Act status	Operational Area		MEVA		EMBA	
Common name	Scientific name		Present	Particular values or sensitivities	Present	Particular values or sensitivities	Present	Particular values or sensitivities
Caspian tern	<i>Hydroprogne caspia</i>	Migratory	X	N/A.	X	N/A.	✓	Breeding known to occur within area.
Bridled tern	<i>Onychoprion anaethetus</i>	Migratory	X	N/A.	X	N/A.	✓	Breeding known to occur within area.
Oriental reed-warbler	<i>Acrocephalus orientalis</i>	Migratory	X	N/A.	X	N/A.	✓	Species or species habitat known to occur within area.
Greater crested tern	<i>Thalasseus bergii</i>	Migratory	X	N/A.	X	N/A.	✓	Breeding known to occur within this area. Overlap with breeding BIA.
Christmas Island White-tailed Tropicbird, Golden Bosunbird	<i>Phaethon lepturus fulvus</i>	Endangered	X	N/A.	X	N/A.	✓	Species or species habitat may occur within area.
Greater Sand Plover, Large Sand Plover	<i>Charadrius leschenaultii</i>	Vulnerable, Migratory	X	N/A.	X	N/A.	✓	Species or species habitat known to occur within area.
Barn Swallow	<i>Hirundo rustica</i>	Migratory	X	N/A.	X	N/A.	✓	Species or species habitat known to occur within area.
Red-rumped Swallow	<i>Cecropis daurica</i>	Migratory	X	N/A.	X	N/A.	✓	Species or species habitat may occur within area.
Yellow Wagtail	<i>Motacilla flava</i>	Migratory	X	N/A.	X	N/A.	✓	Species or species habitat known to occur within area.
Asian Dowitcher	<i>Limnodromus semipalmatus</i>	Migratory	X	N/A.	X	N/A.	✓	Species or species habitat known to occur within area.
Grey Wagtail	<i>Motacilla cinerea</i>	Migratory	X	N/A.	X	N/A.	✓	Species or species habitat known to occur within area.
Black Noddy	<i>Anous minutus</i>	Listed Marine	X	N/A.	X	N/A.	✓	Breeding known to occur within area.
Lesser Crested Tern	<i>Thalasseus bengalensis</i>	Listed Marine	X	N/A.	X	N/A.	✓	Breeding known to occur within area.

### 3.2.6.1 Biologically important areas and critical habitat

BIAs, such as aggregation, breeding, resting, nesting or feeding areas or known migratory routes, for marine fauna species are identified in **Table 3.7** and **Figure 3-14**. No BIAs intersect with the Operational Area, however, **Figure 3-7** to **Figure 3-14** show the BIAs that overlap the EMBA and the MEVA. Although there are only three BIAs within the MEVA, there is the possibility that high aggregations of other species of wildlife foraging could occur within the MEVA in associated with shoals and banks present within the MEVA (**Section 3.2.4**).

Habitat critical to the survival of four EPBC Act-listed marine turtles occurs within the EMBA, as listed in **Table 3.7** and shown in **Figure 3-10** to **Figure 3-13**.

**Table 3.7: BIAs and Habitat Critical identified within the MEVA and EMBA.**

Species	BIA/range	Approximate distance to Operational Area (km)	Presence in the MEVA	Presence in the EMBA	Habitat critical within EMBA (and distance to Operational Area)
Whale shark	Foraging	506	X	✓	NA.
Pygmy blue whale	Migration	171	✓	✓	NA.
	Foraging	974	X	✓	
	Distribution range	51	✓	✓	
Dugong	Foraging (high density seagrass beds)	828	X	✓	NA.
	Breeding	828	X	✓	
	Nursing	828	X	✓	
	Calving	828	X	✓	
	Foraging	828	X	✓	
Loggerhead turtle	Foraging	358	X	✓	X
Green turtle	Nesting	662	X	✓	Ashmore Reef and Cartier Reef 20 km internesting buffer (751 km).
	Internesting buffer	642	X	✓	
	Foraging	316	X	✓	
	Internesting	118	X	✓	
	Mating	822	X	✓	
Hawksbill turtle	Nesting	815	X	✓	New Year Island 20 km internesting buffer (281 km).
	Internesting	243	X	✓	
	Internesting buffer	795	X	✓	

Species	BIA/range	Approximate distance to Operational Area (km)	Presence in the MEVA	Presence in the EMBA	Habitat critical within EMBA (and distance to Operational Area)
	Foraging	776	X	✓	
Flatback turtle	Interesting	50	✓	✓	Soldier Point to Pirlangimpi, including Seagull Island 60 km interesting buffer (72 km). Brace Point to One Tree Point, including all offshore islands 60 km interesting buffer (112 km).
	Foraging	358	X	✓	
Olive Ridley turtle	Foraging	250	✓	✓	X
Brown booby	Breeding	770	X	✓	NA.
Greater frigatebird	Breeding	708	X	✓	NA.
Lesser crested tern	Breeding	111	X	✓	NA.
Lesser frigatebird	Breeding	525	X	✓	NA.
Little tern	Resting	654	X	✓	NA.
Red-footed booby	Breeding	708	X	✓	NA.
Roseate tern	Breeding	276	X	✓	NA.
Wedge-tailed shearwater	Breeding	714	X	✓	NA.
White-tailed tropic bird	Breeding	717	X	✓	NA.

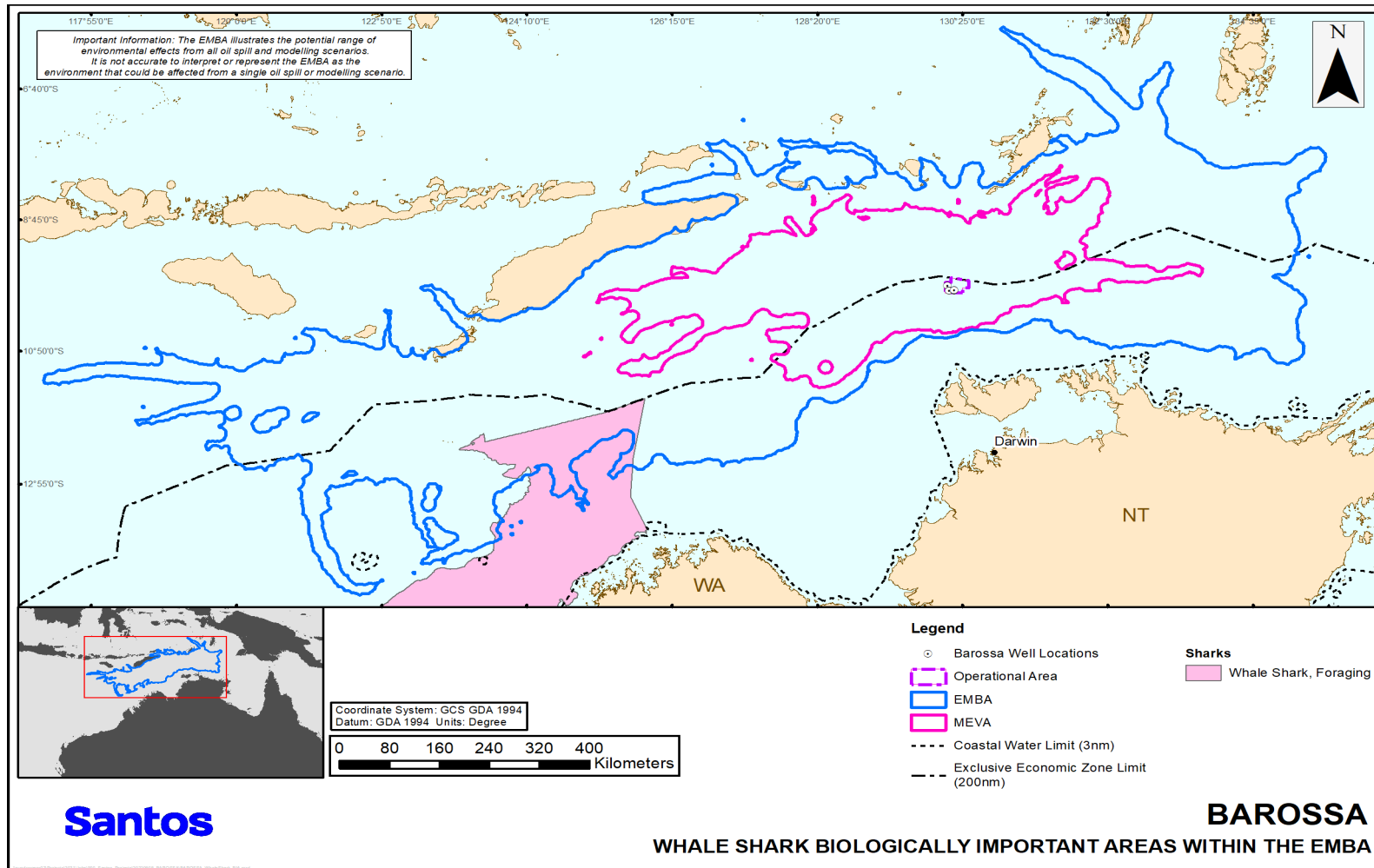


Figure 3-7: Whale shark biologically important areas overlapping the EMBA and MEVA



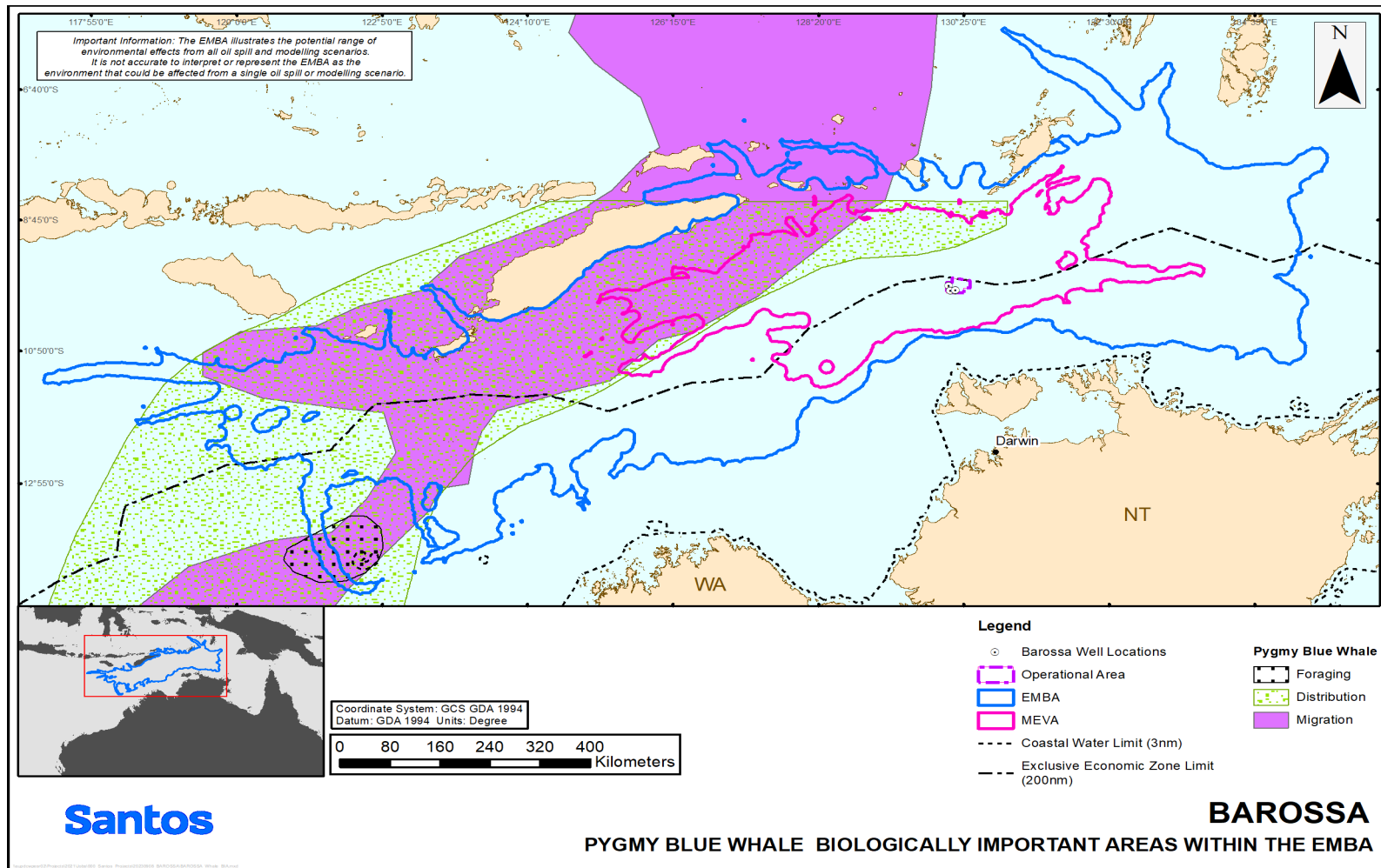


Figure 3-8: Pygmy blue whale biologically important areas overlapping the EMBA and MEVA

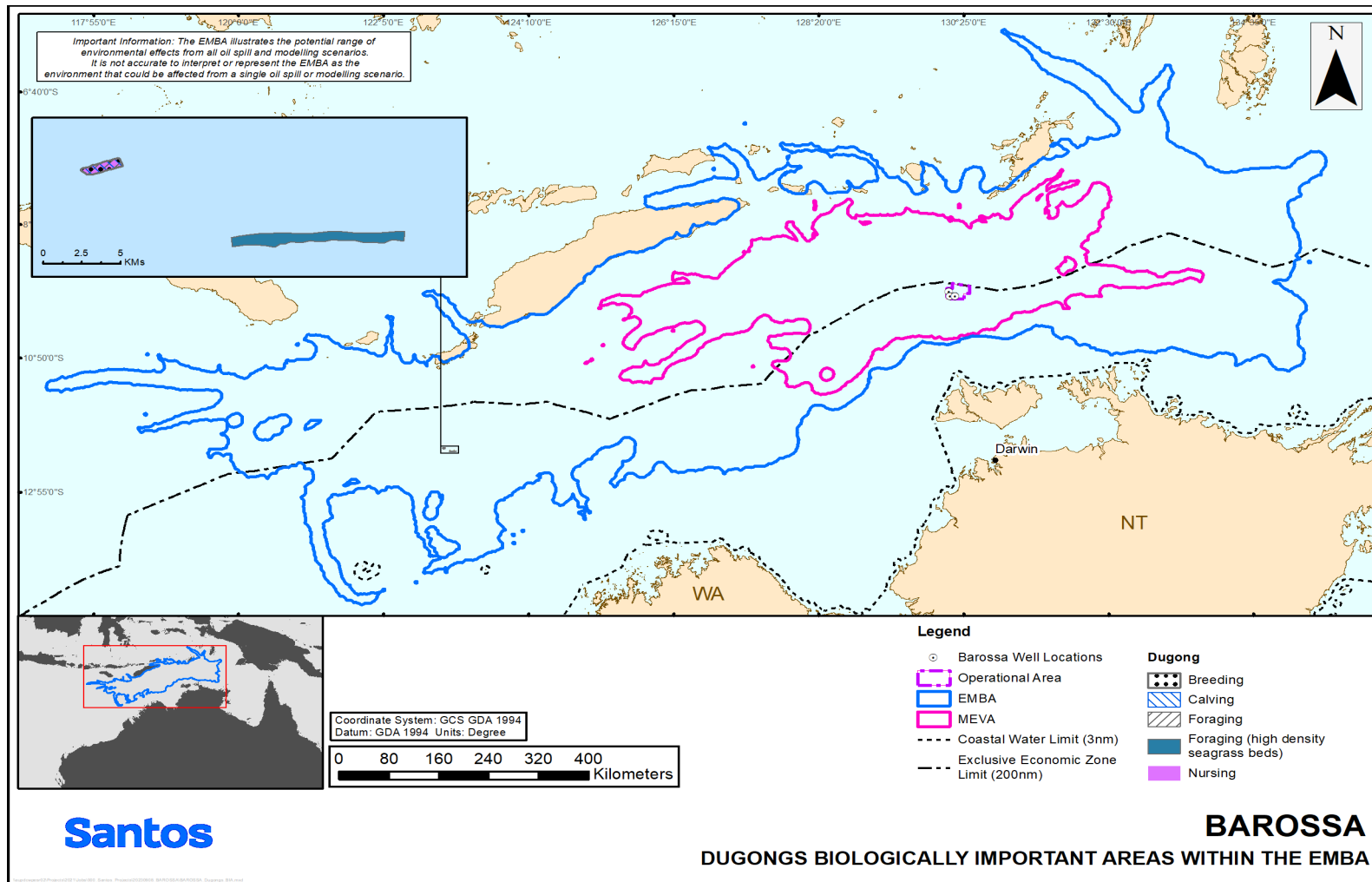


Figure 3-9: Dugong biologically important areas overlapping the EMBA and MEVA

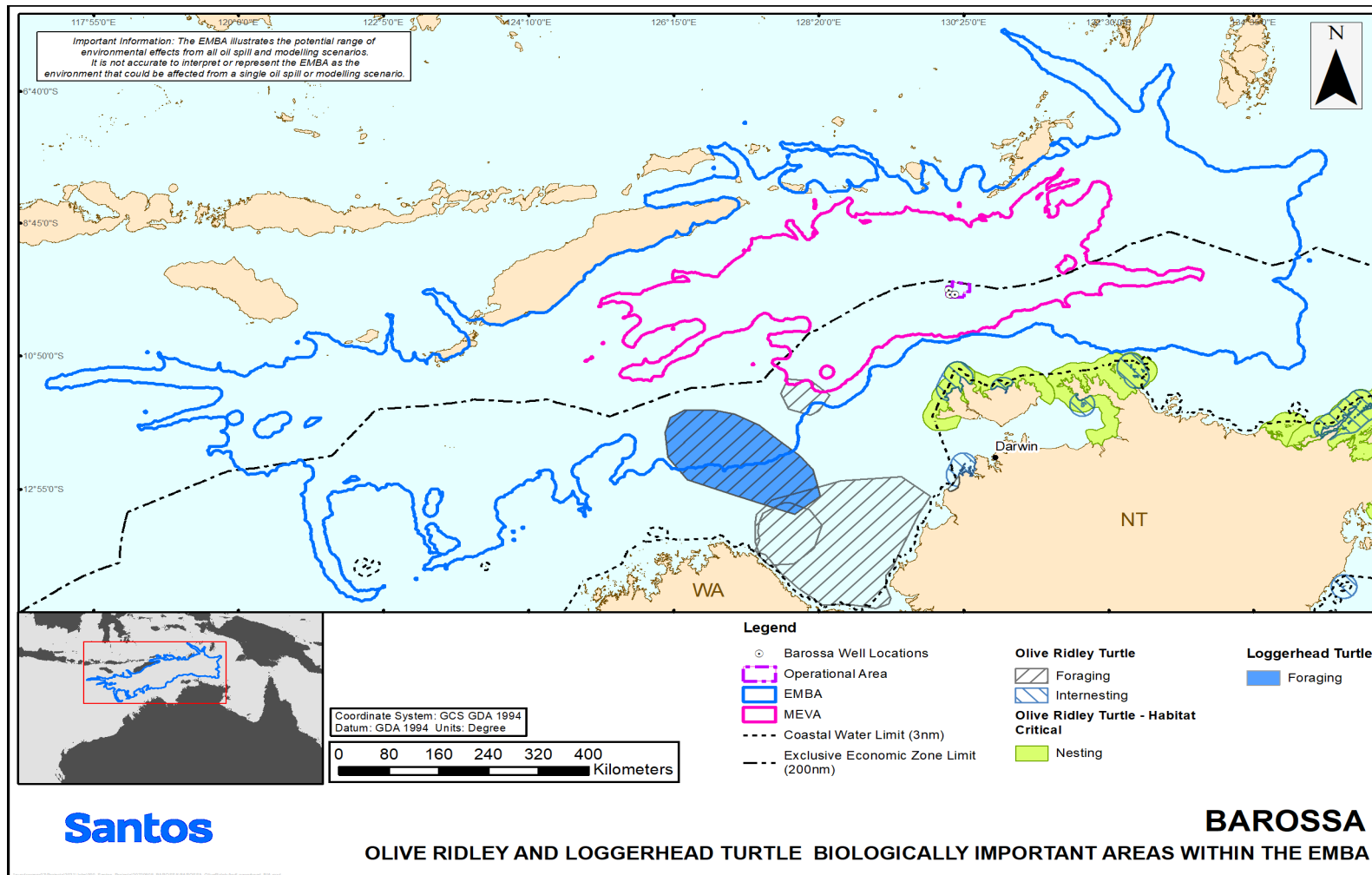


Figure 3-10: Olive Ridley and Loggerhead turtle biologically important areas and critical habitat overlapping the EMBA and MEVA

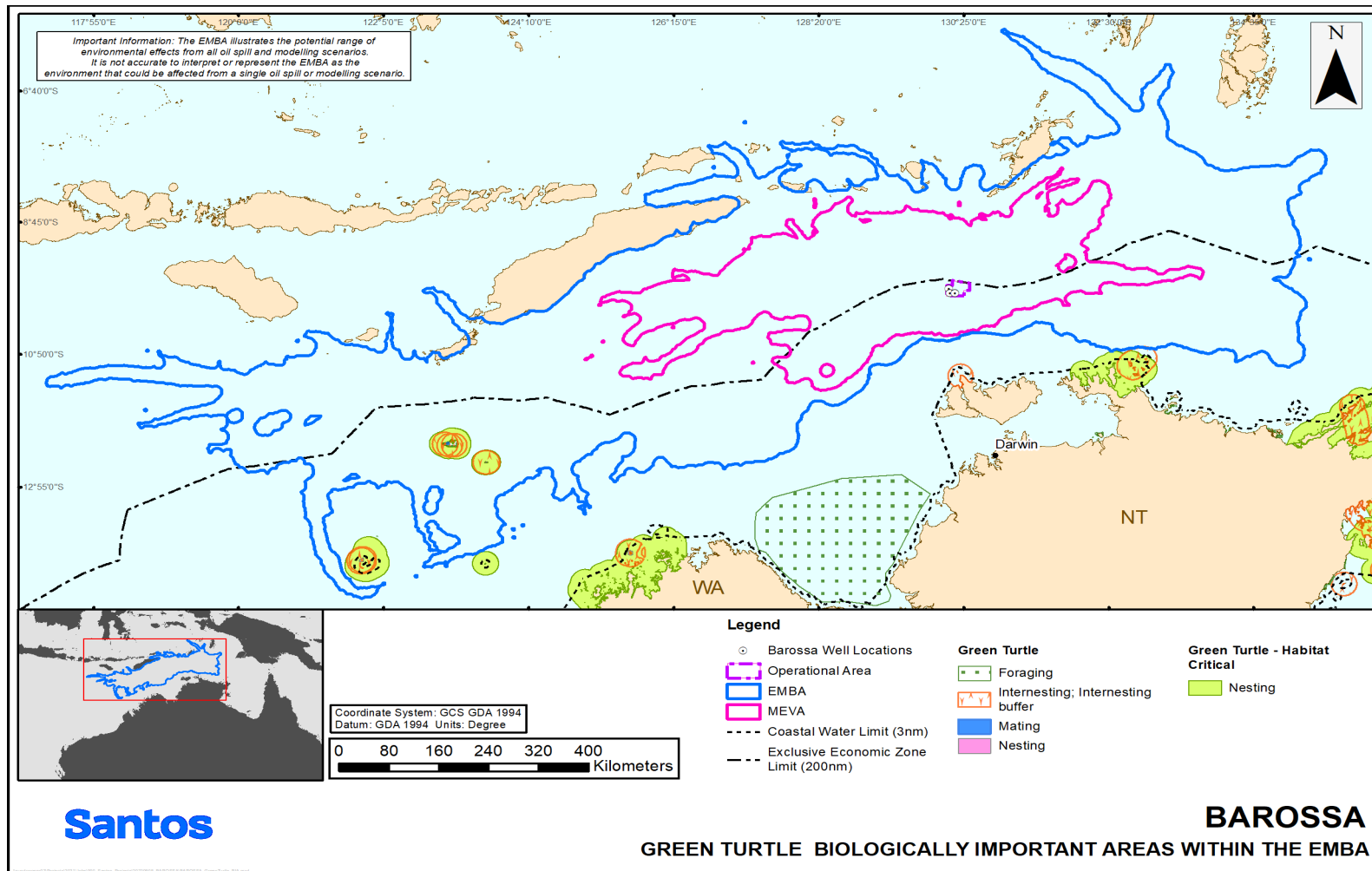


Figure 3-11: Green turtle biologically important areas and critical habitat overlapping the EMBA and MEVA

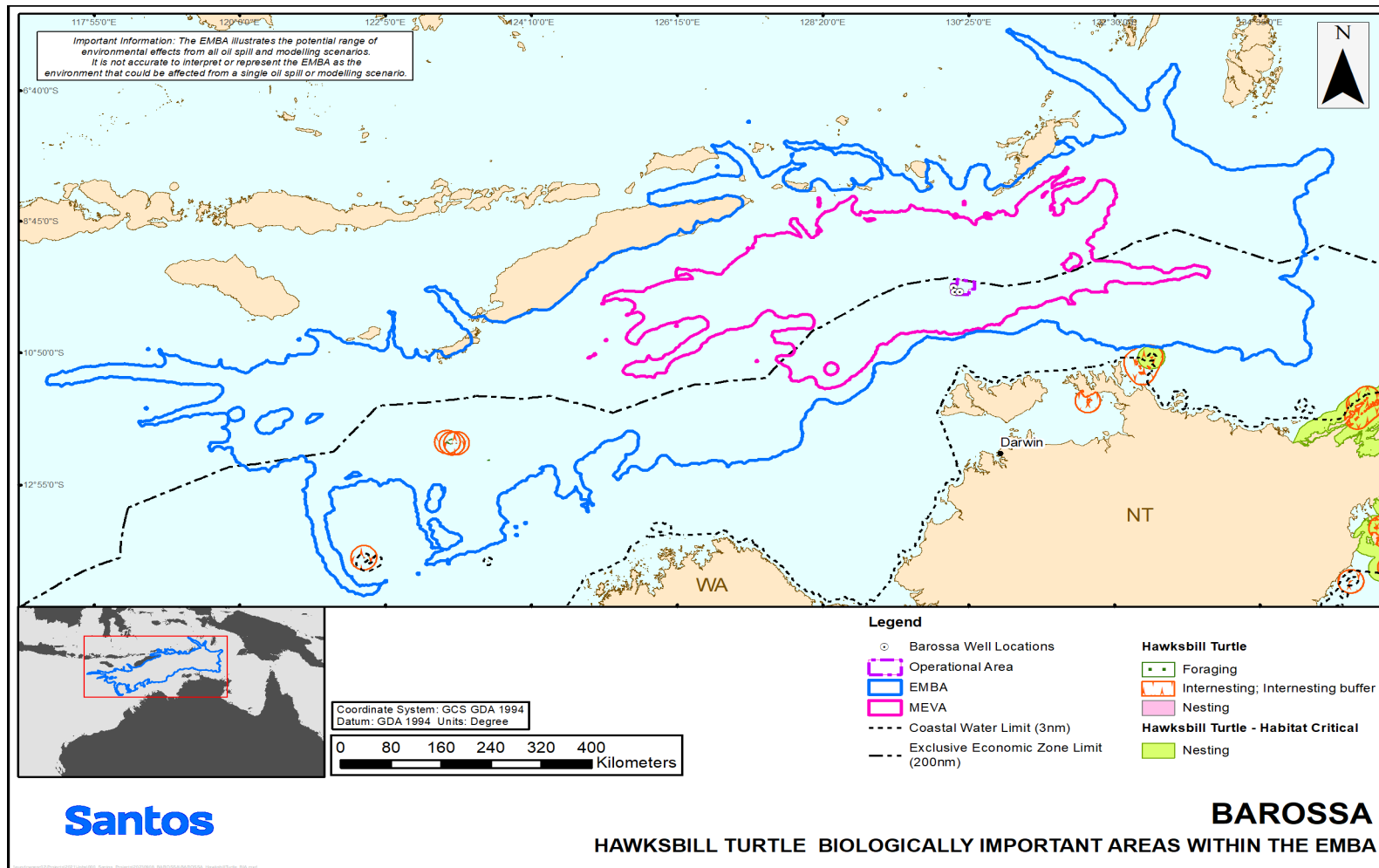


Figure 3-12: Hawksbill turtle biologically important areas and critical habitat overlapping the EMBA and MEVA

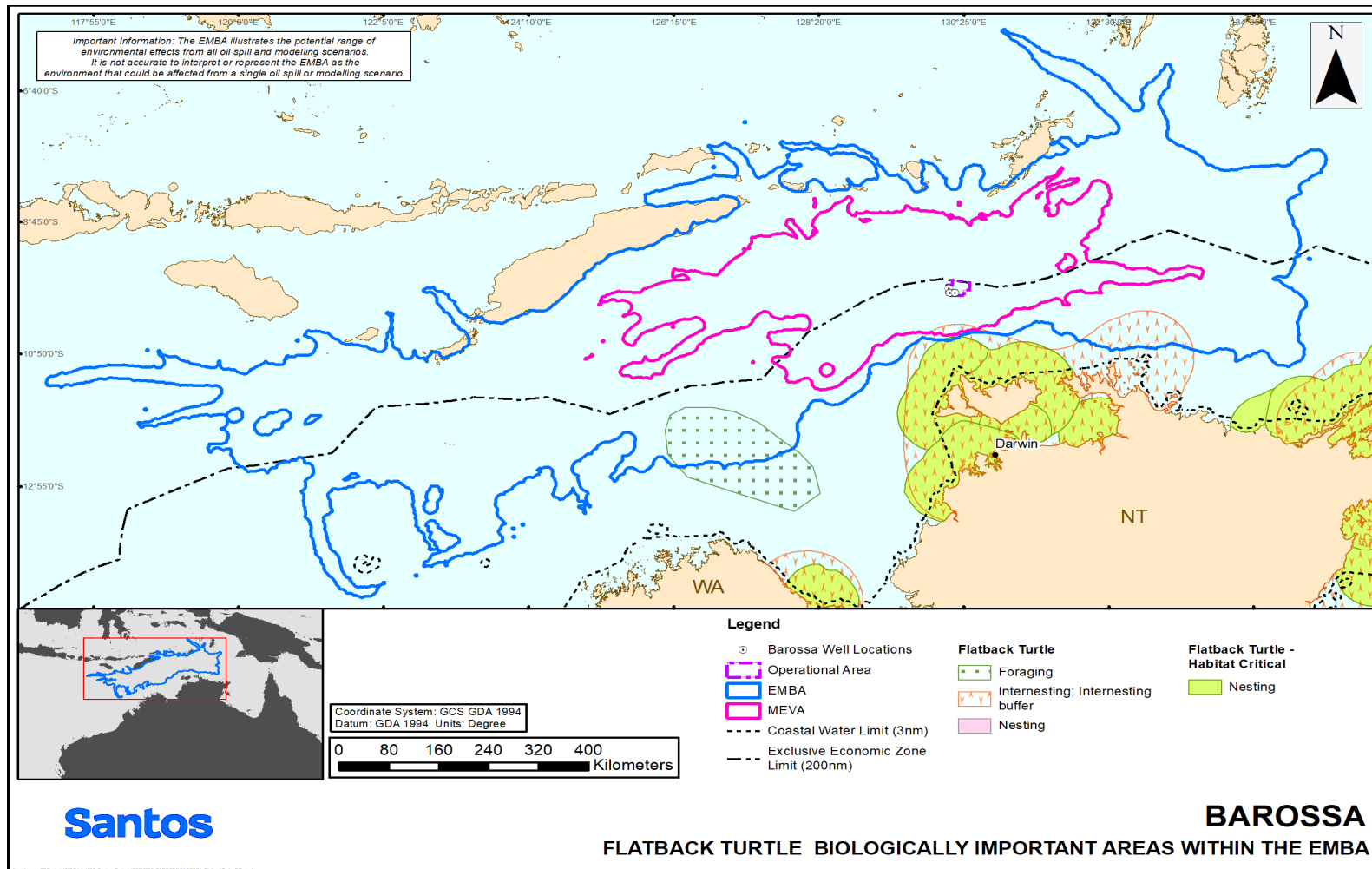


Figure 3-13: Flatback turtle biologically important areas and critical habitat overlapping the EMBA and MEVA

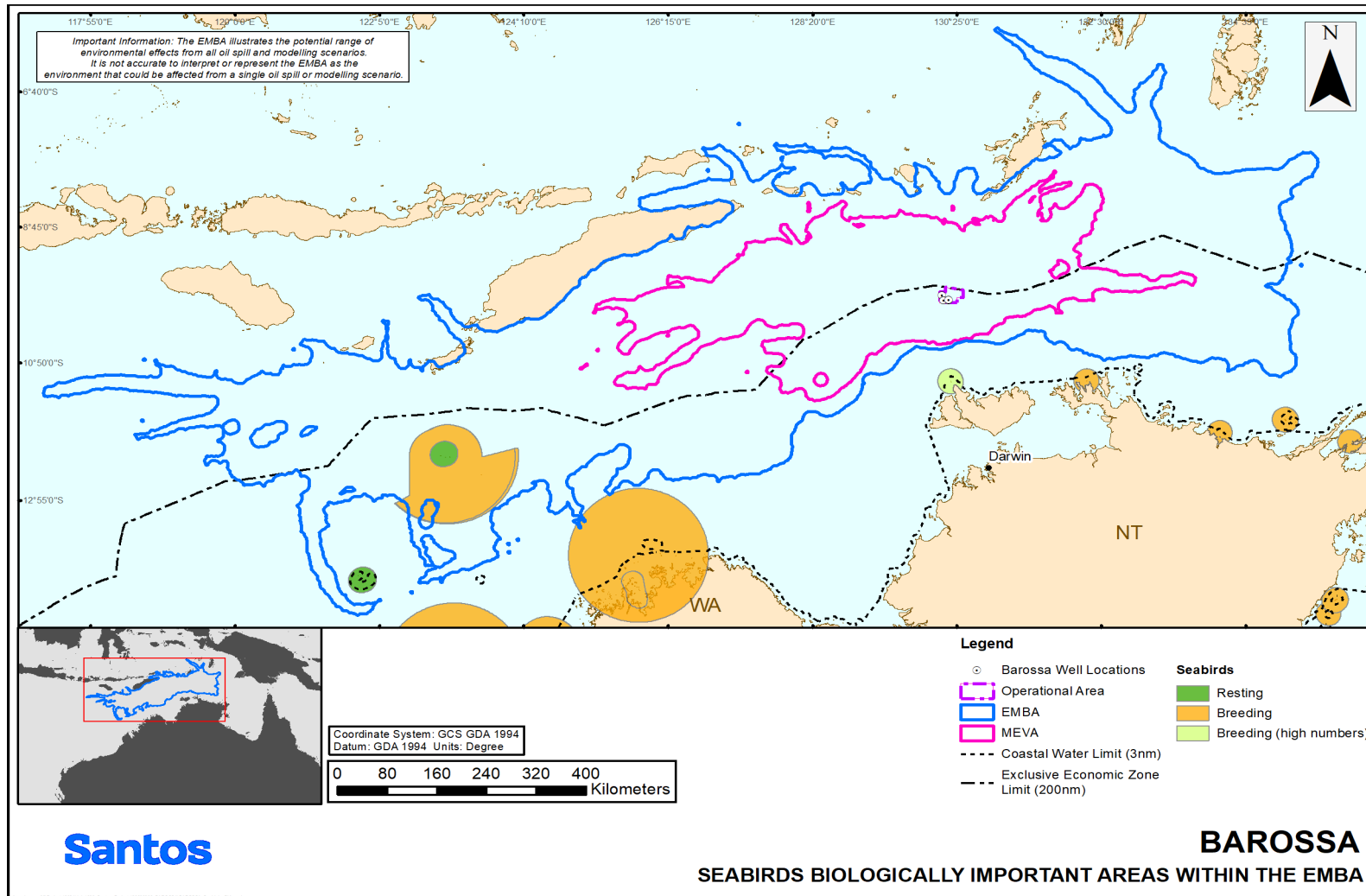


Figure 3-14: Seabirds biologically important areas overlapping the environment that may be affected

## 3.2.6.2 Recovery plans

Recovery plans set out the necessary research and management actions to stop the decline of listed threatened species and support their recovery. **Table 3.8** summarises the actions relevant to the Activity with more information on the requirements of the relevant plans of management (including conservation advice, recovery plans and management plans for marine fauna), and demonstrates where this EP considers those management requirements.



**Table 3.8: Relevant threats identified in recovery plans, conservation advice and management plans for species that occur or may occur within the environment that may be affected**

Receptor	Name	Recovery plan/conservation advice/management plan	Threats identified as relevant to the Activity	Addressed (where relevant) in EP section
All	All vertebrate fauna	Threat Abatement Plan for Impacts of Marine Debris on Vertebrate wildlife of Australia’s coasts and oceans (DoEE, 2018)	Marine debris	7.1
Fish and Sharks	Dwarf sawfish	Sawfish and River Sharks Multispecies Recovery Plan (CoA, 2015a)	Habitat degradation and modification	6.4, 6.6, 6.7, 7.1, 7.2, 7.4, 7.5, 7.6, 7.7, 7.8
	Green sawfish	Sawfish and River Sharks Multispecies Recovery Plan (CoA, 2015a)	Habitat degradation and modification	6.4, 6.6, 6.7, 7.1, 7.2, 7.4, 7.5, 7.6, 7.7, 7.8
	Freshwater sawfish	Sawfish and River Sharks Multispecies Recovery Plan (CoA, 2015a)	Habitat degradation and modification	6.4, 6.6, 6.7, 7.1, 7.2, 7.4, 7.5, 7.6, 7.7, 7.8
			Marine debris	7.1
	Great white shark	Recovery Plan for the White Shark ( <i>Carcharodon carcharias</i> ) (DSEWPac, 2013)	Ecosystem effects	6.4, 6.6, 6.7, 7.1, 7.2, 7.4, 7.5, 7.6, 7.7, 7.8
	Whale shark	Approved Conservation Advice for <i>Rhincodon typus</i> (whale shark) (TSSC, 2015d)	Boat strike from large vessels	7.3
			Habitat disruption from mineral exploration, production and transportation	6.4, 6.6, 6.7, 7.1, 7.2, 7.4, 7.5, 7.6, 7.7, 7.8
			Marine debris	7.1
	Northern river shark	Approved Conservation Advice for <i>Glyphis garricki</i> (northern river shark) (TSSC, 2014a)	Habitat degradation and modification	6.4, 6.6, 6.7, 7.1, 7.2, 7.4, 7.5, 7.6, 7.7, 7.8
			Marine debris	7.1
	Grey nurse shark	Recovery Plan for the Grey Nurse Shark ( <i>Carcharias taurus</i> ) (DoE, 2014a)	Marine pollution	6.6, 6.7, 7.1, 7.4, 7.6, 7.7, 7.8
			Habitat modification	6.4, 6.6, 6.7, 7.1, 7.2, 7.4, 7.5, 7.6, 7.7, 7.8
	Speartooth shark	Approved Conservation Advice for <i>Glphis glyphis</i> (speartooth shark) (DoE, 2014c)	Habitat degradation and modification	6.4, 6.6, 6.7, 7.1, 7.2, 7.4, 7.5, 7.6, 7.7, 7.8
			Marine debris	7.1
Mammals	Fin whale	Approved Conservation Advice for <i>Balaenoptera physalus</i> (fin whale) (TSSC, 2015b)	Habitat degradation including pollution	6.4, 6.6, 6.7, 7.1, 7.2, 7.4, 7.5, 7.6, 7.7, 7.8
			Pollution (persistent toxic pollutants)	6.4, 7.4, 7.5, 7.6, 7.7, 7.8
			Anthropogenic noise and acoustic disturbance	6.1
			Vessel strike	7.3
	Sei whale	Approved Conservation Advice for <i>Balaenoptera borealis</i> (sei whale) (TSSC, 2015a)	Habitat degradation including pollution	6.4, 6.6, 6.7, 7.1, 7.2, 7.4, 7.5, 7.6, 7.7, 7.8
			Pollution	6.4, 7.4, 7.5, 7.6, 7.7, 7.8

Receptor	Name	Recovery plan/conservation advice/management plan	Threats identified as relevant to the Activity	Addressed (where relevant) in EP section	
			Vessel strike	7.3	
			Anthropogenic noise and acoustic disturbance	6.1	
	Blue whale	Conservation Management Plan for the Blue Whale, 2015–2025 (CoA, 2015a)	Noise interference	6.1	
			Habitat modification	6.4, 6.6, 6.7, 7.1, 7.2, 7.4, 7.5, 7.6, 7.7, 7.8, 7.9	
			Vessel Disturbance	7.3	
	Reptiles	All marine turtles	National Light Pollution Guidelines for Wildlife Including Marine Turtles, Seabirds and Migratory Shorebirds (DoEE, 2020)	Light pollution	6.2
		Loggerhead turtle	Recovery Plan for Marine Turtles in Australia 2017–2027 (CoA, 2017)	Marine debris	7.1
Vessel disturbance				7.3	
Light pollution				6.2	
Chemical and terrestrial discharge				6.6, 6.7, 7.4, 7.6, 7.7, 7.8	
Noise interference				6.1	
Green turtle		Recovery Plan for Marine Turtles in Australia 2017–2027 (CoA, 2017)	Deteriorating water quality	6.6, 6.7, 7.4, 7.6, 7.7, 7.8	
			Marine debris	7.1	
			Vessel disturbance	7.3	
			Light pollution	6.2	
			Chemical and terrestrial discharge	6.6, 6.7, 7.4, 7.6, 7.7, 7.8	
			Noise interference	6.1	
Leatherback turtle		Commonwealth Conservation Advice on Dermochelys coriacea (DoEE, 2008)	Boat strike	7.3	
			Changes to breeding sites	6.6, 6.7, 7.4, 7.6, 7.7, 7.8	
			Ingestion of marine debris	7.1	
			Degradation of foraging areas	6.6, 6.7, 7.4, 7.6, 7.7, 7.8	
		Recovery Plan for Marine Turtles in Australia (CoA, 2017)	Chemical and terrestrial discharge	6.6, 6.7, 7.4, 7.6, 7.7, 7.8	
	Marine debris		7.1		

Receptor	Name	Recovery plan/conservation advice/management plan	Threats identified as relevant to the Activity	Addressed (where relevant) in EP section
			Habitat modification	6.4, 6.6, 6.7, 7.1, 7.2, 7.4, 7.5, 7.6, 7.7, 7.8
			Vessel disturbance	7.3
			Light pollution	6.2
			Noise interference	6.1
	Hawksbill turtle	Recovery Plan for Marine Turtles in Australia 2017–2027 (CoA, 2017)	Chemical and terrestrial discharge	6.6, 6.7, 7.4, 7.6, 7.7, 7.8
			Marine debris	7.1
			Habitat modification	6.4, 6.6, 6.7, 7.1, 7.2, 7.4, 7.5, 7.6, 7.7, 7.8
			Vessel disturbance	7.3
			Light pollution	6.2
			Noise interference	6.1
	Flatback turtle	Recovery Plan for Marine Turtles in Australia 2017–2027 (CoA, 2017)	Chemical and terrestrial discharge	6.6, 6.7, 7.4, 7.6, 7.7, 7.8
			Marine debris	7.1
			Habitat modification	6.4, 6.6, 6.7, 7.1, 7.2, 7.4, 7.5, 7.6, 7.7, 7.8
			Vessel disturbance	7.3
			Light pollution	6.2
			Noise interference	6.1
	Olive Ridley turtle	Recovery Plan for Marine Turtles in Australia 2017 – 2027 (CoA, 2017)	Chemical and terrestrial discharge	6.6, 6.7, 7.4, 7.6, 7.7, 7.8
			Marine debris	7.1
			Habitat modification	6.4, 6.6, 6.7, 7.1, 7.2, 7.4, 7.5, 7.6, 7.7, 7.8
			Vessel disturbance	7.3
Light pollution			6.2	
Short-nosed sea snake	Approved Conservation Advice on Aipysurus apraefrontalis (Short-nosed seasnake) (DSEWPaC, 2011)	Energy industry exploration	6 and 7	
Leaf-scaled sea snake	Approved Conservation Advice on Aipysurus foliosquama (Leaf-scaled seasnake) (DSEWPaC, 2011)	Energy industry exploration	6 and 7	

Receptor	Name	Recovery plan/conservation advice/management plan	Threats identified as relevant to the Activity	Addressed (where relevant) in EP section		
Birds	All seabirds and shorebirds	National Light Pollution Guidelines for Wildlife Including Marine Turtles, Seabirds and Migratory Shorebirds (DoEE, 2020)	Light pollution	6.2		
	Bar-tailed godwit Curlew sandpiper Eastern curlew Red knot Streaked shearwater	Wildlife Conservation Plan for Migratory Shorebirds (CoA, 2015c)	Pollution and contaminants	6.6, 6.7, 7.4, 7.6, 7.7, 7.8		
			Habitat loss and degradation	6.6, 7.1, 7.4, 7.5, 7.6, 7.7, 7.8		
	Black noddy Bridled tern Brown booby Caspian tern Common noddy Great frigatebird Greater crested tern Lesser crested tern Lesser frigatebird Little tern Masked booby Osprey Red-footed booby Red-tailed tropicbird Roseate tern Streaked shearwater Wedge-tailed shearwater White-tailed tropicbird	Wildlife Conservation Plan for Seabirds (CoA, 2020)	Habitat modification	6.6, 7.1, 7.4, 7.5, 7.6, 7.7, 7.8		
			Resource extraction	6 and 7		
			Light pollution	6.2		
			Marine debris	7.1		
			Chronic pollution	6.6, 6.7, 7.4		
			Acute pollution	6.6, 6.7, 7.5, 7.6, 7.7, 7.8		
			Christmas Island White-tailed Tropicbird	Conservation Advice Phaethon lepturus fulvus white-tailed tropicbird (Christmas Island) (DoE, 2014d)	Oil spills	6.6, 6.7, 7.5, 7.6, 7.7
			Curlew sandpiper	Approved Conservation Advice for Calidris ferruginea (Curlew Sandpiper) (TSSC, 2015e)	Habitat loss and degradation from pollution	6.6, 7.1, 7.4, 7.5, 7.6, 7.7, 7.8
					Marine pollution	6.6, 6.7, 7.4, 7.6, 7.7, 7.8

Receptor	Name	Recovery plan/conservation advice/management plan	Threats identified as relevant to the Activity	Addressed (where relevant) in EP section
	Eastern curlew	Approved Conservation Advice for Numenius madagascariensis (Eastern Curlew) (TSSC, 2015f)	Habitat loss and degradation from pollution	6.6, 7.1, 7.4, 7.5, 7.6, 7.7, 7.8
	Greater sand plover	Conservation Advice Charadrius leschenaultii Greater sand plover (TSSC, 2016c)	Habitat loss and degradation	6.6, 7.1, 7.4, 7.5, 7.6, 7.7, 7.8
	Red knot	Approved Conservation Advice for Calidris canutus (Red knot) (TSSC, 2016b)	Pollution/contamination impacts	6.6, 6.7, 7.4, 7.6, 7.7, 7.8
			Habitat loss and degradation	6.6, 7.1, 7.4, 7.5, 7.6, 7.7, 7.8
	Northern Siberian bar-tailed godwit	Conservation Advice Limosa lapponica menzbieri (Bar-tailed godwit (northern Siberian)) (TSSC, 2016a)	Habitat loss disturbance and modifications	6.6, 7.1, 7.4, 7.5, 7.6, 7.7, 7.8
			Pollution/contamination impacts	6.6, 6.7, 7.4, 7.6, 7.7, 7.8
	Abbott's booby	Conservation Advice for the Abbott's booby Papasula abbotti (2020)	Marine debris – plastics	7.1
	Australian lesser noddy	Conservation Advice Anous tenuirostris melanops (Australian lesser noddy) (TSSC, 2015g)	Habitat loss, disturbance and modification	6.6, 7.1, 7.4, 7.5, 7.6, 7.7, 7.8
			Pollution	6.6, 6.7, 7.4, 7.6, 7.7, 7.8
			Oil spills	6.6, 6.7, 7.5, 7.6, 7.7

## 3.2.7 Socio-economic receptors

The EMBA encompasses both Australian and international waters, as shown in **Figure 3-1**, and extends beyond the Exclusive Economic Zone (EEZ) into parts of Indonesian and Timor-Leste sovereign waters.

The coastlines of Indonesia and Timor-Leste are approximately 149 km and 347 km from the Operational Area respectively. The EMBA extends to the Indonesian and Timor-Leste coastlines.

Socio-economic activities and features that may occur in the Operational Area and EMBA are set out in this section and summarised in **Table 3.9**.

The broader cultural features of the Operational Area and the EMBA are addressed at **Section 3.2.8**.

**Table 3.9: Socio-economic-related activities / features that occur or may occur in the Operational Area and/or environment that may be affected**

Value/sensitivity	Operational Area presence	EMBA presence
Commercial fisheries – Commonwealth (Figure 3-15)	Four Commonwealth-managed fisheries overlap the Operational Area (Figure 3-15): <ul style="list-style-type: none"> <li>+ Northern Prawn Fishery</li> <li>+ Southern Bluefin Tuna Fishery</li> <li>+ Western Skipjack Tuna Fishery</li> <li>+ Western Tuna and Billfish Fishery.</li> </ul>	Commonwealth fisheries within the EMBA (Figure 3-15): <ul style="list-style-type: none"> <li>+ Northern Prawn Fishery</li> <li>+ Southern Bluefin Tuna Fishery</li> <li>+ Western Skipjack Tuna Fishery</li> <li>+ Western Tuna and Billfish Fishery</li> <li>+ North-West Slope Trawl Fishery.</li> </ul>
Commercial fisheries – State (Figure 3-16)	Five NT-managed fisheries overlap the Operational Area (Figure 3-16): <ul style="list-style-type: none"> <li>+ Aquarium Fishery</li> <li>+ Offshore Net and Line Fishery</li> <li>+ Timor Reef Fishery</li> <li>+ Spanish Mackerel Fishery</li> <li>+ Pearl Oyster Fishery.<sup>6</sup></li> </ul>	NT fisheries within the EMBA (Figure 3-16): <ul style="list-style-type: none"> <li>+ Coastal Line Fishery</li> <li>+ Aquarium Fishery</li> <li>+ Demersal Fishery</li> <li>+ Offshore Net and Line Fishery</li> <li>+ Timor Reef Fishery</li> <li>+ Spanish Mackerel Fishery</li> <li>+ Small Pelagic Development Fishery</li> <li>+ Pearl Oyster Fishery.<sup>6</sup></li> </ul> WA fisheries within the EMBA (Figure 3-16): <ul style="list-style-type: none"> <li>+ Mackerel Managed Fishery</li> <li>+ Northern Demersal Scalefish Fishery.</li> </ul>
Aquaculture	No aquaculture activities operate within the Operational Area.	Seaweed farming occurs off the Indonesian coastline.

<sup>6</sup> The Pearl Oyster Fishery and the Small Pelagic Development Fishery are not active in the Operational Area or EMBA. Although no fishing activity occurs, the fisheries do intersect the Operational Area and EMBA (Pearly Oyster Fishery) and the EMBA (Small Pelagic Development Fishery). These fisheries are not included in Figure 3-16 for the reasons stated.

Value/sensitivity	Operational Area presence	EMBA presence
Subsistence Indonesian fishing and Australian recreational fishing	Given the water depths in the Operational Area, Australian recreational fishing activity is not expected. Subsistence and modern Indonesian fishing is permitted in the Perth Treaty Area adjacent to but outside the Operational Area (refer to <b>Section 3.2.7.2</b> ).	Indonesian and Timorese traditional fishers, as well as Australian recreational fishers, are expected to transit and fish in the EMBA.
Energy industry ( <b>Section 3.2.7.3</b> )	There are no established petroleum operations within, or immediately adjacent to the Operational Area.	The nearest offshore operating facility to the Operational Area is the Santos-operated Bayu Undan platform, located approximately 409 km southwest of the Operational Area. Energy industry exploration permits are operated by other titleholders throughout the EMBA.
Telecommunications cables ( <b>Figure 3-17</b> )	The North-West Cable System is located approximately 227 km south of the Operational Area.	This cable system intersects the EMBA though a hydrocarbon spill will not have any impact on submarine cables.
Defence ( <b>Section 3.2.7.5</b> )	There are no designated military/defence exercise areas within or in the immediate vicinity of the Operational Area. During their surveillance, Australian Border Force vessels may transit the Operational Area.	The EMBA intersects a practice area of the North Australian Exercise Area (NAXA) ( <b>Figure 3-17</b> ). During their surveillance, Australian Border Force vessels may transit the EMBA.
Shipping ( <b>Section 3.2.7.6</b> )	The closest major commercial port to the Operational Area is Darwin Port, located approximately 285 km away. No designated shipping fairways intersect the Operational Area.	<b>Figure 3-18</b> shows the vessels recorded in the AUSREP system in 2021 and shipping density within the region. It shows the main commercial shipping channel tracking to the west of the Operational Area. Vessel traffic is expected within the EMBA.



Value/sensitivity	Operational Area presence	EMBA presence
Tourism ( <b>Section 3.2.7.7</b> )	The Operational Area is located in offshore waters that are highly unlikely to be accessed for tourism activities (e.g., recreational fishing and boating and charter boat operations). These tend to be centred around nearshore waters, islands and coastal areas.	There are several shoals and banks within the EMBA, and some these may be visited by small numbers of recreational fishers/charter vessels targeting fish that inhabit these shallower features. Other tourism operators may also operate within the EMBA.
Shipwrecks	No shipwrecks are recorded within the Operational Area.	One known shipwreck listed under the <i>Underwater Cultural Heritage Act 2018</i> (Cth) is located at the Cartier Island Marine Park: the <i>Ann Millicent</i> (wrecked in 1888).

### 3.2.7.1 Commercial fisheries

The Timor and Arafura seas support a variety of shark, demersal and pelagic finfish and crustacean species of commercial importance. The Operational Area overlaps four Commonwealth commercial fisheries, and five NT-managed commercial fisheries. The EMBA overlaps one additional Commonwealth fishery **Figure 3-15**, as well as two additional NT-managed commercial fisheries and two WA-managed commercial fisheries (**Figure 3-16**) (NT Government, 2019a,b,c,d, 2021). Santos' understanding of fishing effort within these commercial fisheries, based on publicly available information and consultation with Relevant Persons, is provided in **Table 3.10**.

**Table 3.10: Commonwealth and state fisheries that overlap the Operational Area and/or environment that may be affected**

Fishery	Overlap		Description	Likelihood of interaction with fishers
	Op area	EMBA		
Commonwealth-managed fisheries				
Northern Prawn Fishery	✓	✓	<p><b>Area:</b> Extends from 126° E near Cape Londonderry in WA across to the northernmost tip of Cape York in Queensland.</p> <p>Most of the Northern Prawn Fishery effort lies in the Gulf of Carpentaria, Joseph Bonaparte Gulf and along the Arnhem Land coast (DoA, 2014).</p> <p><b>Gear:</b> trawl.</p> <p><b>Key target species:</b> The key target species are banana prawns, tiger prawns and endeavour prawns. There are two fishing seasons, with the season end date depends on catch rates:</p> <ul style="list-style-type: none"> <li>+ Season 1 (mainly banana prawns caught): 1 April to 15 June</li> <li>+ Season 2 (mainly tiger prawns caught): 1 August to end of November.</li> </ul> <p>Fishing for scampi also occurs in deeper waters, with fishing effort spread across two-to-three months of the year (December to February).</p> <p><b>Effort (2019):</b> 52 active vessels, around 8500 tonnes (ABARES fishery status reports, 2020).</p>	<p>The areas of low, medium and high fishing effort are distant from the Operational Area. Based on industry consultation prawn fishing is not expected in water depths greater than around 130 m, therefore interaction with this fishery is unlikely.</p> <p>Scampi is targeted in deeper waters (&gt;250 m) within and surrounding the Operational Area. There is a low level of fishing effort, with December and January the peak scampi fishing periods. Therefore, interaction with this fishery is possible during these months.</p>
Southern Bluefin Tuna Fishery	✓	✓	<p><b>Area:</b> The Southern Bluefin Tuna Fishery (SBTF) spans the Australian Fishing Zone. However, it is only active in waters offshore of South and South Eastern Australia.</p> <p><b>Gear:</b> purse seine and pelagic long line.</p> <p><b>Key target species:</b> southern bluefin tuna.</p> <p><b>Effort (2019):</b> 27 active vessels, around 6,000 tonnes (ABARES Fishery status reports, 2020).</p>	<p>No active commercial fishing effort reported in the Operational Area or EMBA, therefore interaction with this fishery is unlikely.</p>

Fishery	Overlap		Description	Likelihood of interaction with fishers
	Op area	EMBA		
Western Skipjack Tuna Fishery	✓	✓	<p><b>Area:</b> The Western Skipjack Tuna Fishery (SBTF) spans the Australian EEZ and adjacent high seas, from Cape York to the Victoria – South Australia border, including waters around Tasmania and the high seas of the Pacific Ocean.</p> <p><b>Gear:</b> purse seine.</p> <p><b>Key target species:</b> skipjack tuna.</p> <p><b>Effort (2019):</b> None. There has been no fishing effort since the 2008–09 season, and in that season, activity concentrated off South Australia (ABARES Fishery status reports, 2020).</p>	No recent active commercial fishing effort reported in the Operational Area or EMBA, therefore interaction with this fishery is unlikely.
Western Tuna and Billfish Fishery	✓	✓	<p><b>Area:</b> Operates in Australia’s EEZ and high seas of the Indian Ocean. In recent years, fishing effort has concentrated off south-west Western Australia, with occasional activity off South Australia.</p> <p><b>Gear:</b> pelagic longline.</p> <p><b>Key target species:</b> bigeye tuna, yellowfin tuna, striped marlin, swordfish.</p> <p><b>Effort (2019):</b> Four active vessels, around 200 tonnes (ABARES Fishery status reports, 2020).</p>	No recent active commercial fishing effort reported in the Operational Area or EMBA, therefore interaction with this fishery is unlikely.
North-West Slope Trawl Fishery	✗	✓	<p><b>Area:</b> Operates off north-western Australia from 114°E to 125°E, roughly between the 200 m isobath and the outer boundary of the Australian Fishing Zone. A large area of the Australia–Indonesia MoU Box falls within the North West Shelf (NWS) throughflow.</p> <p><b>Gear:</b> demersal trawl.</p> <p><b>Key target species:</b> scampi.</p> <p><b>Effort (2019):</b> Four active vessels, around 70 tonnes (ABARES Fishery status reports, 2020).</p>	No fishery overlaps with the Operational Area. Effort known within the EMBA.

Fishery	Overlap		Description	Likelihood of interaction with fishers
	Op area	EMBA		
State managed fisheries – NT				
Aquarium Fishery	✓	✓	<p><b>Area:</b> It includes freshwater, estuarine and marine habitats to the outer boundary of the Australian Fishing Zone. Most marine species are collected within 100 km of Nhulunbuy and Darwin. A specimen shell collection enterprise occurs around Ashmore Reef and Cartier Island (NT Government, 2021).</p> <p><b>Gear:</b> handheld, nets and pots (dive-based).</p> <p><b>Key target species:</b> fish, invertebrates and plants for aquariums.</p> <p><b>Effort:</b> unknown – no restriction on number of licences.</p>	<p>No known recent effort within the Operational Area. Therefore, interaction with this fishery is unlikely.</p> <p>Effort could occasionally occur within the EMBA near Evans Shoal.</p>
Spanish Mackerel Fishery	✓	✓	<p><b>Area:</b> Commercial fishing for Spanish mackerel is allowed from the high water mark to the outer boundary of the Australian Fishing Zone, which is 200 nautical miles offshore.</p> <p>The majority of the fishing effort occurs in the vicinity of reefs, headlands and shoals and includes waters near Bathurst Island, New Year Island, northern and western Groote Eylandt, the Gove Peninsula, the Wessel Islands, the Sir Edward Pellew Group and suitable fishing grounds on the western and eastern mainland coasts.</p> <p>Fishing generally takes place around reefs, headlands and shoals (NT Government, 2021).</p> <p><b>Gear:</b> trolling, handline.</p> <p><b>Key target species:</b> Spanish mackerel.</p> <p><b>Effort:</b> 15 licences allowed.</p>	<p>No known recent effort within the Operational Area. Therefore, interaction with this fishery is unlikely.</p> <p>Effort is known within the EMBA.</p>

Fishery	Overlap		Description	Likelihood of interaction with fishers
	Op area	EMBA		
Timor Reef Fishery	✓	✓	<p><b>Area:</b> The Timor Box extends north-west of Darwin to the WA/NT border and to the outer boundary of the Australian Fishing Zone. The fishery has an area of approximately 8,400 square nm (NT Government, 2021). Fishing occurs primarily in the 100 to 200 m depth range.</p> <p>Consultation indicates that the main target species is goldband snapper, with other tropical snappers (e.g., crimson snapper and saddletail snapper) also making up part of the catch; there are two active fishing licence holders currently operating in the fishery; main fishing method is trap fishing; fishery is most productive between October and May, with less activity during the dry season months of June-August due to strong northerly winds.</p> <p>Due to the water depth and based on a review of available historical catch data, fishing activity is not expected across the Operational Area.</p> <p><b>Gear:</b> line and trap.</p> <p><b>Key target species:</b> snapper, red emperor and cods.</p> <p><b>Effort:</b> 15 licences allowed.</p>	Effort possible within the Operational Area and expected in the EMBA. Therefore, interaction with this fishery is possible.
Offshore Net and Line Fishery	✓	✓	<p><b>Area:</b> It operates in NT waters from the low water mark to the boundary of the Australian Fishing Zone (AFZ) (NT Government, 2020). Most fishing is done in the coastal zone within 12 nautical miles of the coast, and immediately offshore in the Gulf of Carpentaria (NT Government, 2021).</p> <p><b>Gear:</b> longlines or pelagic nets (there are restrictions on where certain gear can be used).</p> <p><b>Key target species:</b> blacktip sharks, grey mackerel.</p> <p><b>Effort:</b> Unknown – no restriction on number of licences.</p>	Interaction with this fishery in the Operational Area is possible but highly unlikely due to the concentration of fishing effort in near coastal areas and distribution of the targeted species.

Fishery	Overlap		Description	Likelihood of interaction with fishers
	Op area	EMBA		
Demersal Fishery (NT)	X	✓	<p><b>Area:</b> Demersal fishing is allowed from 15 nautical miles from the low water mark to the outer boundary of the Australian Fishing Zone, excluding the area of the Timor Reef fishery (NT Government, 2021).</p> <p><b>Gear:</b> lines, fish traps and semi-demersal trawl nets.</p> <p><b>Key target species:</b> snapper (various species).</p> <p><b>Effort:</b> Unknown – 18 licences currently issued.</p>	<p>No fishery overlaps with the Operational Area.</p> <p>Effort expected within the EMBA only.</p>
Coastal Line Fishery	X	✓	<p><b>Area:</b> Extends from the NT coast between the high-water mark and 15 nautical miles out from the low water mark. Special restrictions apply in the western zone which extends from the Western Australian border to Vashon Head on Cobourg Peninsula, in the NT. Fishing is prohibited in reef fish protection areas Access is also restricted around registered Aboriginal sacred sites and protected areas.</p> <p><b>Gear:</b> Lines, cast and scoop nets or gaffs. Traps in some areas</p> <p><b>Key target species:</b> Black jewfish and golden snapper.</p> <p><b>Effort:</b> 52 allocated licences.</p>	<p>No effort occurs within the Operational Area. Therefore, interaction with this fishery is unlikely.</p> <p>Effort could occasionally occur within the EMBA.</p>
Pearl Oyster Fishery	✓	✓	<p><b>Area:</b> The fishery extends from the high-water mark in NT waters to the outer boundary of the Australian Fishing Zone, 200 nautical miles offshore in Commonwealth Waters.</p> <p>All current activity occurs in NT waters within 12 nautical miles of the mainland.</p> <p>There are five active fishing licence holders currently operating in the fishery which can be active throughout the year.</p> <p><b>Gear:</b> farming by hand only.</p> <p><b>Effort:</b> 5 licences allowed.</p>	<p>Fishery boundaries overlap with Operational Area and EMBA, but there is no fishing effort established within these areas.</p>

Fishery	Overlap		Description	Likelihood of interaction with fishers
	Op area	EMBA		
State Managed Fisheries – WA				
Mackerel Managed Fishery	X	✓	<p><b>Area:</b> Commercially fished between Geraldton and the WA/NT border.</p> <p><b>Gear:</b> trolling.</p> <p><b>Key target species:</b> Spanish mackerel.</p> <p><b>Effort:</b> Active vessels less than three (FishCube data, 2019), around 300 tonnes (Gaughan and Santoro, 2021).</p>	<p>No fishery overlaps with the Operational Area.</p> <p>Effort expected within the EMBA.</p>
Northern Demersal Scalefish Managed Fishery (WA)	X	✓	<p><b>Area:</b> Operates off WA's coast in waters east of 120° E longitude.</p> <p><b>Gear:</b> handline, dropline and fish traps, although the fishery has essentially operated as a trap-based fishery since 2002.</p> <p><b>Key target species:</b> goldband snapper and red emperor.</p> <p><b>Effort:</b> active vessels: (unknown), around 1500 tonnes (Gaughan &amp; Santoro, 2021).</p>	<p>No fishery overlaps with the Operational Area.</p> <p>Effort expected within the EMBA.</p>



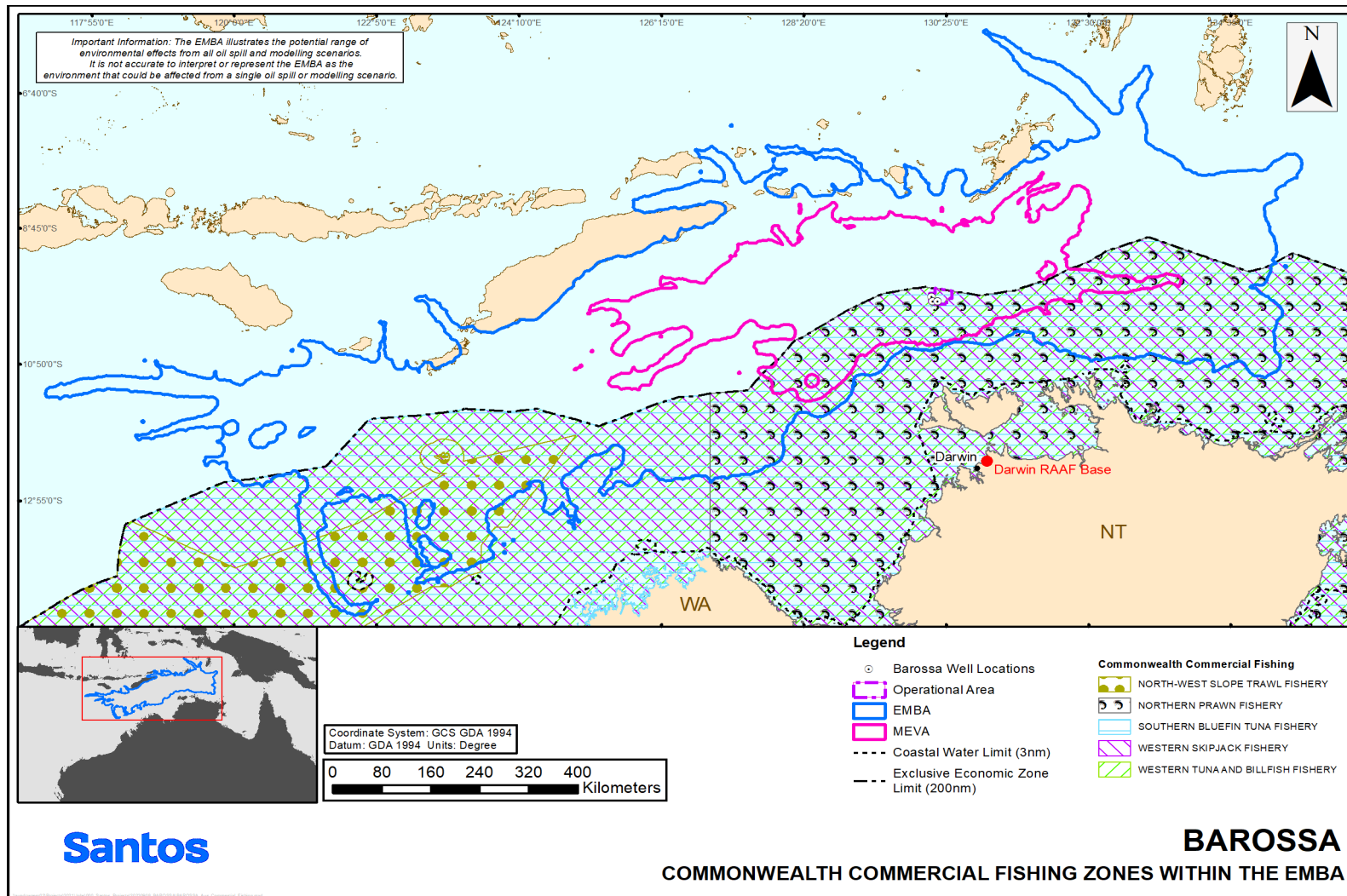


Figure 3-15: Commonwealth-managed fisheries overlapping the EMBA and MEVA.

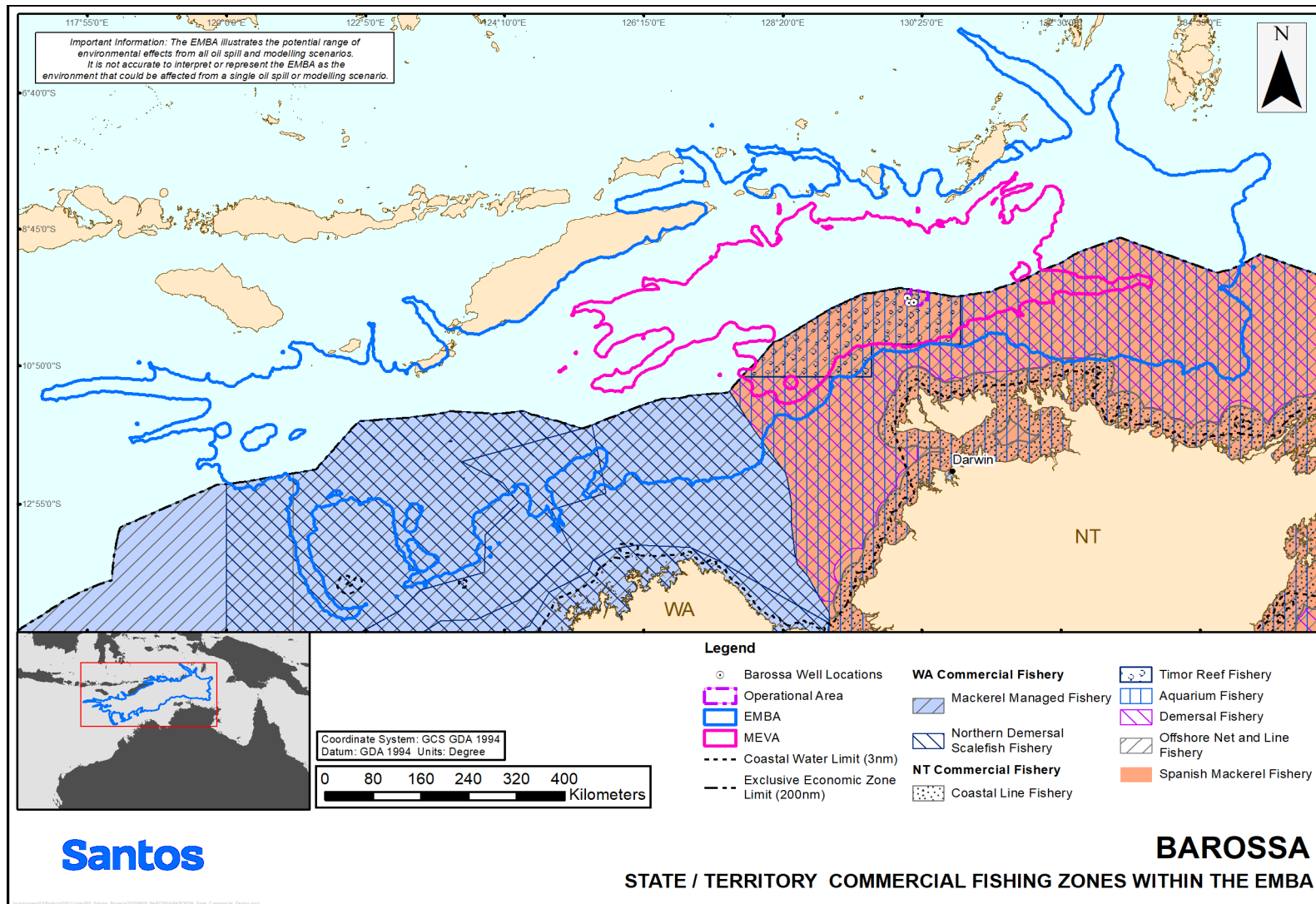


Figure 3-16: Western Australian and Northern Territory managed (active) fisheries overlapping the EMBA and MEVA.

### 3.2.7.2 Indonesian and Timorese commercial and subsistence fishing

Indonesian and Timor-Leste subsistence fishers fish in the Timor Sea and Arafura seas. Indonesian fishers typically utilise Australian locations at locations such as Hibernia Reef, Ashmore Reef and Scott Reef (more than 770 km south-west of the Operational Area). Fishing occurs from April to December, with most activity occurring in September and October. The Big Bank shoals (located to the west of the Operational Area, in the centre of the EMBA) lie in the Indonesian EEZ and Indonesian commercial vessels may fish in and around the shoals (Heyward *et al.*, 1997a). Species that are likely to be targeted by Indonesian or Timorese subsistence fishers are shark, tuna, mackerel and reef fish such as snapper.

An MoU between the Australian and Indonesian governments, officially known as the Australia-Indonesia *Memorandum of Understanding on the Operations of Indonesian Traditional Fishermen in Areas of the Australian Fishing Zone and Continental Shelf – 1974* exists to:

“provide the framework for fisheries and marine cooperation between Australia and Indonesia, and facilitates information exchange on research, management and technological developments, complementary management of shared stocks, training and technical exchanges, aquaculture development, trade promotion and cooperation to deter illegal fishing.” (DAWE, 2020)

The MoU enables traditional fishing to occur within sections of the Australian EEZ. The fishers focus their activities in and around the shallow water lagoons of Scott Reef primarily targeting trepang; and opportunistically gather trochus shells, generally from July to October, and to a lesser extent from April to June. They also catch fish largely for subsistence purposes.

The Operational Area falls entirely within the Australian EEZ. Indonesian and Timor-Leste fishing is not permitted within the Operational Area. Parts of the EMBA extend to an area of overlapping jurisdiction established in an Agreement between the Government of the Commonwealth of Australia and the Government of the Republic of Indonesia establishing Certain Seabed Boundaries (1971) and the Seabed Boundaries Agreement between the Commonwealth of Australia and the Republic of Indonesia on Seabed Boundaries in the Area of the Timor and Arafura Seas (1972). Each of these Agreements, together with the MOU, was affirmed by the Treaty between the Government of Australia and the Government of the Republic of Indonesia establishing an Exclusive Economic Zone Boundary and Certain Seabed Boundaries (Perth, 14 March 1997) (Perth Treaty). This area is commonly referred to as the Perth Treaty Area. When this treaty is ratified, Australia will have jurisdiction over the seabed and Indonesia will have jurisdiction over the water column within the Perth Treaty Area. The treaty permits Indonesian fishing by both traditional and modern vessels, although as noted above Indonesian commercial fishing activity is concentrated at locations several hundred kilometres to the west and south-west of the Operational Area. Although not yet ratified, Santos understands that the Perth Treaty is generally observed.

### 3.2.7.3 Energy industry

Approximately 898 wells have been drilled by the energy industry within the area of the drilling modelled EMBA between 1967 and 2022 (<https://www.petrosys.com.au/products/gpinfo/>). There are several energy companies that currently hold petroleum permits near the Operational Area, however, no established operations are located within, or in the immediate surrounds of the Operational Area. The closest operational offshore production facilities and in-field subsea infrastructure are associated with the Santos-operated Bayu-Undan platform, located approximately 409 km to the south-west of the Operational Area.

Petroleum retention lease area and exploration permit leases, or greenhouse gas emissions assessment permits within the EMBA (not including Santos’ interests) are currently held by various operators (and subsidiaries), including Bengal Energy Ltd, Carnarvon Energy Ltd, Woodside Energy Ltd, Shell Development

(Australia) Pty Ltd, Eni Australia Limited, Inpex Ichthys Pty Ltd, Finder No. 1 Pty Ltd, Jadestone Pty Ltd, Melbana Energy Pty Ltd, PTTEP Australia, Vulcan Exploration Pty Ltd and Timor Sea Oil & Gas Australia Pty Ltd.

#### 3.2.7.4 Telecommunications cables

The North-West Cable System (NWCS) is located approximately 227 km south of the Operational Area (Figure 3-15). Extending 2,100 km from Darwin to Port Hedland, the NWCS connects Australia's remote northern and western regions, including offshore energy industry facilities, with onshore locations.

#### 3.2.7.5 Defence activities

There are no designated military/defence exercise areas within or near the Operational Area. However, the EMBA intersects a practice area of the NAXA, a maritime military zone administered by the Department of Defence (**Figure 3-17**). The NAXA comprises practice and training areas and extends approximately 290 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 Australian EEZ. During their surveillance, Australian Border Force vessels may transit through the Operational Area and EMBA.

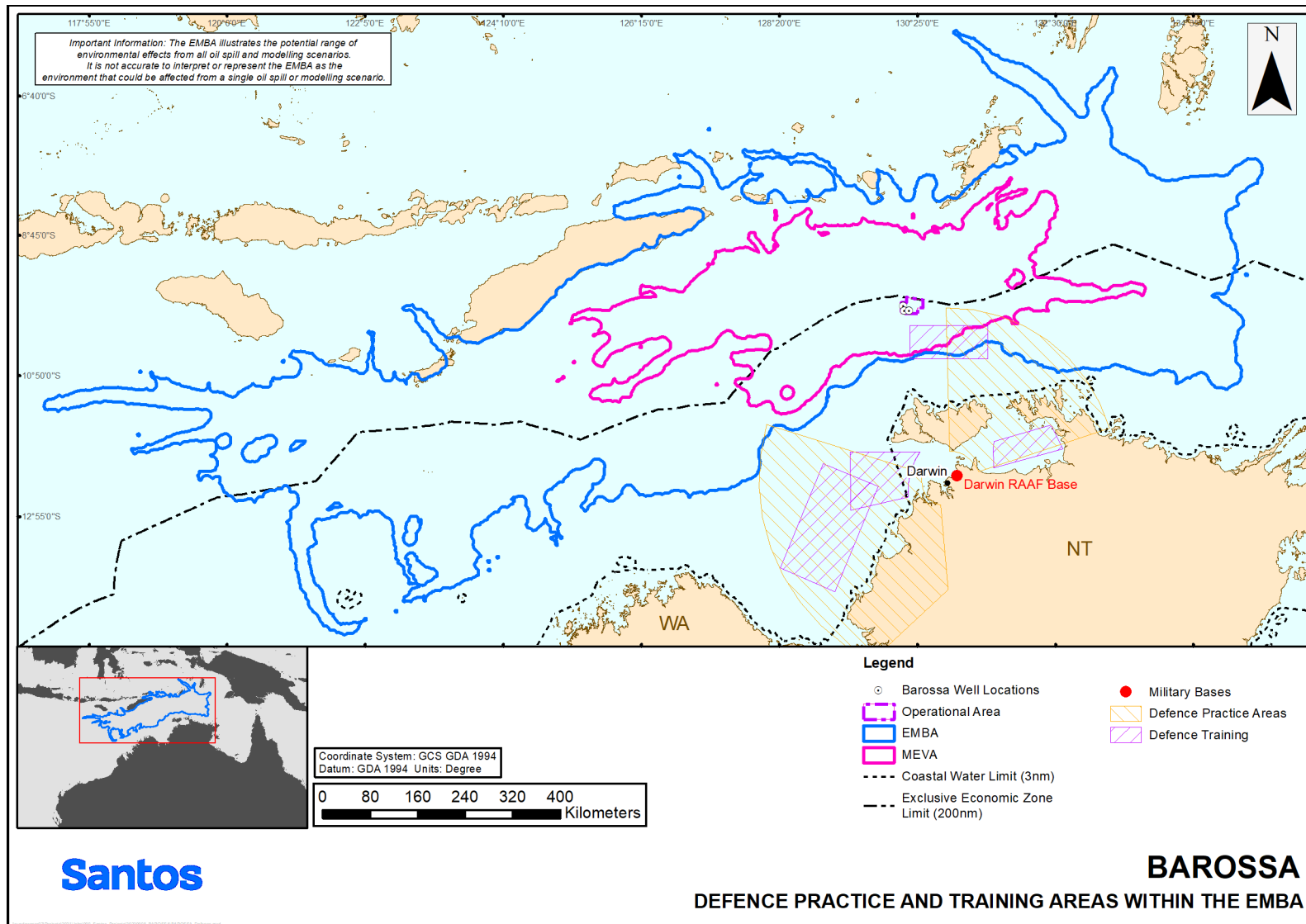


Figure 3-17: Defence training and exercise areas and telecommunications cables within the EMBA.

## 3.2.7.6 Shipping

The closest major commercial port to the Operational Area is Darwin Port, located approximately 285 km to the south-east. Darwin Port is a major shipping port in Australia. In 2020-21, there were a total of 1,510 trading vessel calls to port (Darwin Port website <https://darwinport.com.au/trade/vessel-visits>).

Darwin Port is a major port of call for vessels servicing operations offshore from north-west Australia. There is also small-scale port activity to the south and east of the Operational Area at the Tiwi Islands (outside the EMBA).

The main preferred shipping routes that occur within the EMBA 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
- + general cargo vessels averaging 4,900 tonnes with speeds of approximately 12 knots.

**Figure 3-18** presents Australian Maritime Safety Authority (AMSA) recorded vessel movements through the AUSREP system in April 2023. The records show limited vessel movements through the Operational Area.

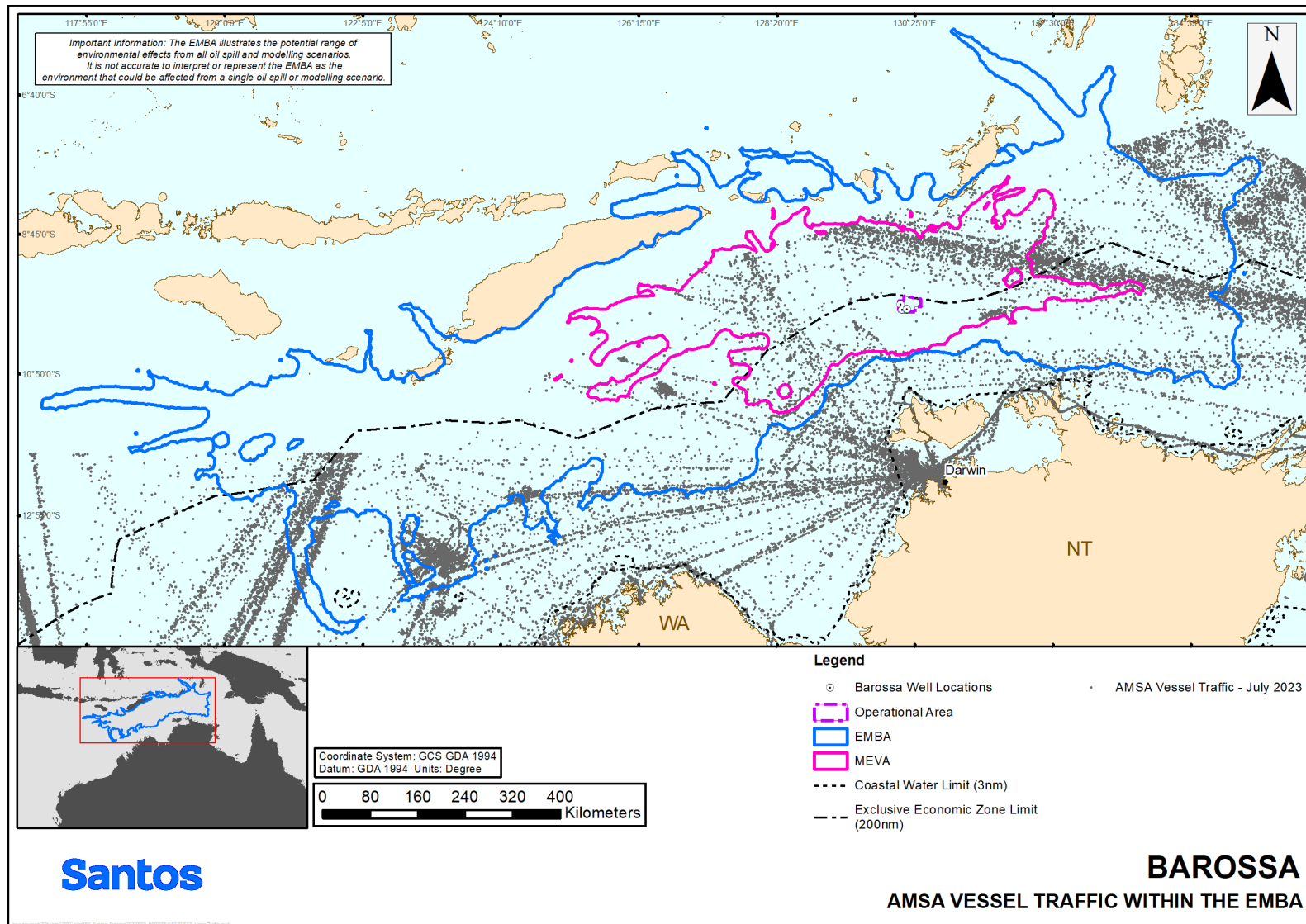


Figure 3-18: Australian Maritime Safety Authority recorded vessel movements and shipping routes overlapping the EMBA.

### 3.2.7.7 Recreation and Tourism

The Operational Area is located in offshore waters that are not likely to be accessed for tourism activities (e.g., recreational fishing and boating and charter boat operations) as these tend to be centred around nearshore waters, islands and coastal areas. Several shoals and banks within the EMBA may be visited by small numbers of recreational fishers/charter vessels targeting fish inhabiting these shallower features. Consultation undertaken for the OPP identified one fishing charter operator who conducts tours in open offshore waters near Evans Shoal and Goodrich Bank during the main fishing season (September to December).

Australian (WA and NT-based) fishing and diving charter companies offer tours to some remote areas within the EMBA, including Cartier Island and Ashmore Hibernia and Seringapatam reefs, although the vast majority of these activities occur outside the EMBA close to shore. Indonesian and Timor-Leste-based marine tourism companies have advised that they also offer diving to areas predominantly close to shore. The majority occur off the northern coastlines, but some of these activities may occur in the EMBA.

### 3.2.7.8 Indigenous and Non-Indigenous Heritage

There are no recorded Aboriginal heritage sites under applicable Aboriginal heritage legislation (see **Appendix B**) within the EMBA.

No shipwrecks are located within the Operational Area. One known shipwreck listed under the *Underwater Cultural Heritage Act 2018* (Cth) is located within the EMBA at the Cartier Island Marine Park: the *Ann Millicent* (wrecked in 1888).

## 3.2.8 Cultural features

### 3.2.8.1 Introduction

First Nations people have occupied the Australian continent for at least 65,000 years, making them the oldest continuous culture in the world. First Nations Australians' "connection to land is essential to the continued cultural survival of Australia's First Peoples as well as their economic and social development." (AIATSIS, 'Land Rights', Reuters).

Santos acknowledges the tradition of the First Nations people of Australia includes a cultural and spiritual connection to their land and waters, including sea country. These connections are rooted in their traditional communal beliefs and practices. First Nations people view their land and waters as integral to their identity, culture, and spirituality and they have a deep respect for the natural world. First Nations persons and groups that identify as saltwater people/groups have a complex relationship with sea country, based, for the most part, on inherited rights, including totemic affiliation, and ceremonial duties. Santos understands that First Nations groups of Northern Australia are generally aware of the nature and geographic extent of their areas of responsibilities over sea country.

The cultural heritage of First Nations people is defined by indigenous tradition through traditional laws and customs amongst themselves.

It includes a vast array of cultural artifacts, practices and beliefs. The protected heritage of First Nations peoples is also of cultural value to Australia and the global community. The cultural value of First Nations protected heritage to Australia is evidenced and given force by a range of factors, including the laws, regulations and institutions established across Australia that are designed specifically to protect First Nations rights and interests in relation to sacred sites and other aspects of First Nations cultural heritage, including the *Native Title Act 1993* (Cth) (NT Act), *Aboriginal and Torres Strait Islander Heritage Protection Act 1984* (Cth) (ATSIHP Act), *Underwater Cultural Heritage Act 2018* (Cth) (UCH Act), *Aboriginal Land Rights (Northern Territory) Act 1976* (Cth) (ALR Act) and *Northern Territory Aboriginal Sacred Sites Act 1989* (NT) (NTASS Act).



For the Activity covered by this EP, there are no native title claims or determinations, sacred sites registered or recorded under the NTASS Act or protected under the ATSIHP Act, UCH Act or ALR Act, Aboriginal land rights claimed or granted under the ALR Act or Indigenous Protected Areas (IPAs) that overlap the EMBA, including those within the North and Northwest Marine Park networks (see sections 3.2.8.6 to 3.2.8.11 below).

Although there are no features or sites recognised as having cultural significance under native title or other cultural heritage legislation within the EMBA, Santos was provided with information by First Nations people during consultation meetings and by NOPSEMA in the course of preparing this EP. NOPSEMA provided Santos with 4 separate letters from Tiwi clan members to NOPSEMA in April 2022 requesting the statement of reasons for NOPSEMA's decision to accept Revision 3 of this EP (2022 Statement of Reasons Requests<sup>7</sup>), and asked Santos to consider the relevance of the information to EMBA under this EP. This information is described in sections 3.2.8.8 to 3.2.8.11 below.

### 3.2.8.2 Native Title

Native title was first recognised in Australia in *Mabo v Queensland (No 2)* (1992) 175 CLR 1 (*Mabo*). Consequent to that decision, the *Native Title Act 1993* (Cth) was enacted to provide a statutory mechanism for the recognition of claims for, and protection of, native title.

Native title claims are applications made to the Federal Court under the NT Act for a determination, or decision about native title in a particular area. A claimant application is made by a native title claim group which asserts it holds native title rights and interests in an area of land and/or water, according to its traditional laws and customs. By making a claimant application, the native title claim group seeks a decision that native title exists, so its physical and spiritual rights and interests are recognised by the common law of Australia. This is called a native title determination. A determination is a decision by a recognised body, such as the Federal Court or High Court of Australia, that native title either does or does not exist in relation to a particular area.

A native title claim group must demonstrate that the acknowledgement and observance of traditional laws and customs have continued substantially uninterrupted since sovereignty (capable of being recognised by the common law of Australia) (section 223(1) NT Act). Native title rights and interests are determined as a question of fact. For example, in *Western Australia v Ward* (2000) 99 FCR 316, [243], the Full Federal Court stated that:

*Acknowledgment and observance may be established by evidence that traditional practices and ceremonies are maintained by the community, insofar as that is possible, off the land, and that ritual knowledge including knowledge of the Dreamings which underlie the traditional laws and customs, continue to be maintained and passed down from generation to generation. Evidence of present members of the community, which demonstrates knowledge of the boundaries to their traditional lands, in itself provides evidence of continuing connection through adherence to their traditional laws and customs.*

A requirement to establishing a positive determination of native title in court is proving that there is an organised group that occupies the claimed land and waters at the time of British annexation. The requirement of an 'organised society' is set out in *Mabo*.

From this, it is considered that it is a group of native titleholders that hold communal native title and that native title claims are understood to represent the area over which First Nations groups are claiming their rights and interests.

A native title determination is where native title has been determined to exist, which may include only part of a native title claim, and represents the lands and waters over which the native title group has recognised

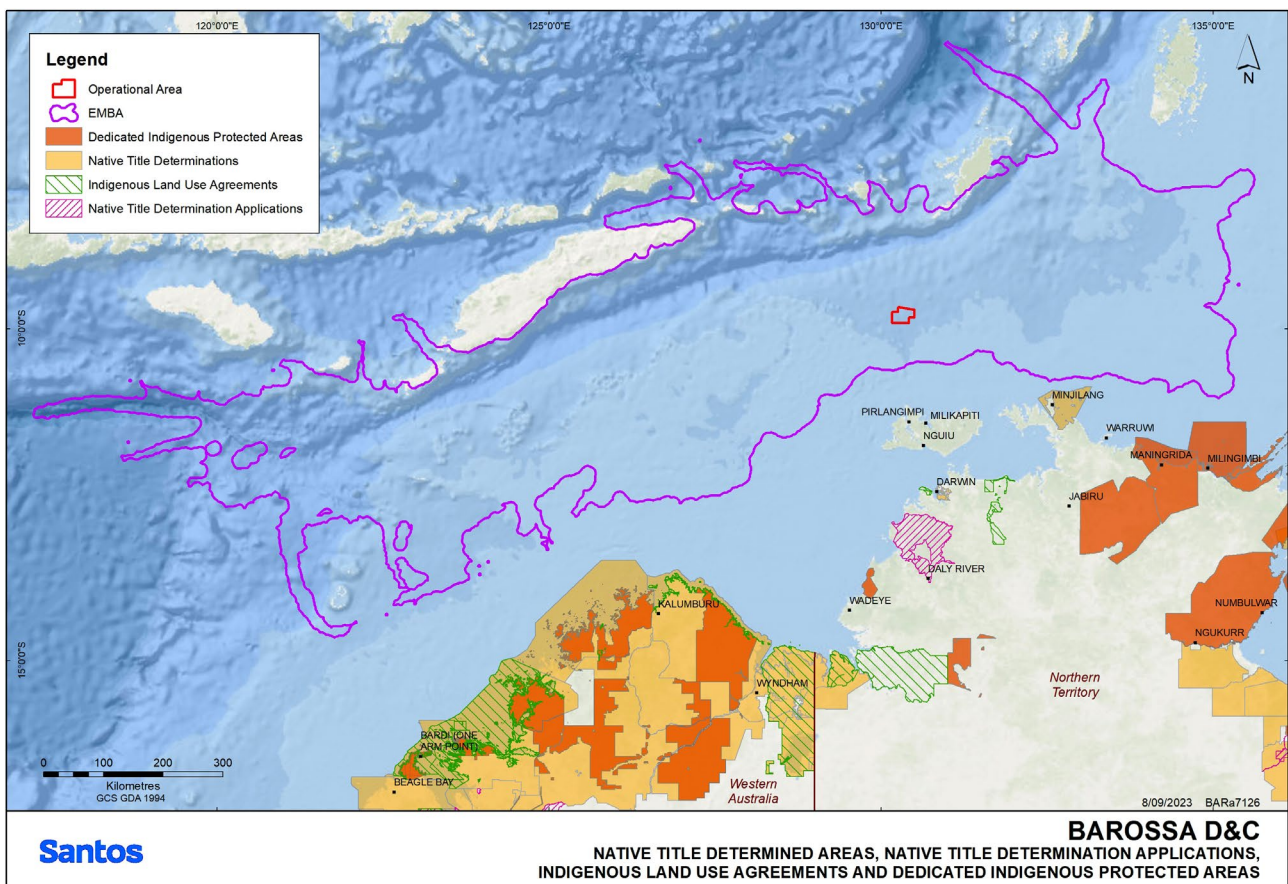
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<sup>7</sup> 2022 Statement of Reasons Requests asked for copies of statement of reasons to be sent to EDO email addresses

rights and interests. Where a Court has determined that native title exists, those native title rights and interests will be held (often but not always) in trust by a Registered Native Title Body Corporate designated by the Native Title holders (section 57 NT Act).

Native title is, in any particular case, a collection of rights and interests the content of which varies according to the traditional laws and customs from which they are, in each particular case, derived. For example, these rights may include the right to have access, to camp, hunt, fish, use water, hold meetings, perform ceremony and/or protect cultural sites (see for example, *Akiba v The Commonwealth* (2013) 250 CLR 209).

For the Activity in this EP, there are no native title claims or determinations that overlap with the EMBA (refer to **Figure 3-19**).



**Figure 3-19: Native Title Determined Areas, Native Title Determination Applications, Indigenous Land Use Agreements and Dedicated Indigenous Protected Area.**

Notwithstanding the absence of Native Title claims or determinations that overlap the EMBA, the areas of responsibility for regional Native Title Representative Bodies do overlap with the EMBA as shown in Figure 3-20.

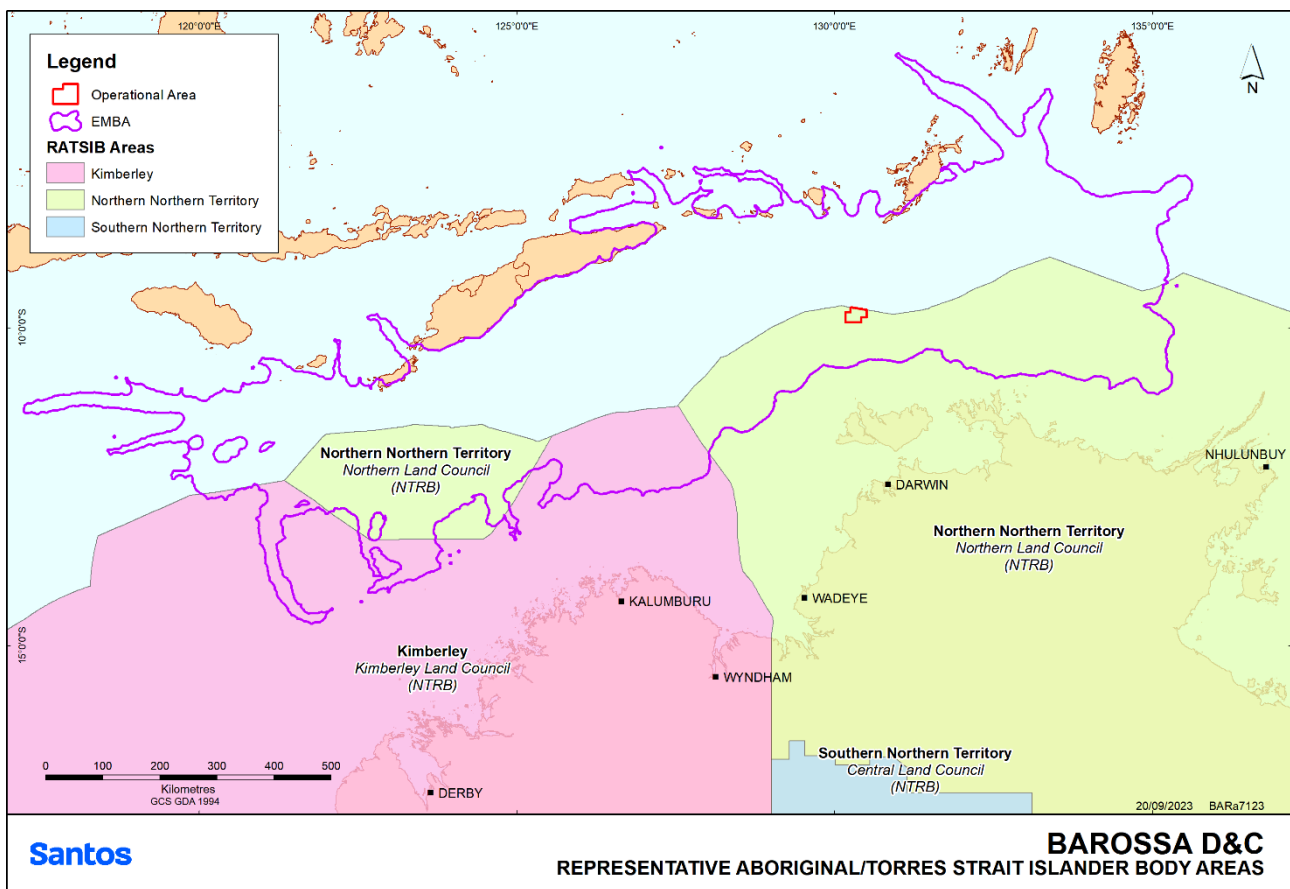


Figure 3-20: Representative Aboriginal/Torres Strait Islander Body Areas within/adjacent to the EMBA.

### 3.2.8.3 Indigenous Land Use Agreements

An Indigenous Land Use Agreement (ILUA) is a voluntary agreement between native title parties and other people or bodies about the use and management of areas of land and/or waters. An ILUA can be made over areas where:

- native title has been determined to exist in at least part of the area
- a native title claim has been made
- no native title claim has been made.

While registered, ILUAs bind all native title holders to the terms of the agreement. ILUAs also operate as a contract between the parties. A register of ILUAs is maintained by the Native Title Registrar. The register of ILUAs does not disclose the existence of any ILUA which overlaps with the EMBA (refer to **Figure 3-19**).

### 3.2.8.4 Indigenous Protected Areas

Indigenous Protected Areas (IPAs) are areas of land and sea managed by First Nations groups as protected areas for biodiversity conservation through voluntary agreements with the Australian Government. IPAs are an essential component of Australia’s National Reserve System, which is the network of formally recognised terrestrial parks, reserves and protected areas across Australia’s landmass. There are currently 82 dedicated IPAs over 87 million hectares of land. There is also around five million hectares of Australia’s sea areas in dedicated IPAs. Managing IPAs helps First Nations communities protect the cultural features of their country for future generations.

For the Activity in this EP, there are no IPAs that overlap with the EMBA. Refer to **Figure 3-19**.

### 3.2.8.5 Sacred Sites

All sacred sites in the Northern Territory are protected in accordance with the NTASS Act. Sacred sites may be registered in sea country, with access not permitted within 100 metres of any such sacred site, though some sacred sites may have more restrictive access.

Sacred sites may also be protected under the ATSIHP Act, the UCH Act, the ALR Act or the *Environment Protection and Biodiversity Conservation Act 1999* (Cth).

For the Activity in this EP, there are no sacred sites registered or recorded under the NTASS Act or protected under the ATSIHP Act, UCH Act, ALR Act or *Environment Protection and Biodiversity Conservation Act 1999* (Cth) that overlap with the EMBA.

### 3.2.8.6 Land Rights

The ALR Act governs Aboriginal land (not native title claims) in the NT. Land that has been granted or recommended for grant under the ALR Act is determined to be held communally by the “*traditional Aboriginal owners*” of that land. The ALR Act has enabled the establishment of Aboriginal Land Trusts to hold title to Aboriginal land granted in the Northern Territory under that Act.

Aboriginal land rights governed under the ALR Act do not extend past the low water mark of tidal waters overlaying the Northern Territory coastline. In coastal areas, grants of Aboriginal land under the ALR Act are made to the low water mark. *Northern Territory v Arnhem Land Aboriginal Land Trust* (2008) 236 CLR 24 confirmed that Traditional Owners of First Nations-owned Northern Territory coastline have exclusive access rights to the tidal waters overlying their land.

For the Activity in this EP, there is no Aboriginal land either claimed or granted under the ALR Act, or sea closures put into effect in accordance with that Act, that overlap with the EMBA.

### 3.2.8.7 Australian Marine Parks

Santos acknowledges that the EMBA for this EP overlaps with features of the North Marine Parks Network Management Plan and the North-West Marine Parks Network Management Plan, which identify natural, cultural and spiritual values associated with AMPs, specifically the Ashmore Reef AMP, the Cartier Island AMP, the Oceanic Shoals AMP and the Arafura AMP.

Santos acknowledges that Commonwealth and State Marine Park Management Plans have sought to recognise cultural interests of First Nations groups. Australian Marine Parks has described this framework as taking ‘values into account’ when making decisions and taking action in relation to marine parks. Australian Marine Parks summarises these values as natural, cultural, heritage and socio-economic values. Additionally, the Commonwealth and State Marine Park Management Plans state that there could be First Nations groups or native title representative groups who may have responsibility for sea country within marine park areas.

### 3.2.8.8 Cultural fishing and hunting activities

Information provided during Tiwi Clan meetings indicated that some Tiwi people have a particular interest in turtles as a traditional food source.

The 2022 Statement of Reasons requests provided Santos with information about Tiwi people:

- going to Seagull Island to collect turtle eggs and seagull eggs;
- collecting black lip oysters from Wulanju Island near Pirlangimpi Bay; and

- hunting on and around Tiwi Islands for a range of other food sources including fish (mullet, mackerel, barramundi, trevally), mud mussels, mud crabs, long bums shellfish, yams, mullet, chilli worms, mangrove worms, turtles, stingray, and dugong.

Fishing and hunting activities on and immediately adjacent to the Tiwi Islands are outside the EMBA.

Santos was also provided with information from Croker Island clients of the EDO that members of the community in Minjilang rely on fish, turtles, dugong, oysters and other marine food sources. The information provided to Santos did not include details about the locations of traditional fishing and hunting activities.

### 3.2.8.9 Culturally Significant Marine Species

In consultations with Tiwi Clans, Tiwi people emphasised that marine turtles are regarded by Tiwi people as totemic and culturally significant species. Therefore environmental protection measures for marine turtles are important to Tiwi people.

The 2022 Statement of Reasons requests indicated that Tiwi people also consider fish, dugong and whales to hold cultural significance as totemic species (in addition to marine turtles).

The Northern Land Council (NLC) also indicated a number of marine species that are significant to Aboriginal Dreaming including birds, crocodiles, crows, whales, manta rays, crabs, dugong, sea turtle, gropers, sea-eagles, octopus and other turtles. The 2022 Statement of Reasons requests provided to Santos by NOPSEMA also indicated other terrestrial species, such as the brown fowl, as having cultural significance to Tiwi people.

Terrestrial species of cultural significance that inhabit the Tiwi Islands are outside the EMBA and therefore are not considered further in this EP.

### 3.2.8.10 Culturally Significant Sites

Information provided during consultation and other information provided to Santos by NOPSEMA (2022 Statement of Reasons requests) indicated a number of sites in the region that are culturally significant to First Nations groups.

- The NLC indicated a number of culturally significant sites across the Cox Peninsula, beyond the southern extent of the EMBA.
- The 2022 Statement of Reasons requests indicated that there are a number of sacred sites under the water (including underwater caves) in sea country which are significant for cultural stories and dreaming, even though these sites have not been formally registered. These included sacred sites located on a small island in Pirlangimpi Bay (the Tiwi name is Wulanju Island); a site near Imalu Point which holds an important story; an underwater dreaming site called Muripiyanga near Shark Bay and the small island there; and an underwater dreaming site called Waylo in the south between Buchanan Island and Wurrumiyanga. Each of these sites of cultural significance are located outside the EMBA.
- Croker Island clients of the EDO indicated that there are sacred sites in the sea country around Minjilang, and that sacred sites are in the sea as well as the land. They also highlighted numerous small islands to the east and north/east of Minjilang which house sacred sites of enormous significance. These include (in their English names) Oxley Island, the islands making up New Year Island, McCluer Island, Grant Island, Wirgungun Island, Lawson Island, Templer Island, Valencia Island and a number of other islands. These two individuals advised that these places house important sacred sites, and Croker Island people are not permitted to go to certain areas within this vicinity for fear of disturbing sacred sites. All of the islands where these sites are located are outside the EMBA.

### 3.2.8.11 Sea country

First Nations people view their land and waters as integral to their identity, culture, and spirituality and they have a deep respect for the natural world. The cultural heritage of First Nations peoples includes a vast array of cultural artifacts, practices and beliefs.

Santos acknowledges the cultural features of the First Nations people includes their intangible spiritual and cultural heritage stories, song lines and connections to their lands and waters, including sea country, and that these connections are rooted in their traditional communal beliefs and practices.

The Australian Marine Parks North-west Marine Parks Network Management Plan 2018 states:

*Sea country refers to the areas of the sea that Aboriginal people are particularly affiliated with through their traditional lore and customs. Sea country is valued for Indigenous cultural identity, health and wellbeing. Across Australia, Indigenous people have been sustainably using and managing their sea country for tens of thousands of years.*

Santos acknowledges regulatory guidance that under Regulation 4 'environment' is defined as including ecosystems and their constituent parts including people and communities, and this further includes the cultural features of those people and communities (Reg 4 (definition of 'environment') (e)). On that basis, Santos considers that the First Nations people and communities of the Tiwi Islands and Croker Island are part of the ecosystem that may be affected by the activity (Reg 13(2)(a)).

As part of consultation in developing this Environment Plan, some First Nations Relevant Persons expressed cultural connections with sea country in terms of spiritual beings. Information about First Nations cultural beliefs and connection with their sea country, within and adjacent to the environment that may be affected by the Activity, was provided during First Nations consultation meetings and from other information provided by NOPSEMA to Santos (2022 Statement of Reasons requests).

During Tiwi Clan consultation meetings, Tiwi people spoke about the importance of their spiritual dreaming which protects the Tiwi Islands from man-made and natural disasters. Santos recognises that some First Nations Relevant Persons fear sickness or other adverse effects from the actions of spiritual beings in response to impacts on the environment of sea country itself. Tiwi people's spiritual beliefs were not linked to any specific place within the EMBA.

The 2022 Statement of Reasons requests claimed that four individual Tiwi Islanders have a spiritual and cultural connection with the land and the sea, and more specifically with the location of the Activity (Operational Area) and the area that may be affected (EMBA), describing it as "their water" and "the home of their Ampitji". The four individual Tiwi Islanders also claim that their bodies are part of the land and the sea, and they describe their deep connection with the sea through cultural totems (see Section 3.2.8.9) and skin names. Santos was also advised by some of these individuals that their sea country extends from Cape Van Diemen to the East all along Snake Bay and around to South West side of the Tiwi Islands, and that the Eastern Side of Snake Bay is home to cultural stories and legends. The area from Cape Van Diemen to the East all along Snake Bay and around to the South West side of the Tiwi Islands is outside the EMBA. Santos acknowledges the spiritual beliefs of these individual Tiwi Islanders and also observes that these beliefs are not shared by all Tiwi Islanders.

During Croker Island consultation meetings in Darwin, Croker Islanders conveyed their affiliation to their land and sea. They advised that their culture is at the coast and includes everything in the water including the marine life.

Croker Island clients of the EDO provided information to Santos during consultation about their connections with their sea country. They advised that their sea country is to the north of Cape Croker out to the deep water, and is called Inigarrka, and is considered the most sacred place in the ocean. They advised that they are not permitted to travel in that sea country for fishing or any other purposes because it is so sacred that it should never be disturbed. These individuals also advised that their sea country to the north of Inigarrka crossed into the EMBA. They also advised that important songlines go from land to the sea, and that in particular, there are important songlines that go out into sea country from Inigarrka. They also described a rainbow serpent, called Ambidj/Umbidj, who protects the ocean and protects Minjilang. They advised that her (Amidj/Umbidj) sea is to the north of Inigarrka and she travels far north and all the way to the Tiwi Islands as well. According to Minjilang Dreaming, Minjilang is the birthplace of the rainbow serpent, Umbidj, and the sea country is very sacred and important because of that.

Santos commissioned an independent expert assessment by Dr Brendan Corrigan for the purpose of identifying UCH places along the route of the Barossa Gas Export Pipeline (GEP) west and northwest of the Tiwi Islands ("Corrigan Report"). The cultural heritage assessment by Dr Corrigan is relevant to the description of the environment that may be affected by the drilling and completions activities (noting that the GEP extends to the site of the drilling and completion activities) and the values and sensitivities of that environment (Reg 13(2)).

Dr Corrigan is of the view that the cultural heritage of First Nations people is defined by indigenous tradition through traditional laws and customs amongst themselves. Dr Corrigan reviewed extensive ethnographic studies of the Tiwi people in order to gain an historical understanding of their society, culture and hierarchy. As part of the fieldwork, Dr Corrigan considered the views presented by the EDO reports prepared by Mr Lewis and Dr O'Leary and the affidavits of EDO clients in the Tipakalippa case (which concerned the prior accepted D&C EP) and conducted extensive interviews amongst the communities.

Dr Corrigan documented a range of views on Tiwi clans connection with sea country and considered claims for several items to be protected in accordance with Tiwi law and custom. This included:

- The travels of the Crocodile Man
- The location of mother Ampitji
- The travels of Ampitji

- The necessity to look after country in a manner that seeks to ensure no industrial accidents occur which might affect sea country and marine resources (including spiritual connections to the same)
- The Imunka force present in the seas
- The location of a place under the sea where spirits go to upon people's death and then being moved on from the world of the living through Pukamani ceremony

Tiwi Islanders interviewed by Dr Corrigan about the location of the above items expressed a variety of views, but Santos notes those locations appear to be outside the EMBA for this activity.

Dr Corrigan noted that there were differing views on the cultural significance of each of these items and that in many cases the location was insufficiently defined to require protection.

A key theme of the information provided by Tiwi Island and Croker Island clients of the EDO, is that a spirit being (or spirit beings) called Ampitji (sometimes known as a rainbow serpent) routinely traverses all of the sea in the vicinity of the islands and that Ampitji might become disturbed by the activities associated with the activities associated with the Barossa Gas Project (including the drilling and completion activities the subject of this EP) and cause spiritual and physical harm to the Tiwi Islanders, Croker Islanders and others. In some instances, people who believe this also believe that preventative measures, such as having relevant Tiwi people 'introduce the [activities] to the rainbow serpent' would ameliorate any risk. Others have put the view that Ampitji remains fairly local to known geographic sites on the Tiwi islands and does not travel in the seas around the Tiwi Islands. Dr Corrigan concluded that the geographic extent of Tiwi sea country was a fairly limited distance from shore due to the limited seafaring capacity of the Tiwi people.

Dr Corrigan concluded that, in accordance with indigenous tradition, there were no specific underwater cultural heritage places along the GEP route that may be affected by the activities under the GEP Environment Plan: that there are no known sacred sites or some other specific places which are known to be specific locations where something happened that are part of well-known sets of ancestral creation stories amongst the Tiwi people. Whilst this conclusion was made in relation to activities which will be covered in a separate GEP Environment Plan, they apply in this context because the GEP extends to the site of the drilling and completion activities. This means there are no intangible cultural heritage values and sensitivities attached to specific locations along the GEP route, including, relevantly within that part of OA and EMBA for this EP.

In its correspondence to Santos of 25 August 2023 in relation to this EP, NOPSEMA drew Santos' attention to two reports provided to NOPSEMA by the EDO on behalf of seven Tiwi Islander clients on 21 July 2023. These reports relate to the proposed gas export pipeline (GEP) for the Barossa Development (EDO GEP Reports), which NOPSEMA said may contain information relevant to the environment that may be affected by the Activity covered by this EP. The EDO GEP Reports claim to provide an assessment of the locations of potential impacts to Indigenous underwater cultural heritage sites along the Barossa GEP Route. The GEP is the subject of a separate Environment Plan. The EDO GEP Reports claim to identify underwater cultural heritage along the Barossa GEP route. Locations of the claimed sites of significance through cultural mapping of sea country in the GEP reports are outside the EMBA for this EP. Santos commissioned an independent expert assessment of underwater cultural heritage places along the Barossa GEP as required by the General Direction. This assessment was undertaken by an independent expert anthropologist, Dr Brendan Corrigan in his report titled, "General Direction #1898; Assessment to identify any underwater cultural heritage places along the Barossa pipeline route to the west and northwest of the Tiwi Islands, Northern Australia" (Corrigan Report). The assessment included consideration of detailed expert reports on archaeology and sedimentology along the pipeline route conducted by Wessex Archaeology and Dr Posamentier; and the EDO GEP reports. The Corrigan Report concluded there are no specific underwater cultural heritage places along the Barossa GEP (of which the northern section is located within the Drilling and Completions OA and EMBA) to which people, in accordance with Indigenous tradition, may have spiritual and cultural connections that may be affected by the activities covered by the GEP Environment Plan.



Notwithstanding the claims of underwater cultural heritage sites made in the EDO GEP Reports, all of the purported sites are located outside the EMBA for this EP. The Corrigan Report provided the following independent expert comments on the EDO Reports:

- The EDO Reports come to dramatic conclusions about cultural heritage elements in the vicinity of the GEP which overestimate the consistency of the views of the EDO clients with those held by the wider jural public of the Tiwi Islanders;
- Some Tiwi Islanders express views consistent with the EDO Reports, but the authors of those reports failed to consider and take account of other alternative expression;
- The narratives contained in the EDO Reports are not anything like the narratives described to Dr Corrigan in the interviews he undertook;
- Dr O’Leary (the author of one of the EDO Reports) does not mention any qualification he holds for which he might rely upon to undertake detailed and nuanced ethnographic enquiries in the context of a controversial industrial project;
- Dr O’Leary incorrectly assumes an accuracy of the advice he received about the location of paleo sub-sea burial places;
- The EDO Reports do not correctly identify any specific underwater cultural heritage places along the Barossa GEP Route.

Dr Corrigan also identified a constant theme in his interviews with the Tiwi Islanders that Ampitji travel within the waterholes of the Tiwi Islands and surrounding the Tiwi Islands. Dr Corrigan accepts that the Ampitji exists in the sea country surrounding the Tiwi Islands. Dr Corrigan did not state that Ampitji exist anywhere else as part of his assessment, which included an area at the north end of the GEP which intersects the OA for this EP.

While Santos recognises the importance of cultural and spiritual beliefs to Tiwi Islands and Croker Island First Nations people, Santos also observes that these beliefs as described above are expressed in a way that broadly describes their connection with sea country without reference to a specific place or location which is regarded by Tiwi Islands and Croker Island communities as being culturally significant.

## 4 Consultation

OPGGs(E)R 2009 Requirements
<b>Regulation 9AB</b>
<p>If the Regulator’s provisional decision under Regulation 9AA is that the environment plan includes material apparently addressing all the provisions of Division 2.3 (Contents of an environment plan), the Regulator must publish on the Regulator’s website as soon as practicable:</p> <ul style="list-style-type: none"> <li>(a) the plan with the sensitive information part removed; and</li> <li>(b) the name of the titleholder who submitted the plan; and</li> <li>(c) a description of the activity or stage of the activity to which the plan relates; and</li> <li>(d) the location of the activity; and</li> <li>(e) a link or other reference to the place where the accepted offshore project proposal (if any) is published; and</li> <li>(f) details of the titleholder’s nominated liaison person for the activity.</li> </ul>
<b>Regulation 11A</b>
<ul style="list-style-type: none"> <li>(1) In the course of preparing an environment plan, or a revision of an environment plan, a titleholder must consult each of the following (a relevant person): <ul style="list-style-type: none"> <li>(a) each Department or agency of the Commonwealth to which the activities to be carried out under the environment plan, or the revision of the environment plan, may be relevant;</li> <li>(b) each Department or agency of a State or the Northern Territory to which the activities to be carried out under the environment plan, or the revision of the environment plan, may be relevant;</li> <li>(c) the Department of the responsible State Minister, or the responsible Northern Territory Minister;</li> <li>(d) a person or organisation whose functions, interests or activities may be affected by the activities to be carried out under the environment plan, or the revision of the environment plan;</li> <li>(e) any other person or organisation that the titleholder considers relevant.</li> </ul> </li> <li>(2) For the purpose of the consultation, the titleholder must give each relevant person sufficient information to allow the relevant person to make an informed assessment of the possible consequences of the activity on the functions, interests or activities of the relevant person.</li> <li>(3) The titleholder must allow a relevant person a reasonable period for the consultation.</li> <li>(4) The titleholder must tell each relevant person the titleholder consults that: <ul style="list-style-type: none"> <li>(a) the relevant person may request that particular information the relevant person provides in the consultation not be published; and</li> <li>(b) information subject to such a request is not to be published under this Part.</li> </ul> </li> </ul>
<b>Regulation 14(9)</b>
<p>The implementation strategy must provide for appropriate consultation with:</p> <ul style="list-style-type: none"> <li>(a) relevant authorities of the Commonwealth, a State or Territory; and</li> <li>(b) other relevant interested persons or organisations.</li> </ul>

**Regulation 16**

The environment plan must contain the following:

- (b) a report on all consultations under regulation 11A of any relevant person by the titleholder, that contains:
  - (iii) a summary of each response made by a relevant person; and
  - (iv) an assessment of the merits of any objection or claim about the adverse impact of each activity to which the environment plan relates; and
  - (v) a statement of the titleholder's response, or proposed response, if any, to each objection or claim; and
  - (vi) a copy of the full text of any response by a relevant person;

## 4.1 Consultation background

Santos (including through ConocoPhillips, as previous operator of the Barossa Gas Project), has continued to undertake consultation with Relevant Persons throughout various phases of the Barossa Gas Project to date, and specifically for the following key components:

- the OPP, which was accepted by NOPSEMA in March 2018;
- the Barossa Gas Export Pipeline (**GEP**) Installation EP, which was accepted by NOPSEMA in March 2020; and
- the Barossa Drilling and Completions EP (Revision 3), which was accepted by NOPSEMA in March 2022.

NOPSEMA's decision to accept the Barossa Drilling and Completions EP (Revision 3) was subsequently set aside by the Federal Court in October 2022, following an application for judicial review. The Full Federal Court, on appeal, in making its findings, provided certain guidance on the requirements for consultation under the OPGGS(E)R.

Following the Appeal Judgment, in December 2022, NOPSEMA issued an interim Guideline entitled *Consultation in the course of preparing an environment plan*, subsequently finalised in May 2023, to assist titleholders to comply with their obligations to consult Relevant Persons (see **Section 4.4**).

Santos has undertaken further regulation 11A consultation with Relevant Persons in relation to this EP to comply with applicable regulations, the Appeal Judgment and the latest NOPSEMA guidance, to supplement consultation previously undertaken for Revision 3. **Section 3.2.8.8** describes Santos' further regulation 11A consultation with Relevant Persons. For consultation conducted for Revision 3, see Table 4-2 of Revision 3 of the EP, extracted in full (unamended) at **Appendix E**.

The consultation methodology for this EP is outlined in **Section 4.5** below.

**Section 8** includes Santos' post acceptance consultation implementation strategy for the Activity covered by this EP in accordance with regulation 14(9) of the OPGGS(E)R.

## 4.2 Regulatory requirements

**Table 4.1** outlines the applicable regulatory requirements for consultation with Relevant Persons for this EP.

**Table 4.1. Applicable regulatory requirements.**

Regulation	Relevant Extract of Regulation
Section 280(2) of the OPGGS Act	(2) A person (the <b>first person</b> ) carrying on activities in an offshore area under the permit, lease, licence, authority or consent must carry on those activities in a manner that does not interfere with:

Regulation	Relevant Extract of Regulation
	<p>(a) navigation; or            (b) fishing; or            (c) the conservation of the resources of the sea and seabed; or            (d) any activities of another person being lawfully carried on by way of:                (i) exploration for, recovery of or conveyance of a mineral (whether petroleum or not); or                (ii) construction or operation of a pipeline; or                (iii) offshore infrastructure activities (within the meaning of the <i>Offshore Electricity Infrastructure Act 2021</i>); or            (e) the enjoyment of native title rights and interests (within the meaning of the <i>Native Title Act 1993</i>);            to a greater extent than is necessary for the reasonable exercise of the rights and performance of the duties of the first person.</p>
Regulation 4 of the OPGGS(E)R	<p><b>environment</b> means:            (a) ecosystems and their constituent parts, including people and communities; and            (b) natural and physical resources; and            (c) the qualities and characteristics of locations, places and areas; and            (d) the heritage value of places;            and includes            (e) the social, economic and cultural features of the matters mentioned in paragraphs (a), (b), (c) and (d).</p>
Regulation 9(8) of the OPGGS(E)R	<p>(8) All sensitive information (if any) in an environment plan, and the full text of any response by a relevant person to consultation under regulation 11A in the course of preparation of the plan, must be contained in the sensitive information part of the plan and not anywhere else in the plan.</p>
Regulation 10(A) of the OPGGS(E)R	<p>For regulation 10, the criteria for acceptance of an environment plan are that the plan:            ...            (g) demonstrates that:                (i) the titleholder has carried out the consultations required by Division 2.2A; and                (ii) the measures (if any) that the titleholder has adopted, or proposes to adopt, because of the consultations are appropriate;</p>
Regulation 11A(1) of the OPGGS(E)R	<p>(1) In the course of preparing an environment plan, or a revision of an environment plan, a titleholder must consult each of the following (a <b>relevant person</b>):</p> <p>(a) each Department or agency of the Commonwealth to which the activities to be carried out under the environment plan, or the revision of the environment plan, may be relevant;            (b) each Department or agency of a State or the Northern Territory to which the activities to be carried out under the environment plan, or the revision of the environment plan, may be relevant;</p>

Regulation	Relevant Extract of Regulation
	<p>(c) the Department of the responsible State Minister, or the responsible Northern Territory Minister;</p> <p>(d) a person or organisation whose functions, interests or activities may be affected by the activities to be carried out under the environment plan, or the revision of the environment plan;</p> <p>(e) any other person or organisation that the titleholder considers relevant.</p>
Regulation 11A(2) of the OPGGS(E)R	(2) For the purpose of the consultation, the titleholder must give each relevant person sufficient information to allow the relevant person to make an informed assessment of the possible consequences of the activity on the functions, interests or activities of the relevant person.
Regulation 11A(3) of the OPGGS(E)R	(3) The titleholder must allow a relevant person a reasonable period for the consultation.
Regulation 11A(4) of the OPGGS(E)R	<p>(4) The titleholder must tell each relevant person the titleholder consults that:</p> <p>(a) the relevant person may request that particular information the relevant person provides in the consultation not be published; and</p> <p>(b) information subject to such a request is not to be published under this Part.</p>
Regulation 13(2)-(3) of the OPGGS(E)R	<p><i>Description of the environment</i></p> <p>(2) The environment plan must:</p> <p>(a) describe the existing environment that may be affected by the activity; and</p> <p>(b) include details of the particular relevant values and sensitivities (if any) of that environment.</p> <p>Note: The definition of <i>environment</i> in regulation 4 includes its social, economic and cultural features.</p> <p>(3) Without limiting paragraph (2)(b), particular relevant values and sensitivities may include any of the following:</p> <p>(a) the world heritage values of a declared World Heritage property within the meaning of the EPBC Act;</p> <p>(b) the national heritage values of a National Heritage place within the meaning of that Act;</p> <p>(c) the ecological character of a declared Ramsar wetland within the meaning of that Act;</p> <p>(d) the presence of a listed threatened species or listed threatened ecological community within the meaning of that Act;</p> <p>(e) the presence of a listed migratory species within the meaning of that Act;</p> <p>(f) any values and sensitivities that exist in, or in relation to, part or all of:</p> <p>(i) a Commonwealth marine area within the meaning of that Act; or</p> <p>(ii) Commonwealth land within the meaning of that Act.</p>

Regulation	Relevant Extract of Regulation
Regulation 14(9) of the OPGGS(E)R	(9) The implementation strategy must provide for appropriate consultation with: <ul style="list-style-type: none"> <li>(a) relevant authorities of the Commonwealth, a State or Territory; and</li> <li>(b) other relevant interested persons or organisations.</li> </ul>
Regulation 16(b) of the OPGGS(E)R	The environment plan must contain: <ul style="list-style-type: none"> <li>...</li> <li>(b) a report on all consultations under regulation 11A of any relevant person by the titleholder, that contains:               <ul style="list-style-type: none"> <li>(i) a summary of each response made by a relevant person; and</li> <li>(ii) an assessment of the merits of any objection or claim about the adverse impact of each activity to which the environment plan relates; and</li> <li>(iii) a statement of the titleholder's response, or proposed response, if any, to each objection or claim; and</li> <li>(iv) a copy of the full text of any response by a relevant person;</li> </ul> </li> </ul>

### 4.3 Government and industry guidance

Santos has considered the following NOPSEMA guidance in developing its consultation activities and approach:

- *GL2086 – Consultation in the course of preparing an environment plan – May 2023* (superseding the interim Guideline of the same title issued in December 2022, which Santos had applied until the updated version was released in May 2023) (EP Consultation Guideline)
- *GL1887 – Consultation with Commonwealth agencies with responsibilities in the marine area – January 2023*
- *GL1721 - Environment Plan decision making - December 2022*
- *GN1344 - Environment plan content requirement - December 2022*
- *GN1488 - Oil Pollution Risk Management - July 2021*
- *Supporting cooperative coexistence of seismic surveys and commercial fisheries in Australia's Commonwealth marine area – February 2023, jointly released by NOPSEMA, the Commonwealth Department of Agriculture, Fisheries and Forestry, the Commonwealth Department of Industry, Science and Resources, and the Australian Fisheries Management Authority.*

Santos has also considered other government and industry guidance, including:

#### *International Standards Organisation*

- *ISO14001:2015 Environmental Management Systems*

#### *Australian Fisheries Management Authority*

- *Petroleum industry consultation with the commercial fishing industry*

#### *Australian Heritage Commission*

- *Ask First - A guide to respecting Indigenous heritage places and values*

#### *Commonwealth Department of Agriculture, Fisheries and Forestry*

- *Fisheries and the Environment – Offshore Petroleum and Greenhouse Gas Act 2006*
- *Offshore Installations Biosecurity Guide*

*Commonwealth Department of Climate Change, Energy, the Environment and Water*

- *Interim Engaging with First Nations People and Communities on Assessments and Approvals under the Environment Protection and Biodiversity Conservation Act 1999*

*Commonwealth Ministerial Council on Mineral and Petroleum Resources*

- *Principles for Engagement with Communities and Stakeholders*

*International Association for Public Participation*

- *Quality Assurance Standard for Community and Stakeholder Engagement*

*WA Department of Primary Industries and Regional Development*

- *Guidance statement for oil and gas industry consultation with the Department of Fisheries*

*WA Department of Transport*

- *Offshore Petroleum Industry Guidance Note - Marine Oil Pollution: Response and Consultation Arrangements*

*Western Australian Fishing Industry Council*

- *Consultation approach for unplanned events*

#### 4.4 Applicable case law and guidance

In addition to considering the regulatory requirements and guidance set out above, in developing this EP Santos has considered the guidance of the Full Federal Court in the Appeal Judgment.

The EP Consultation Guideline referred to above provides a summary of the Full Federal Court's interpretation of “functions”, “activities” and “interests” referenced in regulation 11A(1)(d), adopted by NOPSEMA to assist in informing who may be a Relevant Person and how Relevant Persons may be identified, as follows:

<b>Functions</b>	Refers to “a power or duty to do something”
<b>Activities</b>	To be read broadly and is broader than the definition of “activity” in Regulation 4 of the OPGGS(E)R and is likely directed to what the relevant person is already doing
<b>Interests</b>	To be construed as conforming with the accepted concept of “interest” in other areas of public administrative law  Includes “any interest possessed by an individual whether or not the interest amounts to a legal right or is a proprietary or financial interest or relates to reputation”

Santos has also had regard to the purpose of consultation as outlined in the Appeal Judgment and EP Consultation Guideline, the emphasis that superficial or tokenistic consultation is not sufficient and that:

- + consultation must be appropriate and adapted to the nature of each Relevant Person;

- + for each Relevant Person, the appropriate manner and method of consultation (including the nature of information, time periods for consultation and mode of communication) may differ; and
- + there is good reason to adopt pragmatic and practical approaches to consultation conducted in accordance with regulation 11A.

## 4.5 Santos' consultation methodology

### 4.5.1 Overview

Santos consults to ensure that any activity it is proposing under an EP is carried out in a manner:

- + consistent with the principles of ecologically sustainable development set out in section 3A of the *Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)*;
- + by which the environmental impacts and risks of the activity will be reduced as low as reasonably practicable (**ALARP**); and
- + by which the environmental impacts and risks of the activity will be of an acceptable level.

The consultation process is designed to assist Santos to further ascertain, understand and assess values and sensitivities of the environment that may be affected by a proposed activity, and the potential environmental impacts and risks, through information obtained during consultations. Santos may then refine or change its proposed control measures to address potential environmental impacts and risks of the activity based on that information or any claims or objections raised through consultation.

Santos' consultation methodology and process adopted in developing this EP comprised the following key steps:

- identifying potential Relevant Person categories
- identifying Relevant Persons
- providing opportunities for Relevant Persons to identify themselves if they wished to be consulted (e.g. through advertising)
- consultation planning and preliminary consultation activities
- consulting Relevant Persons
- assessing the merits of objections or claims made by Relevant Persons about the adverse impact of each activity to which the EP relates
- providing responses to queries, requests and feedback.

As described below, Santos considered the spatial extent of the environment that may be affected by the Activity and the particular aspects of the relevant environment as part of its process for identifying Relevant Persons.

### 4.5.2 Identifying Relevant Persons

This **Section 4.5.2** outlines the methodology and steps that Santos has used to identify Relevant Persons.

The identification of Relevant Persons was an iterative process.

A summary of the preliminary steps adopted by Santos to identify Relevant Persons appears in **Table 4.2** below.

**Table 4.2. Preliminary identification methodology.**

Process steps
1. Identify the impacts of the planned activities and the risks and impacts of unplanned events.



Process steps
2. Consider the spatial extent of the environment that may be affected by the Activity impacts and risks.
3. Consider and identify aspects of the environment within the environment that may be affected, having regard to: <ul style="list-style-type: none"> <li>(a) ecosystems and their constituent parts, including people and communities</li> <li>(b) natural and physical resources</li> <li>(c) the qualities and characteristics of locations, places and areas</li> <li>(d) the heritage value of places</li> <li>(e) the social, economic and cultural features of the matters mentioned in paragraphs (a), (b), (c) and (d).</li> </ul>
4. Identify Relevant Person categories, having regard to: <ul style="list-style-type: none"> <li>(a) aspects of the environment identified at Item 3</li> <li>(b) the departments or agencies of Commonwealth, State and Territory governments that could therefore be relevant</li> <li>(c) the kinds of functions, interests or activities of people or organisations that could therefore be affected</li> <li>(d) submissions received in response to Santos' advertisements asking Relevant Persons to identify themselves if they wished to be consulted.</li> </ul> <p>Update during consultation based on new information, if appropriate.</p>
5. Identify Relevant Persons within Relevant Person categories, having regard to items 1-4 above.

Santos considered the nature of the Activity (and key component activities) (described in **Section 2**), the location of the Activity and the Operational Area (described and depicted in **Section 2**), the impacts of planned activities (described in **Section 6**) and the risks and impacts of unplanned events (described in **Section 7**).

Santos also considered the spatial extent of the environment that may be affected by the Activity impacts and risks (described in **Section 3** and **Appendix C**).

**Table 4.3** outlines the environmental aspects (described in detail in **Section 3**) Santos then considered for the purpose of identifying Relevant Person categories.

**Table 4.3. Environmental aspects considered for Relevant Person category identification.**

Aspects of the environment	EP Reference
Physical environment	<b>Section 3.2.2</b>
Provincial Bioregions	<b>Section 3.2.3</b>

<b>Aspects of the environment</b>	<b>EP Reference</b>
Benthic habitats	<b>Section 3.2.4</b>
Australian marine parks and state marine parks, management areas, reserves	<b>Section 3.2.5.1</b>
Key Ecological Features	<b>Section 3.2.5.2</b>
Commonwealth Heritage Areas (Indigenous and Non-Indigenous)	<b>Section 3.2.5.3</b> <b>Section 3.2.7.8</b>
Wetlands of International and National Significance	<b>Section 3.2.5.4</b>
Biologically Important Areas and Critical Habitat	<b>Section 3.2.6.1</b>
Recovery Plans	<b>Section 3.2.6.2</b>
Commercial Fisheries	<b>Section 3.2.7.1</b>
Indonesian and Timorese commercial and subsistence fishing	<b>Section 3.2.7.2</b>
Energy Industry	<b>Section 3.2.7.3</b>
Telecommunication Cables	<b>Section 3.2.7.4</b>
Defence Activities	<b>Section 3.2.7.5</b>
Shipping	<b>Section 3.2.7.6</b>
Recreation and Tourism	<b>Section 3.2.7.7</b>
Indigenous and Non-Indigenous Heritage	<b>Section 3.2.7.8</b>
Cultural Features	<b>Section 3.2.8</b>

Consideration of the above environmental aspects resulted in identification of the following Relevant Person categories:

- Reg 11A(1)(a)
  - Commonwealth Departments/Agencies
- Reg 11A(1)(b) and (c)
  - State and Territory Departments/Agencies
- Reg 11A(1)(d)
  - Local Government Authorities
  - First Nations peoples and groups
  - Environmental conservation organisations

- Commercial fishing (Commonwealth, NT, WA, international) Recreational fishers
- Industry associations
- Energy industry titleholders / operators
- Infrastructure operators
- Marine and coastal tourism operators
- Reg 11A(1)(e)
  - People or organisations who Santos had previously recognised as relevant under this category.

Santos then undertook the actions outlined below to identify Relevant Persons within those categories.

**Table 4.4. Actions for identifying Relevant Persons by category.**

Relevant Person Category	Actions to identify Relevant Persons
All Relevant Person categories	<ul style="list-style-type: none"> <li>• Review of relevant regional historical consultation to create a consolidated list of Relevant Persons, having regard to previously identified functions, interests and/or activities. In the case of this EP, Santos commenced this step by reviewing the list of Relevant Persons consulted for Revision 3 of this EP (see <b>Appendix E</b>), before conducting a broader review.</li> <li>• Review of lists of Relevant Persons in publicly available EPs, submitted by other Operators that may be relevant, having regard to the region, activities or risks/impacts under this EP.</li> <li>• Conducting key-word searches using online search engines and reviewing media coverage and organisation websites to identify persons and organisations with reasonably ascertainable functions, interests and activities that may be affected by the activities under this EP.</li> <li>• Conducting a large-scale, targeted media and advertising campaign to promote wide awareness of the Activity and to seek that Relevant Persons come forward.</li> <li>• Review of information provided by or claims made by or on behalf of persons or organisations who claimed to be RPs.</li> </ul>
Reg 11A(1)(a)	
Commonwealth Departments/Agencies	<ul style="list-style-type: none"> <li>• Review of government agency websites and directories to understand agency roles, functions and responsibilities.</li> <li>• Review of NOPSEMA and government agency guidance on consultation expectations.</li> </ul>
Reg 11A(1)(b) and (c)	
State and Territory Departments/Agencies	<ul style="list-style-type: none"> <li>• Review of government agency websites and directories to understand agency roles, functions and responsibilities.</li> <li>• Review of NOPSEMA and government agency guidance on consultation expectations.</li> </ul>
Reg 11A(1)(d)	

Relevant Person Category	Actions to identify Relevant Persons
Academic and Research Organisations	<ul style="list-style-type: none"> <li>• Desktop review of publicly available and reasonably ascertainable published research (including conducting searches of research databases) having regard to the region, activities or risks/impacts under this EP.</li> </ul>
Commercial Fishing	<ul style="list-style-type: none"> <li>• Review of Commonwealth, Northern Territory and WA State Government commercial fishing catch and effort data.</li> <li>• Review of fisheries entitled to fish in the EMBA.</li> </ul>
Environmental Conservation Organisations	<ul style="list-style-type: none"> <li>• Conducting key-word searches of publicly available online search engines, review media coverage and review organisation websites to identify organisations with reasonably ascertainable functions, interests and activities that may be affected, having regard to the region, activities or risks/impacts under this EP.</li> <li>• Review of other publicly available information, eg websites of conservation organisations whose functions, interests or activities within the EMBA may be affected.</li> </ul>
First Nations Peoples and groups	<ul style="list-style-type: none"> <li>• Review of the Judgment and the Appeal Judgment.</li> <li>• Review of publicly available studies, reports and/or other information sources that may assist in identifying or mapping relevant cultural interests in the EMBA.</li> <li>• Review of EMBA overlap with Native Title determined areas and claims, ILUAs, sacred sites, land rights and IPAs to identify areas over which a First Nations group may have functions, interests or activities that may be affected.</li> <li>• Review of Representative Aboriginal/Torres Strait Island Bodies (RATSIBs) on Native Title website.</li> <li>• Review of prescribed bodies corporate on Native Title website.</li> <li>• Conducting searches of public cultural heritage databases relevant to the EMBA.</li> <li>• Review of marine park management plans relevant to the EMBA.</li> <li>• Engagement with government departments/agencies with relevant knowledge or relevant responsibilities.</li> <li>• Engagement with representative bodies under the NT Act and the ALR Act.</li> </ul>
Infrastructure Operators	<ul style="list-style-type: none"> <li>• Review of EMBA overlap with offshore and onshore infrastructure, such as submarine telecommunications cables or ports.</li> </ul>
Industry Associations	<ul style="list-style-type: none"> <li>• Review of industry association representation of Relevant Persons.</li> </ul>

Relevant Person Category	Actions to identify Relevant Persons
Local Government Authorities	<ul style="list-style-type: none"> <li>Review of EMBA overlap with boundaries of Local Government Areas.</li> </ul>
Energy Industry	<ul style="list-style-type: none"> <li>Review of EMBA overlap with petroleum, greenhouse gas and any other NOPTA issued titles.</li> </ul>
Recreational Fishers	<ul style="list-style-type: none"> <li>Review of EMBA overlap with areas of interest to recreational fishing.</li> <li>Review of website information of relevant agencies/organisations that represent recreational fishing interests.</li> <li>Review of records of previous liaison with such representative agencies/organisations that may indicate persons or organisations with functions, interests and activities that may be affected by the activities under this EP.</li> </ul>
Marine and Coastal Tourism Operators	<ul style="list-style-type: none"> <li>Review of EMBA overlap with areas of interest to charter and tourism operators.</li> <li>Review of website information of relevant operators/organisations that represent commercial tourism interests.</li> <li>Review of records of previous liaison with such representative agencies/organisations that may indicate persons or organisations with functions, interests and activities that may be affected by the activities under this EP.</li> </ul>
Reg 11A(1)(e)	<ul style="list-style-type: none"> <li>Review of relevant persons consultation summary and documents for Revision 3 of the EP.</li> </ul>

In addition to the steps outlined above, Santos undertook a public awareness and media and advertising campaign. This was designed to:

- raise public awareness of the Barossa Gas Project generally, the activities proposed under this EP and Santos' regulation 11A consultation in respect of this EP; and
- seek Relevant Persons and encourage them to come forward.

From its engagements with a wide range of people and experience engaging with First Nations people, Santos was aware that mobile smartphones and social and digital media were used by First Nations people, particularly in remote communities, and considered that this form of advertising would be an effective way to reach to potential First Nations Relevant Persons.

Copies of the advertisements run by Santos are included at **Appendix J**.

The public awareness campaign involved the key steps outlined in **Table 4.5**, as follows:

**Table 4.5. Public awareness campaign.**

Step	Description	Purpose
<p><b>Website Hub</b></p>	<p>Dedicated Barossa Gas Project Hub created for Santos’ website.</p> <p>Website content developed and made available at <a href="https://www.santos.com/barossa/">https://www.santos.com/barossa/</a></p> <p>This was publicly available from 25 March 2023.</p>	<p>To provide information regarding:</p> <ul style="list-style-type: none"> <li>• the Barossa Gas Project generally (including an animated overview of the Project)</li> <li>• the Activity</li> <li>• the environment that may be affected by the Activity (including depictions of the modelled EMBA and explaining how the EMBA is determined)</li> <li>• the potential environmental impacts and risks and proposed control measures</li> <li>• the environmental approval process</li> <li>• the purpose of consultation, who may be a Relevant Person and how to self-nominate as a potential Relevant Person</li> <li>• Santos’ obligations during consultation in the course of preparing an environment plan</li> <li>• how to provide feedback (described to include input for this EP regarding values and sensitivities of the environment that may be affected by the Activity and potential environmental impacts and risks of the Activity).</li> </ul> <p>To link to the other information documents including:</p> <ul style="list-style-type: none"> <li>• Barossa Gas Project Drilling and Completions Information Booklet (Information Booklet)</li> <li>• online self-nomination form as a potential Relevant Person (<a href="https://www.santos.com/barossa/drilling-completions-relevant-persons-consultation/">https://www.santos.com/barossa/drilling-completions-relevant-persons-consultation/</a>)</li> <li>• FAQ document, which was modified and updated during the consultation process.</li> </ul>
<p><b>Media and advertising campaign</b></p>	<p>Large-scale, targeted advertising campaign involving widespread print, radio and social media advertising.</p>	<p>To promote wide awareness of the Activity and seek out Relevant Persons. The advertisements encouraged interested parties to visit the website hub for more detailed information about the Activity.</p>

Step	Description	Purpose
	This included national print and radio advertisements, with a specific focus on the Northern Territory and WA, and social media advertisements throughout Australia, Timor-Leste and Indonesia.	See <b>Table 4.7</b> and <b>Table 4.8</b> .
<b>Drop-in consultation sessions</b>	Four drop-in sessions held at the Darwin Convention Centre. Sessions advertised in the NT News, on NT radio and social media (see <b>Table 4.9</b> ).	To make available: <ul style="list-style-type: none"> <li>• Information Booklets</li> <li>• iPads pre-loaded with video content including a project overview video</li> <li>• project maps</li> <li>• Santos representatives to answer questions and receive feedback.</li> </ul>
<b>Pop-up stalls</b>	Two pop-up stalls held in the Darwin Mall.	To make available: <ul style="list-style-type: none"> <li>• Information Booklets</li> <li>• iPads pre-loaded with video content including a project overview video</li> <li>• project maps</li> <li>• Santos representatives to answer questions and receive feedback.</li> </ul>
<b>Arts in the Grass involvement</b>	Santos representatives attended two Arts in the Grass events organised by Larrakia Nation at Mindil Beach for people living rough in Darwin. Santos was advised by the NT Government and other sources that these events could be effective in reaching potential First Nations Relevant Persons, noting a large number of Tiwi and other First Nations people who live in the Darwin region for work or who camp around the Mindil Beach area and attend Arts in the Grass.	To make available: <ul style="list-style-type: none"> <li>• Fact sheets</li> <li>• project maps</li> <li>• Santos representatives to answer questions and receive feedback.</li> </ul>

In some cases, these steps and initiatives also provided consultation opportunities.

As set out above in **Table 4.5**, Santos conducted a large-scale, targeted advertising campaign to promote wide awareness of the Activity, to seek out Relevant Persons, and to promote opportunities to provide feedback.

This involved phases as follows, depicted in **Table 4.6** below:

**Table 4.6. Targeted advertising campaign**

Phase	Purpose	Description
Identifying Relevant Persons	To raise broad awareness of the Activity and identify Relevant Persons.	Widespread 30-day print, radio and social media advertising from 25 March 2023 to 22 April 2023. This advertising included advertisements in national and regional newspapers, including the Australian, Australian Financial Review, West Australian, Northern Territory News and National Indigenous Times, as well as radio advertising. There was also geotargeted social media advertisements to reach Indonesia and Timor-Leste.  See <b>Table 4.7</b> .
Seeking feedback from Relevant Persons	To seek feedback from Relevant Persons and advertise avenues for providing feedback.	Widespread 30-day print, radio and social media advertising from 17 May 2023 to 15 June 2023. In this phase, Santos also placed advertisements on Top End Aboriginal Bush Broadcasting Association to reach 29 remote communities.  See <b>Table 4.8</b> .
Seeking feedback from Relevant Persons in Darwin	To advertise and promote consultation opportunities within Darwin.	Encouraging accessible consultation and engagement opportunities through hosting Darwin drop-in sessions held at the Darwin Convention Centre, at which information was made available and feedback sought. Also provided opportunities for Santos to identify additional Relevant Persons.
Identifying and seeking feedback from international Relevant Persons	To raise broad awareness of the Activity, identify Relevant Persons and seek feedback from Relevant Persons located internationally	Geotargeted social media advertising to Indonesia and Timor-Leste in English and national languages of Bahasa and Tetum.



**Table 4.7: Phase 1 – Advertising seeking Relevant Persons (March 2023 – April 2023)**

<b>Date</b>	<b>Advertising type</b>	<b>Description</b>	<b>Reach</b>
Saturday 25 March 2023	Press ad – NT News	Full page, page 22	Target Northern Territory with reach of 25,000
Monday 27 March 2023 – 22 April 2023	Social media ad	Facebook, Instagram and Messenger	Geotargeted Northern Territory
Monday 27 March 2023 - 22 April 2023	Social media ad	Facebook, Instagram and Messenger	Geotargeted Australia, Indonesia & Timor-Leste
Monday 27 March 2023	Press ad – The Australian	Full page, page 20	National coverage with reach of 451,000
Tuesday 28 March 2023	Press ad – NT News	Full page, page 6	Target Northern Territory with reach of 20,000
Tuesday 28 March 2023	Press ad – National Indigenous Times	Full page, page 14	National coverage with reach of 1,100,000
Friday 31 March 2023	Press ad – NT News	Full page, page 14	Target Northern Territory with reach of 22,000
Saturday 1 April 2023	Public notice – NT News	Page 7	Target Northern Territory with reach of 25,000
Saturday 1 April 2023	Press ad – The Australian	Full page – page 28	National coverage with reach of 635,000
Saturday 1 April 2023	Public Notice – The Australian	Page 12	National coverage with reach of 635,000
Tuesday 4 April 2023	Press ad – Australian Financial Review	Full page, page 7	National coverage with reach of 219,000
Tuesday 4 April 2023	Public Notice – Australian Financial Review	Page 9	National coverage with reach of 219,000
Saturday 8 April 2023	Public Notice – The Australian	Page 28	National coverage with reach of 635,000

<b>Date</b>	<b>Advertising type</b>	<b>Description</b>	<b>Reach</b>
Saturday 8 April 2023	Press ad – The West Australian	Full page, page 10	Target Western Australia with reach of 491,000
Monday 10 April 2023	Public Notice – The West Australian	Page 3	Target Western Australia with reach of 451,000
Wednesday 12 April 2023	Public Notice – NT News	Page 5	Target Northern Territory with reach of 25,000
Wednesday 12 April 2023	Public Notice – Australian Financial Review	Page 7	National coverage with reach of 226,000
Saturday 15 April 2023	Public Notice – The Australian	Page 8	National coverage with reach of 635,000
Saturday 15 April 2023 – 21 April 2023	National radio advertising across metro stations	235 spots/plays across period in Sydney, Melbourne, Brisbane, Adelaide and Perth	National coverage across major cities with reach of 1,130,000
Saturday 15 April 2023 – 21 April 2023	Radio advertising across Darwin	66 spots/plays across period	Darwin specific
Monday 17 April 2023	Public Notice – The West Australian	Page 7	Target Western Australia with reach of 415,000
Monday 17 April 2023	Public Notice – Australian Financial Review	Page 6	National coverage with reach of 258,000
Saturday 22 April 2023	Public Notice – The Australian	Page 11	National coverage with reach of 635,000

**Table 4.8: Phase 2 – Further advertising seeking Relevant Persons and seeking feedback (May 2023 – June 2023)**

<b>Date</b>	<b>Advertising type</b>	<b>Description</b>	<b>Reach</b>
Wednesday 17 May 2023	Press ad – The Australian	Half page, page 16	National coverage with reach of 369,000
Wednesday 17 May 2023	Press ad – The West Australian	Half page, page 10	Target Western Australia with reach of 348,000
Wednesday 17 May 2023 – 15 June 2023	Radio advertising across metro stations	1,034 spots/plays across period in Sydney, Melbourne, Brisbane, Adelaide and Perth	National coverage across major cities with reach of 5,520,904
Wednesday 17 May 2023 – 15 June 2023	Radio advertising across Darwin	288 spots/plays across period	Darwin specific advertising
Wednesday 17 May 2023 – 15 June 2023	Radio advertising Top End Aboriginal Bush Broadcasting Association (TEABBA)	120 spots/plays across period	29 remote communities across NT, including Tiwi Islands and Croker Island
Thursday 18 May 2023	Press ad – NT News	Half page, page 9	Target Northern Territory with reach of 20,000
Thursday 18 May 2023	Press ad – Australian Financial Review	Half page, page 9	National coverage with reach of 187,000
Friday 19 May 2023	Press ad – NT News	Half page, page 22	Target Northern Territory with reach of 22,000
Saturday 20 May 2023	Pres ad – The Australian	Half page, page 29	National coverage with reach of 635,000
Saturday 20 May 2023	Press ad – The West Australian	Half page, page 13	Target Western Australia with reach of 491,000
Monday 22 May 2023	Press ad – Australian Financial Review	Half page, page 5	National coverage with reach of 258,000

<b>Date</b>	<b>Advertising type</b>	<b>Description</b>	<b>Reach</b>
Tuesday 23 May 2023 – 15 June 2023	Social media ad	Facebook, Instagram and Messenger	Geotargeted NT & WA
Friday 26 May 2023	Press ad – NT News	Half page, page 9	Target Northern Territory with reach of 22,000
Saturday 27 May 2023	Press ad – The West Australian	Half page, page 10	Target Western Australia with reach of 491,000
Saturday 27 May 2023	Press ad – The Australian	Half page, page 30	National coverage with reach of 635,000
Monday 29 May 2023	Press ad – Australian Financial Review	Half page, page 8	National coverage with reach of 258,000
Tuesday 30 May 2023	Press ad – National Indigenous Times	Half page, page 22	National coverage with reach of 1,100,000
Friday 2 June 2023	Press ad – NT News	Half page, page 11	Target Northern Territory with reach of 22,000
Saturday 3 June 2023	Press ad – The West Australian	Half page, page 11	Target Western Australia with reach of 491,000
Saturday 3 June 2023	Press ad – The Australian	Half page, page 9	National coverage with reach of 635,000
Monday 5 June 2023	Press ad – Australian Financial Review	Half page, page 5	National coverage with reach of 258,000
Friday 9 June 2023	Press ad – NT News	Half page, page 4	Target Northern Territory with reach of 22,000
Saturday 10 June 2023	Press ad – The West Australian	Half page, page 11	Target Western Australia with reach of 491,000
Saturday 10 June 2023	Press ad – The Australian	Half page, page 6	National coverage with reach of 635,000
Tuesday 13 June 2023	Press ad – Australian Financial Review	Half page, page 5	National coverage with reach of 258,000

**Table 4.9: Phase 3 – Advertising and promoting Darwin drop-in sessions (April 2023 - June 2023)**

<b>Darwin drop-in sessions - first round</b>			
Friday 21 April 2023 – 3 May 2023	Social media ad	Facebook, Instagram and Messenger	Geotargeted Darwin
Friday 21 April 2023	Press ad – NT News	Half page, page 18	Target Northern Territory with reach of 22,000
Thursday 27 April 2023	Press ad – NT News	Half page, page 6	Target Northern Territory with reach of 20,000
Thursday 27 April 2023 – 3 May 2023	Radio advertising across Darwin	51 spots/plays across period	Darwin specific advertising
Friday 28 April 2023	Press ad – NT News	Half page, page 6	Target Northern Territory with reach of 22,000
Monday 1 May 2023	Press ad – NT News	Half page, page 7	Target Northern Territory with reach of 25,000
<b>Darwin drop-in sessions - second round</b>			
Friday 12 May 2023	Press ad – NT News	Half page, page 16	Target Northern Territory with reach of 22,000
Monday 15 May 2023	Press ad – NT News	Half page, page 5	Target Northern Territory with reach of 25,000
Wednesday 17 May 2023 – 12 June 2023	Social media ad	Facebook, Instagram and Messenger	Geotargeted Darwin
Wednesday 17 May 2023	Press ad – NT News	Half page, page 10	Target Northern Territory with reach of 25,000
Monday 22 May 2023	Press ad – NT News	Half page, page 9	Target Northern Territory with reach of 25,000
Monday 22 May 2023 – 7 June 2023	Radio advertising across Darwin	170 spots/plays across period	Darwin specific advertising
Wednesday 24 May 2023	Press ad – NT News	Half page, page 4	Target Northern Territory with reach of 25,000
Monday 29 May 2023	Press ad – NT News	Half page, page 5	Target Northern Territory with reach of 25,000

Wednesday 31 May 2023	Press ad – NT News	Half page, page 4	Target Northern Territory with reach of 25,000
Monday 5 June 2023	Press ad – NT News	Half page, page 11	Target Northern Territory with reach of 25,000
Wednesday 7 June 2023	Press ad – NT News	Half page, page 4	Target Northern Territory with reach of 25,000

#### 4.5.2.1 Santos’ approach to identifying International Relevant Persons

Further to the above, Santos took steps to seek out international persons or organisations with reasonably ascertainable “*functions, interests or activities*” that may be affected by the activities to be carried out under this EP (international Relevant Persons).

Santos’ approach to identifying International Relevant Persons takes into account the nature and scale of the activity, and the likelihood and magnitude of impacts to international persons and organisations that may be affected by the Activity.

With regard to the location of the planned activities, there are no planned impacts generated at the Activity location that may affect the functions, interests or activities of international Relevant Persons (see Section 6). With regard to risk and impacts of unplanned events associated with the Activity, the likelihood of an unplanned spill event occurring and hydrocarbons reaching the locations where international persons or organisations may have functions, interests or activities is remote due to planned engineering prevention measures (see s 2, 7.6, 7.7 for details). In the very unlikely event of an unplanned spill, the likelihood of impacts to functions, interests or activities of international relevant persons is further reduced through the implementation of spill response measures which are described in detail in the Barossa Development Drilling and Completions Oil Pollution Emergency Plan - it is important to note here that the modelled EMBA assumes none of the suite of mitigations described in the OPEP are implemented. This is particularly relevant to locations and receptors near the outer limits of the EMBA, where there is even lower likelihood of international persons or organisations functions, interests or activities being affected once spill response mitigation measures are taken into account.

Santos therefore sought to reasonably ascertain international Relevant Persons in a manner proportionate to the remote likelihood of any effect on the functions, interests or activities of international persons or organisations.

Santos initially considered that no further steps were reasonably required to identify international Relevant Persons due to the remote likelihood of any internationally held functions interests or activities that may be affected by the Activity. However, a number of international persons or organisations self-nominated following Santos' domestic advertising campaign. Notwithstanding the remote likelihood of the Activity having any effect on internationally held functions, interests or activities, Santos noted the success of its domestic advertising campaign in identifying some international Relevant Persons and opted to conduct a further international advertising campaign. This involved geotargeted advertising on Facebook, Instagram and Messenger, in Indonesian, Tetum and English, to target locations including Indonesia and Timor-Leste (in May and June 2023), asking Relevant Persons to contact Santos in addition to the general widespread media and advertising campaign, as set out in **Table 4.7** and **Table 4.8**). Those advertisements contained links to Santos’ website for the Drilling and Completions EP consultation which provided Activity and consultation information (see s 4.6.2) and a form for self-nomination as a potential relevant person. There were no further persons or organisations that self-nominated following the international advertising campaign.

**Table 4.10: Targeted International Phase - Targeted international media / advertising**

Date	Advertising type	Description	Reach
Monday 22 May 2023 – 15 June 2023	Social media ad – Timor-Leste ad in Tetum and English	Facebook, Instagram and Messenger	Geotargeted Timor-Leste
Tuesday 23 May 2023 – 15 June 2023	Social media ad – Indonesian ad in Bahasa and English	Facebook, Instagram and Messenger	Geotargeted Indonesia
Tuesday 30 May 2023 – 15 June 2023	Social media ad	Facebook, Instagram and Messenger	Geotargeted Indonesia and Timor-Leste

Where a person or organisation self-nominated as a potential international relevant person, Santos sought to ascertain whether they have functions, interests or activities which may be affected by the Drilling and Completions activity. Where the person or organisation articulated a function, interest or activity which may be affected, and/or where Santos’ own research revealed a function, interest or activity that may be affected, Santos treated the person or organisation as a Relevant Person under 11A(1)(d).

In addition to its advertising campaign, Santos consulted with DFAT, which has an interest in coordinating and facilitating communication between Australia and the Indonesian or Timor-Leste governments.

During consultation with DFAT, DFAT noted from Santos’ oil spill modelling, Indonesia and Timor-Leste may be affected in the event of a hydrocarbon spill and confirmed that DFAT can provide assistance if it is determined there is a need to consult the Indonesian or Timor-Leste Governments, and that NOPSEMA can contact the relevant part of DFAT should this be necessary.

As Santos has assessed there to be no Activity impacts or risks to internationally held functions, interest and activities, the only matter in respect of which consultation with Indonesian and Timor-Leste persons or organisations might be required is in relation to a hydrocarbon spill that reaches Indonesian or Timor-Leste waters. No particular Indonesian or Timor Leste government person or organisation has been identified as having reasonably ascertainable functions, interests or activities that may be affected by the Activity. Santos understands that in the unlikely event of a hydrocarbon spill, communication about such matters is to occur at a State-to-State level. Under the National Plan for maritime environmental emergencies (AMSA, 2020) Australia has entered into mutual aid arrangements and associated cooperation agreements with other countries impacted by maritime environmental emergencies. In this regard, Australian has entered into a bilateral agreement with Indonesia, and a Maritime Boundaries Treaty with Timor-Leste. Any relevant affected government authorities of Indonesia or Timor-Leste would be identified and notified through the domestic arrangements of that State.

#### 4.5.2.2 Further detail regarding Santos’ approach to identifying First Nations Relevant Persons.

While Santos’ approach to identifying First Nations Relevant Persons is outlined above, further detail is provided below.

As with Santos’ process for identifying Relevant Persons generally, Santos’ process for identifying First Nations Relevant Persons was an iterative process, with multiple avenues of enquiry.

Santos' process involved identifying First Nations groups, clans and/or organisations along the NT/WA coastline in the vicinity of the EMBA and asking itself the following questions in order to positively identify First Nations Relevant Persons:

- i. Do any First Nations groups, clans and/or organisations along the NT/WA coastline in the vicinity of the EMBA have any native title claims pending or determined (or any Indigenous Land Use Agreements) that extend offshore and cross into the EMBA?
- ii. Do any First Nations groups, clans and/or organisations along the NT/WA coastline in the vicinity of the EMBA have any responsibilities for sacred sites that extend offshore and cross into the EMBA (recognised and protected under the ALR Act, the NTASS Act, the ATSIHP Act, the UCH Act, or the EPBC Act).
- iii. Do any First Nations groups, clans and/or organisations along the NT/WA coastline in the vicinity of the EMBA have any land rights (apart from native title claims) pending or determined that extend offshore and cross into the EMBA?
- iv. Are there any Indigenous Protected Areas (IPAs) that extend offshore and cross into the EMBA?

If the answer to any of the above questions was Yes, this would have resulted in identification of the particular First Nations group, clan or organisation as a Relevant Person. However, in all cases, the answer to all four questions was No.

Santos recognises that not all relevant functions, interests or activities of First Nations persons or groups will be identified through the four steps above, and that even if the answer to all four of the above questions is no, First Nations groups in the vicinity of the EMBA could still potentially have communal cultural interests (such as connection to Sea Country) that extend into the EMBA. The EMBA, however, includes large areas where only unplanned activities such as a spill event with very low probability of occurrence, could have any impact on the environment.

The context for how the spatial extent of the environment that may be affected is determined is relevant when evaluating whether any First Nations sea country or other interests could potentially be affected by the Activity. In the case of this EP, the EMBA is informed by modelling the maximum potential extent of all major unplanned spill events under all seasonal conditions as further explained in Section 3.1.1. There is no single event that could ever result in the whole EMBA being affected at the same time. The modelling itself represents the potential extent of detection of a spill in the environment rather than the extent of environmental impact on receptors in the environment, for example impacts to marine species which may be of cultural/totemic significance to First Nations communities. The EMBA also does not take into account implementation of OPEP mitigations which would reduce the size of the EMBA in any scenario. This means the EMBA is an overly conservative representation of the full extent of the environment that may be affected. When considering the remote possibility of any major unplanned spill event, and the inherent conservatism of the EMBA, the likelihood of First Nations communities along the Northern Australia NT/WA coastline having an interest that may be affected by the proposed activities (if such groups do have sea country or other interests) becomes increasingly unlikely with increasing distance from the Operational Area, where planned activities will occur.

Nonetheless, having regard to the residual potential for other cultural interests within the EMBA, Santos supplemented its 4 step process above by:

- the completion of First Nations Relevant Persons identification steps (see Table 4-4 above);
- including the Northern Land Council and the Kimberley Land Council as Relevant Persons, including in their capacity as Native Title Representative Bodies who would have knowledge about any sea country interests of coastal First Nations communities along the WA/NT coastlines in the vicinity of the EMBA and inviting their input on First Nations Relevant Persons;



- inviting information from identified First Nations Relevant Persons (include the NLC and KLC) as to other potential First Nations Relevant Persons; and
- widespread public awareness and advertising campaigns targeted at increasing awareness of the Barossa Gas Project, and Drilling and Completions Activity; and encouraging any First Nations Relevant Persons who have not been identified to come forward (see Tables 4.5 to 4.9 above).

These steps were carried out to further inform Santos' identification of First Nations people or groups with reasonably ascertainable functions, interests or activities that may be affected by the activities to be carried out under this EP.

As to point 3 above, Santos' process for identifying Relevant Persons involved including in its consultation materials an invitation for Relevant Persons to notify Santos of other potential Relevant Persons for Santos to consider consulting about this EP. Santos was not directed to any other First Nations groups or organisations in response to this invitation.

Santos' consultation with Native Title Representative Bodies relevant to the Activity EMBA also included inviting advice from the NLC and the KLC about other First Nations individuals/groups who may have communal cultural interests (such as connection to Sea Country) that may be affected by the Activity. As noted in Table 4.11, each of NLC and KLC has representative functions in relation to potential sea country interests within the EMBA and therefore were expected to be aware of such interests. Both the NLC and the KLC did not identify anyone when provided the opportunity, to assist with Santos' First Nations identification efforts (see Section 4.7 for details of Santos consultation with NLC and KLC). As a result, Santos' consultation with the NLC and KLC did not yield any additional potential First Nations Relevant Persons to be consulted by Santos.

Santos' process further included a large-scale, targeted media and advertising campaign to promote wide awareness of the Activity and to seek to identify potential Relevant Persons. The media and advertising campaign had a strong regional focus, noting the remoteness of First Nations and other communities in Northern Australia, with social media and radio advertising seen as useful tools to raise awareness in First Nations communities about the proposed Activity and associated consultation opportunities given known widespread use in these communities of mobile smartphones and social media platforms. Santos utilised a large-scale advertising and awareness campaign to assist in identification of other First Nations groups with interests (such as connection with Sea Country) that may be affected by the Activity, that weren't identified through other identification steps described above and in Table 4.4. While Santos recognises that the obligation to identify relevant persons lies on the titleholder, and titleholders cannot rely solely on a process of public notification and self-identification, Santos considers its campaign to be an appropriate measure to promote comprehensive identification of First Nations (and other) Relevant Persons, particularly having regard to the remoteness of the Activity, the remote possibility of a major unplanned spill event, the inherent conservatism in spill modelling used to inform the EMBA and the difficulty in ascertaining whose interests may be affected in remote offshore waters.

In support of the effectiveness of this measure, Santos notes that on 21 April 2023, the EDO wrote to Santos saying that it represented a Traditional Owner from Minjilang who considered himself to be a Relevant Person in respect of the Activity. That correspondence expressly noted Santos' call for relevant persons to contact Santos. As a result of all of Santos' collective enquiries Santos identified the First Nations persons and organisations listed in Table 4-11. Identification of the Tiwi Islands Clans was prompted by consideration of content in the Tipakalippa judgments, including:

- The conclusions of the Full Court of the Federal Court that:
  - Dennis Tipakalippa and the Munupi clan had interests within the meaning of regulation 11A(1)(d) of the OPGGS(E)R;

- “interests” within the regulatory framework includes cultural and spiritual interests of the kind described in the sea country material in Revision 3 of the Drilling EP;
- “Mr Tipakalippa and the Munupi clan had interests within the meaning of reg 11A(1)(d) that required them to be consulted”. Mr Tipakalippa had claimed that he and the Munupi clan, as well as other traditional owners of the Tiwi Islands, have “sea country” in the Timor Sea to the north of the Tiwi Islands, extending to and beyond the Operational Area.

Santos’ process also resulted in identification of the Croker Island clan members as potentially relevant persons in consideration of the following:

- the EDO had written to Santos saying that it represented a Traditional Owner from Minjilang who considered himself to be a Relevant Person and that other members of his community may also have functions, interests and activities that may be affected by the Drilling and Completions Activity; and Croker Island is reasonably proximate to the boundary of the EMBA; and
- there is mention of the Croker Island clans in the North Marine Parks Network Management Plan 2018 indicating that the Croker Island clans have sea country interests in the Arafura Marine Park and part of the Arafura Marine Park is within the EMBA. Santos, therefore, undertook to further explore whether the Croker Island clans have reasonably ascertainable functions interests or activities that may be affected by the activities proposed under this EP.

While the North Marine Parks Network Management Plan 2018 indicated that the Croker Island clans have sea country interests in the Arafura Marine Park, this may be (although it is not clear) isolated to, or in close proximity to, where the Arafura Marine Park intersects the Croker Island Native Title Determination (DCD1998/001), which is outside the EMBA for the Activity (refer to Figure 4-1). The North Marine Parks Network Management Plan 2018 states that Yuwurrumu members of the Mandilarri-Ildugij, the Mangalara, the Murran, the Gadura-Minaga and the Ngaynjaharr clans (being the registered native title holders under the Croker Island Native Title Determination) have responsibilities for sea country in the Arafura Marine Park, and that these clans have native title determined over part of their sea country. The Marine Park Management Plan therefore implies, although without reference or evidence, that the Croker Island clans’ sea country extends beyond the intersection of the Arafura Marine Park and the Croker Island Native Title Determination. No information is provided in the North Marine Parks Network Management Plan 2018 as to how far outside the Determination those interests extend and where in the Arafura Marine Park those interests might be located. As such, and noting that the EMBA for this activity only partially intersects with the Arafura Marine Park, Santos does not have clear evidence from the North Marine Parks Network Management Plan 2018 that the sea country interests within the Arafura Marine Park are located within the EMBA.

Santos subsequently engaged with representatives of the Croker Island clans via the Mulurryud Consultative Committee (refer to section 4.6.6 below). Santos’ process (including its consultation with other Relevant Persons and widespread advertising campaign) did not uncover any other First Nations persons or organisations with reasonably ascertainable functions, interests or activities that may be affected by the activities to be carried out under this EP.

### 4.5.3 Relevant Persons

The list of Relevant Persons identified through application of the above steps for the purposes of regulation 11A(1) is contained in **Table 4.11**.

**Table 4.11 Relevant Persons**

Relevant Person	Relevance
<b>Regulation 11A(1)(a): Departments or agencies of the Commonwealth to which the activities to be carried out under the environment plan may be relevant</b>	
Australian Communications and Media Authority (ACMA)	<p>ACMA is responsible for the regulation of communications and media services in Australia.</p> <p>ACMA is a relevant agency because the Activity has the potential to impact future proposed subsea communications cable installations. Whilst there is no impact or risk from the Activity currently anticipated in respect of current subsea communication cables already in situ, there is potential for other/additional future proposed subsea communication cables installation within or proximate to the Operational Area which may be affected by the Activity.</p>
Australian Fisheries Management Authority (AFMA)	<p>AFMA is responsible for managing Commonwealth fisheries and is a relevant agency because the Activity has the potential to impact on fisheries resources in AFMA managed fisheries. Commonwealth fisheries were mapped against the EMBA and incorporated into consultation activity where appropriate.</p>
Australian Hydrographic Office (AHO)	<p>AHO is part of the Department of Defence and is the entity responsible for the provision of hydrographic services to Australia, under the Safety of Life at Sea (SOLAS) Convention and the <i>Navigation Act 2012</i> (Cth). This includes the publication and distribution of nautical products and other information required for the safety of ships navigating in Australian waters.</p> <p>AHO is a relevant agency for consultation because the Activity requires nautical products or other maritime safety information to be updated.</p>

Relevant Person	Relevance
<p>Australian Maritime Safety Authority (AMSA)</p>	<p>AMSA is a statutory authority and its principal functions are to:</p> <ul style="list-style-type: none"> <li>• promote maritime safety and protection of the marine environment.</li> <li>• prevent and combat ship-sourced pollution in the marine environment.</li> <li>• provide infrastructure to support safe navigation in Australian waters.</li> <li>• provide a national search and rescue service to the maritime and aviation sectors.</li> </ul> <p>AMSA is a relevant agency for consultation because the Activity may impact on the safe navigation of commercial shipping in Australian waters.</p>
<p>Department of Agriculture, Forestry and Fisheries (DAFF)</p> <ul style="list-style-type: none"> <li>• Biosecurity (marine pests, vessels, aircraft and personnel)</li> <li>• Fisheries</li> </ul>	<p>DAFF administers the <i>Biosecurity Act 2015</i> (Cth) (Biosecurity Act). The Biosecurity Act has jurisdiction within Australian territory and does not encompass the full extent of the Commonwealth marine area. DAFF is a relevant agency for consultation because the Activity involves:</p> <ul style="list-style-type: none"> <li>• the movement of aircraft or vessels between Australia and offshore petroleum activities either inside or outside Australian territory.</li> <li>• the exposure of an aircraft or vessel (which leaves Australian territory not subject to biosecurity control) to offshore petroleum activities.</li> <li>• the movement of goods or personnel to or from offshore petroleum activities.</li> </ul>

Relevant Person	Relevance
	<ul style="list-style-type: none"> <li>an aircraft or vessel seeking permission to return to a non-first point of entry after exposure to offshore petroleum activities.</li> </ul> <p>DAFF also has primary policy responsibility for promoting the biological, economic and social sustainability of Australian fisheries. DAFF is a relevant agency for consultation because the Activity has the potential to impact on fishing operations and/or fishing habitats in Commonwealth waters by:</p> <ul style="list-style-type: none"> <li>disrupting existing fishing activities.</li> <li>causing declines in valuable fisheries resources in the area.</li> <li>damaging habitat or marine eco-systems on which valuable fisheries resources depend.</li> </ul>
<p>Department of Climate Change, Energy, the Environment and Water (Parks Australia) (Parks Australia)</p>	<p>Parks Australia is the statutory authority responsible for administration, management and control of Australian Marine Parks (AMPs).</p> <p>It is a relevant agency for consultation because activities proposed to occur outside a reserve may impact on the values within an Australian Marine Park.</p> <p>An environmental incident which occurs in Commonwealth waters surrounding an Australian Marine Park due to an Activity under this EP may impact on the values within an Australian Marine Park.</p>
<p>Department of Defence (DoD)</p>	<p>DoD utilises several maritime exercise areas in Australian waters to perform a unique role in support of Australia’s strategic and national security interests.</p> <p>DoD is a relevant agency for consultation because:</p>

Relevant Person	Relevance
	<ul style="list-style-type: none"> <li>the proposed Activity may impact DoD training and operational requirements, in that the EMBA overlaps DoD training areas.</li> <li>the proposed Activity encroaches on known training areas and/or restricted airspace.</li> <li>there is a risk of unexploded ordnance in the area where the Activity is taking place.</li> </ul>
Department of Foreign Affairs and Trade (DFAT)	<p>DFAT promotes and protects Australia’s interests internationally and contributes to global stability and economic growth.</p> <p>The modelled EMBA for this EP extends beyond Australia’s territory.</p> <p>DFAT is a relevant agency for consultation as the proposed Activity poses a hydrocarbon spill risk that could result in impacts extending to other international jurisdictions, and where persons or organisations in international jurisdictions may be affected by the proposed Activity, including foreign individuals or governments, vessels, international fishers and/or international marine parks.</p>

Relevant Person	Relevance
Department of Home Affairs and Australian Border Force (ABF)	The Department of Home Affairs is an Australian Government department responsible for overseeing migration, national security and resilience, and border-related functions. Australian Border Force (ABF) is an operationally independent body within the Home Affairs portfolio. ABF is Australia’s border law enforcement agency and customs service. ABF’s vessels undertake patrols as part of its surveillance and response activities throughout an offshore maritime area of almost 45.1 million square kilometres. This area includes the EMBA.
Department of Industry, Science and Resources (DISR)	DISR is a relevant agency for consultation because its responsibilities include offshore oil and gas development and safety.
National Indigenous Australians Agency (NIAA)	NIAA is an Australian Government agency responsible for whole-of-government coordination of policy development, program design and service delivery for Indigenous Australians.
<b>Regulation 11A(1)(b): Departments or agencies of the Northern Territory to which the activities to be carried out under the environment plan may be relevant</b> <b>Regulation 11A(1)(c): Department of the responsible Northern Territory Minister</b>	
Northern Territory Department of Industry, Tourism and Trade (DITT-NT) – Energy Division	DITT-NT is the department of the responsible Territory Minister and is required to be consulted under subregulation 11A(1)(c) of the OPGGS(E)R.
Northern Territory Department of Industry, Tourism and Trade (DITT-NT) – Fisheries Division	DITT-NT has functions in relation to NT-managed fisheries. The Operational Area overlaps the Timor Reef Fishery which is jointly managed by the NT and Commonwealth governments.

Relevant Person	Relevance
Northern Territory Department of Infrastructure, Planning and Logistics (DIPL-NT) – Transport Division	DIPL-NT is responsible for marine safety in NT coastal waters. The Operational Area and EMBA are in Commonwealth Waters.
Northern Territory Department of Territory Families, Housing and Communities - Heritage branch	The Department of Territory Families, Housing and Communities' Heritage branch has a role in protecting the maritime heritage of the Northern Territory.
Tourism NT	Government statutory authority responsible for promoting tourism in the Northern Territory, including potential activity by NT-based operators in the EMBA.
<p><b>Regulation 11A(1)(b): Departments or agencies of Western Australia to which the activities to be carried out under the environment plan may be relevant</b></p> <p><b>Regulation 11A(1)(c): Department of the responsible Western Australian Minister</b></p>	
Department of Biodiversity, Conservation and Attractions (DBCA-WA)	DBCA-WA has functions in relation to the protection of Western Australian flora and fauna, including in relation to the Scott Reef Reserve (which is in WA waters) and works in tandem with DPIRD to promote biodiversity and conservation with an interest in sustainable management of species and ecosystems.
Department of Mines Industry Regulation and Safety (DMIRS)	DMIRS is the department of the responsible Western Australian Minister and is required to be consulted under subregulation 11A(1)(c) of the OPGGS(E)R. This department holds responsibility for resource and environmental regulation in WA.



Relevant Person	Relevance
Department of Primary Industries and Regional Development (DPIRD-WA) – Fisheries	DPIRD-WA has functions in relation to Western Australian (WA) managed commercial fisheries which extend beyond WA Waters and into Commonwealth Waters of the EMBA. Its interests in primary industries include commercial fisheries and aquaculture. As such, biosecurity is also an area of interest.
Department of Transport Western Australia (DOT)	DOT has functions in relation to commercial vessel movements in the navigable waters of the State and seas adjacent to the State of Western Australia. Its interests extend to response to an unplanned spill event through its Maritime Environmental Emergency Response (MEER) unit.
<b>Regulation 11A(1)(d): Persons or organisations whose functions, interests or activities may be affected by the activities to be carried out under the environment plan</b>	
<b>Academic and Research Organisations</b>	
Australian Institute of Marine Science (AIMS)	According to its website, AIMS <sup>8</sup> is a government agency established under the <i>Australian Institute of Marine Science Act 1972</i> (Cth), which conducts research that supports the sustainable use and protection of oceans. AIMS' focus is on tropical marine research across the top end of Australia from Ningaloo across to the Great Barrier Reef and undertakes research activities in areas within the EMBA. AIMS conducts monitoring activities in key areas for marine environmental research within the EMBA.

<sup>8</sup> <https://www.aims.gov.au/about-aims>

Relevant Person	Relevance
Australian Marine Sciences Association - NT (AMSA-NT)	AMSA-NT was previously recognised in Revision 3 of this EP under regulation 11A(1)(d). AMSA NT’s website <sup>9</sup> states that AMSA is Australia's peak professional body for marine scientists, with a branch in the Northern Territory (NT). Its listed interests and stated activities include promoting all aspects of marine science in the NT and making formal comment on NT marine development assessments and NT Government policies, strategies and plans, and nominations of rare and threatened marine species and habitats in the NT (potentially including within the EMBA).
WorldFish Timor-Leste	According to its website: <sup>10</sup> <ul style="list-style-type: none"> <li>• WorldFish is a research organisation focusing on sustainable aquatic food systems in Timor-Leste, potentially including within the EMBA;</li> <li>• It has an interest in resilient and sustainable aquaculture projects and small-scale fisheries production, promoting community-based resource management of coastal fisheries to strengthen livelihoods and combat poverty and malnutrition.</li> <li>• It works in a partnership model with NGOs and governments.</li> </ul>
<b>Commercial fishing</b>	
Licence holders in the following Commonwealth-managed fisheries: <ul style="list-style-type: none"> <li>• Northern Prawn Fishery</li> <li>• Southern Bluefin Tuna Fishery</li> </ul>	The proposed Activity has the potential to affect a number of Commonwealth-managed fisheries.  Licence holders are entitled to fish within the EMBA.

<sup>9</sup> <https://www.amsa.asn.au/branches/northern-territory>

<sup>10</sup> <https://worldfishcenter.org/where-we-work/pacific/timor-leste>

Relevant Person	Relevance
<ul style="list-style-type: none"> <li>Western Skipjack Tuna Fishery</li> <li>Western Tuna and Billfish Fishery</li> <li>North-West Slope Trawl Fishery</li> </ul>	<p>The North-West Slope Trawl Fishery intercepts the EMBA but does not overlap the operational area. There has been little activity in the Western Skipjack Tuna fishery since 2008. The Western Tuna and Billfish Fishery are not known to be active in the vicinity or surrounds of the Barossa Gas Field. The fishing efforts in the Northern Prawn Fishery are distant from the Barossa Gas Field. The Southern Bluefin Tuna Fishery is focused in southern waters.</p>
<p>Licence holders in the following NT-managed fisheries:</p> <ul style="list-style-type: none"> <li>Aquarium Fishery</li> <li>Spanish Mackerel Fishery</li> <li>Timor Reef Fishery</li> <li>Demersal Fishery</li> <li>Coastal Line Fishery</li> <li>Offshore Net and Line Fishery</li> <li>Small Pelagic (Development) Fishery</li> <li>Pearl Oyster Fishery</li> </ul>	<p>The proposed Activity has the potential to affect a number of NT-managed fisheries.</p> <p>Licence Holders in this fishery are entitled to fish in the EMBA.</p> <p>Fishing efforts in the Timor Reef Fishery, the Aquarium Fishery, Demersal Fishery, and Spanish Mackerel Fishery are not expected across the Barossa Field and surrounds. Fishing efforts in the Pearl Oyster and Offshore Net and Line Fishery are concentrated on coastal areas. No licences have been granted under the Small Pelagic (Development) Fishery. The Coastal Line Fishery intercepts the EMBA.</p>
<p>Licence holders in the following WA-managed fisheries:</p> <ul style="list-style-type: none"> <li>Mackerel Managed Fishery</li> <li>Northern Demersal Scalefish Managed Fishery</li> </ul>	<p>Licence Holders in this fishery are entitled to fish in the EMBA. The boundaries of these fisheries intercept the EMBA but do not overlap the Operational Area.</p>
<p><b>Energy Industry</b></p>	
<p>Australian Marine Oil Spill Centre (AMOSC)</p>	<p>AMOSC operates the Australian oil industry's major oil spill response facility.</p>

Relevant Person	Relevance
Eni Australia Ltd Inpex Ichthys Pty Ltd Woodside Energy Ltd Bengal Energy Ltd Carnarvon Energy Ltd Finder No. 1 Pty Ltd Jadestone Pty Ltd Melbana Energy Pty Ltd PTTEP Australia Shell Development (Australia) Pty Ltd Timor Sea Oil & Gas Australia Pty Ltd Vulcan Exploration Pty Ltd	Operators with permits outside the Operational Area and within EMBA.
<b>Environmental organisations</b>	
ATSEA-2 Project	According to its website: <sup>11</sup> <ul style="list-style-type: none"> <li>• ATSEA-2 is the second phase of the Arafura and Timor Seas Ecosystem Action (ATSEA) Program.</li> <li>• Its area of interest includes areas within the EMBA (including where the Arafura and Timor Seas intersect the EMBA).</li> </ul>

<sup>11</sup> <https://atsea-program.com/about-atsea/>

Relevant Person	Relevance
	<ul style="list-style-type: none"> <li>• ATSEA-2 is a Global Environment Facility-funded programme, managed and executed under the United Nations Development Programme.</li> <li>• It has a Regional Steering Committee made up of representatives from national government and lead agencies in Australia, Indonesia, Papua New Guinea and Timor-Leste.</li> <li>• The ATSEA-2 Project outcome objectives include up to 25% of over-exploited fisheries in the Arafura and Timor Seas region returned to a more sustainable level, support establishment of new Marine Protected Areas (MPAs) and strengthen MPA management effectiveness and a regional MPA network and action plan for the enhanced protection of marine turtles.</li> </ul>
<p>Australian Marine Conservation Society – NT (AMCS-NT)</p>	<p>According to its website:<sup>12</sup></p> <ul style="list-style-type: none"> <li>• AMCS-NT is a grassroots independent environmental conservation organisation and charity that works to protect ocean wildlife along the Northern Territory coastline, waters and seas.</li> <li>• Its members work to protect marine animals and critical ocean ecosystems.</li> <li>• It advocates for evidence-based solutions to conservation activity and works closely with marine research centres.</li> </ul> <p>Its interests for the purposes of this EP relate to marine parks and sanctuary zones within the EMBA for threatened and at-risk species.</p>

<sup>12</sup> <https://www.marineconservation.org.au/northern-territory-marine-parks/>

Relevant Person	Relevance
Conservation Council of WA (CCWA)	According to its website and correspondence dated 12 April 2023, CCWA <sup>13</sup> promotes an interest in the protection and restoration of the WA natural environment, including waters, a marine park and marine life potentially within the EMBA.
Environment Centre Northern Territory (ECNT)	<p>ECNT was recognised in Revision 3 of this EP, following correspondence exchanged on 12 and 18 May 2021 and 28 June 2021, by which ECNT asserted that Santos had confirmed it as a relevant person. ECNT was recorded in Revision 3 under regulation 11A(1)(d).</p> <p>Santos has continued to treat ECNT as a Relevant Person on the basis of its previous recognition in Revision 3.</p> <p>According to its website, ECNT<sup>14</sup> is a not-for-profit incorporated association whose objects include protection of all aspects of the natural environment, conducting campaigns to protect the natural environment, environmental research, and public education and information about the natural environment.</p> <p>ECNT is involved in the “Stop Barossa Gas” campaign.</p>
Greenpeace	According to its website, Greenpeace’s stated goals include the protection of ocean biodiversity and marine life, including campaigning for protection of whales <sup>15</sup> (fauna identified in this EP as

<sup>13</sup> [https://www.ccwa.org.au/about\\_us](https://www.ccwa.org.au/about_us)

<sup>14</sup> <https://www.ecnt.org.au/campaigns>

<sup>15</sup> <https://www.greenpeace.org.au/what-we-do/protecting-oceans/whales/>

Relevant Person	Relevance
	potentially affected by the Activity impacts or risks) and sea turtles <sup>16</sup> (also fauna identified in this EP as potentially affected by the Activity impacts or risks).
Keep Top End Coasts Healthy	According to its website, Keep Top End Coasts Healthy <sup>17</sup> is an alliance of environment groups including the Australian Marine Conservation Society (AMCS) and the Environment Centre of the Northern Territory (ECNT). In information provided by Keep Top End Coasts Healthy to Santos via Santos' website portal, Keep Top End Coasts Healthy claims to work with stakeholders with respect to coastal preservation and establishment of marine protected areas, potentially including within the EMBA. Further, two members of the alliance, AMCS and ECNT, are included as Relevant Persons in this EP.
Sea Turtle Foundation	According to its website, the Sea Turtle Foundation <sup>18</sup> is a non-profit, non-government group based in Australia with a stated interest in protecting sea turtles through research, education and action, including specifically the Olive Ridley turtle, Leatherback turtle, Loggerhead turtle and Flatback turtle, being turtle species cited in this EP as being potentially affected by the impacts or risks of the Activity.
West Timor Care Foundation	According to correspondence West Timor Care Foundation, West Timor Care Foundation claims to be an advocacy organisation concerned with the interests and welfare of people who depend on the coast of Timor for their livelihoods and who have been, or may be, impacted by oil

<sup>16</sup> <https://www.greenpeace.org/international/story/28229/turtle-journey-urgent-protect-the-oceans/>; <https://www.greenpeace.org/international/publication/28181/turtles-under-threat/>

<sup>17</sup> <https://www.topendcoasts.org.au/>

<sup>18</sup> <https://seaturtlefoundation.org/about>

Relevant Person	Relevance
	spills from petroleum activities in the Timor Sea, including areas within the EMBA. Santos has been unable to locate a website for West Timor Care Foundation.
World Wildlife Fund (WWF)	According to its website, WWF <sup>19</sup> works to sustain the natural world for the benefit of people and wildlife, collaborating with partners from local to global levels in nearly 100 countries. Its claimed advocacy role extends to the impact of a spill on threatened and protected marine species, including turtles and dugongs (being species occurring within the EMBA and identified in this EP as fauna that may potentially be affected by the impacts or risks of the Activity).
<b>First Nations Peoples</b>	
Kimberley Land Council (KLC)	KLC is the Native Title Representative Body for the Kimberley region in Western Australia. Its primary role is to provide native title services to Kimberley Aboriginal people. KLC's area of interest includes sea country where non-exclusive native title rights and interests may exist, including within the EMBA.
Northern Land Council (NLC)	NLC is the Native Title Representative Body for the Northern Region, including sea country. Its functions are prescribed under the NT Act. NLC also has statutory obligations under the ALR Act and is authorised to perform certain functions under the NT Act. NLC's area of interest includes sea country where non-exclusive native title rights and interests may exist, including within the EMBA.

<sup>19</sup> <https://wwf.org.au/about-us/frequently-asked-questions/>



Relevant Person	Relevance
Tiwi Land Council (TLC)	<p>TLC was recognised as a Relevant Person in Revision 3 of this EP under regulation 11A(1)(d).</p> <p>TLC has continued to be treated as relevant on the basis of its prior inclusion in Revision 3.</p> <p>TLC is governed under the ALR Act. The Tiwi Aboriginal Land Trust was also established under the ALR Act and the TLC is the only body with authority to direct the Trust. The authority of the TLC does not extend into Commonwealth offshore waters, although the sea country interests of Tiwi Island clans do, including within the EMBA.</p>
Tiwi Islands Clan Groups and Traditional Owners	<p>The Appeal Judgment found that “Mr Tipakalippa and the Munupi clan had interests within the meaning of reg 11A(1)(d) that required them to be consulted”.<sup>20</sup> Mr Tipakalippa had claimed that he and the Munupi clan, as well as other traditional owners of the Tiwi Islands, have “sea country” in the Timor Sea to the north of the Tiwi Islands, extending to and beyond the Operational Area.<sup>21</sup></p> <p>The Tiwi Islands are located approximately 80 km north of Darwin in the Arafura Sea. There are three major communities on the Tiwi Islands. The largest community is Wurrumiyanga (on Bathurst Island), with smaller communities of Milikapiti and Pirlangimpi located on Melville Island. There are eight landowning groups (clans) on the islands, Mantiyupwi, Munupi, Yimpinari, Malawu, Wulirankuwu, Wurankuwu, Mirrikawuyanga and Jikilaruwu (or Tikalaru).</p> <p>Santos was expressly requested to consult by clan groups, as set out in <b>Section 4.6.5</b>. However, despite attempts to do so, clan group meetings</p>

<sup>20</sup> Santos NA Barossa Pty Ltd v Tipakalippa [2022] FCAFC 193 [80].

<sup>21</sup> Santos NA Barossa Pty Ltd v Tipakalippa [2022] FCAFC 193 [3], [5].

Relevant Person	Relevance
	<p>ended up being attended by members of multiple clans without objection from the clan for which the meeting was convened.</p> <p>Refer to <b>Section 4.6.5</b> below.</p>
<b>Infrastructure Operators</b>	
Darwin Port	Private consortium responsible for the management of shipping and other commercial activities requiring use of Darwin Harbour. Santos-contracted vessels plan to use Darwin Harbour.
NT Ports and Marine	Private consortium that owns and operates the commercial port at Port Melville on the Tiwi Islands.
<b>Industry Associations</b>	
Amateur Fishermen's Association of the Northern Territory (AFANT)	AFANT is the peak body representing NT recreational fishers whose interests may intersect the EMBA.
Association of Marine Tourism Timor-Leste (AMT-TL)	A registered, national industry body that represents the marine tourism sector in Timor-Leste. It represents a wide range of actors in the marine tourism sector, whose interests may intersect the EMBA.
Australian Southern Bluefin Tuna Industry Association (ASBTIA)	ASBTIA is listed by AFMA as a contact for petroleum operators to use when consultation with Commonwealth fishing operators is required with fishing operators in a number of Commonwealth-managed tuna fisheries, including within the EMBA.
Commonwealth Fisheries Association (CFA)	CFA is listed by AFMA as a contact for petroleum operators to use when consultation is required with fishing operators for a number of Commonwealth-managed fisheries, including within the EMBA.

Relevant Person	Relevance
Northern Prawn Fishery Industry (NPFI)	NPFI is listed by AFMA as a contact for petroleum operators to use when consultation is required with fishing operators in the Northern Prawn Fishery whose interests may intersect the EMBA.
Northern Territory Guided Fishing Industry Association (NTGFIA)	NTGFIA is the peak body responsible for promoting, developing, and maintaining the guided fishing industry in the Northern Territory. It represents professional fishing guides and operators. Interests may intersect the EMBA.
Northern Territory Seafood Council (NTSC)	NTSC is the peak representative body for the wild catch, aquaculture and trader/processor seafood sectors in the Northern Territory. Interest may intersect the EMBA.
Pearl Producers Association (PPA)	The PPA is the peak representative organisation of The Australian South Sea Pearling Industry. Membership covers all of the Pinctada maxima pearl oyster licensees issued under the legislation that governs the Australian North-west Bioregion.
Tourism Top End	Tourism Top End is the Regional Tourism Association, a non-profit entity serving businesses, individuals and organisations involved in tourism activities in the Northern Territory. Interests may intersect the EMBA.
Western Australian Fishing Industry Council (WAFIC)	WAFIC is the peak industry body representing professional fishing, pearling and aquaculture enterprises, processors and exporters in Western Australia. Interests may intersect the EMBA.
<b>Local Government Authorities</b>	
Nil	Nil

Relevant Person	Relevance
<b>Marine and Coastal Tourism Operators</b>	
Arafura Bluewater Charters	Arafura Bluewater Charters <sup>22</sup> is a Darwin-based reef and game fishing charter tourism operator (fishing charter) operating out of Cullen Bay in Darwin. According to information available on its website, it operates in locations that may be within, or transit, the EMBA.
Bathurst Island Lodge/Tiwi Island Retreat	The Bathurst Island Lodge/Tiwi Island Retreat <sup>23</sup> is situated at Munanampi Point on the south-western coast of Bathurst Island, the smaller of the two major islands which make up the Tiwi Islands. According to its website, there are a variety of activities offered by the Lodge including private fishing charters in locations that may be within or transit the EMBA.
Clearwater Island Resort/Tiwi Adventures	Clearwater Island Resort/Tiwi Adventures <sup>24</sup> is a tourism operator located on Melville Island on the outskirts of Pirlangimpi (Tiwi Islands). From information available on its website, the Resort offers a variety of fishing charters in areas around the Tiwi Islands including in locations that may be within or transit the EMBA.
Dreamers Dive Academy (Timor)	According to its website, the Dreamers Dive Academy <sup>25</sup> is a tourism and diver training organisation operating from a base near Dili on the north shore of Timor-Leste. Diving activity is undertaken around Atauro Island in locations that may be within or transit the EMBA.

<sup>22</sup> <https://www.arafurablue.com.au/>

<sup>23</sup> <https://tiwiislandretreat.com.au/>

<sup>24</sup> <https://www.clearwaterislandlodge.com.au/>

<sup>25</sup> <https://timordiveacademy.com/>

Relevant Person	Relevance
Regulation 11A(1)(e): Any other person or organisation that the titleholder considers relevant	
Croker Island Clans	<p>Croker Island is located in the Arafura Sea off the coast of the Northern Territory. The shortest distance from the northern tip of Croker Island to the Operational Area for the drilling and completion activities is approximately 252 km.</p> <p>Croker Island clans have sea country interests in the Arafura Marine Park. Their sea country interests have been determined to exist in the area marked by their communally held Native Title, which does not extend into the EMBA for the Activity. It is also well outside the Operational Area where planned activities will occur.</p> <p>Refer to <b>Section 4.6.6</b> below.</p>
Individual – Darwin	<p>An individual holding an honorary research position with a university, recognised in Revision 3 of this EP under regulation 11A(1)(e), with a stated research interest in coastal marine biodiversity and marine ecosystems occurring within the EMBA.</p>

## 4.6 Consultation activities

A summary report of consultation activities, addressing the requirements of regulation 16(b)(i)-(iii), is at **Table 4.13**. This report relates to consultation with all Relevant Persons for the Activity for Revision 4 of this EP.

The equivalent report of consultation activities for Revision 3 of the EP (accepted by NOPSEMA March 2022) is included, unamended, in **Appendix E**. As noted above, Santos consulted with each Relevant Person identified in Revision 3 of the EP again as part of the consultation for Revision 4 of the EP.

### 4.6.1 Consultation design

Santos designed and implemented its consultation process, acknowledging that the consultation process may need to be adapted to the nature of the person or organisation to be consulted.

To assist in designing an appropriate consultation process, Santos sought feedback about consultation methods and information needs in its correspondence and via a portal and form available on its website. Santos also sought information as to functions, interests or activities that may be affected by the Activity.

Santos offered and provided information in different formats and via a range of different mediums both at the request of Relevant Persons and of its own volition, having regard to the nature of particular Relevant Persons and their potentially affected functions, interests or activities.

Santos' provision of sufficient information is outlined further at **Section 4.6.2** below.

Preferences expressed by Relevant Persons regarding design of the consultation process were considered by Santos on a case-by-case basis. Santos accommodated consultation preferences and requests, where reasonably practicable and appropriate, including having regard to the timing of the preference or request relative to consultation deadlines that had been communicated.

Santos tailored its consultation for the commercial and recreational fishing industry by producing and providing a fishers-specific fact sheet for the purposes of consultation.

Santos also adopted a tailored approach to consultation with First Nations Relevant Persons, in respect of consultation session structure and format, and consultation materials, based on their specific requests and feedback. Further detail is set out in **Section 4.6.5** below.

### 4.6.2 Provision of sufficient information

Santos is required to give Relevant Persons sufficient information so they can make an informed assessment about the possible consequences of the Activity on their functions, interests or activities. Santos provided Relevant Persons with information regarding:

- the Activity proposed under this EP
- the environment that may be affected by the Activity, including depictions of the modelled EMBA and explaining how the EMBA is determined
- the potential environmental impacts and risks of the Activity and proposed control measures
- the environmental approval process
- the purpose of consultation, who may be a Relevant Person and how to self-nominate as a potential Relevant Person
- the titleholder's obligations during consultation in the course of preparing an environment plan, including the obligation of the titleholder not to publish particular information if so requested by the Relevant Person

- how to provide feedback.

At a minimum, this information was available on the Santos website (see **Table 4.5** above) and also included in the Information Booklet, which Santos sent to Relevant Persons by email or letter or made available during consultation sessions.

Relevant Persons were provided access to information using different mediums and platforms, including by telephone, email, website (<https://www.santos.com/barossa/>), hard copy and electronic materials, social media, in person and virtual meetings.

Santos also developed targeted consultation material appropriate to Relevant Persons, including visual aids and videos for First Nations groups and specific fact sheets for the fishing industry and for Tiwi people (discussed above).

Examples of the consultation materials used are included in **Appendix F** and included the following:

- Information Booklet
- Consultation Fact Sheets:
  - *The Barossa Gas Project Drilling and Completions Environment Plan Information Booklet* (general)
  - *The Barossa Gas Project Drilling and Completions Environment Plan Consultation Factsheet* (targeting consultation with Tiwi People)
  - *Commercial Fishing Industry Consultation Factsheet – The Barossa Gas Project Drilling and Completions Environment Plan* (targeting consultation with Relevant Persons in the Commercial Fishing Industry)
- A FAQ document, responding to queries and feedback provided as part of the consultation process (published on Santos' website and updated): <https://www.santos.com/wp-content/uploads/2023/06/Barossa-Gas-Project-FAQs.pdf>
- Revision 3 of this EP (publicly available on NOPSEMA's website and linked on Santos' website)
- For particular Relevant Persons or particular groups of Relevant Persons, videos, animations and maps to convey technical information to different audiences in a clear and accessible way.

Santos also disseminated and promoted the NOPSEMA community information brochure, *Consultation on offshore petroleum environment plans*, following its release on or around 11 May 2023. This brochure contains information for community members to better understand the responsibilities of titleholders to consult Relevant Persons in the development of environment plans, the purpose of consultation and how Relevant Persons can provide feedback.

Santos considered and responded to further information requests as and where appropriate, including as captured in **Table 4.13** below. Where requests for translated materials were made, these were considered on a case-by-case basis, including having regard to matter such as the timing of the request relative to the date such requests were invited and also the pre-notified consultation end-date. Santos also had regard to the extent to which the person or organisation's functions, interests and activities may be affected by the Activity. For example, Santos responded to translation requests made, with reasonable notice, by Tiwi Islands clans by providing interpretation services at Tiwi Islands consultation sessions (see section 4.6.5). In the case of requests made by international Relevant Persons for translated materials, Santos considered the reasonableness of requests for translated materials made after the communicated deadline for consultation preferences and/or only shortly before the previously notified consultation closure date. Santos also considered the very low likelihood of functions, interests and activities of international Relevant Persons being affected by an unplanned event from the Activity, and the extent to which impact reduction measures applied

through OPEP implementation further reduce the likelihood of impact to functions, interests and activities of international Relevant Persons. Where Santos advised Relevant Persons about online translation services, such as Google translate, this was provided as a courtesy and for information only.

Santos also circulated to subscribers and published on its website the Barossa Quarterly Update April 2023 during the consultation period for this EP.

### 4.6.3 Reasonable period for consultation

Santos is required to allow a Relevant Person a reasonable period for consultation.

Santos directly contacted Relevant Persons notifying them of the consultation process and consultation period. Emails or letters were sent to Relevant Persons to invite feedback for the EP, confirming the date by which feedback was sought and outlining how feedback may be provided and providing options for seeking alternative consultation arrangements.

Santos provided approximately 30 days (where feasible and appropriate and/or subject to other agreed arrangements) from the date of initial consultation information being provided to review and respond with feedback about the proposed activities. In some cases, more time was provided. Santos also sought to accommodate reasonable requests for additional time.

Santos' consultation approach also included a 30-day public awareness campaign, commencing from 25 March 2023, see Phase 1 in **Table 4.7** above and **Table 4.8** above, to seek out Relevant Persons and to raise public awareness of the Barossa Gas Project generally.

This was followed by a comprehensive 30-day public awareness campaign, which ran from 17 May to 15 June 2023, specifically seeking feedback from Relevant Persons (see Phase 2 in **Table 4.8** above).

### 4.6.4 Consultation opportunities

Santos offered multiple avenues and mediums for consultation, including:

- Provision of a toll free 1800 number
- Dedicated email address
- Community meetings and drop-in sessions
- In-person or virtual meetings, as appropriate.

Following correspondence, multiple attempts were made (using different mediums wherever feasible) to follow up contact and a response if/where no response was received, e.g. by phone, email or letter, to confirm receipt of emails/letters and to prompt provision of a response.

Santos also held advertised drop-in consultation sessions at the Darwin Convention Centre as well as pop-up stalls in the Darwin Mall and at Arts in the Grass (see **Table 4.5** and **Table 4.9** above).

### 4.6.5 Consultation with Tiwi Islands clans and Traditional Owners

Following the Appeal Judgment, Santos undertook consultation with Tiwi Island clans as outlined below. In addition to meeting regulatory requirements, Santos was mindful of the need to rebuild trust with Tiwi people following the Federal Court proceedings.

Between 6 and 8 February 2023 (inclusive), Santos attended the Tiwi Islands and held community engagement sessions in Milikapiti, Pirlangimpi and Wurrumiyanga to provide project information and seek information and feedback from the clan members as to how they would like to be consulted. Santos received feedback during those sessions to the effect that consultation should occur by clan through clan group meetings, with approximately a month's notice of consultation sessions to allow



time to consider information. Santos also received feedback about a preference for videos and visual aids to be used to communicate information about the proposed drilling and completions activities. Santos also had representatives remain on the Tiwi Islands on 9 and 10 February 2023 to answer questions and receive feedback (including as to the consultation process).

As a result of specific requests and feedback expressed by Tiwi people as to the consultation process and consultation preferences, Santos implemented the following tailored consultation approach for Tiwi people:

- Consultation activities were conducted face-to-face in the form of clan meetings.
- Clan meetings were arranged for each clan at a location convenient for that clan (members of other clans attended with clan trustee consent).
- Clan meetings were scheduled with four weeks' prior written notice (see **Table 4.12**).
- Use of visual aids, videos and animations in presenting information (including information of a more technical nature) to improve accessibility and comprehension.
- Santos representatives and subject matter experts explained the Activity, risks and impacts during in person presentations, assisted by video content, and PowerPoint slides and responded to questions.
- For each consultation session, Santos developed short videos explaining the purpose of the session and key information relating to the consultation process, how feedback could be provided, privacy obligations and non-publication requests. Parts of these videos were recorded by a local Tiwi man in Tiwi language.
- After each consultation session, Santos representatives and subject matter experts were available to answer additional questions or provide further information to clan members and individuals. This offered people the opportunity to speak to Santos representatives or subject matter experts one-on-one or in a smaller group setting (based on feedback this was a more comfortable format for some people).
- A leading turtle expert attended the February, March and April/May sessions to provide information and answer questions about potential impacts on marine life, specifically turtles. The expert was available before and after these sessions for discussions with clan group members.
- An independent, qualified interpreter assisted Santos at the April/May (where available) and June sessions to provide translation as required. Santos also used local interpreters where qualified interpreters were not available through the Aboriginal Interpreter Service (AIS). Santos' observation at clan group meetings was that many Tiwi people spoke and understood English and this was noted by members of the Tiwi Island community themselves.
- Written consultation materials tailored for Tiwi Islands clan groups and Traditional Owners were produced and distributed or made available at consultation sessions, including a fact sheet and maps.
- A FAQ document in response to questions posed by Tiwi Islands clan groups and Traditional Owners was prepared and distributed or made available and this was updated throughout the consultation process and published on Santos' website: <https://www.santos.com/wp-content/uploads/2023/06/Barossa-Gas-Project-FAQs.pdf>.
- Following the release of NOPSEMA's *consultation on offshore petroleum environment plans brochure* in May, Santos provided information about the brochure and distributed it at the June consultation sessions.

- On occasions Santos assisted in organising transport for clan members who were having difficulty attending the consultation sessions due to road closures.
- On occasions Santos rescheduled consultation sessions to accommodate ‘sorry business’ on the Islands.
- The Environment Centre NT (ECNT) attended a number of the consultation sessions.
- The Environmental Defenders Office (EDO) attended a number of the consultation sessions with their clients (Santos understands that they represent approximately 7 Tiwi people). During those consultation sessions, a number of the EDO’s clients asked questions and provided feedback directly to Santos. The EDO and Santos have also corresponded in relation to the EDO’s clients feedback.

Consultation sessions for Tiwi people were notified and advertised as set out in **Table 4.12**.

**Table 4.12: Notification and Advertising of Consultation Sessions.**

<b>Tiwi community engagement sessions February</b>			
Saturday 7 January 2023	Press ad – NT News	Half page, page 6	Target Northern Territory with reach of 25,000
Saturday 7 January 2023 – 4 February 2023	Social media ad	Facebook, Instagram and Messenger	Geotargeted Tiwi Islands
Saturday 21 January 2023	Press ad – NT News	Half page, page 6	Target Northern Territory with reach of 25,000
Saturday 28 January 2023	Press ad – NT News	Half page, page 5	Target Northern Territory with reach of 25,000
<b>Tiwi consultation sessions March</b>			
Saturday 18 February 2023	Press ad – NT News	Full page, page 14	Target Northern Territory with reach of 25,000
Saturday 20 February 2023 – 24 March 2023	Social media ad	Facebook, Instagram and Messenger	Geotargeted Tiwi Islands
Saturday 25 February 2023	Press ad – NT News	Full page, page 19	Target Northern Territory with reach of 25,000
Saturday 4 March 2023	Press ad – NT News	Full page, page 11	Target Northern Territory with reach of 25,000
Saturday 11 March 2023	Press ad – NT News	Full page, page 6	Target Northern Territory with reach of 25,000
Saturday 18 March 2023	Press ad – NT News	Full page, page 26	Target Northern Territory with reach of 25,000

<b>Tiwi consultation sessions April/May</b>			
Tuesday 28 March 2023 – 5 May 2023	Social media ad	Facebook, Instagram and Messenger	Geotargeted Tiwi Islands
Wednesday 29 March 2023	Press ad – NT News	Full page, page 23	Target Northern Territory with reach of 25,000
Saturday 1 April 2023	Press ad – NT News	Full page, page 12	Target Northern Territory with reach of 25,000
Saturday 8 April 2023	Press ad – NT News	Full page, page 12	Target Northern Territory with reach of 25,000
Saturday 15 April 2023	Press ad – NT News	Full page, page 15	Target Northern Territory with reach of 25,000
Saturday 22 April 2023	Press ad – NT News	Full page, page 8	Target Northern Territory with reach of 25,000
<b>Tiwi consultation sessions June</b>			
Friday 12 May 2023 – 16 June 2023	Social media ad	Facebook, Instagram and Messenger	Geotargeted Tiwi Islands
Saturday 13 May 2023	Press ad – NT News	Full page, page 19	Target Northern Territory with reach of 25,000
Saturday 20 May 2023	Press ad – NT News	Full page, page 11	Target Northern Territory with reach of 25,000
Saturday 27 May 2023	Press ad – NT News	Full page, page 23	2 Target Northern Territory with reach of 25,000

Consultation with the Tiwi Islands clan groups and Traditional Owners is summarised in more detail in **Table 4.13** below.

A chronology of consultation with Tiwi Islands clans is contained in **Appendix I**.

#### 4.6.6 Consultation with Croker Island People

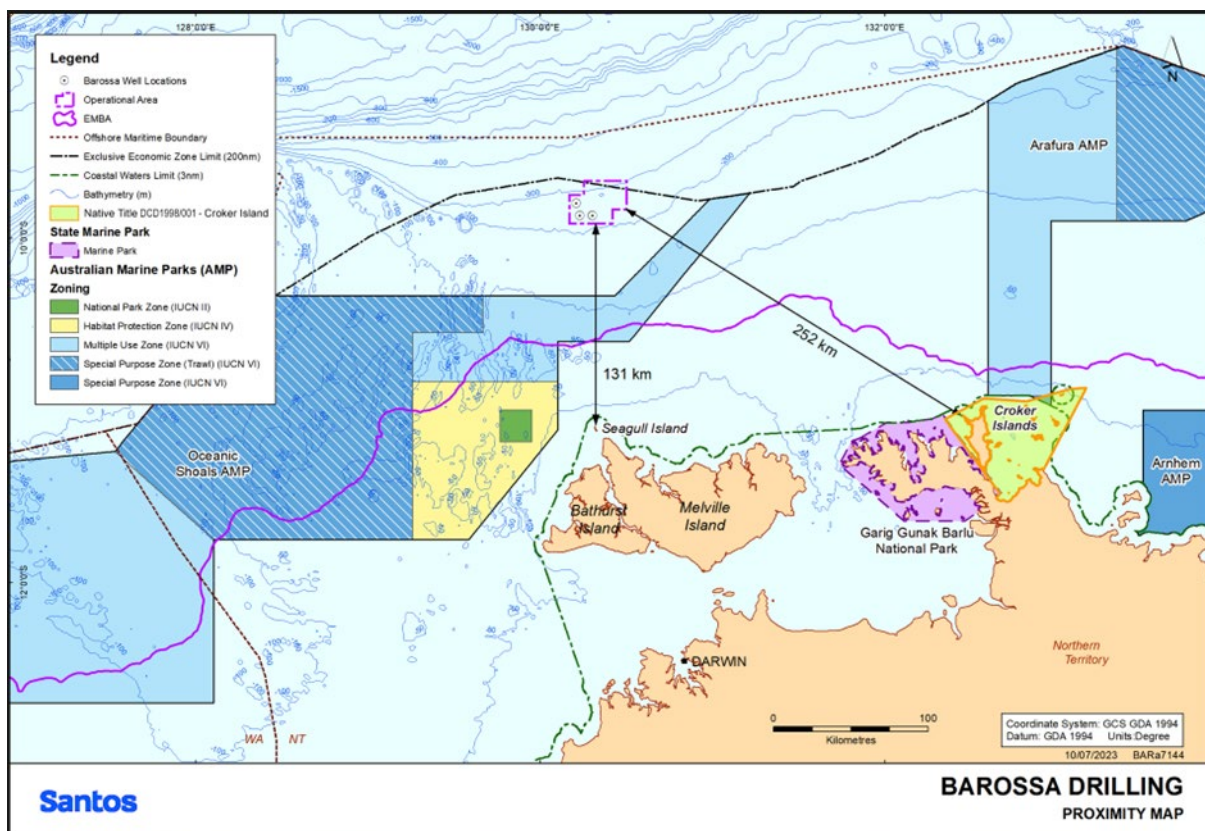
Santos notes in **Appendix C** that the North Marine Parks Network Management Plan 2018 states that the Croker Island clans have sea country interests in the Arafura Marine Park. Their sea country interests have been determined to exist in the area marked by their communally held Native Title which according to the North Marine Parks Network Management Plan 2018 has been determined over part of the Croker Island clans' sea country. The area of determined Native Title surrounding Croker Island (DFD1998/001) does not extend into the EMBA for the Activity. It is also well outside

the Operational Area where planned activities will occur. The shortest distance from the northern tip of Croker Island to the Operational Area for the drilling and completion activities is approximately 252 km.

In *Yarmirr v Northern Territory and Others (No 2)* (1998) 82 FCR 533, the Court held that communal native title existed in relation to the sea and seabed within the claimed area (beyond the low water mark), which was upheld on appeal to the High Court. In reaching its decision on the extent of the sea country, the Court accepted the evidence of community use of the waters within the claimed area to catch fish, hunt for and catch turtle and dugong and collect oysters and crustacea, both for personal consumption and for use in relation to ceremonial activities.

The shortest distance from the northern tip of Seagull Island (part of the Tiwi Islands) to the Operational Area is approximately 131 km, as depicted in **Figure 4-1**.

**Figure 4-1: – Proximity map for Croker Islands and Tiwi Islands (Seagull Island), Operational Area, EMBA and Croker Island native title area**



Santos advertised extensively from 25 March 2023 as set out in **Table 4.7** above, calling for Relevant Persons whose functions, interests or activities may be affected, to contact it by 22 April 2023. This included extensive advertising in the NT News, which is circulated on Croker Island. From 17 May 2023 – 15 June 2023, Santos' advertising campaign (seeking feedback about the EP) included 120 plays on the Top End Aboriginal Bush Broadcasting Association (TEABBA), which reaches 29 remote communities across top end of Australia, including Croker Island.

In addition, Santos met with the NLC on 13 January 2023 to advise that it would be consulting with Relevant Persons from February 2023. Santos has kept the NLC updated about First Nations consultation and engagement throughout 2023.

The EDO wrote to Santos on 21 April 2023 on behalf of a person described as a Traditional Owner from Minjilang, Northern Territory, saying its client considers themselves a relevant person [Con-1575]. The EDO said their client wished to be consulted on the basis they “ha[ve] a traditional connection to an area of the sea and the marine resources that it holds which may be affected by the Activity proposed to be undertaken by Santos” and that they believed other members of their community may also be relevant persons, but were unaware of the Barossa Gas Project.

Having considered the EDO’s 21 April 2023 correspondence, Santos could not reasonably ascertain from that description the nature or extent of the EDO’s client’s functions, interests or activities, whether they extended into the EMBA of the drilling and completion activities, and if so, how they may be affected by the proposed activities.

Further, and notwithstanding the EDO’s 21 April 2023 correspondence, in the intervening period no other Croker Island people had made contact with Santos despite extensive advertising and Santos’ engagements in Darwin through advertised drop-in consultation sessions, pop-up stalls and Arts in the Grass involvement (see **Table 4.5** above).

On 17 May 2023 Santos replied to the EDO, providing information about the Activity sufficient to allow the EDO’s client to make an informed assessment of the possible consequences of the Activity proposed under the Drilling and Completions EP [Con-1578]. In that reply, Santos said that if the EDO’s client had any feedback about how their functions, interests or activities may be affected by the proposed activities, Santos would appreciate receiving it.

On 5 June 2023 the EDO indicated (by email) that it had been unable to obtain instructions from its client but was making arrangements to travel to Minjilang to obtain those instructions “in the coming weeks” [Con-1581].

Santos wrote again on 16 June 2023, requesting that any feedback be provided by 23 June 2023 [Con-1584].

On 18 June 2023, the EDO advised (by email) that it would be travelling to meet with its client on 26 June 2023 and would “be in touch following that visit, but will not be in a position to provide a response by 23 June 2023” [Con-1586].

In its letter to Santos of 27 June 2023, the EDO advised that it had visited Croker Island on 26 June 2023 and, with its client, held a meeting with eight other Croker Island people and discussed the Barossa Gas Project and the drilling and completion activities [Con-1589]. Social media posts recording the meeting suggested that some Tiwi Islands people were also apparently present and suggested familial relationships between one or more of the Tiwi visitors and one or more of the Croker Island attendees. The posts showed “Stop Barossa Gas” ([www.stopbarossagas.org](http://www.stopbarossagas.org)) materials and the Santos Barossa Drilling and Completions Information Booklet were provided at the meeting, although it is not known what other materials or information were provided.

According to the EDO in its 27 June 2023 letter, the people who attended this meeting raised a number of concerns about the activities and wished to be consulted by Santos [Con-1589]. Apart from the EDO’s client identified in its letter of 21 April 2023, the EDO did not state whether it represented any other person who attended that meeting and in what capacity it was engaged to speak on their behalf.

On 28 June 2023, after having earlier made enquiries to visit Croker Island on 4 July 2023, Santos received an email from the EDO saying that it had been instructed and informed by members of the community that Santos was “not welcome nor permitted to visit” [Con-1590]. Again, it was not clear on what basis the EDO was purporting to act for all the members of the Croker Island community.

Santos met with the NLC on 30 June 2023 to discuss the appropriate process for travelling to Croker Island so that Santos could inform Croker Island people about the Barossa Gas Project.

On 7 July 2023, Santos obtained approval from the NLC for Santos to visit Croker Island on 13 July 2023 for the purpose of a “preliminary visit to the Croker Island to share some information on Santos and its business activities in northern waters and to gauge level of interest in further consultation sessions.”

This purpose was intended to include engaging with Croker Island people, providing information about the Barossa Gas Project and the project activities, obtaining information as to whether or not their functions, interests or activities may be affected and planning for future consultation activities, including under the post-acceptance consultation implementation strategy for this EP.

Santos notes that, despite being authorised to visit Croker Island under the NLC permit system, on 7 July and twice on 11 July 2023, Santos received further email correspondence from the EDO saying that Santos was not welcome, invited nor permitted to visit Croker Island on 13 July 2023 [Con-1593 & Con-1597]. Again, it was not clear on what basis the EDO was purporting to act for members of the Croker Island community other than its client. No Croker Island people contacted Santos to express concerns about its proposed visit to the island despite Santos liaising with the local council about logistics for the visit. Santos visited Croker Island on 13 July 2023 and held discussions with a range of Croker Island people.

Subsequent meetings were held in Darwin on 1 and 8 September 2023 with Croker Island clan members for the purpose of building relationships ahead of Regulation 11A consultation. Presentations at the Darwin-based meetings focused on providing an overall project overview, summaries of proposed drilling and subsea installation activities, discussions on activity impacts and risks, as well as providing regional context of historic petroleum industry activities in the region dating back to the drilling of exploration wells within proximity of Croker Island by other Operators from the 1970s.

The 8 September 2023 meeting was held at the Santos-operated Darwin LNG gas plant, at the request of attendees at the 1 September 2023 meeting. Handouts and maps were provided to attendees who were invited to share these materials with family and community members on Croker Island.

The Croker Island clan members in attendance on 1 and 8 September did not provide information regarding functions, interest or activities within the EMBA, and when considering this in the context of the information outlined above, Santos’ view is that it is uncertain whether the Croker Island clans do have relevant functions, interests or activities within the EMBA. In light of this uncertainty, Santos has elected to treat the Croker Island clans as relevant under reg 11A(1)(e) in any case, making them Relevant Persons.

Santos coordinated these meetings with the advice and support of cultural advisers from the broader Arnhem region, all of whom hold leadership positions within their own communities and on formal representative bodies including the NLC. One of the advisers is the elected NLC member for Minjilang. The advisers played a key role in liaising with Croker Island Elders and cultural leaders to allow for a process of self-determination in establishing an consultative committee, known as the Mulurryud Consultative Committee.

Santos recognises the Mulurryud Consultative Committee as a representative forum for the purpose of 11A consultation. Santos has been provided a copy of the Committee’s charter, which includes details of the committee’s purpose to enable culturally appropriate consultation with the First Nations peoples of Croker Island through committee membership representing and comprising traditional owners and custodians of Croker Island and surrounding sea country.

The Mulurryud Consultative Committee met with Santos on 15 September 2023 as part of Regulation 11A consultation [Con-2401]. Discussion was held on the overall project, proposed drilling and completions activities and regulatory requirements for consultation on activity impacts and risks.

Discussion was also held on the identification and management of potential impacts to cultural heritage. The committee considered that these matters should be discussed in an appropriate cultural forum.

No claims or objections were made about proposed activities at the Regulation 11A consultation on 15 September 2023. No significant intangible cultural heritage values and sensitivities were identified that attached to specific locations within the EMBA, for example; a known sacred site or some other physical place where something happened that is a part of well-known sets of ancestral creation stories amongst the Croker Island people.

The Committee met further on 26 September 2023 on Croker Island (without Santos attendees) and subsequently provided confirmation to Santos that consultation was complete for this EP.

More detail on Santos' approach to supporting the activities of the Mulurryud Consultative Committee is outlined in the post-acceptance consultation implementation strategy for First Nations in Section 8.10.1

Further, Santos notes that it has considered the information provided by clients of the EDO in its 27 June 2023 letter [Con-1589]. This information provided about sacred sites, songlines, ancestral beings, and fishing and hunting interests has been taken into account in the development of this EP.

## 4.7 Consultation report

**Table 4.13. Summary of consultation activities.**

Australian Communications and Media Authority (ACMA)			
<b>Summary of consultation effort:</b>			
<ul style="list-style-type: none"> <li>+ On 13 April 2023 Santos emailed the Australian Communications and Media Authority (ACMA) to explain the consultation approach for the Barossa Drilling and Completions Environment Plan (EP), asking if AMCA would like to be consulted, how it would like to be consulted and what information it required. A Barossa Drilling and Completions Information Booklet was also provided and a link to NOPSEMA’s consultation Guideline: <i>Consultation in the course of preparing an Environment Plan</i>. Santos also advised that consultation with Relevant Persons for preparation of the EP was planned to conclude by mid-2023. [Con-1041]</li> <li>+ On 20 April 2023 Santos emailed ACMA the Barossa Development Quarterly Update, which included information on the consultation process for this EP. [Con-1066]</li> <li>+ On 24 April 2023 Santos emailed ACMA to advise of opportunities in Darwin on 27 April 2023 and 3 May 2023 to obtain information, provide feedback and ask questions on the drilling and completions activity. [Con-1078]</li> <li>+ On 4 May 2023 ACMA emailed Santos to advise it had received a voice message from Santos following up on the email sent on 13 April 2023. [Con-1161]</li> <li>+ On 5 May 2023 Santos emailed ACMA to confirm ACMA’s preferred email address for all future correspondence. [Con-1163]</li> <li>+ On 12 May 2023 ACMA emailed Santos advising the Barossa Project may be in the vicinity of a cable system owned and operated by Vocus and information regarding the cable system could be found on ACMA’s website. ACMA advised Santos to engage with any operators of any submarine cables in the vicinity of Santos’ activities and recommended contacting the Australia Hydrographic Office (AHO) for locations of submarine cables. ACMA advised it did not require any further information from Santos in relation to the EP. [Con-1177]</li> <li>+ On 19 May 2023 Santos emailed ACMA providing a link to NOPSEMA’s brochure: <i>Consultation on offshore petroleum environment plans – Information for the community</i>. A Barossa Drilling and Completions Information Booklet was also provided. [Con-1206]</li> <li>+ On 23 May 2023 Santos emailed ACMA advising it had engaged with Vocus and the AHO on the EP and other aspects of the Barossa Project due to the presence of Vocus’ infrastructure and other proposed infrastructure in the EMBA. [Con-1216]</li> <li>+ On 29 May 2023 Santos emailed ACMA a Drilling and Completions Fact Sheet. Santos also reminded ACMA of the timeframe for provision of feedback. [Con-1243]</li> <li>+ No further correspondence or feedback was received.</li> </ul>			
<b>Summary of Objection or Claim</b>	<b>Assessment of Merits</b>	<b>Santos’ Response Statement</b>	<b>EP Reference</b>



ACMA recommended Santos engage with Vocus. [Con-1177]	Santos noted ACMA's advice.	Santos has engaged with submarine cable system operator Vocus as well as proposed operator Sun Cable on Barossa Project offshore activities, including those covered by this Environment Plan. [Con-1216]	No additional EP controls required.
ACMA recommended Santos engage with AHO. [Con-1177]	Santos noted ACMA's advice.	Santos has consulted with the AHO for development of this Environment Plan. [Con-1216]	No additional EP controls required.

## Australian Fisheries Management Authority (AFMA)

### Summary of consultation effort:

- + On 13 April 2023 Santos emailed the Australian Fisheries Management Authority (AFMA) to explain the consultation approach for the Barossa Drilling and Completions Environment Plan (EP), asking if AFMA would like to be consulted, how it would like to be consulted and what information it required. A Barossa Drilling and Completions Information Booklet was also provided and a link to NOPSEMA's consultation Guideline: *Consultation in the course of preparing an Environment Plan*. Santos also advised that consultation with Relevant Persons for preparation of the EP was planned to conclude by mid-2023. [Con-1041]
- + On 20 April 2023 Santos emailed AFMA the Barossa Development Quarterly Update, which included information on the consultation process for this EP. [Con-1066]
- + On 24 April 2023 Santos emailed AFMA to advise of opportunities in Darwin on 27 April 2023 and 3 May 2023 to obtain information, provide feedback and ask questions on the drilling and completions activity. [Con-1078]
- + On 28 April 2023 Santos called AFMA and left a voicemail. [Con-1132]
- + On 15 May 2023 AFMA emailed Santos advising it did not require any further information. AFMA requested it be consulted going forward via email and fact sheets. AFMA encouraged Santos to consult directly with relevant fishing industry associations on proposals consistent with AFMA's brochure on petroleum industry consultation with the commercial fishing industry. [Con-1199]
- + On 19 May 2023 Santos emailed AFMA providing a link to NOPSEMA's brochure: *Consultation on offshore petroleum environment plans – Information for the community*. A Barossa Drilling and Completions Information Booklet was also provided. [Con-1206]
- + On 23 May 2023 Santos responded to AFMA's email of 15 May 2023 advising that Santos is consulting with relevant fishing industry associations in accordance with AFMA's requested process. [Con-1218]
- + On 29 May 2023 Santos emailed AFMA a Drilling and Completions Fact Sheet. Santos also reminded AFMA of the timeframe for provision of feedback. [Con-1243]

+ No further correspondence or feedback was received.			
<b>Summary of Objection or Claim</b>	<b>Assessment of Merits</b>	<b>Santos' Response Statement</b>	<b>EP Reference</b>
<i>AFMA requested Santos consult directly with commercial fishing industry associations. [Con-1199]</i>	<i>Santos noted AFMA's advice which was the same as previous advice issued for EP consultation.</i>	<i>Santos has consulted relevant fishing industry associations in development of this Environment Plan. [Con-1218]</i>	<i>No additional EP controls required.</i>
<b>Australian Hydrographic Office (AHO)</b>			
<b>Summary of consultation effort:</b>			
<ul style="list-style-type: none"> <li>+ On 13 April 2023 Santos emailed the Australian Hydrographic Office (AHO) to explain the consultation approach for the Barossa Drilling and Completions Environment Plan (EP), asking if AHO would like to be consulted, how it would like to be consulted and what information it required. A Barossa Drilling and Completions Information Booklet was also provided and a link to NOPSEMA's consultation Guideline: <i>Consultation in the course of preparing an Environment Plan</i>. Santos also advised that consultation with Relevant Persons for preparation of the EP was planned to conclude by mid-2023. [Con-1041]</li> <li>+ On 14 April 2023 AHO emailed Santos an automated response with standard information for Operators of offshore activities. [Con-1040]</li> <li>+ On 20 April 2023 Santos emailed AHO the Barossa Development Quarterly Update, which included information on the consultation process for this EP. [Con-1066]</li> <li>+ On 24 April 2023 Santos emailed AHO to advise of opportunities in Darwin on 27 April 2023 and 3 May 2023 to obtain information, provide feedback and ask questions on the drilling and completions activity. [Con-1078]</li> <li>+ On 19 May 2023 Santos emailed AHO providing a link to NOPSEMA's brochure: <i>Consultation on offshore petroleum environment plans – Information for the community</i>. A Barossa Drilling and Completions Information Booklet was also provided. [Con-1206]</li> <li>+ On 22 May 2023 AHO emailed Santos an acknowledgement that its email of 19 May 2023 had been received. [Con-1408]</li> <li>+ On 29 May 2023 Santos emailed AHO a Drilling and Completions Fact Sheet. Santos also reminded AHO of the timeframe for provision of feedback. [Con-1243]</li> <li>+ On 30 May 2023 AHO emailed Santos an automated response advising AHO received the email from Santos on 29 May 2023. [Con-1249]</li> <li>+ No further correspondence or feedback was received.</li> </ul>			
<b>Summary of Objection or Claim</b>	<b>Assessment of Merits</b>	<b>Santos' Response Statement</b>	<b>EP Reference</b>
<i>The AHO provided its standard response on activity</i>	<i>Santos noted the AHO's advice which was the same</i>	<i>Santos will incorporate the AHO's notification requirements into the</i>	<i>Activity Notifications Table (Table 8.4).</i>

<p>notifications that is issued to an operator developing an EP. [Con-1040]</p>	<p>as previous advice issued via auto-response in response to requests for EP consultation.</p>	<p>relevant sections of the EP.</p>	
<p><b>Australian Maritime Safety Authority (AMSA)</b></p>			
<p><b>Summary of consultation effort:</b></p> <ul style="list-style-type: none"> <li>+ On 13 April 2023 Santos emailed the Australian Marine Safety Authority (AMSA) to explain the consultation approach for the Barossa Drilling and Completions Environment Plan (EP), asking if AMSA would like to be consulted, how it would like to be consulted and what information it required. A Barossa Drilling and Completions Information Booklet was also provided and a link to NOPSEMA’s Guideline: <i>Consultation in the course of preparing an Environment Plan</i>. Santos also advised that consultation with Relevant Persons for preparation of the EP was planned to conclude by mid-2023. [Con-1041]</li> <li>+ On 20 April 2023 Santos emailed AMSA the Barossa Development Quarterly Update, which included information on the consultation process for this EP. [Con-1066]</li> <li>+ On 24 April 2023 Santos emailed AMSA to advise of opportunities in Darwin on 27 April 2023 and 3 May 2023 to obtain information, provide feedback and ask questions on the drilling and completions activity. [Con-1078]</li> <li>+ On 27 April 2023 AMSA emailed Santos in response to Santos’ email on 24 April 2023. AMSA advised it is a regulatory authority and as such is not able to provide information or advice in relation to offshore drilling Environment Plans. [Con-1086]</li> <li>+ On 19 May 2023 Santos emailed AMSA providing a link to NOPSEMA’s brochure: <i>Consultation on offshore petroleum environment plans – Information for the community</i>. A Barossa Drilling and Completions Information Booklet was also provided. [Con-1206]</li> <li>+ On 28 May 2023 Santos attempted to reach AMSA via phone. [Con-1127]</li> <li>+ On 29 May 2023 Santos emailed AMSA a Drilling and Completions Fact Sheet. Santos also reminded AMSA of the timeframe for provision of feedback. [Con-1243]</li> <li>+ On 30 May 2023 AMSA emailed Santos advising it did not require further consultation on this EP. AMSA advised it should be informed of any changes to the plan and would like project status updates via <a href="mailto:navsafety@amsa.gov.au">navsafety@amsa.gov.au</a>. [Con-1253]</li> <li>+ On 8 June 2023 Santos emailed AMSA confirming Santos would follow the consultation process request from AMSA further to its email of 30 May 2023. [Con-1259]</li> <li>+ No further correspondence or feedback was received.</li> </ul>			
<p><b>Summary of Objection or Claim</b></p>	<p><b>Assessment of Merits</b></p>	<p><b>Santos’ Response Statement</b></p>	<p><b>EP Reference</b></p>
<p>AMSA requested Santos advise any changes to the Environment Plan. [Con-</p>	<p>Santos noted AMSA’s advice which was the same as previous advice issued for EP</p>	<p>Santos will provide AMSA with a copy of the accepted EP. [Con-</p>	<p>Activity Notifications Table (Table 8.4).</p>

1253]	consultation.	1259]	
AMSA advised Santos of the required formal notifications process prior to and during activities. [Con-1086]	Santos noted AMSA's advice which was the same as previous advice issued for EP consultation.	Santos will include all formal notification requirements in the relevant sections of the EP. [Con-1259]	Activity Notifications Table (Table 8.4).

**Department of Agriculture, Forestry and Fisheries (DAFF) – Biosecurity (marine pests) and Fisheries**

**Summary of consultation effort:**

- + On 13 April 2023 Santos emailed the Department of Agriculture, Forestry and Fisheries (DAFF) to explain the consultation approach for the Barossa Drilling and Completions Environment Plan (EP), asking if DAFF would like to be consulted, how it would like to be consulted and what information it required. A Barossa Drilling and Completions Information Booklet was also provided and a link to NOPSEMA's Guideline: *Consultation in the course of preparing an Environment Plan*. Santos also advised that consultation with Relevant Persons for preparation of the EP was planned to conclude by mid-2023. [Con-1041]
- + On 13 April 2023 DAFF emailed Santos an automated response to Santos' email on 13 April 2023 with standard information for Operators of offshore activities. [Con-1043]
- + On 17 April 2023 DAFF emailed Santos confirming receipt of Santos' email on 13 April 2023. DAFF advised it could only provide general biosecurity advice related to the areas mentioned. DAFF advised it would provide more tailored advice if Santos provided specific questions. [Con-1050]
- + On 19 April 2023 DAFF emailed Santos asking that DAFF be kept informed in relation to the project once the EP has been approved by NOPSEMA. [Con-2396]
- + On 20 April 2023 Santos emailed DAFF the Barossa Development Quarterly Update, which included information on the consultation process for this EP. [Con-1066]
- + On 24 April 2023 Santos emailed DAFF to advise of opportunities in Darwin on 27 April 2023 and 3 May 2023 to obtain information, provide feedback and ask questions on the Barossa drilling and completions activity. [Con-1078]
- + On 24 April 2023 DAFF emailed Santos an automated response to Santos' email on 24 April 2023. [Con-1080]
- + On 27 April 2023 DAFF emailed Santos confirming DAFF's understanding that Santos' intended operating practices may expose domestic conveyances (support vessels and aircraft) to interactions with the Installation which may pose an unacceptable level of biosecurity risk. The email also included the following information:
  - Where domestic conveyances become exposed through interactions with persons, goods or conveyances outside Australian territory they automatically become subject to biosecurity control upon their return. If DAFF concludes the level of biosecurity risk associated with the survey vessel is low, within the meaning of the Biosecurity (Exposed Conveyances – Exceptions from Biosecurity Control) Determination 2016 (the Determination), an exposed conveyance may be eligible for an exception from biosecurity control. To be eligible, an exposed conveyance must meet all circumstances as outlined in section 6 of the Determination. Within this context, DAFF's assessment of the biosecurity risk will be limited to topside activities only and will not include any consideration of the marine pest risk or environmental impact.

- DAFF requested that Santos review DAFF’s Offshore Installations webpage and attached Offshore Installations Biosecurity Guide, which provides specific biosecurity information for operators of offshore installations. DAFF also requested that Santos review Australian ballast water and biofouling requirements and pre-arrival reporting using MARS.
- To have biosecurity risk status assessed, offshore installation projects must apply to DAFF at least one month prior to project commencement. DAFF will work with installation representatives to assess the biosecurity risk of the installation and associated support conveyances (vessels and aircraft). For DAFF to undertake an assessment DAFF requires the attached questionnaire to be populated and returned to the [seaportsprogram@agriculture.gov.au](mailto:seaportsprogram@agriculture.gov.au). All requested information must be submitted before the assessment can commence. [Con-1087]
- + On 3 May 2023 Santos confirmed it would keep DAFF informed once the EP has been approved by NOPSEMA and activities are progressed as requested by DAFF’s email on 19 April 2023. [Con-1156]
- + On 3 May 2023 Santos emailed DAFF confirming it had reviewed applicable biosecurity requirements and that they are referenced in relevant commitments documented in the Environment Plans submitted to NOPSEMA. Santos advised it would report and engage directly with DAFF for the management of biosecurity risks post EP acceptance as stated in the cited offshore biosecurity guidelines and other associated documentation. [Con-1157]
- + On 3 May 2023 DAFF emailed Santos an automated response to Santos’ email on 3 May 2023. [Con-1158]
- + On 19 May 2023 Santos emailed DAFF providing a link to NOPSEMA’s brochure: *Consultation on offshore petroleum environment plans – Information for the community*. A Barossa Drilling and Completions Information Booklet was also provided. [Con-1206]
- + On 19 May 2023 DAFF emailed Santos an automated response to Santos’ email on 19 May 2023. [Con-1209]
- + On 29 May 2023 Santos emailed DAFF a Drilling and Completions Fact Sheet. Santos also reminded DAFF of the timeframe for provision of feedback. [Con-1243]
- + On 29 May and 2 June 2023 DAFF emailed Santos its same automated response to Santos’ email on 29 May 2023. [Con-1244], [Con-1255]
- + No further correspondence or feedback was received.

<b>Summary of Objection or Claim</b>	<b>Assessment of Merits</b>	<b>Santos’ Response Statement</b>	<b>EP Reference</b>
<i>DAFF requested Santos’ review cited DAFF documentation to ensure understanding of the required regulatory requirements. [Con-1087]</i>	<i>Santos noted DAFF’s advice which was the same as previous advice issued for EP consultation.</i>	<i>Santos confirms all biosecurity requirements are understood and referenced in relevant commitments documented in the Environment Plans submitted to NOPSEMA.  Santos advised it would report and engage directly with DAFF</i>	<i>No additional EP controls required.</i>

		<i>for the management of biosecurity risk post EP acceptance as stated in the cited offshore biosecurity guidelines and other associated documentation. [Con-1157]</i>	
<i>DAFF requested Santos keep the agency informed after the EP has been accepted and contact DAFF if management of any biosecurity risks require its assistance. [Con-1087]</i>	<i>Santos noted the AHO's advice which was the same as previous advice provided via auto-response in response to requests for EP consultation.</i>	<i>Santos will continue to keep DAFF informed and incorporate DAFF's assistance offer into relevant management plans. [Con-1157]</i>	<i>No additional EP controls required.</i>

**Department of Climate Change, Energy, the Environment and Water (Parks Australia)**

**Summary of consultation effort:**

- + On 13 April 2023 Santos emailed Parks Australia to explain the consultation approach for the Environment Plan (EP), asking if Parks Australia would like to be consulted, how it would like to be consulted and what information it required. A Barossa Drilling and Completions Information Booklet was also provided and a link to NOPSEMA's Guideline: *Consultation in the course of preparing an Environment Plan*. Santos also advised that consultation with Relevant Persons for preparation of the EP was planned to conclude by mid-2023. [Con-1041]
- + On 14 April 2023 Parks Australia emailed Santos in response to Santos' email on 13 April 2023. Parks Australia advised it had no authorisation requirements and no further input or objections or claims at this time. It advised it welcomed EMBA and MEVA modelling. It also advised Santos that Santos should consider Australian marine parks and ensure the EP identifies and manages all impacts and risks on Australian marine park values (including ecosystem values) to an acceptable level and has considered all options to avoid or reduce them to as low as reasonably practicable and clearly demonstrate that the Activity will not be inconsistent with the management plan. Parks Australia requested it 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. [Con-1049]
- + On 20 April 2023 Santos emailed Parks Australia the Barossa Development Quarterly Update, which included information on the consultation process for this EP. [Con-1066]
- + On 24 April 2023 Santos emailed Parks Australia to advise of opportunities in Darwin on 27 April 2023 and 3 May 2023 to obtain information, provide feedback and ask questions on the drilling and completions activity. [Con-1078]
- + On 28 April 2023 Santos called Parks Australia and left a voicemail. [Con-1134]

- + On 4 May 2023 Santos emailed Parks Australia in response to its email on 14 April 2023. Santos confirmed the EP prepared for submission to NOPSEMA will consider the cited NOPSEMA Petroleum Activities and Australian Marine Parks Guidance Note; identify and manage all impacts and risks on Australian marine park values (including ecosystem values) to an acceptable level and consider all options to avoid or reduce them to as low as reasonably practicable; clearly demonstrate that the activity will not be inconsistent with the relevant marine parks management plan(s); and reflect all DNP emergency response notification requirements. [Con-1159]
- + On 19 May 2023 Santos emailed Parks Australia providing a link to NOPSEMA’s brochure: *Consultation on offshore petroleum environment plans – Information for the community*. A Barossa Drilling and Completions Information Booklet was also provided. [Con-1206]
- + On 27 May 2023 Parks Australia responded to Santos’ email on 19 May 2023, confirming it has been consulted as part of this activity. Parks Australia requested the EMBA and MEVA modelling provided in the consultation information as it aids in communicating the risks to the environment. [Con-1222]
- + On 29 May 2023 Santos emailed Parks Australia a Drilling and Completions Fact Sheet. Santos also reminded Parks Australia of the timeframe for provision of feedback. [Con-1243]
- + No further correspondence or feedback was received.

<b>Summary of Objection or Claim</b>	<b>Assessment of Merits</b>	<b>Santos’ Response Statement</b>	<b>EP Reference</b>
<i>Parks Australia requested Santos refer to the NOPSEMA Petroleum Activities and Australian Marine Parks Guidance Note in identifying and managing all impacts and risks on Australian marine park values. [Con-1049]</i>	<i>Santos noted the Parks Australia’s advice which was similar to previous advice issued for EP consultation.</i>	<i>Santos has used the cited NOPSEMA reference in developing the EP.[Con-1159]</i>	<i>No additional EP controls required.</i>
<i>Parks Australia requested that Santos follow all DNP emergency response notification requirements for the accepted activities. [Con-1049]</i>	<i>Santos noted Parks Australia’s advice which was similar to previous advice issued for EP consultation.</i>	<i>Santos has incorporated the notification requirements in the relevant sections of the EP. [Con-1159]</i>	<i>Activity Notifications Table (Table 8.4).</i>

Department of Defence (DoD)

**Summary of consultation effort:**

- + On 13 April 2023 Santos emailed the Department of Defence (DoD) to explain the consultation approach for the Barossa Drilling and Completions Environment Plan (EP), asking if DoD would like to be consulted, how it would like to be consulted and what information it required. A Barossa Drilling and Completions Information Booklet was also provided and a link to NOPSEMA’s Guideline: *Consultation in the course of preparing an Environment Plan*. Santos also advised that consultation with Relevant Persons for preparation of the EP was planned to conclude by mid-2023. [Con-1041]
- + On 20 April 2023 Santos emailed DoD the Barossa Development Quarterly Update, which included information on the consultation process for this EP. [Con-1066]
- + On 24 April 2023 Santos emailed DoD to advise of opportunities in Darwin on 27 April 2023 and 3 May 2023 to obtain information, provide feedback and ask questions on the drilling and completions activity. [Con-1078]
- + On 4 May 2023 Santos called DoD and left a voicemail. [Con-1299]
- + On 5 May 2023 Santos called DoD – no voicemail or message left. [Con-1302]
- + On 8 May 2023 DoD emailed Santos in response to a phone call, confirming receipt of information. [Con-1167]
- + On 9 May 2023 DoD emailed Santos advising the activity areas are located in the North Australian Exercise Area (NAXA) and restricted air space. The email also included the following information:
  - DoD advised unexploded ordnance (UXO) may be present on and in the sea floor. DoD advised Santos must inform itself as to the risks associated with conducting activities in the area (for example, the detonation of UXO). DoD advised Santos that all activities in the area are conducted at its own risk; and the Commonwealth of Australia, represented by the Department of Defence, takes no responsibility for: reporting the location and type of UXO that may be in the areas; identifying or removing any UXO from these areas; and any loss or damage suffered or incurred by Santos or any third party arising out of, or directly related to, UXO in the area.
  - DoD advised Santos the location is outside of promulgated Australian Defence Force (ADF) permanent restricted areas, however during major exercises temporary restricted or danger areas to support activities are promulgated that will affect air access to the rig. ADF consultation must occur during major exercises to facilitate helicopter resupply flights to and from the rig. Identification of an appropriate Santos flight operations POC is required in order to support planning effects. DoD requested Santos provide that directly to [offshore.petroleum@defence.gov.au](mailto:offshore.petroleum@defence.gov.au).
  - DoD requested Santos ensure liaison with the Australian Hydrographic Service (AHS) for Notices to Mariners (NOTMAR). The AHS is to be notified three weeks prior to the actual commencement of activities. This information is critical to maritime safety and reduces negative impacts on other maritime users. [Con-1166]
- + On 9 May 2023 Santos emailed DoD confirming receipt of an email from DoD on 9 May 2023. [Con-1168]
- + On 9 May 2023 DoD emailed Santos confirming receipt of the email on 9 May 2023 and that no further action was required. [Con-1170]
- + On 11 May 2023 DoD emailed Santos advising of a change of contact for its offshore co-ordination team. [Con-1295]
- + On 19 May 2023 Santos emailed DoD providing a link to NOPSEMA’s brochure: *Consultation on offshore petroleum environment plans – Information for the community*. A Barossa Drilling and Completions Information Booklet was also provided. [Con-1206]



<ul style="list-style-type: none"> <li>+ On 23 May 2023 Santos emailed DoD as a follow-up to the phone calls on 4 May and 11 May 2023. [Con-1298]</li> <li>+ On 29 May 2023 Santos emailed DoD a Drilling and Completions Fact Sheet. Santos also reminded DoD of the timeframe for provision of feedback. [Con-1243]</li> <li>+ No further correspondence or feedback was received.</li> </ul>			
<b>Summary of Objection or Claim</b>	<b>Assessment of Merits</b>	<b>Santos' Response Statement</b>	<b>EP Reference</b>
<i>DoD advised Santos that the activities will occur within an area designated for military exercises and provided advice on the responsibilities of an Operator in the area. [Con-1166]</i>	<i>Santos noted DoD's advice which was the same as previous advice issued for EP consultation.</i>	<i>Santos is aware of the circumstances and responsibilities advised by DoD and all required actions are included in the relevant sections of the EP.[Con-1170]</i>	<i>No additional EP controls required.</i>
<i>DoD advised Santos of the potential presence of unexploded ordnance and stated the responsibilities of an Operator in the area. [Con-1166]</i>	<i>Santos noted DoD's advice which was the same as previous advice issued for EP consultation.</i>	<i>Santos is aware of the circumstances and responsibilities advised by DoD and all required actions are included in the relevant sections of the EP. [Con-1170]</i>	<i>No additional EP controls required.</i>
<b>Department of Foreign Affairs and Trade (DFAT)</b>			
<b>Summary of consultation effort:</b>			
<ul style="list-style-type: none"> <li>+ On 13 April 2023 Santos emailed the Department of Foreign Affairs and Trade (DFAT) to explain the consultation approach for the Barossa Drilling and Completions Environment Plan (EP), asking if DFAT would like to be consulted, how it would like to be consulted and what information it required. A Barossa Drilling and Completions Information Booklet was also provided and a link to NOPSEMA's Guideline: <i>Consultation in the course of preparing an Environment Plan</i>. Santos also advised that consultation with Relevant Persons for preparation of the EP was planned to conclude by mid-2023. [Con-1041]</li> <li>+ On 20 April 2023 Santos emailed DFAT the Barossa Development Quarterly Update, which included information on the consultation process for this EP. [Con-1066]</li> <li>+ On 24 April 2023 Santos emailed DFAT to advise of opportunities in Darwin on 27 April 2023 and 3 May 2023 to obtain information, provide feedback and ask questions on the drilling and completions activity. [Con-1078]</li> <li>+ On 19 May 2023 Santos emailed DFAT providing a link to NOPSEMA's brochure: <i>Consultation on offshore petroleum environment plans – Information for the community</i>.</li> </ul>			

<p>A Barossa Drilling and Completions Information Booklet was also provided. [Con-1206]</p> <ul style="list-style-type: none"> <li>+ On 23 May 2023 DFAT emailed Santos in response to Santos' email on 19 May 2023. DFAT advised it has no role in Australian waters and to contact NOPSEMA in accordance with relevant regulations. DFAT observed Indonesia and Timor-Leste may be impacted and that if it is determined there is a need to consult the Indonesian or Timor-Leste Governments, DFAT could assist. [Con-1214]</li> <li>+ On 29 May 2023 Santos emailed DFAT a Drilling and Completions Fact Sheet. Santos also reminded DFAT of the timeframe for provision of feedback. [Con-1243]</li> <li>+ On 16 June 2023 Santos emailed DFAT in response to DFAT's email of 23 May 2023. [Con-1402]</li> <li>+ No further correspondence or feedback was received.</li> </ul>			
<b>Summary of Objection or Claim</b>	<b>Assessment of Merits</b>	<b>Santos' Response Statement</b>	<b>EP Reference</b>
<p><i>DFAT advised Santos that it may be able to assist via NOPSEMA with any liaison that may be required with foreign governments. [Con-1214]</i></p>	<p><i>Santos noted DFAT's advice which was similar to previous advice issued for EP consultation.</i></p>	<p><i>Thank you for your email of 23 May 2023 on behalf of the Department of Foreign Affairs and Trade (DFAT). We appreciate DFAT's offer of assistance for consultations with the Indonesian or Timor-Leste governments if needed. We confirm that at this stage Santos does not require assistance.</i></p> <p><i>We understand from your request to submit Santos' plans to NOPSEMA that DFAT does not have any matters it wishes to consult on regarding the Drilling and Completions Environment Plan (EP). Santos therefore considers its consultation with DFAT for the EP closed. [Con-1402]</i></p>	<p><i>No additional EP controls required.</i></p>

**Summary of consultation effort:**

- + On 13 April 2023 Santos emailed the Department of Home Affairs and its agency Australian Border Force to explain the consultation approach for the Barossa Drilling and Completions Environment Plan (EP), asking if the Department would like to be consulted, how it would like to be consulted and what information it required. A Barossa Drilling and Completions Information Booklet was also provided and a link to NOPSEMA’s Guideline: *Consultation in the course of preparing an Environment Plan*. Santos also advised that consultation with Relevant Persons for preparation of the EP was planned to conclude by mid-2023. [Con-1041]
- + On 20 April 2023 Santos emailed the Department and the ABF the Barossa Development Quarterly Update, which included information on the consultation process for this EP. [Con-1066]
- + On 24 April 2023 Santos emailed the Department and the ABF to advise of opportunities in Darwin on 27 April 2023 and 3 May 2023 to obtain information, provide feedback and ask questions on the drilling and completions activity. [Con-1078]
- + On 19 June 2023 Santos made a follow-up phone call to the ABF [Con-1482] and again on 23 June 2023 to the Department. [Con-1484]
- + On 26 June 2023 Santos emailed the Department advising that the period for providing feedback for EP had closed and Santos remains available to discuss Project activities outside of this consultation process. [Con-1459]
- + No further correspondence or feedback was received.

<b>Summary of Objection or Claim</b>	<b>Assessment of Merits</b>	<b>Santos’ Response Statement</b>	<b>EP Reference</b>
<i>Nil</i>	<i>Nil</i>	<i>Nil</i>	<i>No additional EP controls required.</i>

**Department of Industry, Science and Resources (DISR)**

**Summary of consultation effort:**

- + On 13 April 2023 Santos emailed the Department of Industry, Science and Resources (DISR) to explain the consultation approach for the Barossa Drilling and Completions Environment Plan (EP), asking if DIIS would like to be consulted, how it would like to be consulted and what information it required. A Barossa Drilling Information Booklet was also provided and a link to NOPSEMA’s Guideline: *Consultation in the course of preparing an Environment Plan*. Santos also advised that consultation with Relevant Persons for preparation of the EP was planned to conclude by mid-2023. [Con-1041]
- + On 20 April 2023 Santos emailed DISR the Barossa Development Quarterly Update, which included information on the EP consultation process. [Con-1066]
- + On 24 April 2023 Santos emailed DISR to advise of opportunities in Darwin on 27 April 2023 and 3 May 2023 to obtain information, provide feedback and ask questions on the drilling and completions activity. [Con-1078]
- + On 4 May 2023 Santos called DISR and left a voicemail [Con-1304] [Con-1306], followed by a follow up email on 10 May 2023. [Con-1504]
- + On 10 May 2023 Santos emailed DISR by way of follow up to a phone call on 4 May 2023. Santos confirmed DISR would like to receive information via email. Santos

<p>confirmed it was following DISR's guideline for Consultation with Agencies with Responsibilities in the Commonwealth Marine Area as part of its EP consultation process. [Con-1169]</p> <ul style="list-style-type: none"> <li>+ On 19 May 2023 Santos emailed DISR providing a link to NOPSEMA's brochure: <i>Consultation on offshore petroleum environment plans – Information for the Community</i>. A Barossa Drilling and Completions Information Booklet was also provided. [Con-1206]</li> <li>+ On 29 May 2023 Santos emailed DISR a reminder of the timeframe for provision of feedback on the EP and provided a Barossa Drilling and Completions Fact Sheet. [Con-1243]</li> <li>+ No further correspondence or feedback was received.</li> </ul>			
<b>Summary of Objection or Claim</b>	<b>Assessment of Merits</b>	<b>Santos' Response Statement</b>	<b>EP Reference</b>
<i>Nil</i>	<i>Nil</i>	<i>Nil</i>	<i>No additional EP controls required.</i>
<b>National Indigenous Australians Agency (NIAA)</b>			
<p><b>Summary of consultation effort:</b></p> <ul style="list-style-type: none"> <li>+ On 13 April 2023 Santos emailed the National Indigenous Australians Agency (NIAA) to explain the consultation approach for the Barossa Drilling and Completions Environment Plan (EP), asking if the NIAA would like to be consulted, how it would like to be consulted and what information it required. A Barossa Drilling and Completions Information Booklet was also provided and a link to NOPSEMA's Guideline: <i>Consultation in the course of preparing an Environment Plan</i>. Santos also advised that consultation with Relevant Persons for preparation of the EP was planned to conclude by mid-2023. [Con-1041]</li> <li>+ On 20 April 2023 Santos emailed the NIAA the Barossa Development Quarterly Update, which included information on the consultation process for this EP. [Con-1066]</li> <li>+ On 24 April 2023 Santos emailed the NIAA to advise of opportunities in Darwin on 27 April 2023 and 3 May 2023 to obtain information, provide feedback and ask questions on the drilling and completions activity. [Con-1078]</li> <li>+ On 11 July 2023 Santos phoned the NIAA and sent advice via its website contact process advising that the period for providing feedback for the Environment Plan had closed and Santos remains available to discuss Project activities outside this consultation process. [Con-1526]</li> <li>+ No further correspondence or feedback was received.</li> </ul>			
<b>Summary of Objection or Claim</b>	<b>Assessment of Merits</b>	<b>Santos' Response Statement</b>	<b>EP Reference</b>
<i>Nil</i>	<i>Nil</i>	<i>Nil</i>	<i>No additional EP controls required.</i>
<b>Departments or agencies of the Northern Territory to which the activities to be carried out under the environment plan may be relevant</b>			

**Department of Industry, Tourism and Trade, NT – Energy Division (DITT-NT Energy)**

**Summary of consultation effort:**

- + On 13 April 2023 Santos emailed the Department of Industry, Tourism and Trade’s Energy division (DITT-NT Energy) to explain the consultation approach for the Barossa Drilling and Completions Environment Plan (EP), asking if DITT-NT Energy would like to be consulted, how it would like to be consulted and what information it required. A Barossa Drilling and Completions Information Booklet was also provided and a link to NOPSEMA’s Guideline: *Consultation in the course of preparing an Environment Plan*. Santos also advised that consultation with Relevant Persons for preparation of the EP was planned to conclude by mid-2023. [Con-1041]
- + On 20 April 2023 Santos emailed DITT-NT Energy the Barossa Development Quarterly Update, which included information on the consultation process for this EP. [Con-1066]
- + On 24 April 2023 Santos emailed DITT-NT Energy to advise of opportunities in Darwin on 27 April 2023 and 3 May 2023 to obtain information, provide feedback and ask questions on the drilling and completions activity. [Con-1078]
- + On 4 May 2023 Santos called DITT-NT Energy and left a voicemail. [Con-1313], [Con-1322], [Con-1316], [Con-1317], [Con-1319], [Con-1320]
- + On 10 May 2023 Santos emailed DITT-NT Energy in response to its voicemail and provided a follow-up email. [Con-1323]
- + On 11 May 2023 Santos called DITT-NT Energy. DITT-NT Energy requested the email from 13 April 2023 be re-sent. [Con-1314]
- + On 19 May 2023 Santos emailed DITT-NT Energy providing a link to NOPSEMA’s brochure: *Consultation on offshore petroleum environment plans – Information for the community*. A Barossa Drilling and Completions Information Booklet was also provided. [Con-1206]
- + On 23 May 2023 Santos emailed DITT-NT Energy the Barossa Gas Project Drilling and Completions Information Booklet and requested DITT-NT Energy provide feedback by 15 June 2023. [Con-1405]
- + On 29 May 2023 Santos emailed DITT-NT Energy a Drilling and Completions Fact Sheet. Santos also reminded it of the timeframe for provision of feedback. [Con-1243]
- + No further correspondence or feedback was received.

<b>Summary of Objection or Claim</b>	<b>Assessment of Merits</b>	<b>Santos’ Response Statement</b>	<b>EP Reference</b>
<i>Nil</i>	<i>Nil</i>	<i>Nil</i>	<i>No additional EP controls required.</i>

**Department of Industry, Tourism and Trade – Fisheries Division (DITT-NT Fisheries)**

**Summary of consultation effort:**

- + On 13 April 2023 Santos emailed the Department of Industry, Tourism and Trade’s Fisheries Division (DITT-NT Fisheries) to explain the consultation approach for the Barossa Drilling and Completions Environment Plan (EP), asking if DITT-NT Fisheries would like to be consulted, how it would like to be consulted and what information it required. A

Barossa Drilling and Completions Information Booklet was also provided and a link to NOPSEMA’s Guideline: *Consultation in the course of preparing an Environment Plan*. Santos also advised that consultation with Relevant Persons for preparation of the EP was planned to conclude by mid-2023. [Con-1041]

- + On 14 April 2023 DITT-NT Fisheries responded to Santos’ email on 13 April 2023, confirming it does not require further consultation on the EP prior to resubmission and requesting future consultation to occur via email. [Con-1045]
- + On 20 April 2023 Santos emailed DITT-NT Fisheries the Barossa Development Quarterly Update, which included information on the consultation process for this EP. [Con-1066]
- + On 24 April 2023 Santos emailed DITT-NT Fisheries to advise of opportunities in Darwin on 27 April 2023 and 3 May 2023 to obtain information, provide feedback and ask questions on the drilling and completions activity. [Con-1078]
- + On 1 May 2023 Santos emailed DITT-NT Fisheries in response to DITT-NT Fisheries’ email on 14 April 2023. Santos confirmed that, in accordance with DITT-NT Fisheries’ email, Santos would continue to provide information via email. Santos advised occasionally during consultations with commercial fishers and their representative organisations some queries arise in respect of which Santos may need to seek DITT-NT Fisheries’ advice. Santos confirmed it would do so via email in the first instance. [Con-1092]
- + On 19 May 2023 Santos emailed DITT-NT Fisheries providing a link to NOPSEMA’s brochure: *Consultation on offshore petroleum environment plans – Information for the community*. A Barossa Drilling and Completions Information Booklet was also provided. [Con-1206]
- + On 29 May 2023 Santos emailed DITT-NT Fisheries a reminder of the timeframe for provision of feedback on the EP and provided a Barossa Drilling and Completions Fact Sheet. [Con-1243]
- + No further correspondence or feedback was received.

<b>Summary of Objection or Claim</b>	<b>Assessment of Merits</b>	<b>Santos’ Response Statement</b>	<b>EP Reference</b>
<i>Nil.</i>	<i>Nil</i>	<i>Nil</i>	<i>No additional EP controls required.</i>

**Department of Infrastructure, Planning and Logistics – Transport Division (DIPL-NT-Transport)**

**Summary of consultation effort:**

- + On 13 April 2023 Santos emailed the Department of Infrastructure, Planning and Logistics’ Transport division (DIPL-NT Transport) to explain the consultation approach for the Barossa Drilling and Completions Environment Plan (EP), asking if DIPL-NT Transport would like to be consulted, how it would like to be consulted and what information it required. A Barossa Drilling and Completions Information Booklet was also provided and a link to NOPSEMA’s Guideline: *Consultation in the course of preparing an Environment Plan*. Santos also advised that consultation with Relevant Persons for preparation of the EP was planned to conclude by mid-2023. [Con-1041]
- + On 20 April 2023 Santos emailed DIPL-NT Transport the Barossa Development Quarterly Update, which included information on the consultation process for this EP. [Con-1066]

- + On 24 April 2023 Santos emailed DIPL-NT Transport to advise of opportunities in Darwin on 27 April 2023 and 3 May 2023 to obtain information, provide feedback and ask questions on the drilling and completions activity. [Con-1078]
- + On 4 May 2023 Santos called DIPL-NT Transport and left a voicemail. [Con-1383] A second DIPL-NT contact requested Santos to call again on 5 May 2023. [Con-1319]
- + On 4 May 2023 Santos called DIPL-NT Transport and confirmed the best contact for future engagement and consultation. [Con-1329]
- + On 5 May 2023 Santos called DIPL-NT Transport and left a voicemail. [Con-1384]
- + On 9 May 2023 Santos emailed DIPL-NT Transport in response to a phone call on 4 May 2023, which was a follow up to the email from Santos on 13 April 2023. Santos confirmed any combined feedback would come via DIPL-NT. Santos confirmed once the follow-up round of calls was completed, a reminder email will go out to all Relevant Persons. [Con-1172]
- + On 19 May 2023 Santos emailed DIPL-NT Transport providing a link to NOPSEMA’s brochure: *Consultation on offshore petroleum environment plans – Information for the community*. A Barossa Drilling and Completions Information Booklet was also provided. [Con-1206]
- + On 22 May 2023 Santos called DIPL-NT Transport. Santos advised it would send a follow up email. [Con-1327]
- + On 23 May 2023 Santos emailed DIPL-NT Transport to provide the Barossa Gas Project Drilling and Completions Information Booklet and seek feedback regarding the EP by 15 June 2023. [Con-1332]
- + On 23 May 2023 Santos emailed DIPL-NT Transport as a follow up to the phone call on 4 May 2023, confirming the following information: DIPL-NT is to be consulted during Santos’ preparation of the EP for resubmission; DIPL-NT’s interest is in potential impacts on the Port of Darwin and Northern Territory waters; the provided Barossa Drilling Information Booklet was broad, and fact sheets would be helpful to provide information required to inform any DIPL-NT feedback. DIPL-NT indicated ongoing consultation should occur via emails, phone calls and presentations. [Con-1330]
- + On 23 May 2023 Santos emailed DIPL-NT to confirm Santos has communicated with the best contact at DIPL-NT further to the telephone conversation on 4 May 2023. [Con-1328]
- + On 29 May 2023 Santos emailed DIPL-NT a Drilling and Completions Fact Sheet. Santos also reminded DIPL-NT of the timeframe for provision of feedback. [Con-1243]
- + On 8 June 2023 Santos called DIPL-NT and on 15 June 2023 Santos emailed DIPL-NT advising that the period for providing feedback for the Environment Plan had closed and Santos remains available to discuss Project activities outside this consultation process. [Con-1507]
- + No further correspondence or feedback was received.

<b>Summary of Objection or Claim</b>	<b>Assessment of Merits</b>	<b>Santos’ Response Statement</b>	<b>EP Reference</b>
<i>DIPL-NT Transport advised it would prefer a fact sheet rather than the information</i>	<i>Santos noted DIPL-NT Transport’s advice.</i>	<i>Santos also distributed a fact sheet as part of the EP consultation</i>	<i>No additional EP controls required.</i>

booklet that had been provided for EP consultation. [Con-1330]		process.	
Department of Territory Families, Housing and Communities, NT - Heritage branch			
<p><b>+ Summary of consultation effort:</b></p> <ul style="list-style-type: none"> <li>+ On 13 April 2023 Santos emailed the Department of Territory Families, Housing and Communities' Heritage Branch to explain the consultation approach for the Barossa Drilling and Completions Environment Plan (EP), asking if the Department's Heritage Branch would like to be consulted, how it would like to be consulted and what information it required. A Barossa Drilling and Completions Information Booklet was also provided and a link to NOPSEMA's Guideline: <i>Consultation in the course of preparing an Environment Plan</i>. Santos also advised that consultation with Relevant Persons for preparation of the EP was planned to conclude by mid-2023. [Con-1041]</li> <li>+ On 20 April 2023 Santos emailed the Department's Heritage Branch the Barossa Development Quarterly Update, which included information on the consultation process for this EP. [Con-1066]</li> <li>+ On 24 April 2023 Santos emailed the Department's Heritage Branch to advise of opportunities in Darwin on 27 April 2023 and 3 May 2023 to obtain information, provide feedback and ask questions on the drilling and completions activity. [Con-1078]</li> <li>+ On 10 May 2023 Santos called the Department's Heritage Branch and left a message. [Con-1174]</li> <li>+ On 19 May 2023 Santos emailed the Department's Heritage Branch providing a link to NOPSEMA's brochure: <i>Consultation on offshore petroleum environment plans – Information for the community</i>. A Barossa Drilling and Completions Information Booklet was also provided. [Con-1206]</li> <li>+ On 29 May 2023 Santos emailed the Department's Heritage Branch a Drilling and Completions Fact Sheet. Santos also reminded it of the timeframe for provision of feedback. [Con-1243]</li> <li>+ On 9 June and 20 June 2023 Santos made follow-up calls to the Department's Heritage Branch [Con-1269] and on 29 June 2023 Santos emailed the Department information on a separate Santos project in NT Waters which was the Department's focus.</li> <li>+ No further correspondence or feedback was received.</li> </ul>			
<b>Summary of Objection or Claim</b>	<b>Assessment of Merits</b>	<b>Santos' Response Statement</b>	<b>EP Reference</b>
Nil	Nil	Nil	No additional EP controls required.
Tourism NT			
<p><b>Summary of consultation effort:</b></p> <ul style="list-style-type: none"> <li>+ On 13 April 2023 Santos emailed Tourism NT to explain the consultation approach for the Barossa Drilling and Completions Environment Plan (EP), asking if Tourism NT</li> </ul>			



would like to be consulted, how it would like to be consulted and what information it required. A Barossa Drilling and Completions Information Booklet was also provided and a link to NOPSEMA’s Guideline: *Consultation in the course of preparing an Environment Plan*. Santos also advised that consultation with Relevant Persons for preparation of the EP was planned to conclude by mid-2023. [Con-1041]

- + On 20 April 2023 Santos emailed Tourism NT the Barossa Development Quarterly Update, which included information on the EP consultation process. [Con-1066]
- + On 24 April 2023 Santos emailed Tourism NT to advise of opportunities in Darwin on 27 April 2023 and 3 May 2023 to obtain information, provide feedback and ask questions on the drilling and completions activity. [Con-1078]
- + On 4 May 2023 Santos called Tourism NT and left a voicemail. [Con-1341]
- + On 10 May 2023 Santos emailed Tourism NT as a follow up to the call on 4 May 2023. [Con-1343]
- + On 19 May 2023 Santos emailed Tourism NT providing a link to NOPSEMA’s brochure: *Consultation on offshore petroleum environment plans – Information for the community*. A Barossa Drilling and Completions Information Booklet was also provided. [Con-1206]
- + On 29 May 2023 Santos emailed Tourism NT a Drilling and Completions Fact Sheet. Santos also reminded it of the timeframe for provision of feedback. [Con-1243]
- + On 8 June 2023 Santos called Tourism NT. Tourism NT confirmed it had received the correspondence. Tourism NT advised it did not need to be further consulted. [Con-1342]. Santos confirmed the Department’s advice in an email on 15 June 2023. [Con-1508]
- + No further correspondence or feedback was received.

<b>Summary of Objection or Claim</b>	<b>Assessment of Merits</b>	<b>Santos’ Response Statement</b>	<b>EP Reference</b>
<i>Nil</i>	<i>Nil</i>	<i>Nil</i>	<i>No additional EP controls required.</i>

**Departments or agencies of Western Australia to which the activities to be carried out under the environment plan may be relevant**

**Department of Biodiversity, Conservation and Attractions (DBCA-WA)**

**Summary of consultation effort:**

- + On 13 April 2023 Santos emailed the Department of Biodiversity, Conservation and Attractions (DBCA-WA) to explain the consultation approach for the Barossa Drilling and Completions Environment Plan (EP), asking if DBCA-WA would like to be consulted, how it would like to be consulted and what information it required. A Barossa Drilling and Completions Information Booklet was also provided and a link to NOPSEMA’s Guideline: *Consultation in the course of preparing an Environment Plan*. Santos also advised that consultation with Relevant Persons for preparation of the EP was planned to conclude by mid-2023. [Con-1041]
- + On 20 April 2023 Santos emailed DBCA-WA the Barossa Development Quarterly Update, which included information on the consultation process for this EP. [Con-1066]
- + On 24 April 2023 Santos emailed DBCA-WA to advise of opportunities in Darwin on 27 April 2023 and 3 May 2023 to obtain information, provide feedback and ask

- questions on the drilling and completions activity. [Con-1078]
- + On 24 April 2023 DBCA-WA emailed Santos acknowledging the receipt of the email on 24 April 2023. [Con-1079]
  - + On 28 April 2023 DBC-WA provided feedback to Santos that focused on DBC-WA's management role for the Scott Reef Nature Reserve [Con-1088]. Full details of DBCA-WA's feedback and Santos' assessment and responses are provided below.
  - + On 4 May 2023 Santos called DBCA-WA and left a voicemail and on 19 May 2023 Santos emailed DBCA-WA providing a link to NOPSEMA's brochure: *Consultation on offshore petroleum environment plans – Information for the community*. A Barossa Drilling and Completions Information Booklet was also provided. [Con-1206]
  - + On 23 May 2023 DBCA-WA emailed Santos with an automated response. [Con-1217]
  - + On 29 May 2023 Santos emailed DBCA-WA a reminder of the timeframe for provision of feedback on the EP and provided a Barossa Drilling and Completions Fact Sheet. [Con-1243]
  - + On 8 June 2023 Santos responded to DBCA-WA's feedback of 28 April 2023. [Con-1262]
  - + No further correspondence or feedback was received.

<b>Summary of Objection or Claim</b>	<b>Assessment of Merits</b>	<b>Santos' Response Statement</b>	<b>EP Reference</b>
<p><b>DBCA correspondence [Con-1088]</b></p> <p><i>DBCA has undertaken a review of the documentation provided and other readily available information and provides the following comments in relation to its responsibilities under Western Australian State legislation, namely the Conservation and Land Management Act 1984 (CALM Act) and Biodiversity Conservation Act 2016 (BC Act).</i></p>	<p><i>Santos acknowledges and understands DBCA's role under the cited legislation.</i></p>	<p><b>Santos' response [Con-1262]</b></p> <p><i>Thank you for providing the response to Santos' request for feedback regarding the proposed Barossa Gas Project Drilling and Completions Environment Plan (D&amp;C EP) to be submitted to NOPSEMA.</i></p> <p><i>Santos understands that this response has been provided on behalf of the Department of Biodiversity, Conservation and Attractions (DBCA) in respect of its responsibilities under the Conservation and Land Management Act 1984 (WA) (CALM Act) and Biodiversity</i></p>	<p><i>No additional EP controls required.</i></p>

		<p><i>Conservation Act 2016 (WA) (BC Act), specifically relating to the Scott Reef Nature Reserve (R 42749).</i></p>	
<p><i>The Scott Reef Nature Reserve (R 42749) is located within the area of the environment that may be affected (EMBA) by offshore activities outlined in Santos' supplied Barossa Gas project Drilling and Completions Information Booklet, including if there is a substantial hydrocarbon release subject to particular weather or other environmental conditions. Given the ecological importance of this reserve and that it may potentially be affected by a hydrocarbon release from the proposed activities, it is considered important that the baseline values and state of the potentially affected environment are appropriately understood and documented prior to any operations commencing that have the potential to lead to a hydrocarbon release.</i></p>	<p><i>Santos to respond with information on the collected baseline survey data and note the Scott Reef Nature Reserve is 'proximal' to, but outside, the boundary of the modelled environment that may be affected (EMBA) by the Drilling and Completions activity.</i></p>	<p><i>Santos has collected baseline survey data for the current state of the areas supporting important ecological values and any current contamination, if present, within the area of potential impact from an unplanned hydrocarbon release (as identified through Santos' hydrocarbon spill modelling, RPS 2019).</i></p> <p><i>Specifically, Information sourced from publicly available baseline studies of the Scott Reef Nature Reserve, including the purpose-designed Barossa Environmental Baseline Study undertaken by the Australian Institute of Marine Science (2015), has been collected, analysed and incorporated into both the Barossa Offshore Project Proposal accepted by NOPSEMA in 2018 and the Drilling and Completions Environment Plan currently under assessment by NOPSEMA and being updated for re-submission.</i></p> <p><i>It is also relevant to the Department's feedback, to point</i></p>	<p><i>No additional EP controls required.</i></p>

<p><i>DBCA would like to have the confidence that Santos has established appropriate baseline survey data on the current state of the areas supporting important ecological values and any current contamination if present within the area of a potential impact of hydrocarbon releases (as identified through Santos' modelling).</i></p>		<p><i>out that Santos' spill modelling shows Scott Reef Nature Reserve to be 'proximal' to, but outside, the boundary of the modelled environment that may be affected (EMBA) by the Drilling and Completions activity.</i></p> <p><i>The modelling indicates zero probability of surface, dissolved or entrained hydrocarbons reaching Scott Reef Nature Reserve. However, Santos is taking a conservative approach by detailing in its Environment Plan, certain environmental values and sensitivities and landmarks, such as Scott Reef Nature Reserve, that are outside of, but in close proximity to the modelled EMBA.</i></p>	
<p><i>DBCA undertakes monitoring in marine parks and reserves and publishes monitoring reports which are available on the department's website. However, Santos should be aware that this monitoring is targeted to inform DBCA's values and objectives to marine park management and is not necessarily suitable to provide all baseline</i></p>	<p><i>Santos to provide assurance that relevant published monitoring will be considered in spill modelling and response planning.</i></p>	<p><i>In preparing the updated D&amp;C EP and accompanying Oil Pollution Emergency Plan (OPEP) for submission to NOPSEMA, Santos will consider any published monitoring that is relevant to the evaluation of Santos' spill modelling and spill response planning.</i></p>	<p><i>No additional EP controls required.</i></p>

<p><i>information required for oil spill risk assessment and management planning. DBCA encourages Santos to acquire the necessary information to implement a Before-After, Control-Impact (BACI) framework in planning and evaluating its management response. This may include independently monitoring and collecting data where required or identifying other data sources.</i></p>			
<p><i>In the event of a hydrocarbon release, it is requested that Santos notify DBCA's Kimberly regional office as soon as practicable on (08) 9195 5500. Note however, that DBCA will not implement an oiled wildlife management response on behalf of a petroleum operator except as part of a whole of government response mandated by regulatory decision makers, and any advice or assistance from DBCA, at any scale, will occur on a full cost recovery basis. Santos should also commit to the monitoring</i></p>	<p><i>Santos to provide assurance that arrangements will be appropriately reflected in the OPEP and addressed during the implementation of any required response.</i></p>	<p><i>Santos acknowledges the Department's response role, cost-recovery model and specific requirements of an operator in the event of an unplanned hydrocarbon release, as stated in your feedback below and in the WA Department of Transport's Offshore Petroleum Industry Guidance Note Marine Oil Pollution: Response and Consultation Arrangements (September 2018). These arrangements will be appropriately reflected in the OPEP and addressed during the implementation of any required response.</i></p>	<p><i>Activity Notifications Table (Table 8.4).</i></p>

<p>and clean-up of any DBCA interests affected by an oil spill in consultation with DBCA.</p> <p>Santos may refer to the Department of Transport's (DoT) web content regarding marine pollution (<a href="https://www.transport.wa.gov.au/imagery/marine-pollution.asp">https://www.transport.wa.gov.au/imagery/marine-pollution.asp</a>), and the Offshore Petroleum Industry Guidance Note of September 2018 titled Marine Oil Pollution: Response and Consultation Arrangements. These documents provide information on the Western Australian emergency management arrangements for marine oil pollution incidents in State waters, petroleum titleholder' obligations under those arrangements, and the DoT's expectations as the jurisdictional authority for such incidences.</p>			
<p><b>Department of Mines, Industry Regulation and Safety-WA (DMIRS)</b></p>			
<p><b>Summary of consultation effort:</b></p> <ul style="list-style-type: none"> <li>+ On 13 April 2023 Santos emailed the WA Department of Mines, Industry Regulation and Safety (DMIRS) to explain the consultation approach for the Barossa Drilling and Completions Environment Plan (EP), asking if DMIRS would like to be consulted, how it would like to be consulted and what information it required. A Barossa Drilling</li> </ul>			

and Completions Information Booklet was also provided and a link to NOPSEMA’s Guideline: *Consultation in the course of preparing an Environment Plan*. Santos also advised that consultation with Relevant Persons for preparation of the EP was planned to conclude by mid-2023. [Con-1041]

- + On 20 April 2023 Santos emailed DMIRS the Barossa Development Quarterly Update, which included information on the consultation process for this EP. [Con-1066]
- + On 24 April 2023 Santos emailed DMIRS to advise of opportunities in Darwin on 27 April 2023 and 3 May 2023 to obtain information, provide feedback and ask questions on the drilling and completions activity. [Con-1078]
- + On 19 June 2023 Santos phoned DMIRS and followed this up with an email on 26 June 2023 advising that the period for providing feedback for the Environment Plan had closed and Santos remains available to discuss project activities outside this consultation process. [Con-1460]
- + No further correspondence or feedback was received.

<b>Summary of Objection or Claim</b>	<b>Assessment of Merits</b>	<b>Santos’ Response Statement</b>	<b>EP Reference</b>
<i>Nil</i>	<i>Nil</i>	<i>Nil</i>	<i>No additional EP controls required.</i>

**Department of Primary Industries and Regional Development – Fisheries (DPIRD-WA Fisheries)**

**Summary of consultation effort:**

- + On 13 April 2023 Santos emailed DPIRD-WA Fisheries to explain the consultation approach for the Barossa Drilling and Completions Environment Plan (EP), asking if DPIRD-WA Fisheries would like to be consulted, how it would like to be consulted and what information it required. A Barossa Drilling and Completions Information Booklet was also provided and a link to NOPSEMA’s Guideline: *Consultation in the course of preparing an Environment Plan*. Santos also advised that consultation with Relevant Persons for preparation of the EP was planned to conclude by mid-2023. [Con-1041]
- + On 20 April 2023 Santos emailed DPIRD-WA Fisheries the Barossa Development Quarterly Update, which included information on the EP consultation process. [Con-1066]
- + On 24 April 2023 Santos emailed DPIRD-WA Fisheries to advise of opportunities in Darwin on 27 April 2023 and 3 May 2023 to obtain information, provide feedback and ask questions on the drilling and completions activity. [Con-1078]
- + On 4 May 2023 DPIRD-WA Fisheries emailed Santos to ask whether any operation was occurring (under the EP) in WA state or Commonwealth waters (of WA). [Con-1160]
- + On 5 May 2023 Santos advised DPIRD-WA via email that no operations would be occurring in those areas [Con-1162] and the same day DPIRD-WA advised it would not need to make comment on the EP. [Con-1165]
- + On 19 May 2023 Santos emailed DPIRD-WA providing a link to NOPSEMA’s brochure: *Consultation on offshore petroleum environment plans – Information for the community*. A Barossa Drilling and Completions Information Booklet was also provided. [Con-1206]

<ul style="list-style-type: none"> <li>+ On 29 May 2023 Santos emailed DPIRD-WA a Drilling and Completions Fact Sheet. Santos also reminded it of the timeframe for provision of feedback. [Con-1243]</li> <li>+ No further correspondence or feedback was received.</li> </ul>			
<i>Summary of Objection or Claim</i>	<i>Assessment of Merits</i>	<i>Santos' Response Statement</i>	<i>EP Reference</i>
<i>Nil</i>	<i>Nil</i>	<i>Nil</i>	<i>No additional EP controls required.</i>
<b>Department of Transport (DOT) WA</b>			
<b>Summary of consultation effort:</b>			
<ul style="list-style-type: none"> <li>+ On 7 June 2023 Santos emailed the draft Barossa Drilling Oil Pollution Emergency Plan (OPEP) to the Department of Transport (DoT) WA for its review. [Con-1599]</li> <li>+ On 10 July 2023 the Department provided comments on the OPEP [Con-1600] which were answered by Santos on 13 July 2023 [Con-1602]</li> <li>+ On 14 August 2023 the Department emailed Santos advising that it had no further comments on the OPEP and requesting to be provided with a copy of the accepted version. [Con-2328]</li> <li>+ On 15 August 2023 Santos emailed the Department confirming it would provide a copy of the accepted version. [Con-2329]</li> <li>+ No further correspondence or feedback was received.</li> </ul>			
<i>Summary of Objection or Claim</i>	<i>Assessment of Merits</i>	<i>Santos' Response Statement</i>	<i>EP Reference</i>
<i>DoT WA was provided a copy of the OPEP and subsequently provided its review comments.</i>	<i>DoT WA is a key stakeholder involved in oil spill response preparedness and activities.</i>	<i>Santos has addressed DoT WA's comments and will provide DoT WA with the final accepted version.</i>	<i>No additional EP controls required.</i>
<b>Persons or organisations whose functions, interests or activities may be affected by the activities to be carried out under the environment plan</b>			
<b>Academic and Research Organisations</b>			
<b>Australian Institute of Marine Science (AIMS)</b>			
<b>Summary of consultation effort:</b>			
<ul style="list-style-type: none"> <li>+ On 13 April 2023 Santos emailed AIMS to explain the consultation approach for the Barossa Drilling and Completions Environment Plan (EP), asking if AIMS would like to</li> </ul>			



be consulted, how it would like to be consulted and what information it required. A Barossa Drilling and Completions Information Booklet was also provided and a link to NOPSEMA’s Guideline: *Consultation in the course of preparing an Environment Plan*. Santos also advised that consultation with Relevant Persons for preparation of the EP was planned to conclude by mid-2023. [Con-1041]

- + On 20 April 2023 Santos emailed AIMS the Barossa Development Quarterly Update, which included information on the EP consultation process. [Con-1066]
- + On 24 April 2023 Santos emailed AIMS to advise of opportunities in Darwin on 27 April 2023 and 3 May 2023 to obtain information, provide feedback and ask questions on the drilling and completions activity. [Con-1078]
- + On 19 May 2023 Santos emailed AIMS providing a link to NOPSEMA’s brochure: *Consultation on offshore petroleum environment plans – Information for the community*. A Barossa Drilling and Completions Information Booklet was also provided. [Con-1206]
- + On 29 May 2023 Santos emailed AIMS a Drilling and Completions Fact Sheet. Santos also reminded it of the timeframe for provision of feedback. [Con-1243]
- + On 19 June 2023 Santos made a follow-up call to AIMS which advised Santos via email that it would not be participating in the consultation process. [Con-1417]
- + No further correspondence or feedback was received.

<b>Summary of Objection or Claim</b>	<b>Assessment of Merits</b>	<b>Santos’ Response Statement</b>	<b>EP Reference</b>
<i>Nil</i>	<i>Nil</i>	<i>Nil</i>	<i>No additional EP controls required.</i>

**Australian Marine Sciences Association – NT (AMSA-NT)**

**Summary of consultation effort:**

- + On 13 April 2023 Santos emailed Australian Marine Sciences Association-NT (AMSA-NT) to explain the consultation approach for the Barossa Drilling and Completions Environment Plan (EP), asking if AMSA-NT would like to be consulted, how it would like to be consulted and what information it required. A Barossa Drilling and Completions Information Booklet was also provided and a link to NOPSEMA’s Guideline: *Consultation in the course of preparing an Environment Plan*. Santos also advised that consultation with Relevant Persons for preparation of the EP was planned to conclude by mid-2023. [Con-1041]
- + On 18 April 2023 AMSA-NT emailed Santos confirming it would like to be further consulted during Santos’ preparation of the EP for resubmission and would like to receive information via email and one-on-one meetings. AMSA-NT requested a range of new, additional or updated technical information in relation to the revised EP and made recommendations on other stakeholders that Santos should consult. The requests and recommendations and Santos’ responses to each are detailed in the assessment section of this entry. [Con-1051]
- + On 20 April 2023 Santos emailed AMSA-NT the Barossa Development Quarterly Update, which included information on the consultation process for this EP. [Con-1066]
- + On 24 April 2023 Santos emailed AMSA-NT to advise of opportunities in Darwin on 27 April 2023 and 3 May 2023 to obtain information, provide feedback and ask questions on the drilling and completions activity. [Con-1078]

- + On 15 May 2023 Santos emailed AMSA-NT confirming receipt of AMSA-NT's email of 18 April 2023 where AMSA-NT indicated it considers itself a Relevant Person for the purpose of consultation with respect to the proposed Barossa Drilling and Completions Environment Plan. Santos requested EP feedback from AMSA-NT by 15 June 2023. The Barossa Drilling and Completions Information Booklet was again provided. [Con-1182] Santos stated the purpose of the email was to:
  - seek information to better understand any functions, interests or activities that may be affected by the proposed activities under the EP and how they may be affected;
  - explain the purpose of consultation and Santos' regulatory obligations to consult with Relevant Persons;
  - set out Santos' proposed approach to consulting with Relevant Persons;
  - seek feedback on how Santos can provide further information that is appropriate and accessible to assess the possible consequences of Santos' proposed drilling and completions activities (if a Relevant Person); and/or
  - invite Relevant Persons' feedback regarding the EP. [Con-1182]
- + On 18 May 2023 Santos emailed AMSA-NT providing a link to NOPSEMA's brochure: *Consultation on offshore petroleum environment plans – Information for the community*. A Barossa Drilling and Completions Fact Sheet was also provided. [Con-1206]
- + On 29 May 2023 Santos emailed AMSA-NT a Drilling and Completions Fact Sheet. Santos also reminded it of the timeframe for provision of feedback. [Con-1243]
- + On 29 May 2023 AMSA-NT emailed Santos in response to Santos' email on 15 May 2023 stating it had already provided feedback on 18 April 2023 and also provided further information on its role, functions and interests. [Con-1247]
- + On 13 June 2023 AMSA-NT called Santos with a query on the consultation emails that had been sent. [Con-1391].
- + On 14 June 2023 Santos responded to AMSA-NT's phone enquiry via an email. [Con-1392]
- + On 15 June 2023 AMSA-NT emailed Santos its feedback on the Barossa Drilling and Completions EP. [Con-1395]
- + On 20 June 2023 Santos responded to AMSA-NT's email of 29 May 2023 and the information requests made on 18 April 2023. [Con-1442]
- + On 21 June 2023 AMSA-NT emailed Santos and made criticisms of the consultation process and advised it was unavailable to meet by a date proposed due to prior commitments and the short notice. [Con-1421]
- + On 24 June 2023 AMSA-NT provided feedback to Santos on Revision 3 of the EP. [Con-1429]
- + On 3 July 2023 Santos responded to AMSA-NT's letter of 23 June (received by Santos by email on 24 June 2023). [Con-1516]
- + On 17 July 2023 AMSA-NT emailed Santos in response to Santos' letter of 3 July 2023. [Con-2330]
- + On 18 July 2023 AMSA-NT emailed Santos to provide an additional reference to be included with its 17 July 2023 response. [Con-2331]
- + On 24 July 2023 Santos emailed AMSA-NT in response to AMSA-NT's letter of 17 July 2023 and providing a further response to AMSA-NT's letter of 23 June. [Con-2332]

+ No further correspondence or feedback was received.			
<b>Summary of Objection or Claim</b>	<b>Assessment of Merits</b>	<b>Santos' Response Statement</b>	<b>EP Reference</b>
<p><b>AMSA-NT correspondence [Con-1051]</b></p> <p>AMSA-NT confirms its request for formal recognition and consultation as "relevant persons" by Santos on any draft Environment Plans (Eps) in relation to the Barossa Offshore Gas Project.</p> <p>AMSA-NT would like to continue to be consulted on the Barossa Offshore Gas Project, and the preparation of the revised Drilling and Completions Environment Plan.</p>	<p>Santos has assessed AMSA-NT as a Relevant Person for Barossa Drilling and Completions EP consultation.</p>	<p><b>Santos response [Con-1442]</b></p> <p>Santos treated AMSA-NT as a relevant person in Revision 3 of the EP, prior to a Federal Court decision in late 2022 setting aside the acceptance of Revision 3 of the EP by the regulator, the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA). Our 13 April email sought to confirm if AMSA NT wished to continue to be consulted in respect of Santos' revised EP.</p>	<p>No additional EP controls required.</p>
<p>AMSA-NT requests any new, additional or updated technical information in relation to the revised EP:</p> <p>1) technical and consultants reports, field surveys and assessment reports in relation to the marine environmental, socio-economic aspects of the Barossa Drilling and Completions Environment Plan (EP) commissioned by</p>	<p>Relevant documentation has been publicly available since March 2022. The current consultation process is assisting the updating required to this existing information.</p>	<p>There are no new, additional or updated technical and consultants' reports, field surveys or assessment reports relating to the marine environmental or socio-economic aspects within the environment that may be affected (EMBA) by the activities proposed under the revised Drilling and Completions Environment Plan (EP).</p> <p>The revised EP may contain updates regarding these</p>	<p>No additional EP controls required.</p>

<p><i>Santos – within the EMBA region, including the waters of Indonesia and Timor-Leste.</i></p> <p><i>2) technical and meeting/consultation reports in relation to the ecological, socio-cultural and Indigenous ‘sea country’ aspects of the EP undertaken or commissioned by Santos.</i></p> <p><i>3) technical information and reports, relating to Santos’s definition of the EMBA and MEVA.</i></p> <p><i>4) technical reports, industry and scientific data sourced and accessed by Santos in relation to its assessment of the marine biodiversity values of the EMBA region, particularly species listed under the Environment Protection and Biodiversity Conservation Act 1999.</i></p> <p><i>5) technical reports, analyses, assessments, modelling and/or other documents, in relation to the potential environmental impacts and risks of activities within the EMBA, including in relation to a ‘Worst Case Oil</i></p>		<p><i>matters, including updates informed by consultation activities, however the underlying information and assessments remain the same as for the previous Revision 3 of the EP.</i></p> <p><i>Revision 3 of the EP is (and has been) available online at <a href="https://docs.nopsema.gov.au/A831694">https://docs.nopsema.gov.au/A831694</a>. It was accepted by NOPSEMA in March 2022, before being set aside in late 2022. That document has been publicly available since 15 March 2022 (and remains so). There has been ample opportunity for access.</i></p>	
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<p><i>Spill'.</i></p> <p>6) <i>information, including any reports, assessments and/or other documents that assess the potential international and transboundary environmental, socio-economic and cultural impacts and risks of activities within the EMBA region, including in relation to a 'Worst Case Oil Spill'</i></p> <p>7) <i>information and updates on marine stakeholders from Indonesia and Timor-Leste contacted and/or consulted.</i></p>			
<p><b>AMSA-NT correspondence [Con-1395]</b></p> <p><i>AMSA provided comments on the Barossa Drilling and Completions EP consultation process on the 9 July 2021 – particularly the critical need for more technical information and key stakeholder consultation. This included a specific request to see and provide technical comment on a draft Drilling EP.</i></p>	<p><i>Relevant documentation has been publicly available since March 2022. The current consultation process is assisting the updating required to this existing information.</i></p>	<p><i>Santos is in the process of revising the EP and undertaking consultation with relevant persons under regulation 11A of the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009 (Cth) to seek feedback to inform and develop the revised EP for submission to NOPSEMA.</i></p> <p><i>For consultation in the preparation of a revised EP, the Drilling and Completions Information Booklet (supplied on 13 April 2023) and Fact Sheet</i></p>	<p><i>No additional EP controls required.</i></p>

<p>AMSA notes with concern that it never saw or received a copy of a Draft Barossa Drilling and Completions EP (for technical comment and feedback) – despite its formal request on 9<sup>th</sup> July 2021.</p> <p>AMSA notes with concern that it never received an opportunity to provide comment on Santos’s response to AMSA technical comments that it provided on 9<sup>th</sup> July 2021 – or, to provide technical comments/input on issues/concerns raised by other key stakeholders.</p> <p>In none of Santos’s emails have stakeholders been directed to the Drilling EP document. As such, AMSA notes it is unclear whether Santos is seeking formal stakeholder input on the Barossa Drilling EP (approved by NOPSEMA on 14 March 2023) – or only the Drilling Booklet or Information Brochure and Fact Sheet provided in 2023. Please clarify this.</p>		<p>(supplied on 29 May 2023) have been provided to assist relevant persons to make an informed assessment of the possible consequences of the Drilling and Completions activity on their functions, interests or activities. This is explained in our emails of 13 April, 15 May, 19 May and 29 May (though Revision 3 of the EP may still be a useful reference).</p> <p>AMSA NT has also been supplied with NOPSEMA’s brochure entitled “Consultation on offshore petroleum environment plans – Information for the Community” (on 19 May).</p> <p>AMSA NT was invited (by email of 24 April) to attend consultation drop-in sessions in Darwin scheduled for 27 April and 3 May (though it did not attend).</p> <p>Concerns as to the current regulatory process itself are not matters for Santos to address.</p>	
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<p><i>It is also unclear whether stakeholder input is sought to inform the original EP (approved by NOPSEMA on 14 March 2023) or a revised EP for submission to NOPSEMA. Please clarify this.</i></p> <p><i>AMSA has major concerns with the current Barossa Drilling EP (approved by NOPSEMA on 14 March 2023), including the following gaps/issues:</i></p> <p><i>a) lack of assessment of cumulative impacts, particularly through integrated, seascape or ecosystem models and predictive activity-impact modelling</i></p> <p><i>b) need to address major data gaps in baseline information through baseline surveys, particularly for threatened, migratory species and Matters of National Environmental Significance (MNES) in this globally-significant region</i></p> <p><i>c) recognition of monitoring, impact and risk assessments in a 'data-</i></p>			
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<p><i>poor' setting, particularly the need for application of the precautionary principle and multiple-lines of evidence</i></p> <p><i>d) recognition of the pronounced 'ecological connectivity', 'shared species' and 'shared resources' of region – and failure to assess potential 'transboundary' species, resources and impacts (via a 'transboundary EIA'), particularly impacts on the adjacent marine uses, ecological and economic values, especially within the activity's identified EMBA (environment that may be affected) and MEVA (moderate exposure value)</i></p> <p><i>e) failure to appropriately consult with relevant and key stakeholders in Indonesia and Timor-Leste (including industry, non-industry, government and non-government, and regional forums) – given the location of the activity and the legal status of the Timor Sea as a 'semi-enclosed sea' and</i></p>			
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<p><i>significantly, the relevant forums with interests/responsibility for regional management 2</i></p> <p><i>f) need to assess potential seabed-water column impacts</i></p> <p><i>g) need to address the significant methodological challenges with impact detection and monitoring of marine megafauna populations, including measurement criteria, 'multiple lines of evidence' and direct megafauna and environmental observations</i></p> <p><i>h) lack of current and best available, accessible data/information, particularly for threatened and migratory species and MNES</i></p> <p><i>i) heavy reliance on industry consultants and non-peer reviewed studies</i></p> <p><i>j) lack of expert, independent peer review and peer-reviewed published scientific data</i></p> <p><i>AMSA also has major concerns with the current</i></p>			
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<p><i>regulatory process – which prevents any stakeholder consultation and input on draft Environment Plans, prior to their submission to NOPSEMA – including significantly, independent and appropriate technical review and assessment.</i></p>			
<p><i>Santos’s current timeline for stakeholder comments on the revised Drilling EP (15 June 2023) is just 4 weeks after your response to AMSA’s request to be ‘relevant persons’ (email dated 15 May 2023). Given the range and breadth of issues Identified by AMSA’s in response to the current EP (outlined in paragraph 10), AMSA maintains that this is insufficient time to adequately assess/review the available EP documents, engage with relevant technical experts and provide detailed input on the EP.</i></p> <p><i>AMSA requests an extension of the timeline for AMSA comments on the Barossa Drilling and Completions EP until 31 July</i></p>	<p><i>Relevant documentation has been publicly available since March 2022. The current consultation process is assisting the updating required to this existing information. Santos will accommodate an extension.</i></p>	<p><i>AMSA NT has had the benefit of access to the Drilling Information Booklet since 13 April. A further copy was supplied on 15 May. The subsequent fact sheet is merely a condensed, simplified format for presentation of that same information. As previously notified, including in our emails of 15 May, 19 May and 29 May, Santos has been inviting and seeking feedback regarding the EP by 15 June.</i></p> <p><i>Santos is happy to arrange a discussion with AMSA NT this week regarding any further feedback it may have and to discuss the matters raised at paragraph 10 of its 15 June letter. Please let us know your availability this week.</i></p> <p><i>Santos can also accommodate an extension of the feedback period until Friday, 23 June.</i></p>	

<p>2023. In the meantime, AMSA would be grateful if you could provide a response and importantly, clarity on the matters raised in paragraphs 2, 8 and 9, of this letter, by 20 June 2023.</p>			
<p>AMSA-NT requests any new, additional or updated technical information in relation to the revised EP: [Con-1051]</p> <p>1) technical and consultants' reports, field surveys and assessment reports in relation to the marine environmental, socio-economic aspects of the Barossa Drilling and Completions Environment Plan (EP) commissioned by Santos – within the EMBA region, including the waters of Indonesia and Timor-Leste. [Con-1051]</p>	<p>Santos noted the request and will provide a response.</p>	<p>There are no new, additional or updated technical and consultants' reports, field surveys or assessment reports relating to the marine environmental or socio-economic aspects within the environment that may be affected (EMBA) by the activities proposed under the revised Drilling and Completions Environment Plan (EP). The revised EP may contain updates regarding these matters, including updates informed by consultation activities, however the underlying information and assessments remain the same as for the previous Revision 3 of the EP.</p> <p>Section 3.2.2 of the previous Revision 3 of the Drilling and Completions Environment Plan (EP) describes the field and desktop/modelling studies to inform understanding of the Drilling and Completions activity</p>	<p>No additional EP controls required.</p>

		<p><i>EMBA, and to inform assessment of associated impacts and risks.</i></p> <p><i>Further detail and copies of the studies are provided in Section 5 and Appendices of the accepted Barossa Development OPP at NOPSEMA's website (<a href="https://www.nopsema.gov.au/offshore-industry/environmental-management/assessment-process/public-comment">https://www.nopsema.gov.au/offshore-industry/environmental-management/assessment-process/public-comment</a>)</i></p>	
<p><i>2) technical and meeting/consultation reports in relation to the ecological, socio-cultural and Indigenous 'sea country' aspects of the EP undertaken or commissioned by Santos. [Con-1051]</i></p>	<p><i>Santos noted the request and will provide a response, noting there are confidentiality factors to be considered.</i></p>	<p><i>Santos has sought, and continues to seek, information about aspects of the Drilling and Completions activity EMBA (including sea country) through consultation with relevant persons. Santos does not propose to share meeting / consultation reports relating to other consultations as requested. Certain information will be published in the consultation section of Rev 4 of the EP which will be published and available for public viewing at NOPSEMA's website upon resubmission. This may include information in relation to ecological, socio-cultural and Indigenous 'sea country' aspects, however any relevant person that provides information during the course of consultation has the ability to</i></p>	<p><i>Consultation report (Section 4.7)</i></p>

		<i>request that particular information not be published on NOPSEMA's website.</i>	
<i>3) technical information and reports, relating to Santos's definition of the EMBA and MEVA. [Con-1051]</i>	<i>Santos noted the request and has provided information in response.</i>	<p><i>There are no new, additional or updated technical and consultants' reports, field surveys or assessment reports relating to the marine environmental or socio-economic aspects within the environment that may be affected (EMBA) by the activities proposed under the revised Drilling and Completions Environment Plan (EP). The revised EP may contain updates regarding these matters, including updates informed by consultation activities, however the underlying information and assessments remain the same as for the previous Revision 3 of the EP.</i></p> <p><i>Stochastic hydrocarbon dispersion and fate modelling, applied to the worst-case spill scenario for the drilling activity (loss of well containment), was undertaken to determine the environment that may be affected (EMBA). Areas potentially contacted by hydrocarbons were determined using stochastic modelling which overlaid hundreds of individual</i></p>	<i>No additional EP controls required.</i>

		<p><i>hypothetical oil spill simulations from an oil spill into a single map, with each simulation subject to a different set of metocean conditions drawn from historical records.</i></p> <p><i>The modelling considered key physical and chemical phases of hydrocarbons that pose differing environmental and socioeconomic risks, being surface, entrained, dissolved aromatic and shoreline accumulated hydrocarbons. Defining the areas that may be contacted by spilled hydrocarbons depends on the concentrations of the hydrocarbons on the sea surface, in the water column and on the shoreline.</i></p> <p><i>Hydrocarbon exposure threshold values defined by NOPSEMA (Environment Bulletin: Oil Spill Modelling, April 2019) for each of these phases were applied to the stochastic modelling outputs to determine the areas affected by the high exposure values (HEVA), the moderate exposure values (MEVA) and the low exposure values (LEVA).</i></p> <p><i>The MEVA and HEVA represent areas wherein contact with</i></p>	
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		<p><i>hydrocarbons may result in harmful impacts to biota, with the MEVA being the more conservative, encompassing the maximum extent of biological impact. The LEVA represents the maximum extent of possible contact with hydrocarbons within the depth range between 0-10 m and reflects the range of socio-economic considerations for oil spill response planning and scientific monitoring. For this reason, the LEVA has been used to define the modelled EMBA. In assessing the EMBA for Drilling and Completions activities, Santos has also considered significant values and sensitives outside but proximal to the extent of the modelled EMBA.</i></p> <p><i>Further technical information about spill modelling performed to define the modelled EMBA and MEVA is contained in Section 7.5 of Revision 3 of the EP, available at NOPSEMA's website (<a href="https://docs.nopsema.gov.au/A831694">https://docs.nopsema.gov.au/A831694</a>).</i></p>	
<p>4) technical reports, industry and scientific data sourced and accessed by Santos in relation to its</p>	<p>Santos noted the request and has provided information in response.</p>	<p>There are no new, updated or additional technical reports or industry and scientific data sourced and accessed by Santos</p>	<p>No additional EP controls required.</p>

<p><i>assessment of the marine biodiversity values of the EMBA region, particularly species listed under the Environment Protection and Biodiversity Conservation Act 1999. [Con-1051]</i></p>		<p><i>in relation to its assessment of the marine biodiversity values within the EMBA in respect of the EP.</i></p> <p><i>Please refer to the response to item 1 above for previous information about data and reports gathered by Santos to inform its assessment of marine biodiversity values within the environment that may be affected by Drilling and Completions activities, including listed species under the Environment Protection and Biodiversity Conservation Act 1999 (Cth) (EPBC Act). This information remains current for the revised EP.</i></p>	
<p><i>5) technical reports, analyses, assessments, modelling and/or other documents, in relation to the potential environmental impacts and risks of activities within the EMBA, including in relation to a 'Worst Case Oil Spill'. [Con-1051]</i></p>	<p><i>Santos noted the request and has provided information in response.</i></p>	<p><i>There are no new, updated or additional analyses, assessments, modelling and/or other documents in relation to the potential environmental impacts and risks of activities in the EMBA in respect of the revised EP. The revised EP may contain updates regarding these matters, including updates informed by consultation activities, however the underlying information and assessments remain the same as for the previous Revision 3 of the</i></p>	<p><i>No additional EP controls required.</i></p>



		<p><i>EP.</i></p> <p><i>Sections 6 and 7 of the previous Revision 3 of the Drilling and Completions EP present relevant information from relevant technical reports and Santos' analyses and assessments in relation to potential environmental impacts and risks of Drilling and Completions activities within the EMBA, including for planned activities and unplanned events.</i></p> <p><i>Sections 7.5, 7.6 and 7.7 present results of technical (including modelling) reports and analyses and assessments by Santos in relation to potential impacts and risks of credible worst case spill scenarios for Barossa Drilling and Completions. A copy of Revision 3 of the EP is available at NOPSEMA's website (<a href="https://docs.nopsema.gov.au/A831694">https://docs.nopsema.gov.au/A831694</a>)</i></p>	
<p><i>6) information, including any reports, assessments and/or other documents that assess the potential international and transboundary environmental, socio-economic and cultural impacts and risks of</i></p>	<p><i>Santos noted the request and has provided information in response.</i></p>	<p><i>By virtue of the modelled EMBA extending into international waters, Santos has considered the potential socio-economic and cultural impacts and risks to receptors at these locations, including in relation to credible worst case spill scenarios. For example, the Barossa Drilling</i></p>	<p><i>No additional EP controls required.</i></p>

<p>activities within the EMBA region, including in relation to a 'Worst Case Oil Spill' [Con-1051]</p>		<p>and Completions EP has considered and assessed the potential environmental impacts of a worst-case condensate spill, including on seaweed farming and traditional fishing activities off the West Timor and Timor-Leste coastlines, noting that the MEVA does not reach either of these coastlines.</p>	
<p>7) information and updates on marine stakeholders from Indonesia and Timor-Leste contacted and/or consulted. [Con-1051]</p>	<p>Santos noted the request and has provided information in response.</p>	<p>Information and updates on marine stakeholders within the EMBA for Drilling and Completions activities will be presented in the consultation section of Revision 4 of the EP, which will be published and available for public viewing at NOPSEMA's website upon resubmission (subject to any requests by those relevant persons that their Information not be published on NOPSEMA's website).</p>	<ul style="list-style-type: none"> <li>+ Consultation report (<b>Section 4.7</b>)</li> <li>+ No additional EP controls required.</li> </ul>
<p>Based on the Barossa OPP identification of stakeholders and also, the EMBA and MEVA for the EP (which includes the waters of Indonesia and Timor-Leste), the Australian Marine Sciences Association recommends that Santos consult with all relevant</p>	<p>Santos noted the request and has provided information in response.</p>	<p>Santos takes steps to identify and consult with relevant government and non-government marine stakeholders that may be affected by impacts and risks of Drilling and Completions activities, having regard to regulation 11A(1) of the Offshore Petroleum and Greenhouse Gas Storage</p>	<ul style="list-style-type: none"> <li>+ Consultation report (<b>Section 4.7</b>)</li> <li>+ No additional EP controls required.</li> </ul>

<p>and key government and non-government marine stakeholders in Indonesia and Timor-Leste. [Con-1051]</p> <p><b>AMSA-NT correspondence [Con-1429]</b></p> <p>Santos has refused AMSA-NT's request of 13 June 2023 for an appropriate period of time to review information and provide feedback. Santos informed AMSA-NT on the evening of 20 June that the deadline for all comments on the EP is 23 June 2023.</p> <p>AMSA-NT refutes Santos's current misleading summary and assessment of 'AMSA consultation' outlined in the Drilling EP (Version 3.0) (page 104-106) particularly:</p> <p>a. It's failure to acknowledge and recognize the significant uncertainty surrounding the lengthy Federal Court legal proceedings against the Drilling EP and its impacts and implications for stakeholder consultation.</p> <p>b. It's failure to contact</p>		<p>(Environment) Regulations 2009 (Cth) (<b>Environment Regulations</b>) and the NOSPEMA guideline 'Consultation in the course of preparing an environment plan' (N-04750-GL2086 A900179; 12/05/2023).</p> <p>It is NOPSEMA's role to assess whether Santos' relevant persons consultation process has met the requirements of the Environment Regulations.</p>	
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<p><i>AMSA-NT on the Drilling EP process through this period of uncertainty.</i></p> <p><i>c. We believe it is an unrealistic for Santos to expect that AMSA-NT (and other unpaid, under-resourced stakeholders) would continue to be 'actively engaged' in the consultation on the Drilling EP, without any specific update or direct formal communication from Santos.</i></p> <p><i>d. AMSA-NT received no emails from Santos, specifically on the Drilling EP since 18 August 2021 (Santos's response to AMSA-NT submission) to 13 April 2023.</i></p> <p><i>e. AMSA-NT was unaware of the status of the Drilling EP following the successful legal challenge in the Federal Court.</i></p> <p><i>f. AMSA-NT only became aware of start of a new consultation process for the Drilling EP, following an email from Santos on 13 April 2023, which requested if we wanted to be</i></p>			
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<p><i>considered 'relevant persons'.</i></p> <p><i>g. AMSA-NT were only informed of the 15 June 2023 deadline for comments on a revised Drilling EP via an email from Santos on 15 May 2023 (together with a request for information for 'relevant persons').</i></p> <p><i>Having regard to the requirements of cl.11A(2) of the Environment Regulations, and the EP Content Guidance, Consultation Guideline and EP Decision Guideline, AMSA-NT are currently not able to adequately assess the potential impacts to the marine environment.</i></p> <p><i>For AMSA-NT and the broader public to be able to effectively engage with and provide comment on the project the Revised Drilling EP should be made public, prior to its submission (and approval) by NOPSEMA.</i></p> <p><i>AMSA-NT requests a copy of the DRAFT Drilling and Completions Environment Plan (Revised) be provided</i></p>			
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<p>to all stakeholders prior to its submission to NOPSEMA.</p>			
<p><b>AMSA-NT correspondence [Con-1429]</b></p> <p><b>Comments on the Drilling EP (Version 3.0)</b></p> <p>9. The Barossa Drilling Environment Plan (Drilling EP) fails to sufficiently recognise the global marine values of the Arafura and Timor Seas region (Alongi et al. 2011, ATSEA 2012). A region including the most pristine and biodiverse tropical coastal and marine habitats in the world (Halpern et al 2008) – as well as a recognised ‘global refuge’ and migratory corridor for some of the planet’s most threatened marine megafauna and wildlife populations (particularly sea turtles, sharks/rays, whales, dolphins and dugongs).</p>	<p>Santos assessed this claim as not valid due to the EP recognizing marine values within the Operational Area. MEVA and EMBA.</p>	<p><b>Santos response [Con-2332]</b></p> <p>The Drilling and Completions EP considers available information and information Santos has collected to identify marine values in the Operational Area (meaning the boundaries of petroleum production licence NT/L1) and within the broader environment that may be affected (<b>EMBA</b>). The EMBA represents the maximum extent of a hydrocarbon spill for the Drilling and Completions EP for the purposes of response planning and monitoring, but does not represent the impacts to marine life. The moderate exposure values (<b>MEVA</b>) area within the EMBA represents the extent of the area in which a spill could impact marine life. Section 3.2.2 of the Drilling and Completions EP outlines the Barossa environmental studies undertake to characterise the existing marine environment within and surrounding the Operational Area.</p>	<p>No additional EP controls required.</p>

<p>10. Despite its globally-significant ecological values, the region (particularly the Sahul Shelf and the ecosystems of the Arafura and Timor Seas) remain some the most under-studied and data poor in Australia, including for migratory, rare, threatened and protected marine megafauna. To this end, AMSA-NT recognizes and supports the oil-gas industry's major commitment to investing in marine megafauna research, particularly under NOPSEMA's Research Strategy 2023-2025.</p>	<p>Santos noted this comment.</p>	<p>Noted</p>	<p>No additional EP controls required.</p>
<p>11. AMSA-NT however notes that, in the meantime, the Drilling EP (and Barossa Offshore Gas Project) continues to operate within a significant, 'data-poor' environment – with very limited investment by Santos in collecting critical baseline surveys and key marine species data, essential for impact assessment,</p>	<p>Santos assessed this claim as not valid as Santos performed detailed field and desktop environmental studies.</p>	<p>Santos has performed detailed field and desktop environmental studies which cover the spatial extent of the Operational Area and its surrounds. These are summarised in section 3.2.2 of the Drilling and Completions EP (Revision 3).</p> <p>The impacts from planned activities are confined to the Operational Area, but notwithstanding this, the studies completed for the Offshore</p>	<p>No additional EP controls required.</p>

<p><i>monitoring and to ensure the protection of the global ecological values of the region.</i></p>		<p><i>Project Proposal (OPP) also considered the surrounding area.</i></p>	
<p><i>-NT</i></p> <p><i>12. Rather, in preparing the Drilling EP, Santos have followed the standard NOPSEMA and EPBC Act processes, EIS's templates that offshore oil/gas industry consultants use – and rely heavily on the use of the EPBC's PMST (Protected Matters Search Tool) and the identification of Biologically Important Areas (BIAs) for listed marine threatened/migratory species to identify species of concern – <a href="https://atlas.parksaustralia.gov.au/amps/natural-values/biologically-important-areas">https://atlas.parksaustralia.gov.au/amps/natural-values/biologically-important-areas</a> - based on the DoEE's Species Profile and Threats (SPRATs) database – <a href="http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl">http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl</a></i></p>	<p><i>Santos assessed this claim as not valid on the basis that Santos' usage on the Protected Matters Search Tool, Biologically Important Areas and the SPRAT database is appropriate.</i></p>	<p><i>Santos has performed detailed field and desktop environmental studies which cover the spatial extent of the operational area and its surrounds. These are summarised in section 3.2.2 of the Drilling and Completions EP (Revision 3).</i></p> <p><i>Outside of the operational area, reliance on tools the Protected Matters Search Tool, Biologically Important Areas and the SPRAT database is appropriate for the identification of environmental receptors.</i></p> <p><i>AMSA-NT has acknowledged that Santos has followed standard NOPSEMA and EPBC Act processes. Usage of the Protected Matters Search Tool, Biologically Important Areas and the SPRAT database are standard processes which Santos is expected to use under the current framework Santos updated its searches of these tools and databases for the revised EP and has updated the EP where necessary. Santos has included additional information</i></p>	<p><i>No additional EP controls required.</i></p>



		<p><i>about values along the West Timor and Timor-Leste coastlines and coastal waters within the EMBA.</i></p>	
<p>13. AMSA-NT notes the major findings of the Independent Review of the EBPC Act in 2020, particularly the very poor state of the data systems supporting the EBPC Act, noting that:</p> <p>a. “The information systems supporting the EPBC Act are inefficient, disorganised and incomplete. Decision-makers, proponents and the community do not have access to the best available data, information and science.”</p> <p>b. “The collection of data and information is fragmented, disparate, and there are fundamental information gaps.”</p> <p>c. “Data collected by proponents to support environmental impact assessments or the</p>	<p><i>Santos assessed this claim as not valid because the EPBC Act review is outside the scope of the consultation for this EP.</i></p>	<p><i>Santos has undertaken detailed field and desktop environmental studies which cover the spatial extent of the Operational Area and its surrounds. These are summarised in section 3.2.2 of the Drilling and Completions EP (Revision 3). Santos is not only relying on the information systems supporting the EPBC Act.</i></p> <p><i>The EPBC Act review is outside the scope of this consultation.</i></p>	<p><i>No additional EP Controls required.</i></p>

<p><i>acquisition and management of offsets is not provided in a way that is able to be shared or re-used by governments.”</i></p> <p><i>d. “The Review considers that claims that the data collected to inform environmental impact assessments is commercial-in-confidence and subject to copyright are unacceptable.”</i></p>			
<p><i>14. This is particularly the case for northern Australia – and particularly the offshore waters of the Timor and Arafura Seas. AMSA-NT notes that the SPRAT database and BIA maps are not only significantly outdated for Australia’s northern waters, but also, have only been developed for 14 marine species.</i></p>	<p><i>Santos assessed this claim as not valid as it is outside the scope of the consultation for this EP.</i></p>	<p><i>Matter such as the quality of the databases run by government departments and agencies are matters for those departments and agencies. This is beyond the scope of the Drilling and Completions EP consultation. Santos uses the best available data it has access to.</i></p>	<p><i>No additional EP controls required.</i></p>
<p><i>15. AMSA-NT notes that marine species data in the Drilling EP (and also SPRAT and the BIAs) could be significantly updated with the following:</i></p> <p><i>a. marine wildlife</i></p>	<p><i>Santos assessed this claim as not valid as the EP already considers the marine species listed and further data regarding marine wildlife which has already been considered would result in a change to</i></p>	<p><i>Santos has undertaken detailed field and desktop environmental studies which cover the spatial extent of the Operational Area and its surrounds, which provided detailed information with respect to marine wildlife in the Operational Area and its</i></p>	<p><i>No additional EP controls required.</i></p>

<p><i>data/records for adjacent international waters (ie. In the Arafura and Timor Seas). As such, knowledge of sea turtles, sharks/rays, dugongs and cetacean (whale and dolphin) species has vastly improved with biological surveys and monitoring in the waters of the Northern Territory – and also, Indonesia and Timor-Leste – particularly over the past 5-7 years (under NESP, CTI, ATSEA).</i></p> <p><i>b. incorporation of major peer-reviewed studies, particularly:</i></p> <ul style="list-style-type: none"> <li><i>o turtle migration/tagging studies – particularly from the major WAMSI research in the Kimberley (eg. Whittock et al 2016, Thums et al 2017, Whiting et al 2018) which highlight the importance of key foraging areas on the Sahul Shelf (terraces, deep holes and valleys) for flatbacks, olive ridley and loggerheads.</i></li> <li><i>o review of turtle tagging studies (Waayers et al 2015), which identifies foraging areas (ie. Loggerheads, Olive Ridley)</i></li> </ul>	<p><i>the consequence level or necessitate the implementation of additional controls.</i></p>	<p><i>surrounds. The Drilling and Completions EP (both revision 3 and the revised EP) has identified and has addressed all marine wildlife species the subject of the studies AMSA-NT has listed here.</i></p> <p><i>The BIAs within the Operational Area, MEVA and EMBA have all informed the impact and risk assessment undertaken for the Drilling and Completion EP. The controls proposed to be implemented in the EP have already been assessed on the basis that a worst-case hydrocarbon spill has a major consequence level with a remote likelihood. It is highly unlikely that further data regarding marine wildlife which has already been considered would result in a change to the consequence level or necessitate the implementation of additional controls.</i></p> <p><i>Santos has reviewed the articles cited in paragraph 15.b. New and updated searches of relevant government data and industry data sources have been undertaken for the revised EP.</i></p> <p><i>Some additional work was commissioned to improve our understanding of sea turtle</i></p>	
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<p><i>currently not included in BIAs in the EMBA.</i></p> <p><i>o recent Pygmy blue whale migration, critical habitat modelling studies (Moller et al 2020, Sahri et al 2022 Thums et al 2022)</i></p> <p><i>o recent research within the Oceanic Shoals Marine Park, showing the significant role of submerged carbonate reefs in aggregating marine megafauna (ie. 'megafauna hotspots')</i></p> <p><i>c. access to relevant professional oil/gas industry data for the region.</i></p>		<p><i>utilisation in the operational area and in the vicinity of the Tiwi Islands. Where relevant, this information has been incorporated into the EP. The references provided by AMSA-NT have been reviewed and provide no additional information to inform the risks of the activity, or require a change in our management controls. Appropriate control measures have been applied to reduce risks and impacts to as low as reasonably practicable and to acceptable levels.</i></p> <p><i>Santos acknowledges that there is additional published literature available, relevant data that has been collected but not yet published and ongoing studies that will provide information on significant marine species. At any point in time, that will be the case. However, the information utilised in the development of the Drilling and Completions EP is adequate to identify risks and impacts arising from drilling activities and for informing risk mitigation and controls. Santos has followed the recommendations of NOPSEMA for matters of national environmental significance</i></p>	
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		protected under Part 3 of the EPBC Act.	
<p>16. Marine species data in the Drilling EP relies heavily on outdated government or and/or industry data sources, and an alarming lack of independent and expert advice. As such, data in Table 3-7 and Table 3-8 in the EP is are outdated. For eg. Table 3-7 lists just 10 species of cetaceans (adjacent Indonesia and Timor-Leste waters record twice this number). For individual species, the BIAs are also outdated. For the Pygmy Blue Whale BIA (Figure 3-6) we know feeding occurs in the Timor Sea for Pygmy Blue Whales, in Timor-Leste's and Indonesia's waters (in the Maluku region). And significantly fails to include any BIAs for 'vulnerable' Sperm Whales, Humpback Whales (and other listed cetacean species), which</p>	<p>Santos assessed this claim as not valid as it incorrectly states the number of species listed in revision 3 of the EP, and nonetheless updated searches have been undertaken for the revised EP.</p>	<p>New and updated searches of relevant government data and industry data sources have been undertaken for the revised EP.</p> <p>AMSA-NT states that Table 3-7 of the Revision 3 of the EP lists only 10 species of cetaceans, when in fact it lists 12. Nonetheless, the equivalent of this table in the revised EP was updated and now lists 29 species of cetaceans.</p> <p>As to the comment regarding the BIAs for whales, Revision 3 of the EP already includes BIAs for whales in the Timor Sea and the Maluka region (See Figure 3-6). This remains true for the revised EP, as shown in the consultation materials (see Figure 4 of the Drilling and Completions Information Booklet provided to AMSA-NT on 13 April). These BIAs have been considered in the impact and risk assessment undertaken for the Drilling and Completion EP. This feedback</p>	<p>No additional EP controls required.</p>

<p>most definitely feed, breed or calve in the region.</p>		<p>does not provide any new information which would necessitate the implementation of additional controls in the revised EP.</p> <p>The database and mapping for BIAs is maintained by the Department of Climate Change, Energy, the Environment and Water (DCCEEW).</p>	
<p>17. The lack of updated information on cetaceans, sea turtles, sharks and rays and dugongs in the Drilling EP is concerning – particularly given the recent extensive national/international work undertaken in the region (eg. under NESP, Australian Marine Parks, ATSEA2).</p>	<p>Santos assessed this claim as not valid as updated searches have been undertaken for the revised EP.</p>	<p>Santos has accessed the most current information available, including through government databases. Where this information has been updated since Revision 3 of the EP was prepared, these updates have been considered in the revised EP.</p>	<p>No additional EP controls required</p>
<p><b>Further Clarification</b></p> <p>18. Further clarification is needed on the BIAs for Olive Ridley and Loggerheads in the Drilling EP– Figure 3.8 (Tiwi nesting included) vs Figure 6.1 (Tiwi nesting excluded).</p> <p>19. Further clarification, rationale and information is also needed on the differences between the</p>	<p>Santos has responded to some questions that are based on incorrect assumptions related to information publicly available.</p>	<p><b>Santos response [Con-1516]:</b></p> <p>The differences between Figure 3-8 of the main body of the Drilling and Completions EP and Figure 6-1 in Appendix C of the EP are due to Figure 3-8 being a map of biologically important areas and critical habitat, whereas Figure 6-1 is a map of biologically important areas only (as per the descriptions for these figures). The nesting critical</p>	<p>No additional EP controls required</p>

<p><i>figures in the Barossa OPP (by Conoco Phillips) and Drilling EP (by Santos). Particularly regarding spill modelling, and impact assessment:</i></p> <p><i>a. The ‘area of influence’ (AOI) in OPP is based on the spill modelling – and importantly, includes the Tiwi Islands shoreline (based on scenario 6, see Fig 6-28).</i></p> <p><i>b. However, this AOI boundary has been amended when defining the area of ‘environment may be affected’ (EMBA) in the Drilling EP.</i></p> <p><i>c. BIA maps in their Drilling EP have been amended to exclude the Tiwi Islands – compared with original maps in Appendix C (included in the EP report). Table of Contents does not refer to original maps, only ‘Appendix C’.</i></p> <p><i>d. The new amended boundaries in the EP exclude biologically important areas. This is particularly evident in comparing the flatback</i></p>		<p><i>habitat is therefore not shown on Figure 6-1.</i></p> <p><i>The claim that the area of influence boundary, as defined in the Barossa Gas Project Offshore Project Proposal (OPP), has been amended when defining the environment that may be affected (EMBA) in the Drilling and Completion EP, is not correct.</i></p> <p><i>The area of influence in the OPP and the Drilling and Completions EP EMBA are two independently defined areas. The area of influence in the OPP is the largest extent of the adverse exposure zone based on the three maximum credible spill scenarios described on page 158 of the OPP.</i></p> <p><i>The Drilling and Completions EP EMBA was informed by stochastic modelling for the worst-case spill scenario for the drilling and completions activity only (see section 3.1.1 of Revision 3 of the Drilling and Completions EP).</i></p> <p><i>AMSA-NT’s comment that the biologically important area maps in the Drilling and Completions EP have been “amended” to exclude the Tiwi Islands</i></p>	
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<p>turtle and NT-WA fisheries maps.</p> <p><b>Additional Comments</b></p> <p>20. AMSA-NT provides additional feedback and comments on the Drilling EP, in <b>Attachment 1</b>.</p> <p>21. [Note: Details of an individual’s name and workplace were supplied but have been redacted by Santos for privacy reasons] provides additional feedback and comments on the Drilling EP in <b>Attachment 2</b>.</p>		<p>compared with the “original maps” in Appendix C, is also incorrect.</p> <p>Appendix C, as it appears in the Drilling and Completions EP, defines an EMBA for various petroleum activities associated with the Barossa development (see the introduction of Appendix C). The drilling and completions EMBA, as described above, is the EMBA for the drilling and completions activity only. To improve clarity, Santos plans to revise Appendix C for the revised EP to only show the EMBA for the drilling and completions activity.</p>	
<p><b>Attachment 1</b></p> <p><b>AMSA-NT Response to Santos – 9 July 2021 (summarised in Drilling EP, Version 3.0) BAD-200-0003 (Pages 104-106</b></p> <p><b>Relevant persons consultation summary (OPGGSJ Regulation 16 (b)(i)) [CLAIM 001]:</b></p> <p>Santos should lead a best practice approach to address potentially complex impacts and implement the sustainability principles</p>	<p>Santos assessed this claim as not valid because criticisms of the regulatory framework are outside the scope of consultation and the revised EP considers cumulative impacts.</p>	<p><b>Santos response [Con-2332]:</b></p> <p>Santos is required to operate in accordance with current Australian laws. Criticisms of the current regulatory framework are outside the scope of this consultation.</p> <p>Notwithstanding this, the revised EP considers the potential cumulative impacts of the Drilling and Completions activity together with the activities under the Barossa Gas Export Pipeline Installation EP.</p> <p>The Barossa OPP was accepted</p>	<p>No additional EP controls required</p>



<p><i>incorporated into the EPBC Act (as per the Convention for Biological Diversity) and consider complexities of cumulative pressures, multiple stressors and various spatial and temporal scales in the EP.)</i></p> <p><i>Assessment of the merits of objections and claims (OPGGSI Regulation 16 (b)(ii)), information and requests. [CLAIM 001]:</i></p> <p><i>Santos considered AMSA-NT's claim relating to strategic and cumulative impact assessment. The EP will be prepared in accordance with requirements of the OPGGSI Regulations.</i></p> <p><i>Statement of response, or proposed response, to the objections and claims (OPGGSI Regulation 16 (b)(iii)), and information and requests</i></p> <ul style="list-style-type: none"> <li><i>• Santos responded to AMSA-NT on 15 July 2021.</i></li> <li><i>• Santos advised it will comply with Australian legislated requirements for environmental assessment.</i></li> </ul>		<p><i>by NOPSEMA in March 2018, and comments on the Cumulative Impact Assessment in the OPP are outside the scope of this consultation. As to paragraph 8 of your feedback, in particular your concern that the OPP includes no assessment of major proposed CCS offshore development activities in the Timor Sea, it is not possible for the Barossa OPP to have considered CCS developments which were not contemplated at the time the OPP was submitted for acceptance.</i></p>	
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<p>• Santos included information relating to strategic and cumulative assessment in the Barossa Area Development Offshore Project Proposal (OPP), Section 6.5 (Cumulative Impacts) commencing on page 435.</p> <p><b>AMSA-NT Response</b></p> <p>1. Review of the EPBC Act (Samuel's Report 2020) has highlighted the current operation of the EPBC Act does not effectively address cumulative impacts (see Section 8.1.1).</p> <p>2. In particular, the oil-gas industry and its regulator, NOPSEMA, focus on developing and assessing 'activity-based' Eps for all exploration and development activities (together with the Commonwealth's policy shift for a Strategic Environmental Impact Assessment approach for large-scale projects and development areas) is grossly inadequate for assessing and addressing the potential cumulative</p>			
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<p><i>impacts and interactions of a range of individual activities. With impacts potentially operating at multiple spatial scales (local, national, and international) and in combination with other concurrent stressors, much greater consideration and oversight of cumulative impacts is necessary.</i></p> <p><i>3. Specifically, analysis of the offshore oil and gas regulatory reform agenda (Marsden 2016) has highlighted the major challenges associated with the current (post-2013) application of SEIA, particularly in Commonwealth, Northern Territory and South Australian waters:</i></p> <p><i>4. "The objective of SEA as applied to Australia's recent and current oil and gas frameworks is regulatory reform rather than ESD. Indeed, it may not be too far-fetched an assertion to make that SEA in Australia is, in reducing the regulatory burden rather than focusing on ESD,</i></p>			
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<p><i>increasingly also becoming a fast-track process alongside certain project level assessments, whether they are of major significance or not.” (Marsden 2016)</i></p> <p><i>5. In contrast, the SEIA in Western Australia of the offshore Browse Basin gas development (2008-2013) is consistent with overseas experience in contributing towards (ecologically) sustainable development (Marsden 2016).</i></p> <p><i>6. Barossa OPP – Cumulative Impact Assessment (CIA) (Table 6-49) is inadequate and does not follow accepted ‘best practice’ guidelines for CIA (see NSW DPIE 2022, GBRMPA 2018) is dated (2017). And importantly does not consider non-LNG marine uses.</i></p> <p><i>7. Only 2 activities/developments are considered in the CIA assessment, both LNG activities: a. INPEX Masela Abadi FLNG project (in Indonesian EEZ, Arafura</i></p>			
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<p>Sea); b. Melbana Energy Tassie Shoal Methanol project (1 LNG, 2 methanol production facilities)</p> <p>8. Significantly, the current CIA includes no assessment of major proposed CCS offshore development activities in the Timor Sea.</p> <p>9. All commercial fishing and shipping activities are currently excluded from the Cumulative Impact Assessment – on the basis they are assessed elsewhere in the OPP (Section 6-4).</p>			
<p><b>[CLAIM 002]</b> The Proposed Consultation and 4-page Information Brochure does not provide sufficient information to provide appropriate technical input and make an ‘informed assessment’. Santos should expand or supplement the 4-page Information Brochure with information upon which AMSA-NT can provide expert comment, including external context, thresholds of acceptable impact and risk, risk mitigation strategies, and</p>	<p>Santos assessed this claim not valid as it has assessed a worst case spill event with consideration for biological impacts within the MEVA and socio-economic impacts within the EMBA.</p>	<p>Revision 3 of the Drilling and Completions EP has been publicly available on NOPSEMA’s website since 15 March 2022. This was communicated in the Barossa Development Quarterly Update – March 2022 which has been available on Santos’ website since late March 2022. The quarterly update included a link to the Environment Plans page on NOSPEMA’s website.</p> <p>As to paragraph 11 of this claim, Santos has assessed the full potential spatial extent of a worst case spill event with</p>	<p>No additional EP controls required.</p>

<p>implementation of control measures.</p> <p><b>[CLAIM 003]</b> The following information should be made public:</p> <ul style="list-style-type: none"> <li>– the draft Drilling EP or, if the draft is not yet prepared, then information, including any reports, analyses, assessments, modelling and/or other documents, in relation to the potential environmental impacts and risks of activities, including in relation to a worst case oil spill, greenhouse gas (GHG) emissions and cumulative impacts.</li> <li>– information, including any reports, assessments and/or other documents that assess the potential international and transboundary environmental and social-ecological impacts and risks of activities, including in relation to a worst case oil spill.</li> <li>– information, including any reports, analyses, assessments and/or other documents, that</li> </ul>		<p>consideration for biological impacts within the MEVA and socio-economic impacts within the EMBA. With the exception of hydrocarbon spills (the likelihood of which is remote), environmental risks and impacts from the Drilling and Completions EP are localised and remain within Australia's Exclusive Economic Zone. The risk assessment and controls for hydrocarbon spills are described in Sections 7.5 to 7.8 of the EP and within the accompanying Barossa Development Drilling and Completions Oil Pollution Emergency Plan (OPEP). In the unlikely event that a hydrocarbon spill enters international or neighbouring country waters, Santos will seek direction and guidance from the Commonwealth Department of Foreign Affairs and Trade (DFAT) on the appropriate action.</p> <p>As to AMSA-NT's claims regarding Santos' failure to provide information, Santos is required to provide relevant persons with sufficient information to assess the impacts of the Drilling and Completions EP on their functions, interests and</p>	
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<p><i>demonstrates that the environmental impacts and risks of the activities will be reduced to as low as reasonably practicable and be of an acceptable level.</i></p> <p><i>Assessment of the merits of objections and claims (OPGGS(E) Regulation 16 (b)(ii)), information and requests</i></p> <p><b>[CLAIM 002] [CLAIM 003]</b>  <i>Santos considered AMSA-NT's claim and provided supplementary information to that contained in the initial consultation package.</i></p> <p><i>Statement of response, or proposed response, to the objections and claims (OPGGS(E) Regulation 16 (b)(iii)), and information and requests</i></p> <p><i>Santos provided AMSA-NT with supplementary information relevant to the Drilling and Completions EP and, wherever practicable, information already publicly available specifically in the NOPSEMA-accepted Barossa OPP. This included information on GHG</i></p>		<p><i>activities. Santos considers that it has provided AMSA-NT with sufficient information.</i></p>	
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<p><i>emissions as relevant to the proposed drilling and completions activities.</i></p> <p><i>In relation to information requests on project GHG emissions, Santos will present in the Barossa Production Operations Environment Plan a greenhouse gas (Scopes 1 to 3) life cycle analysis associated with production operations. Relevant persons, including AMSA-NT, will be consulted during the development of this EP. Should AMSA-NT request information on GHG emissions associated with production operations during this consultation then Santos will provide sufficient information to allow AMSA-NT to make an informed assessment of the possible consequences of the activity on its functions, interests or activities.</i></p> <p><i>Since Santos' response to AMSA-NT, the Barossa Drilling and Completions EP containing all relevant environmental impact and risk information has been made available for public</i></p>			
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<p><i>review (October 2021). AMSA-NT has access to this information and was advised that the EP would be made publicly available. Santos also advised AMSA-NT that consultation for this activity would be ongoing until activity completion. Santos considers that AMSA-NT has all relevant information and has been afforded sufficient time to raise any further objections or claims.</i></p> <p><b>AMSA-NT Response</b></p> <p><i>10. Santos did not contact AMSA-NT to specifically advise that the Drilling EP was available online.</i></p> <p><i>11. Santos has failed to undertake or provide any information, including any reports, assessments and/or other documents that assess the potential international and 'transboundary' environmental and social-ecological impacts and risks of activities, including in relation to a worst-case oil spill.</i></p> <p><i>12. Santos has failed to</i></p>			
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<p><i>provide the following specific information (as requested on 9 July 2021):</i></p> <p><i>a. Predictive and stochastic modelling studies on the potential area and nature of impact of any marine pollutants on the coastal and marine habitats and ecosystems of the 'semi-enclosed' Arafura-Timor Seas (ATS)</i></p> <p><i>b. Modelling studies on the potential socio-economic impacts of any marine pollutants on the livelihoods of coastal communities in the ATS, particularly small-scale fisheries, aquaculture and 'subsistence' coastal communities</i></p> <p><i>c. Environmental risks and impacts on current and proposed MPAs, under the regional Arafura Timor Seas Marine Protected Areas System</i></p> <p><i>d. Environmental risks and impacts and potential conflicts with existing marine protected species legislation, regulations and the objectives, activities</i></p>			
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<p><i>and implementation of relevant management plans in the ATS</i></p> <p><i>e. Environmental risks and impacts and potential conflicts with the objectives, activities and implementation of the proposed Arafura Timor Seas Regional Plan of Action for Sea Turtles</i></p> <p><i>f. Potential risks and environmental and socio-economic impacts to known shared, straddling commercial fish stocks in the ATS.</i></p>			
<p><b>AMSA-NT correspondence of 17 July 2023 [Con-2330]</b></p> <p>AMSA-NT re-iterates its major concerns with the current Barossa Drilling EP (approved by NOPSEMA on 14 March 2023), outlined in our letter of 15th June (paragraph 10) and detailed in our submission of 23 June 2023 (including Annex 1), including the following gaps/issues:</p> <p>a) lack of assessment of cumulative impacts, particularly through integrated, seascape or</p>	<p>While Santos is appreciative of AMSA-NT's contributions to the consultation for this EP, AMSA-NT has not provided any new data or information that changes Santos' assessment about the appropriateness of adopted/rejected control measures for the Drilling and Completions EP operational area.</p>	<p><b>Santos' response correspondence of 24 July 2023 [Con-2332]</b></p> <p>Santos is required to operate in accordance with current Australian laws. Criticisms of the current regulatory framework are outside the scope of this consultation.</p> <p>Notwithstanding this, the revised EP considers the potential cumulative impacts of the Drilling and Completions activity together with the activities under the Barossa Gas Export</p>	<p>No additional EP controls required</p>

<p><i>ecosystem models and predictive activity-impact modelling</i></p> <p><i>b) need to address major data gaps in baseline information through baseline surveys, particularly for threatened, migratory species and Matters of National Environmental Significance (MNES) in this globally-significant region</i></p> <p><i>c) recognition of monitoring, impact and risk assessments in a 'data-poor' setting, particularly the need for application of the precautionary principle and multiple-lines of evidence</i></p> <p><i>d) recognition of the pronounced 'ecological connectivity', 'shared species' and 'shared resources' of region - and failure to assess potential 'transboundary' species, resources and impacts (via a 'transboundary EIA'), particularly impacts on the adjacent marine uses, ecological and economic values, especially within the activity's identified EMBA</i></p>		<p><i>Pipeline Installation EP.</i></p> <p><i>The Barossa OPP was accepted by NOPSEMA in March 2018, and comments on the Cumulative Impact Assessment in the OPP are outside the scope of this consultation. In particular your concern that the OPP includes no assessment of major proposed CCS offshore development activities in the Timor Sea, it is not possible for the Barossa OPP to have considered CCS developments which were not contemplated at the time the OPP was submitted for acceptance.</i></p> <p><i>Revision 3 of the Drilling and Completions EP has been publicly available on NOPSEMA's website since 15 March 2022. This was communicated in the Barossa Development Quarterly Update – March 2022 which has been available on Santos' website since late March 2022. The quarterly update included a link to the Environment Plans page on NOSPEMA's website.</i></p> <p><i>Santos has assessed the full potential spatial extent of a worst case spill event with consideration for biological impacts within the MEVA and</i></p>	
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<p>(environment that may be affected) and MEVA (moderate exposure value)</p> <p>e) failure to appropriately consult with relevant and key stakeholders in Indonesia and Timor-Leste (including industry, non-industry, government and non-government, and regional forums) – given the location of the activity and the legal status of the Timor Sea as a ‘semi-enclosed sea’ and significantly, the relevant forums with interests/responsibility for regional management</p> <p>f) need to assess potential seabed-water column impacts</p> <p>g) need to address the significant methodological challenges with impact detection and monitoring of marine megafauna populations, including measurement criteria, ‘multiple lines of evidence’ and direct megafauna and environmental observations</p> <p>h) lack of current and best available, accessible</p>		<p>socio-economic impacts within the EMBA. With the exception of hydrocarbon spills (the likelihood of which is remote), environmental risks and impacts from the Drilling and Completions EP are localised and remain within Australia’s Exclusive Economic Zone. The risk assessment and controls for hydrocarbon spills are described in Sections 7.5 to 7.8 of the EP and within the accompanying Barossa Development Drilling and Completions Oil Pollution Emergency Plan (OPEP).</p> <p>In the unlikely event that a hydrocarbon spill enters international or neighbouring country waters, Santos will seek direction and guidance from the Commonwealth Department of Foreign Affairs and Trade (DFAT) on the appropriate action.</p> <p>As to AMSA-NT’s claims regarding Santos’ failure to provide information, Santos is required to provide relevant persons with sufficient information to assess the impacts of the Drilling and Completions EP on their functions, interests and activities. Santos considers that it has provided AMSA-NT with</p>	
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<p><i>data/information, particularly for threatened and migratory species and MNES</i></p> <p><i>i) heavy reliance on industry consultants and non-peer reviewed studies</i></p> <p><i>j) lack of expert, independent peer review and peer-reviewed published scientific data.</i></p>		<p><i>sufficient information.</i></p>	
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<p>AMSA-NT would like to raise the critical issue of the lack of control measures for marine fauna interactions (Table 7.4) proposed for this major drilling and shipping activity – which currently include just one standard control measure (BAD-CM-001) ie. legislated requirements for interacting with marine fauna.</p> <p>AMSA-NT is very concerned at Santos’s rejection of the following 5 voluntary (non-legislated) control measures for marine fauna interactions (Table 7.4):</p> <p>a) Adopt further measures to those outlined in ‘EPBC Regulations 2000 – Part 8 Division 8.1 during peak periods of ecological sensitivity, for example, additional management considerations for vessels outlined in the Australian national guidelines for whale and dolphin watching (2017)</p> <p>b) Manage the timing of the activity to avoid sensitive periods</p> <p>c) Restrict vessel</p>	<p>While Santos is appreciative of AMSA-NT’s contributions to the consultation for this EP, AMSA-NT has not provided any new data or information that changes Santos’ assessment about the appropriateness of adopted/rejected control measures for the Drilling and Completions EP operational area.</p>	<p>Santos has assessed the residual risk from marine fauna interactions in the drilling and completions Operational Area as very low. In forming this view, Santos has considered the data it obtained from both the Barossa project marine field studies program and other relevant public data, as it relates to presence of marine fauna in the drilling and completions Operational Area.</p> <p>The drilling and completions Operational Area does not contain any significant feeding, breeding or aggregation areas and is relatively distant from shoals/banks, reefs and islands. Therefore, it is expected that there will be a relatively limited abundance of individual marine fauna present in the Operational Area at any time, particularly EPBC Act listed species (please note Omura’s whales are not EPBC Act listed species).</p>	<p>No additional EP controls required</p>
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<p><i>operating speeds in the operational area</i></p> <p><i>d) Dedicated MMO on vessels (EPBC Policy Statement 2.1 Part B)</i></p> <p><i>e) Activities will only occur during daylight hours</i></p> <p><i>AMSA-NT highlights the major findings of the 12-month (July 2014-July 2015) marine mammal passive acoustic baseline studies by JASCO2 for the Barossa OPP (Conoco-Philips), particularly:</i></p> <p><i>a) "Marine mammals were detected acoustically in the Barossa area during the entire deployment period. Pygmy blue, Omura's and Bryde's whales were detected, with detections commonly occurring during the months of May - August, while no detections occurred between 1 November and 23 December."</i></p> <p><i>b) "The area appeared to be used consistently by Omura's and Bryde's whales from mid-autumn through mid-spring, and odontocetes throughout the</i></p>			
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<p><i>year. The area is along the edge of the broader migration pathway for pygmy blue whales in winter, as they move through it as part of their broader northward migration.”</i></p> <p><i>c) “The pygmy blue whale detections are over 400km farther east than the currently estimated north- bound migration corridor of pygmy blue whales, and their detection is a significant regional scientific contribution.”</i></p> <p><i>d) “Omura’s whales were detected consistently from April to September inclusive, with a peak in June and July. Based on the year of recordings, the whales seemed to enter the region in a south-west to north-east direction, then maintain a higher presence within the Barossa field area (than compared to the Evans Shoal or Caldita field areas) for the autumn and winter months. They appeared to leave the region in a north-east to south-west direction,</i></p>			
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<p><i>reversing their entry path, leaving the area by the start of November.”</i></p> <p><i>e) “Pygmy blue whales were detected during their northward migration once in August 2014, over a few consecutive days in late May-early June 2015, on the 16 and 30 June, and 1 July 2015. The detections are over 400 km further east than the north-bound migration corridor of pygmy blue whales described in Double et al. (2014). No detections were logged from the south-bound migration, suggesting a different migration path. The highest calling rates of the three monitoring stations occurred at the Barossa field, which may reflect its greater depth and proximity to the trench. The whales, assumed to be calling from a depth of 30m, were anywhere from approximately 5-80 km from Station J2 (Barossa field) with a median distance of over 23km (call source level of 179 dB re 1</i></p>			
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<p><i>pPa) or over 31km from Station J2 (call source level of 183 dB re 1 pPa)."</i></p> <p><i>f) "Bryde's whales, distinguished from the Omura's whales through variations in the spatial and temporal occurrence of vocalisations, were present in the region from January to October. They appear to move into the area in a south to north direction during summer and autumn, then utilise the region with a preference for the shallower sections (Evans shoal and Caldita field areas) over the Barossa field region. They then leave the area in a north - south direction, with the last detections in early October."</i></p> <p><i>g) "Odontocetes were extremely common. Many species were detected on a daily basis, with a primarily nocturnal diel cycle." Detections of odontocetes were abundant, equally distributed across the deployment period at Stations J2 and J3 and primarily occurred at</i></p>			
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<p>night.” h) “Unknown beaked whale species were detected on four days over the entire program at Stations J2 (Barossa field) and J3 (Caldita field).”</p>			
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<p><i>Importantly, AMSA-NT highlights the possible and potential serious contravention or non-alignment with the Blue Whale Conservation Management Plan (CMP), as interpreted under the 'Guidance on key terms within the Blue Whale Conservation Management Plan' (DAWE 2021) and NOPSEMA- DAWE FAQ (issued 12 November 2021). Including:</i></p> <p><i>a) AMSA-NT notes that both vessel strike and underwater noise are identified in the Blue Whale CMP as key threats to the recovery of blue whales in Australia. Vessel strike accounts for the highest level of direct mortality to the species and is largely underreported for blue whales.</i></p> <p><i>b) AMSA-NT notes the increasing evidence of Pygmy Blue Whale aggregation and foraging activity in the Timor Seas, ie. see 'aggregation area' identified in the Timor Trough region (Sahri et al.)</i></p>	<p><i>While Santos is appreciative of AMSA-NT's contributions to the consultation for this EP, AMSA-NT has not provided any new data or information that changes Santos' assessment about the appropriateness of adopted/rejected control measures for the Drilling and Completions EP operational area.</i></p>	<p><i>Santos rejects any allegation of contravention or non-alignment with the Blue Whale Conservation Management Plan. Santos has considered the Conservation Management Plan for the Blue Whale in its assessment of marine fauna interactions (see section 7.3.6), and while a relevant consideration for the EMBA, the Pygmy Blue Whale Migration and Foraging BIAs do not intersect the Operational Area, and are therefore not relevant to planned activities inside the Operational Area. Santos has used the most up to date information on BIAs from the Department of Climate Change, Energy, the Environment and Water (DCCEEW) for the revised EP. DCCEEW maintains the database and mapping of BIAs.</i></p> <p><i>As to AMSA-NT's comments regarding the GEM 3D Marine Seismic Survey EP, the location of that activity intersected the Pygmy Blue Whale migration BIA. The Drilling and Completions EP Operational Area does not intersect Pygmy Blue Whale BIAs, which may explain the difference in marine fauna control measures for each</i></p>	<p><i>No additional EP controls required</i></p>
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<p><i>and also, recent major sightings of Pygmy Blue Whales (and other baleen whales) outside the current Pygmy Blue Whale BIA, including in close proximity (~40km) to the Barossa operational area (see Annex 1)</i></p> <p><i>c) AMSA-NT notes the major uncertainty regarding habitat usage by Pygmy Blue Whale in the Barossa field area, including JASCO's identification of the need for further data analysis: "Further analysis of data from all stations would provide more detailed information about this usage, and could also be used to confirm the published call source levels, along with determine the source levels of the other types of calls. However, the data analysis completed to inform this report is considered adequate to inform a baseline understanding of the species broad use of the area." (JASCO 2016)</i></p> <p><i>d) AMSA-NT notes the</i></p>		<p><i>activity.</i></p> <p><i>As to AMSA-NT's comments regarding the noise impacts of anchor piling on marine fauna, no anchor piling will occur as part of the drilling and completions activity, so this feedback is not relevant to this EP.</i></p> <p><i>While Santos is appreciative of AMSA-NT's contributions to the consultation for this EP, AMSA-NT has not provided any new data or information that changes Santos' assessment about the appropriateness of adopted/rejected control measures for the Drilling and Completions EP operational area.</i></p>	
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<p><i>need to re-assess the OPP acoustic studies (JASCO 2016), given the improved understanding of the Bryde's, Omura's and Pygmy Blue Whales taxonomy and also, calls, to assess habitat usage of the Barossa field area, and also, validate and confirm species identification of calls.</i></p> <p><i>e) AMSA-NT re-iterates the critical need to update current BIAs within the EMBA and the region, especially for Pygmy Blue Whales (eg. Sahri et al 2022) and Sperm Whales (eg. Sahri et al. 2020)4. Pygmy Blue Whales and Sperm Whales are both widely recognized as occurring and feeding within the EMBA, and since 2016, have been key focal species for a major commercial whale tourism industry operating within the waters of Timor-Leste.</i></p> <p><i>f) AMSA-NT notes that the Sapura Gem EP in the Timor Sea, for 3D seismic, adopted temporal control measures and adaptive</i></p>			
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<p><i>mitigation to deal with uncertainty in blue whale presence.</i></p> <p><i>AMSA-NT re-iterates the data-poor nature of the Timor Seas region, the need for additional baseline marine faunal surveys, and importantly, the need to develop BIAs for other known threatened marine species occurring within the EMBA and the region, including Brydes Whale, Omura Whales, Fin Whales and Sei Whales.</i></p> <p><i>Specifically, AMSA-NT urges Santos to accept the five proposed control measures for marine faunal interactions (Table 7.4) based on the following:</i></p> <p><i>a) A range of threatened marine fauna have been detected acoustically in the Barossa area – including Pygmy Blue Whales, Omura’s and Bryde’s whale, with the latter 2 species using the area “consistently” and “regularly” from mid-autumn to mid-spring” (JASCO 2016).</i></p> <p><i>b) Major uncertainty</i></p>			
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<p><i>exists surrounding the extent of habitat usage of the Barossa field area by Pygmy Blue Whales, Omura's and Bryde's whales – particularly the potential for aggregation and feeding areas.</i></p> <p><i>c) The need to address potential shipping impacts and 'vessel avoidance' and the potential 'displacement of animals in foraging areas', as a potential significant environmental impact.</i></p> <p><i>d) The need to adopt appropriate control measures, including restricting activities during daylight hours; reducing vessel speeds during the operational area; and adopting MMO (marine mammal observers) on all vessels to enable sighting and detection of Pygmy Blue Whales and other whales to reduce potential impacts (disturbance, displacement, ship-strike).</i></p> <p><i>e) Consistent with the National Vessel Strike Strategy<sup>5</sup>, AMSA-NT strongly recommends a</i></p>			
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<p><i>speed limit of &lt; 12 knots within the operational area.</i></p> <p><i>f) The need to adopt the 'precautionary principle', particularly given the level of uncertainty surrounding habitat usage by threatened marine fauna, and also, lack of consultation with recognized marine faunal experts in the region (including relevant information) to inform 'best practice' appropriate risk assessments and control measures.</i></p> <p><i>AMSA-NT acknowledges the findings of the comprehensive noise modelling conducted by JASCO on the potential impacts of UW noise from anchor piling on marine fauna.</i></p> <p><i>a) "Considering Scenarios 1-8, the maximum distances to the NMFS 8PL threshold for possible behavioural effects on marine mammals (SPL 160 dB re 1 pPa) (NMFS 2013) at Sites 1 and 2 are 23.83 and 28.30 km respectively (Scenarios 4</i></p>			
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<p><i>and 8; Table 8). Marine mammals could experience PTS near the piling operations based on the 24 h SEL criteria from Wood et al. (2012). Considering Scenarios 1-8 and Sites 1 and 2 respectively, the maximum distance an animal could be experience PTS is 6.07 or 4.92 km for low-frequency cetaceans, 0.79 or 0.54 km for mid-frequency cetaceans, and 16.59 or 18.75 km for high-frequency cetaceans (Table 7). The 24 h SEL is a cumulative metric that reflects the dosimetric impact of noise levels within 24 hours based on the assumption that an animal is consistently exposed to such noise levels at a fixed position. The corresponding radii are significantly larger than those for peak pressure criteria, but they represent an unlikely 'worst case scenario' since, more realistically, marine mammals would not stay in the same location or at the same range for 24 hours. Therefore, a reported</i></p>			
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<p><i>radius of 24 h SEL criteria does not mean that any animal travelling within this radius of the source will be injured, but rather that it could be injured if it remained in that range for 24 hours.”</i></p> <p><i>b) AMSA-NT notes that this current noise impact modelling is based on “species broad use of the area” and as such, excludes information on the habitat usage of key marine threatened species in the Barossa field area. As per Paragraph 12 b) above, AMSA-NT recommends, as a matter of priority, further data analysis of existing acoustic data (JASCO 2016) to identify habitat usage of Bryde’s, Omura’s and Pygmy Blue Whales within the Barossa field area, to better assess and evaluate noise impacts.</i></p>			
<p><b>WorldFish Timor-Leste (WorldFish)</b></p>			
<p><b>Summary of consultation effort:</b></p>			
<ul style="list-style-type: none"> <li>+ On 21 April 2023 WorldFish lodged a self-nomination and feedback form (as a potential Relevant Person) via the portal on the Santos website. [Con-1073]</li> <li>+ On 24 April 2023 Santos emailed WorldFish in response to the form completed on 21 April 2023. Santos advised that it would be in contact again and in the meantime should WorldFish have any questions or require further information it should contact Santos by phone or email (details provided). [Con-1142]</li> </ul>			

- + On 15 May 2023 Santos emailed WorldFish, to provide information about the consultation for the Barossa Drilling and Completions EP and attached the Barossa Drilling and Completions Information Booklet. Santos invited consultation preferences by 29 May 2023 and indicated that it was seeking feedback for this EP by 15 June 2023. [Con-1192] Santos stated the purpose of the email is to:
  - o seek information to better understand any functions, interests or activities that may be affected by the proposed activities under the EP and how they may be affected;
  - o explain the purpose of consultation and Santos' regulatory obligations to consult with Relevant Persons;
  - o set out Santos' proposed approach to consulting with Relevant Persons;
  - o seek feedback on how Santos can provide further information that is appropriate and accessible to assess the possible consequences of Santos' proposed drilling and completions activities (if a Relevant Person); and/or
  - o invite Relevant Persons' feedback regarding the EP.
- + On 18 May 2023 Santos emailed WorldFish providing NOPSEMA's brochure: *Consultation on offshore petroleum environment plans – Information for the community*. Santos also reminded WorldFish of how and by when feedback was sought and to contact Santos to make any alternate arrangements by 29 May 2023. [Con-1452]
- + On 29 May 2023 Santos emailed WorldFish a Drilling and Completions Fact Sheet. Santos also reminded WorldFish the availability of further information on the Santos website and of the timeframes for provision of consultation preferences and for feedback for this EP. [Con-1230]
- + On 15 June 2023 WorldFish emailed Santos, with requests including for the provision of translated information and materials, a face-to-face meeting in Dili and an extension of the timeframe for feedback until its consultation requests were met. [Con-1394]
- + On 20 June Santos emailed WorldFish and provided a response to its feedback received on 15 June 2023, including an extension to the timeframe for feedback to 23 June 2023 and an offer to meet by telephone or videoconference during that week. [Con-1437]
- + On 23 June 2023 WorldFish emailed Santos and stated it was unable to further respond within the time provided. [Con-1427]
- + No further correspondence or feedback was received.

<b>Summary of Objection or Claim</b>	<b>Assessment of Merits</b>	<b>Santos' Response Statement</b>	<b>Summary of Objection or Claim</b>
<b>WorldFish correspondence [Con-1394]:</b>  <i>Under the current regulatory process, we will not have the opportunity to view and comment on the</i>	<i>Santos assessed this claim as not valid due to the public availability of the Rev 3 version of the Drilling and Completions EP and provision of information direct to</i>	<b>Santos response [Con-1437]:</b>  <i>The prior version of the EP (Revision 3), previously accepted by the regulator, the National Offshore Petroleum Safety and Environmental Management</i>	<i>No additional EP controls required.</i>

<p><i>Drilling EP (prior to its submission to NOPSEMA).</i></p>	<p><i>WorldFish.</i></p>	<p><i>Authority (<b>NOPSEMA</b>), is available online at NOPSEMA's website (<a href="https://docs.nopsema.gov.au/A831694">https://docs.nopsema.gov.au/A831694</a>). It was accepted by NOPSEMA in March 2022, before NOPSEMA's acceptance was set aside by a Federal Court decision in late 2022 (as noted in our email of 15 May). That document has been publicly available since 15 March 2022.</i></p>	
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<p>We note that all the consultation materials provided were in English.</p> <p>Given the significant 'challenges' associated with undertaking public and stakeholder consultation in Timor-Leste (i.e. non-English languages, human development status, literacy levels, limited internet connectivity), we also respectfully request additional communication materials to enable effective and appropriate consultation on the Barossa Offshore Gas Project and Drilling EP. Including:</p> <p>a) translation of project and activity-related consultation materials in the accepted and relevant major languages of the country i.e. Tetun, Portuguese and Bahasa Indonesia)</p> <p>b) a short video (in Tetun and Bahasa Indonesia) of the Barossa Offshore Gas Project</p> <p>c) a 'face-to-face' meeting in Dili, to present, explain and discuss the Barossa Offshore Gas Project, as</p>	<p>Santos has accommodated request for an extension of time to provide comment.</p>	<p>Whilst the materials supplied were in English, Santos notes that information is available on our website and that the website content may be translated into Bahasa Indonesia or Portuguese using Google translate.</p> <p>We further note that such an extensive request for additional translated material has only been made on the date by which feedback was sought (15 June), rather than earlier. There was ample opportunity to raise any such issue or request well in advance of 15 June. Also, we assume that you are otherwise able to translate, or arrange translation of, any information we provide to the members whose interests you represent.</p>	<p>No additional EP controls required.</p>
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<p><i>well as the Drilling and Completions project activity – with translators.</i></p>			
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<p><i>Santos have advised that the deadline for all comments on the Drilling EP is 15 June 2023.</i></p> <p><i>Given the importance of effective and appropriate consultation, we formally request and would be grateful for an extension of the deadline for comment on the Drilling EP, pending the completion of all the relevant stakeholder consultation activities (outlined in paragraph 4).</i></p>		<p><i>Having regard to WorldFish Timor-Leste’s request for additional time to respond and provide feedback, Santos can accommodate an extension of the feedback period until Friday, 23 June 2023.</i></p> <p><i>We also note WorldFish Timor-Leste’s request to meet. We are available this week for a meeting by telephone or videoconference. Please let us know WorldFish Timor-Leste’s availability and we can confirm suitable arrangements.</i></p>	<p><i>No additional EP controls required.</i></p>
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**Commercial Fishing**

**Commonwealth-managed fisheries**

**Northern Prawn Fishery Licence Holders (additional to consultation via representative body Northern Prawn Fishery Ltd)**

**Summary of consultation effort:**

- + On 13 April 2023, in addition to emailing Northern Prawn Fishery Ltd, the licence-holders’ representative body, Santos also emailed Northern Prawn Fishery Licence Holders (for whom email addresses were provided) to explain the consultation approach for the Barossa Drilling and Completions Environment Plan (EP), asking if they would like to be consulted, how it would like to be consulted and what information it required. A Barossa Drilling and Completions Information Booklet was also provided and a link to NOPSEMA’s Guideline: *Consultation in the course of preparing an Environment Plan*. Santos also advised that consultation with Relevant Persons for preparation of the EP was planned to conclude by mid-2023. [Con-1041]
- + On 14 April 2023 Austral Fisheries emailed Santos in response to Santos’ email on 13 April 2023. Austral Fisheries advised it operates five full time trap vessels within the Timor Reef Fishery zone. Austral Fisheries formally registers an interest in the process of the consultation phase. Austral Fisheries’ dealings with Santos have been collegiate with the acknowledgement of both parties’ right of use of the marine space and the minimising of impacts to both parties. Where impacts to Austral Fisheries’ fishing operation and or catches are identified, Austral Fisheries expects an open and transparent negotiation on compensation. Austral Fisheries’ preference for consultation is a mixture of one-on-one discussions and emails. [Con-1047]
- + On 20 April 2023 Santos emailed Northern Prawn Fishery Licence Holders (for whom email address had been provided) the Barossa Development Quarterly Update,

which included information on the consultation process for this EP. [Con-1066]

- + On 24 April 2023 Santos emailed Northern Prawn Fishery Licence Holders (for whom email address had been provided) to advise of opportunities in Darwin on 27 April 2023 and 3 May 2023 to obtain information, provide feedback and ask questions on the drilling and completions activity. [Con-1078]
- + On 28 April 2023 Santos spoke with Austfish via phone. The discussion covered a concern regarding a well location on the boundary of an operational area near the Barossa drilling locations. This area is fished by two Licence Holders for about one month each year. The licence holder provided coordinates of the well location. Santos advised it was unlikely to be one of the locations for the drilling program covered in this EP. Santos confirmed it would check and get back to the licence holder. [Con-1122]
- + On 28 April 2023 Santos spoke on the phone with Austral Fisheries and it advised it had no feedback regarding the EP. [Con-1125]
- + On 28 April 2023 Santos called WA Seafood Exporters and left a voicemail. [Con-1123]
- + On 3 May 2023 Santos emailed WA Seafood Exporters following up on Santos' email on 13 April 2023. [Con-1153]
- + On 3 May 2023 Santos emailed Austfish in follow up to the phone conversation on 28 April 2023. Santos provided the proposed drilling locations, which have not altered since 2021 when the previous round of consultation was undertaken. An internal check suggests the coordinates provided by the licence-holder are close to a previously drilled well that is not part of the Barossa proposed drilling program. [Con-1152]
- + On 19 May 2023 Santos emailed Northern Prawn Fishery Licence Holders (for whom an email address had been provided) providing a link to NOPSEMA's brochure: *Consultation on offshore petroleum environment plans – Information for the community*. A Barossa Drilling and Completions Information Booklet was also provided. [Con-1206]
- + On 29 May 2023 Santos emailed Northern Prawn Fishery Licence Holders (for whom an email address had been provided) a Drilling and Completions Fact Sheet. Santos also reminded them of the timeframe for provision of feedback. [Con-1243]
- + On 19 June 2023 Santos made a follow-up phone call to A. Raptis and Sons during which the licence-holder stated they did not have any concerns and will not be submitting any feedback. [Con-1478]
- + On 19 June 2023 Santos made a follow-up call to a proprietor of WA Seafood Exporters in his capacity as head of the Northern Trawl Owners Association and A. Raptis and Sons. [Con-1124]
- + On 26 June 2023 Santos emailed WA Seafoods [Con-1458] and A. Raptis and Sons [Con-1456] advising that the period for providing feedback for the Environment Plan had closed and Santos remains available to discuss Project activities outside this consultation process.
- + No further correspondence or feedback was received.

<b>Summary of Objection or Claim</b>	<b>Assessment of Merits</b>	<b>Santos' Response Statement</b>	<b>EP Reference</b>

<p><i>Austfish asked whether a specific well location was one of the wells that Santos intended to drill and, if so, it would have a concern as the location was in an area within which they fished for scampi. [Con-1122]</i></p>	<p><i>Santos determined the well location coordinates supplied by Austfish were for a previously drilled well and not part of the drilling activities covered by this EP.</i></p>	<p><i>Santos provided this information to Austfish, another scampi commercial fisher who operates in the area, and their representative organisation, Northern Prawn Fishery Ltd. No further consultation has been required. [Con-1152]</i></p>	<p><i>Activity Notifications Table (Table 8.4).</i></p>
<p><b>Southern Bluefin Tuna/ Western Skipjack Tuna and Western Tuna and Billfish Fisheries Licence Holders</b></p>			
<p><b>Summary of consultation effort:</b></p> <p>+ These stakeholders were consulted via their representative body, the Australian Southern Bluefin Tuna Industry Association (ASBTIA). Refer to ABSTIA entry in this table for details.</p>			
<p><b>Summary of Objection or Claim</b></p>	<p><b>Assessment of Merits</b></p>	<p><b>Santos' Response Statement</b></p>	<p><b>EP Reference</b></p>
<p><i>Nil</i></p>	<p><i>Nil</i></p>	<p><i>Nil</i></p>	<p><i>No additional EP controls required</i></p>
<p><b>North-West Slope Trawl Fishery Licence Holders</b></p>			
<p><b>Summary of consultation effort:</b></p> <p>+ These stakeholders were consulted via their representative body, the Western Australian Fishing Industry Association (WAFIC). Refer to WAFIC entry in this table for details.</p>			
<p><b>Summary of Objection or Claim</b></p>	<p><b>Assessment of Merits</b></p>	<p><b>Santos' Response Statement</b></p>	<p><b>EP Reference</b></p>
<p><i>Nil</i></p>	<p><i>Nil</i></p>	<p><i>Nil</i></p>	<p><i>No additional EP controls required.</i></p>
<p><b>NT-managed fisheries Licence Holders: Aquarium Fishery, Spanish Mackerel Fishery, Timor Reef Fishery, Demersal Fishery, Coastal Line Fishery, Offshore Net and Line Fishery, Small Pelagic (Development) Fishery, Pearl Oyster Fishery</b></p> <p><b>(In addition to consultation undertaken with representative bodies the Northern Territory Seafood Council and the Pearl Producers Association)</b></p>			

**Summary of consultation effort:**

- + Licence holders were consulted via their representative body, the Northern Territory Seafood Council (NTSC). Refer to the separate NTSC entry in this table for details.
- + On 13 April 2023, in addition to emailing the NTSC, Santos also emailed NT Licence Holders (for whom email addresses had been provided) to explain the consultation approach for the Barossa Drilling and Completions Environment Plan (EP), asking if they would like to be consulted, how it would like to be consulted and what information it required. A Barossa Drilling and Completions Information Booklet was also provided and a link to NOPSEMA's Guideline: *Consultation in the course of preparing an Environment Plan*. Santos also advised that consultation with Relevant Persons for preparation of the EP was planned to conclude by mid-2023. [Con-1041] As per NTSC's standing request, the same information was posted to all NT Licence Holders on 14 April 2023. [Con-1077]
- + On 20 April 2023 Santos emailed NT Licence Holders (for whom email addresses had been provided) the Barossa Development Quarterly Update, which included information on the consultation process for this EP. [Con-1066]
- + On 24 April 2023 Santos emailed NT Licence Holders (for whom email addresses had been provided) to advise of opportunities in Darwin on 27 April 2023 and 3 May 2023 to obtain information, provide feedback and ask questions on the drilling and completions activity. [Con-1078]
- + On 28 April 2023 Santos called Northern Trawl Owners Association (Demersal Fishery (NT) Licence Holder) and left message. [Con-1130]
- + On 28 April 2023 Santos called Northern Wildcatch (Demersal Fishery (NT) Licence Holder) and left message. [Con-1131]
- + On 28 April 2023 Santos called Australia Bay Seafoods (Demersal Fishery (NT) Licence Holder) and left message. [Con-1133]
- + On 28 April 2023 Santos called WA Seafoods (Demersal Fishery (NT) Licence Holder) and left message. [Con-1123]
- + On 4 May 2023 Santos called Monsoon Aquatics (Aquarium Fishery (NT) Licence Holder) and left a voicemail. [Con-1367]
- + On 4 May 2023 Santos called Spanish Mackerel Commercial Fishing Association (representing Spanish Mackerel Fishery (NT) Licence Holders). During this call Spanish Mackerel Commercial Fishing Association requested it is consulted during Santos' preparation of the EP for resubmission. Spanish Mackerel Commercial Fishing Association indicated receiving information via emails and the Barossa Gas Development Drilling and Completions Information Booklet would be adequate to inform any feedback. Spanish Mackerel Commercial Fishing Association indicated it was not likely to have any feedback to provide. [Con-1352]
- + During May 2023 Santos also made attempts via phone and email to consult directly with licence holders for whom contact information had been provided:
  - o On 4 May 2023 Santos called Taroonna (Spanish Mackerel Fishery (NT) Licence Holder). During this call Taroonna advised it is to be consulted during Santos' preparation of the EP for resubmission. Taroonna requested to receive information via emails and said the Barossa Drilling and Completions Information Booklet would be adequate to inform Taroonna's feedback (if any). Taroonna is to be consulted and provide any feedback via phone calls and emails. Taroonna indicated it was not likely to have any feedback. Taroonna advised the Spanish Mackerel Commercial Fishing Association should be included in consultation for the EP. Santos confirmed Spanish Mackerel Commercial Fishing Association has been contacted. [Con-1345]
  - o On 10 May 2023 Santos emailed Monsoon Aquatics (Aquarium Fishery (NT) Licence Holder) regarding the Drilling and Completions Environment Plan. [Con-1368]

- On 19 May 2023 Santos emailed NT Licence Holders (for whom email addresses had been provided) providing a link to NOPSEMA’s brochure: *Consultation on offshore petroleum environment plans – Information for the community*. A Barossa Drilling and Completions Information Booklet was also provided. [Con-1206]
- On 23 May 2023 Santos emailed Taroona (Spanish Mackerel Fishery (NT) Licence Holder) including the Barossa Drilling and Completions Information Booklet and requesting any feedback be provided to Santos by 15 June 2023. [Con-1346 and Con-1347]
- On 29 May 2023 Santos emailed NT Licence Holders (for whom email addresses had been provided) a Drilling and Completions Fact Sheet. Santos also reminded them of the timeframe for provision of feedback. [Con-1243]
- On 12 June 2023 Santos emailed NT Licence Holders (for whom email addresses had been provided) a fishing fact sheet. [Con-1272]
- On 19 June 2023 Santos made a follow-up phone call to Fischer Wholesale Pty Ltd and email to request any feedback [Con-1479] and on 26 June 2023 emailed Fischer Wholesale Pty Ltd advising that the period for providing feedback for the Environment Plan had closed and Santos remains available to discuss Project activities outside of this consultation process. [Con-1515]

+ No further correspondence or feedback was received.

<b>Summary of Objection or Claim</b>	<b>Assessment of Merits</b>	<b>Santos’ Response Statement</b>	<b>EP Reference</b>
<i>Nil</i>	<i>Nil</i>	<i>Nil</i>	<i>No additional EP controls required.</i>

**WA-managed fisheries Licence Holders: Mackerel Managed Fishery, Northern Demersal Scalefish Managed Fishery**

**Summary of consultation effort:**

+ These Licence Holders were consulted via their representative body, the Western Australian Fishing Industry Council (WAFIC). Refer to the WAFIC entry in this table for details.

<b>Summary of Objection or Claim</b>	<b>Assessment of Merits</b>	<b>Santos’ Response Statement</b>	<b>EP Reference</b>
<i>Nil</i>	<i>Nil</i>	<i>Nil</i>	<i>No additional EP controls required.</i>

**Energy Industry**

**Australian Marine Oil Spill Centre (AMOSC)**

**Summary of consultation effort:**

+ On 13 April 2023 Santos emailed AMOSC to explain the consultation approach for the Barossa Drilling and Completions Environment Plan (EP), asking if AMOSC would

like to be consulted, how it would like to be consulted and what information it required. A Barossa Drilling and Completions Information Booklet was also provided and a link to NOPSEMA's Guideline: *Consultation in the course of preparing an Environment Plan*. Santos also advised that consultation with Relevant Persons for preparation of the EP was planned to conclude by mid-2023. [Con-1041]

- + On 20 April 2023 Santos emailed AMOSC the Barossa Development Quarterly Update, which included information on the consultation process for this EP. [Con-1066]
- + On 24 April 2023 Santos emailed AMOSC to advise of opportunities in Darwin on 27 April 2023 and 3 May 2023 to obtain information, provide feedback and ask questions on the drilling and completions activity. [Con-1078]
- + On 4 May 2023 Santos called AMOSC and left a voicemail. [Con-1407]
- + On 10 May 2023 Santos emailed AMOSC regarding the EP. [Con-1406]
- + On 19 May 2023 Santos emailed AMOSC providing a link to NOPSEMA's brochure: *Consultation on offshore petroleum environment plans – Information for the community*. A Barossa Drilling and Completions Fact Sheet was also provided. [Con-1206]
- + On 19 May 2023 AMOSC emailed Santos referencing previous correspondence on 11 May 2023 confirming AMOSC acknowledged the information provided via email and the phone call. For AMOSC to be considered consulted during the EP development process, AMOSC requires a copy of the EP (specifically the risk scenario(s); NEBA/SIMA; EPS/EPO/MC's) and the Oil Pollution Emergency Plan (OPEP) to be provided to AMOSC for review and consultation prior to submission to NOPSEMA. AMOSC requests two weeks to review the plans, in which AMOSC will note the requirements for AMOSC within the plans and seek clarification/provide recommendations to SANTOS where required. In return, AMOSC will provide a letter of consultation confirming our service capability. On acceptance of the EP/OPEP, AMOSC requests a copy of the final plans to be provided to support our response readiness. [Con-1210]
- + On 29 May 2023 Santos emailed AMOSC a Drilling and Completions Fact Sheet. Santos also reminded it of the timeframe for provision of feedback. [Con-1243]
- + On 12 June 2023 Santos emailed AMOSC the draft Barossa Drilling and Completions OPEP for AMOCS's review. [Con-1387]
- + On 23 June 2023 AMOSC emailed Santos with technical comments on the OPEP. [Con-1424]
- + On 28 June 2023 Santos emailed AMOSC advising its review comments had been addressed and the final accepted version of the OPEP would be provided in due course. [Con-1495]
- + No further correspondence or feedback was received.

<b>Summary of Objection or Claim</b>	<b>Assessment of Merits</b>	<b>Santos' Response Statement</b>	<b>EP Reference</b>
AMOSC requested a copy of the OPEP and EP to review. [Con-1210] AMOSC subsequently	Santos considers AMOSC to be a key stakeholder involved in oil spill response preparedness	Santos provided AMOSC with the draft OPEP and the draft EP submitted to NOPSEMA. [Con-1274]	No additional EP controls required.

<p>provided its review comments. [Con-1424]</p>	<p>and activities.</p>	<p>Santos has addressed AMOSC's comments and will provide ASOC with the final accepted version in due course. [Con-1495]</p>	
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**Energy Industry Operators**  
 (Inpex, Bengal Energy, Carnarvon Energy, Eni, Finder No 1, Jadestone, Melbana Energy, PTTEP Australia, Shell, Timor Sea Oil & Gas, Vulcan Exploration, ENI and Woodside)

**Summary of consultation effort:**

- + On 13 April 2023 Santos emailed energy industry operators (Eni, Inpex, Shell and Woodside) to explain the consultation approach for the Barossa Drilling and Completions Environment Plan (EP), asking if energy industry operators would like to be consulted, how they would like to be consulted and what information they required. A Barossa Drilling and Completions Information Booklet was also provided and a link to NOPSEMA's Guideline: *Consultation in the course of preparing an Environment Plan*. Santos also advised that consultation with Relevant Persons for preparation of the EP was planned to conclude by mid-2023. [Con-1041]
- + On 20 April 2023 Santos emailed energy industry operators the Barossa Development Quarterly Update, which included information on the consultation process for this EP. [Con-1066]
- + On 24 April 2023 Santos emailed four of the operators listed above to advise of opportunities in Darwin on 27 April 2023 and 3 May 2023 to obtain information, provide feedback and ask questions on the drilling and completions activity. [Con-1078]
- + On 4 May 2023 Santos called four of the operators listed above and left a voicemail. [Con-1369, Con-1371, Con-1377, Con-1373, Con-1354, Con-1333]
- + On 10 May 2023 Santos emailed four of the operators listed above. [Con-1370, Con-1378, Con-1372, Con-1355, Con-1334]
- + On 19 May 2023 Santos emailed four of the operators listed above, providing a link to NOPSEMA's brochure: *Consultation on offshore petroleum environment plans – Information for the community*. A Barossa Drilling and Completions Fact Sheet was also provided. [Con-1206]
- + On 23 May 2023 Santos emailed Inpex providing the Barossa Gas Project Drilling and Completions Information Booklet and requesting any feedback regarding the EP is required from Inpex by 15 June 2023. [Con-1404]
- + On 29 May 2023 Santos emailed four of the operators listed above a Drilling and Completions Fact Sheet. Santos also reminded them of the timeframe for provision of feedback. [Con-1243]
- + On 6 June 2023 and 11 June 2023 Santos emailed additional energy industry operators requesting feedback on the EP. [Con-1263] and Con-1264]
- + On 12 June Carnarvon Energy emailed Santos in response to Santos' email of 11 June 2023 and advised it had no comments and did not require further information. [Con-1390]

- + Between 19 and 23 June 2023 Santos made follow-up phone calls to several energy industry operators and left messages.
- + On 20 June 2023 PTTEP emailed Santos and stated it did not have any feedback on the EP. [Con-1419]
- + On 26 June 2023 provided the energy industry operators with follow-up emails advising that the period for providing feedback for the Environment Plan had closed and Santos remains available to discuss Project activities outside of this consultation process. [Con-1476, Con-1475, Con-1499, Con-1471, Con-1470, Con-1473, Con-1474, Con-1477]
- + On 28 July 2023 Finder Energy emailed Santos advising that it does not have any functions, interests or activities that may be affected by this EP and was happy to be removed as a relevant person from the consultation. [Con-2336]
- + No further correspondence or feedback was received.

<b>Summary of Objection or Claim</b>	<b>Assessment of Merits</b>	<b>Santos' Response Statement</b>	<b>EP Reference</b>
<i>Nil</i>	<i>Nil</i>	<i>Nil</i>	<i>No additional EP controls required.</i>

**Environmental Organisations**

**ATSEA-2 Project**

**Summary of consultation effort:**

- + On 26 April 2023 ATSEA-2 Project lodged a self-nomination and feedback form (as a potential Relevant Person) via the portal on the Santos website. [Con-1083]
- + On 2 May 2023 Santos emailed ATSEA-2 Project in response to the form completed on 26 April 2023. Santos advised that it would be in contact again and in the meantime should ATSEA-2 have any questions or require further information it should contact Santos by phone or email (details provided). [Con-1510]
- + On 15 May 2023 Santos emailed ATSEA-2 Project. Santos provided information about the consultation for the Barossa Drilling and Completions EP and attached the Barossa Drilling and Completions Information Booklet. Santos invited consultation preferences by 29 May 2023 and indicated that it was seeking feedback for this EP by 15 June 2023. [Con-1183] Santos stated the purpose of the email is to:
  - o seek information to better understand any functions, interests or activities that may be affected by the proposed activities under the EP and how they may be affected;
  - o explain the purpose of consultation and Santos' regulatory obligations to consult with Relevant Persons;
  - o set out Santos' proposed approach to consulting with Relevant Persons;
  - o seek feedback on how Santos can provide further information that is appropriate and accessible to assess the possible consequences of Santos' proposed drilling and completions activities (if a Relevant Person); and/or



- invite Relevant Persons’ feedback regarding the EP.
- + On 18 May 2023 Santos emailed ATSEA-2 Project providing a link to NOPSEMA’s brochure: *Consultation on offshore petroleum environment plans – Information for the community*. Santos also reminded ATSEA-2 Project of how and by when feedback was sought and to contact Santos to make any alternate arrangements by 29 May 2023. [Con-1448]
- + On 29 May 2023 Santos emailed ATSEA-2 Project a Drilling and Completions Fact Sheet. Santos also reminded it of the timeframes for provision of consultation preferences and for feedback for this EP. [Con-1227]
- + On 29 May 2023 ATSEA-2 Project emailed Santos with additional information about its functions, interests and activities. ATSEA-2 Project advised its conservation activities relating to the EMBA include the conservation of sea turtles as migratory species that are threatened in the ATS region. ATSEA-2 Project advised it focuses on tackling unsustainable fisheries (including illegal, unreported and unregulated (IUU) fishing), marine and land-based pollution (including oil spills), conservation of critical habitats (through supporting existing MPAs and establishing new ones) and conserving endangered, threatened and protected (ETP) species (especially sea turtles) and improving understanding of and adapting to climate change. [Con-1248]
- + On 1 June 2023 Santos emailed ATSEA-2 Project acknowledging receipt of information via email sent on 29 May 2023. Santos asked ATSEA-2 Project if it had any feedback on the Barossa Drilling and Completions EP or required further information. [Con-1251]
- + On 15 June 2023 ATSEA-2 emailed Santos with requests including for the provision of translated information and materials, a face-to-face meeting in Dili and an extension of the timeframe for feedback until its consultation requests were met . [Con-1398]
- + On 20 June 2023 Santos responded to ATSEA-2’s feedback provided on 15 June 2023, including an extension to the timeframe for feedback to 23 June 2023 and an offer to meet by telephone or videoconference during that week. [Con-1454]
- + On 23 June 2023 ATSEA-2 emailed Santos a response to Santos’ email of 20 June 2023. [Con-1518]
- + On 27 June 2023 Santos emailed ATSEA-2 a response to ATSEA-2’s email of 23 June 2023. [Con-1519]
- + No further correspondence or feedback was received.

<b>Summary of Objection or Claim</b>	<b>Assessment of Merits</b>	<b>Santos’ Response Statement</b>	<b>EP Reference</b>
<p><b>ATSEA-2 Project correspondence [Con-1398]:</b></p> <p>ATSEA has major concerns regarding the current Proponent-driven process for stakeholder consultation</p>	<p>Relevant documentation has been publicly available since March 2022. The current consultation process is assisting the updating required to this existing information.</p>	<p><b>Santos’ response [Con-1454]:</b></p> <p>The prior version of the EP (Revision 3), previously accepted by the regulator, the National Offshore Petroleum Safety and Environmental Management Authority (<b>NOPSEMA</b>), is</p>	<p>No additional EP controls required.</p>

<p>on this EP under the current regulations, namely: a. ATSEA will not have the opportunity to view and comment on the Drilling EP, prior to its submission to the regulator, NOPSEMA.</p> <p>ATSEA will not have the opportunity to provide feedback/input on how Santos has responded to our specific comments (which will be presented in the Drilling EP).</p> <p>In the interests of 'best practice', transparency and adequate and effective consultation, we request the opportunity to view and comment on a draft Drilling EP. And further, urge NOPSEMA to consider regulatory amendments to allow stakeholder feedback on draft Eps (prior to their submission for regulatory approval) for all offshore oil/gas developments.</p>		<p>available online at NOPSEMA's website (<a href="https://docs.nopsema.gov.au/A831694">https://docs.nopsema.gov.au/A831694</a>). It was accepted by NOPSEMA in March 2022, before NOPSEMA's acceptance was set aside by a Federal Court decision in late 2022 (as noted in our email of 15 May). That document has been publicly available since 15 March 2022.</p> <p>Santos is in the process of considering and reviewing feedback provided through consultation on its revised EP including any additional proposed control measures. Santos would be happy to arrange a virtual meeting with ATSEA-2 this week to discuss ATSEA-2's feedback. Santos could also discuss any proposed updates to the EP, including any additional control measures.</p>	
<p>We note that all the consultation materials provided were in English.</p> <p>ATSEA notes the significant 'challenges' associated with</p>	<p>Santos noted the comments and the fact that the request was not made earlier in the consultation period.</p>	<p>Whilst the materials supplied were in English, Santos notes that information is available on our website and that the website content may be translated into Bahasa Indonesia using Google</p>	<p>No additional EP controls required.</p>

<p><i>undertaking public and stakeholder consultation across the ATS region (ie. Non-English languages, remoteness, human development status, literacy levels, limited internet connectivity). To this end, ATSEA respectfully requests additional communication materials to enable effective and appropriate consultation on the Barossa Offshore Gas Project and Drilling EP. Including:</i></p> <p><i>a) translation of all project and activity-related consultation materials in the accepted and relevant major languages of the relevant countries in the ATS (ie. Bahasa Indonesia and Tetun)</i></p> <p><i>b) a short video (in relevant languages) of the Barossa Offshore Gas Project</i></p> <p><i>c) 'face-to-face' multi-stakeholder meetings in Kupang, Nusa Tenggara Province, Indonesia and Dili, Timor-Leste to present, explain and discuss the Barossa Offshore Gas</i></p>		<p><i>translate.</i></p> <p><i>We further note that such an extensive request for additional translated material has only been made on the date by which feedback was sought (15 June), rather than earlier. There was ample opportunity to raise any such issue or request well in advance of 15 June. Also, we assume that you are otherwise able to translate, or arrange translation of, any information we provide to the members whose interests you represent.</i></p>	
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<p><i>Project, as well as the Drilling and Completions project activity – with Bahasa Indonesia and Tetun translators</i></p> <p><i>d) an ‘online’ meeting with ATSEA Regional Project Management Unit (RPMU – based in Bali) to discuss logistics, priorities and best methods for appropriate and effective consultation.</i></p>			
<p><i>Santos have advised that the deadline for all comments on the Drilling EP is <b>15 June 2023</b>.</i></p> <p><i>Given the importance of effective and appropriate consultation, we formally request and would be grateful for an extension of the deadline for comment on the Drilling EP, pending the completion of all the relevant stakeholder consultation activities.</i></p>	<p><i>Santos notes the request and an extension of time to comment will be provided.</i></p>	<p><i>Having regard to ATSEA-2’s request for additional time to respond and provide feedback, Santos can accommodate an extension of the feedback period until Friday, 23 June 2023.</i></p> <p><i>We also again re-iterate our invitation for a virtual meeting this week, by telephone or videoconference. Please let us know ATSEA-2’s availability and we can confirm suitable arrangements.</i></p>	<p><i>No additional EP controls required.</i></p>
<p><b>ATSEA-2 correspondence [Con-1518]</b></p> <p><i>ATSEA-2 notes and understands that the prior version of the Barossa Drilling EP (Revision 3) has been publicly available</i></p>	<p><i>Santos has provided ATSEA-2 with sufficient information to assess the impacts of the Drilling and Completions Environment Plan, and reasonable time to provide any feedback.</i></p>	<p><b>Santos response [Con-1519]</b></p> <p><i>Santos is very happy to meet with ATSEA-2 at any time, as we have previously advised, and remains committed to good faith discussions with ATSEA-2.</i></p>	<p><i>No additional EP controls required.</i></p>

<p>since 15 March 2022 (15 months ago). However, ATSEA-2 stresses that it was only first made aware of the EP (and indeed the entire Barossa Offshore Gas Project) in April this year, following Santos official public call for ‘relevant persons’ (deadline of 22 April 2023).</p> <p>ATSEA-2 thanks Santos for their offer to arrange a virtual meeting over the next 2 days with ATSEA-2 to consider feedback on its revised EP (including any additional proposed control measures). However, our members have not been provided the relevant Drilling EP information in a language that they understand. Please note that many of our key staff and members/partners in ATSEA-2 simply do not speak English.</p> <p>We have also not been given sufficient time (or resources) to fund translations and hire translators for a virtual meeting. Two days are grossly insufficient time to</p>		<p>We consider we have provided ATSEA-2 with sufficient information to assess the impacts of the Drilling and Completions Environment Plan, and reasonable time to provide any feedback it may have.</p> <p>ATSEA-2 is welcome to contact us at any time and we look forward to receiving and addressing any feedback it may have on the Drilling and Completions Environment Plan.</p> <p>ATSEA-2 can stay up to date with consultation processes for other activity environment plans by monitoring <a href="https://www.santos.com/barossa/">https://www.santos.com/barossa/</a>.</p>	
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<p><i>translate the relevant EP materials, i.e. 4-page Information Brochure, 24-page Drilling Booklet, 11-page Fact Sheet and the 590-page Drilling EP. Key ATSEA-2 staff also currently have prior commitments with a major ATSEA-2 regional workshop this week.</i></p> <p><i>Google Translate is highly inappropriate for the translation of technical information. And further Google Translate is not available for Tetun – the national language of Timor-Leste. As noted above (4), two days is also insufficient time to undertake this major task.</i></p> <p><i>ATSEA-2's also wholly rejects Santos's assumption that ATSEA-2 is "otherwise able to translate, or arrange translation of, any information we provide to the members whose interests you represent." Please be advised that ATSEA-2 is funded by Global Environment Facility to undertake specific project activities in the ATS region.</i></p>			
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<p><i>As such, its current work plan and budget do not include the staff and costs associated with undertaking a consultation on behalf of private oil-gas companies.</i></p> <p><i>Regarding Santos' offer to extend the deadline for feedback until Friday, 23 June 2023 – we note that this is just 2 working days from the date of your letter (received after hours, on 20 June 2023). These are impossible timeframes to provide feedback on this major offshore development proposal.</i></p> <p><i>ATSEA-2 also refers you to paragraph 4 of this letter on the major difficulties in providing feedback/input on detailed technical information that has not been provided to us in the languages of our key members/stakeholders.</i></p> <p><i>ATSEA-2 reminds Santos of the role, members and key responsibilities and interests of ATSEA – as a major regional inter-governmental forum/program in the</i></p>			
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<p><i>Arafura and Timor Seas- and also, its legal foundations under the 1982 United Nations Convention on the Law of the Sea (Article 122 and Article 123).</i></p> <p><i>ATSEA-2 must conclude that Santos has, to-date, not engaged in good faith or adequately engaged in consultation with us, regarding this very important and major offshore gas development in the Timor Sea.</i></p> <p><i>We remain committed to providing feedback once sufficient technical information has been provided in the requested and appropriate format and languages.</i></p>			
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**Australian Marine Conservation Society – NT branch (AMCS-NT)**

**Summary of consultation effort:**

- + On 13 April 2023 Santos emailed AMCS-NT to explain the consultation approach for the Barossa Drilling and Completions Environment Plan (EP), asking if AMCS-NT would like to be consulted, how it would like to be consulted and what information it required. A Barossa Drilling and Completions Information Booklet was also provided and a link to NOPSEMA’s Guideline: *Consultation in the course of preparing an Environment Plan*. Santos also advised that consultation with Relevant Persons for preparation of the EP was planned to conclude by mid-2023. [Con-1041]
- + On 20 April 2023 Santos emailed AMCS-NT the Barossa Development Quarterly Update, which included information on the consultation process for this EP. [Con-1066]
- + On 24 April 2023 Santos emailed AMCS-NT to advise of opportunities in Darwin on 27 April 2023 and 3 May 2023 to obtain information, provide feedback and ask



questions on the drilling and completions activity. [Con-1078]

- + On 19 June 2023 Santos phoned AMCS-NT which stated it was not sure if it would be providing any feedback on the EP. [Con-1485]
- + On 26 June 2023 Santos emailed AMCS-NT advising that the period for providing feedback for the Environment Plan had closed and Santos remains available to discuss Project activities outside of this consultation process. [Con-1461]
- + No further correspondence or feedback was received.

<b>Summary of Objection or Claim</b>	<b>Assessment of Merits</b>	<b>Santos' Response Statement</b>	<b>EP Reference</b>
<i>Nil</i>	<i>Nil</i>	<i>Nil</i>	<i>No additional EP controls required.</i>

**Conservation Council of WA (CCWA)**

**Summary of consultation effort:**

- + On 12 April 2023 CCWA emailed Santos advising it would like to be recognised as a Relevant Person for the Barossa Drilling and Environment Plan (EP). CCWA stated why it should be considered a Relevant Person and also made the following statements:
  - The Barossa Gas Project is of importance and relevance to WA with the potential to effect Traditional Owner communities and WA's marine wildlife;
  - The Project is located in waters adjacent to WA waters and spans an area that WA marine life use for roaming and migratory purposes;
  - The Project's location is also subject to the flows of the Leeuwin Current, which spreads down the WA coast, impacting communities, wildlife and climate. [Con-1037]
- + On 14 April 2023 Santos acknowledged the form completed by CCWA on 12 April 2023. Santos advised that it would be in contact again and in the meantime should CCWA have any questions or require further information it should contact Santos via phone or email (details provided). [Con-1137]
- + On 15 May 2023 Santos emailed CCWA in response to the email sent by Santos on 14 April 2023. Santos provided information about the consultation for the Barossa Drilling and Completions EP and advised the timeframe for provision of feedback from all Relevant Persons (15 June 2023). The Barossa Drilling and Completions Information Booklet was also provided. [Con-1181] Santos stated the purpose of the email is to:
  - seek information to better understand any functions, interests or activities that may be affected by the proposed activities under the EP and how they may be affected;
  - explain the purpose of consultation and Santos' regulatory obligations to consult with Relevant Persons;
  - set out Santos' proposed approach to consulting with Relevant Persons;
  - seek feedback on how Santos can provide further information that is appropriate and accessible to assess the possible consequences of Santos' proposed

- drilling and completions activities (if a Relevant Person); and/or
  - invite Relevant Persons’ feedback regarding the EP.
- + On 18 May 2023 Santos emailed CCWA providing a link to NOPSEMA’s brochure: *Consultation on offshore petroleum environment plans – Information for the community*. A Barossa Drilling and Completions Fact Sheet was also provided. [Con-1450]
- + On 29 May 2023 Santos emailed CCWA a Drilling and Completions Fact Sheet. Santos also reminded it of the timeframe for provision of feedback. [Con-1225]
- + On 22 June 2023 Santos called CCWA and left a message. [Con-1487]
- + On 26 June 2023 Santos emailed CCWA advising that the period for providing feedback for the Environment Plan had closed and Santos remains available to discuss Project activities outside this consultation process. [Con-1462]
- + No further correspondence or feedback was received.

<b>Summary of Objection or Claim</b>	<b>Assessment of Merits</b>	<b>Santos’ Response Statement</b>	<b>EP Reference</b>
<i>Nil</i>	<i>Nil</i>	<i>Nil</i>	<i>No additional EP controls required.</i>

**Environment Centre NT (ECNT)**

- Summary of consultation effort:**
- + ECNT representatives attended certain meetings and consultation sessions held by Santos on the Tiwi Islands on 6-8 February 2023 and 22 March 2023.
  - + On 13 April 2023 Santos emailed the ECNT to explain the consultation approach for the Barossa Drilling and Completions Environment Plan (EP), asking if the ECNT would like to be consulted, how it would like to be consulted and what information it required. A Barossa Drilling and Completions Information Booklet was also provided and a link to NOPSEMA’s Guideline: *Consultation in the course of preparing an Environment Plan*. Santos also advised that consultation with Relevant Persons for preparation of the EP was planned to conclude by mid-2023. [Con-1041]
  - + On 20 April 2023 Santos emailed the ECNT the Barossa Development Quarterly Update, which included information on the consultation process for this EP. [Con-1066]
  - + On 21 April 2023 the ECNT emailed Santos in response to the email on 13 April 2023. The ECNT re-stated that it is a Relevant Person for the Barossa Development Drilling and Completions activities and indicated it considers it is necessary for Santos to consult with it regarding the development of the new Environment Plan for drilling activities and completions activities. The ECNT indicated it looked forward to productive engagement with Santos on the new EP, including by way of correspondence and meetings with Santos representatives. [Con-1071]
  - + On 24 April 2023 Santos emailed the ECNT to advise of opportunities in Darwin on 27 April 2023 and 3 May 2023 to obtain information, provide feedback and ask

questions on the drilling and completions activity. [Con-1078] ECNT did not attend.

- + On 24 April 2023 the ECNT emailed Santos stating it holds a number of concerns in relation to the proposed activities. The ECNT's objections, claims and requests for information and Santos' responses to each are detailed in the assessment section of this entry. [Con-1082]
- + On 10 May 2023 Santos emailed the ECNT confirming receipt of its correspondence of 24 April 2023. Santos advised responses were being prepared and to be provided as soon as possible. [Con-1171]
- + On 19 May 2023 Santos emailed the ECNT providing a link to NOPSEMA's brochure: *Consultation on offshore petroleum environment plans – Information for the community*. A Barossa Drilling and Completions Information Booklet was also provided. [Con-1206]
- + On 29 May 2023 Santos emailed the ECNT a Drilling and Completions Fact Sheet. Santos also reminded the ECNT of the timeframe for provision of feedback. [Con-1243]
- + On 3 June 2023 Santos emailed the ECNT in response to its email of 24 April 2023. The email explained Santos' regulatory obligations to consult with Relevant Persons and proposed approach to consulting with Relevant Persons and responded to the objections, claims and requests for information in the letter of 24 April 2023. [Con-1252]
- + On 8 June 2023 the ECNT emailed Santos in response to Santo's email on 3 June 2023. [Con-1261]
- + On 14 June and 16 June Santos emailed the ECNT in response to its email on 8 June 2023. In its email response of 16 June 2023 Santos advised ECNT that it could accommodate an extension until 23 June 2023 and was able to meet with ECNT during that week. [Con-1400]
- + On 23 June 2023 the ECNT emailed Santos further correspondence and advised it would provide further feedback on the EP on or around 10 July 2023. [Con-1426]
- + On 27 June 2023 Santos emailed the ECNT in response to the ECNT's letter of 23 June 2023. [Con-1445]
- + On 10 July 2023 ECNT emailed Santos further correspondence on the EP, attached a report commissioned by ECNT and requested an additional meeting to discuss its concerns. [Con-2337]
- + On 24 July 2023 Santos emailed the ECNT in response to the ECNT's letter of 10 July 2023. [Con-2338]

<b>Summary of Objection or Claim</b>	<b>Assessment of Merits</b>	<b>Santos' Response Statement</b>	<b>EP Reference</b>
<p><b>Correspondence provided 21 April 2023 [Con-1071]</b></p> <p>ECNT maintains its assertion that it is a relevant person within the meaning of cl 11A of the Offshore Petroleum and</p>	<p>On receipt of ECNT's correspondence on 21 April 2023 [Con-1071], Santos had already commenced consultation on 13 April 2023 with the Relevant Persons listed in Rev 3 of</p>	<p>The list of Relevant Persons includes ECNT.</p>	<p>No additional EP controls required.</p>

<p><i>Greenhouse Gas Storage (Environment) Regulations 2009 (Cth) (Environment Regulations) for the purpose of the Barossa Development Drilling and Completions activities. ECNT its status as a relevant person has been accepted by Santos through its action in recognising ECNT as a stakeholder and purporting to consult with it pursuant to the Environment Regulations.</i></p>	<p><i>the Barossa Drilling and Completions EP currently listed on the NOPSEMA website.</i></p> <p><i>The list of Relevant Persons included ECNT which was provided information from Santos via email on 13 April 2023.</i></p>		
<p><b>Correspondence provided 24 April 2023 [Con-1082]</b></p> <p><i>ECNT has not yet been provided with information in relation to the new Drilling EP that Santos intends to submit to NOPSEMA. However, on the basis of the publicly available information concerning Santo's plans concerning the proposed drilling and completions activities, including the 2022 Drilling EP, ECNT holds a number of concerns in relation to the proposed activities in their capacity as a relevant</i></p>	<p><i>Santos assessed this claim as not valid due to the fact that ECNT had been previously provided with information in relation to the new Drilling EP.</i></p>	<p><b>Santos response [Con-1252]</b></p> <p><i>On 13 April 2023 ECNT was provided with the latest information booklet supporting the Barossa Drilling and Completions EP consultation, a link to this and other relevant information on the Santos website.</i></p> <p><i>On 24 April 2023 ECNT was also provided with information on upcoming community consultation drop-in sessions relating to the Barossa Drilling and Completions EP, held in Darwin on 27 April and 3 May 2023.</i></p>	<p><i>No additional EP controls required.</i></p>

<p>person.</p>		<p><i>In both instances, the information was provided under covering email to three recipients at ECNT. This is the most up to date information in relation to the new Barossa Drilling and Completions EP.</i></p> <p><i>Attendance records for the Darwin consultation drop-in sessions on 27 April and 3 May 2023 indicate that no representatives from ECNT attended these sessions.</i></p> <p><i>ECNT representatives have attended meetings and consultation sessions held by Santos on the Tiwi Islands on 6-8 February 2023 and 22 March 2023. [Con-1252]</i></p>	
<p><i>The sections of the invalidated 2022 Drilling EP pertaining to oil spill modelling, and the OPEP, are inappropriate for the nature and scale of the activity. On the basis of the evidence provided in the invalidated Drilling EP and the OPEP, ECNT submits that should Santos resubmit these sections of the 2022 Drilling EP to NOPSEMA, Santos will have failed to demonstrate, with evidence,</i></p>	<p><i>Santos assessed this objection as not valid due to the fact that Santos will be re-submitting the Barossa Drilling and Completions EP in its entirety for NOPSEMA assessment under the OPGGS Environment Regulations.</i></p>	<p><i>Santos will be re-submitting the Barossa Drilling and Completions EP in its entirety for NOPSEMA assessment under the OPGGS Environment Regulations. [Con-1252]</i></p>	<p><i>No additional EP controls required.</i></p>

<p><i>that the environmental impacts and risks of the activity will be reduced to as low as reasonably practicable (ALARP). [Con-1082]</i></p>			
<p><i>ECNT is concerned that Santos has not provided a copy of its full stochastic modelling study that was commissioned for the Drilling EP. The worst-case credible oil spill scenario in the Drilling EP, a subsea loss of well control with the release of 800,000 STB (129,000 m<sup>3</sup>) of Barossa Condensate (approximately 1,433 m<sup>3</sup>/day or 9,015 bbl/day) over 90 days, involves the release of seven times the volume of condensate than was modelled in the Offshore Project Proposal (OPP). Access to the stochastic modelling that informs these scenarios is critical in allowing stakeholders to fully assess the potential risks that are posed by the activities. [Con-1082]</i></p>	<p><i>Santos assessed this request for information as not being necessary due to the fact the stochastic modelling study was performed by a spill modelling specialist and will be assessed by NOPSEMA.</i></p>	<p><i>The stochastic modelling study for the Barossa Drilling and Completions EP (EP) was performed by a spill modelling specialist under contract to Santos and is accurately summarised in the body of the EP and the Drilling and Completions Oil Pollution Emergency Plan (OPEP) Addendum: Drilling and Completions. [Con-1252]</i></p>	<p><i>No additional EP controls required.</i></p>
<p><i>Appendix G of the Drilling EP provides only a summary of</i></p>	<p><i>Santos assessed that these claims are not valid due to</i></p>	<p><i>Appendix G only includes spill modelling results for receptors</i></p>	<p><i>No additional EP controls required.</i></p>

<p><i>results in the form of two tables and is missing key information. For instance, Appendix G omits key receptors such as Indonesia, Timor-Leste, and the Tiwi Islands. These are dangerous omissions, given each of these locations was predicted in the Offshore Project Proposal (OPP) to be impacted under a number of scenarios modelled.</i></p> <p><i>The 2009 Montara oil spill disaster was found by the Federal Court to be spilling in excess of 2,5000 barrels a day and was found by the Federal Court to impact seaweed farms in Indonesia. The worst-case loss of well control event for the Barossa project is modelled to be larger in volume than the Montara spill, and as such we submit that it is highly probably that Indonesia would be impacted in this event. [Con-1082]</i></p>	<p><i>the spill modelling results, differences between oil and gas operations and the public availability of information since March 2022.</i></p>	<p><i>impacted at moderate exposure values or high exposure values.</i></p> <p><i>While Indonesian, Timor-Leste and Tiwi Islands receptors are located inside the environment that may be affected (EMBA) for the EP, the spill modelling indicated results at low exposure values for these receptors, which is why Indonesian, Timor-Leste and Tiwi Islands receptors do not appear in Appendix G.</i></p> <p><i>Moderate exposure values or high exposure values are representative of potential biological impact from an unplanned spill event. The low exposure values are not considered to be representative of a biological impact, but they are adequate for identifying the full range of environmental receptors that might be contacted by surface and/or subsurface hydrocarbons (NOPSEMA, 2019) and a visible sheen.</i></p> <p><i>Refer to Section 7.5.4 of the EP for a description of hydrocarbon exposure values for the environment that may be affected. This information has been publicly available on NOPSEMA's website since 15 March 2022.</i></p>	
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		<p><i>It is not appropriate to compare the extent of impacts between oil and gas fields based on spill volumes alone. Field location and regional metocean conditions are important factors, as is the product type. For example, Montara is an oil field and Barossa is a gas and condensate field, which means the product types, and associated impacts, are not directly comparable. [Con-1252]</i></p>	
<p><i>Santos has failed to provide an evidence base for the new loss of well control volume, and that further locations could be impacted by hydrocarbon exposure, based on the previous hydrocarbon spill modelling study. Under the Hydrocarbon spill modelling study commissioned by ConocoPhillips from RPS, ('RPS 2017e') two scenarios dealt with the spill of condensate: Scenario 3 – via a vessel collision (19,400m3) and Scenario 4 – via a long term well blow-out (16,833m3). The volume of Scenario 4 in RPS 2017e appeared to be grossly</i></p>	<p><i>Santos assessed the claims/objections as not valid based on the explainable differences between the 2017 modelling study completed for the OPP, and the 2019 modelling study completed for the EP.</i></p>	<p><i>The difference in condensate release volumes for the loss of well containment scenario between the 2017 modelling study completed for the OPP, and the 2019 modelling study completed for the EP, can be explained by different assumptions about the well bore diameter. The inner diameter of the well bore assumed for the 2017 modelling study scenario was smaller (8.5 inch compared to 10.7 inch in the 2019 modelling study). [Con-1252]</i></p> <p><i>Despite the differences in well bore diameter assumptions and associated release volumes between the two studies, there was no significant difference between the spatial extent of the</i></p>	<p><i>No additional EP controls required.</i></p>



<p><i>underestimated.</i></p> <p><i>The subsea release of Barossa condensate over 80 days estimated a release of approximately 210m<sup>3</sup>/day, however it was estimated that the project will produce 1.5 million barrels of condensate per year (ConocoPhillips report, page 2). This corresponded to an average daily rate of over 650 m<sup>3</sup>/ day. Both of the scenarios modelled in RPS 2017e are dwarfed by the new well blow out volume laid out in Santos' Drilling Plan, which estimates 129,000 m<sup>3</sup> could be spilled from a sub-sea release lasting 90 days. [Con-1082]</i></p>		<p><i>environment that may be affected from a worst-case condensate spill from a loss of well control event.</i></p> <p><i>This can be explained as follows:</i></p> <ul style="list-style-type: none"> <li><i>• With a smaller assumed well bore diameter for the 2017 study, this increased the exit velocity and in turn the amount of turbulent energy available to break the condensate into smaller droplets (18.4 µm to 92.1 µm), compared to the 2019 study where the droplet sizes were between 100 µm to 462 µm. As described in ITOPF's (2014) Technical Information Paper on the Fate of Marine Oil Spills, oil droplets of about 70 µm are likely to remain in the water column because the speed by which they rise to the water surface is slowed down by the ambient turbulence in the sea compared to larger droplet sizes, hence increasing the exposure in the water column by entrained condensate.</i></li> </ul> <p><i>On that basis, for the 2017 scenario more than 80% of the condensate droplets were smaller than 70 µm and remained permanently in the water column, while the droplets for the 2019 scenario were estimated to all be</i></p>	
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		<p><i>above 70 <math>\mu\text{m}</math> and would rise to the surface and re-entrain in the presence of moderate winds (&gt; 10 knots) and breaking waves. It should be noted that entrained hydrocarbons are droplets that are suspended into the water column and not dissolved.</i></p> <ul style="list-style-type: none"> <li><i>• The 2019 modelling study also reflected a 3-fold reduction in the assumed gas to condensate ratio compared to the 2017 modelling study. The 3-fold reduction in the condensate to gas ratio in the 2019 modelling study can be attributed to new data that was not available for the 2017 modelling study. The 2019 modelling study incorporated information from additional appraisal drilling from the Barossa-5A and 6 well results, a complete review of all fluid samples, additional fluid analyses and the change in well design. With a higher gas to condensate ratio used for the 2017 study, this resulted in very small condensate droplets (&lt;70 <math>\mu\text{m}</math>) which increased the extent of entrained hydrocarbons in the water column, despite the lower assumed condensate released volumes. [Con-1252]</i></li> </ul>	
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<p><i>Under the RPS 2017e modelling study, the largest volume of condensate to be spilled, was 19,400m<sup>3</sup>, via a vessel collision (Scenario 3). Figures were provided showing the potential hydrocarbon exposure of these events. No similar maps have been provided of the most recent stochastic modelling commissioned by Santos, with a greater volume of sub-sea volume estimate, which was referenced in their OPEP. However, we submit that it is likely that a far greater geographical region will be affected, including Australian, Indonesian and Timor-Leste territory. [Con-1082]</i></p>	<p><i>Santos assessed the claims/objections as not valid based on the explainable differences between the 2017 and 2019 spill modelling studies and the integrity of the results not being compromised.</i></p>	<p><i>For both condensate spill scenarios in the Barossa Development OPP, the OPP displays stochastic modelling results separately for surface, entrained and dissolved hydrocarbons. For the loss of well containment scenario in the EP, stochastic modelling results for surface (or floating), entrained, dissolved are combined into one figure (Figure 7.3). When comparing Figure 7.3 in the EP to the equivalent figures in the OPP (Figure 6-24; Figure 6-25; Figure 6-26) it is evident that the area that may be affected is comparable between both sets of figures, and in both cases the furthest extent of the environment that may be affected is determined by the entrained component of the released condensate.</i></p> <p><i>Spill modelling for both the OPP in 2017 and the EP in 2019 was performed by specialist consultants external to Santos, with extensive experience in spill modelling. Despite the differences observed by ECNT between the 2017 and 2019 modelling studies, as explained above these differences do not compromise the integrity of the modelling results and in both cases serve as</i></p>	<p><i>No additional EP controls required.</i></p>
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		<p><i>a useful tool to assess the impacts of a worst-case spill event and to develop appropriate spill response strategies. The modelling results for both the OPP and the Barossa Drilling and Completions EP can be relied upon. [Con-1252]</i></p>	
<p><i>Santos has failed to treat condensate uniquely throughout its oil spill management response plans, including monitoring, response, and clean-up. We submit that the environmental impacts and risks of the activity have not been appropriately identified, and therefore have not been appropriately reduced. [Con-1082]</i></p>	<p><i>Santos assessed the claim/objection as not valid based on the OPEP methodology and information being based on the appropriate industry practice.</i></p>	<p><i>Appendix A of the Barossa Development OPEP and the Barossa Development OPEP Addendum: Drilling and Completions (pp. 268 of the Barossa Development OPEP) consider and assess the properties of condensate and specific response strategies for a condensate spill. These sections of the OPEP appropriately identify the environmental impacts and risks of the drilling and completions activity.</i></p> <p><i>The OPEP Addendum: Drilling and Completions considers a range of spill response strategies which have been assessed as potentially applicable for combatting a condensate spill based on the spill modelling results. The OPEP identifies the following as applicable primary and secondary response strategies for a condensate spill: source control, implementation of a monitor and evaluate plan, mechanical</i></p>	<p><i>No additional EP controls required.</i></p>

		<p><i>dispersion, oiled wildlife response and scientific monitoring.</i></p> <p><i>All strategies would be subject to an operational net environmental benefit analysis during an actual spill incident, to confirm the response strategies with the least detrimental environmental impacts. [Con-1252]</i></p>	
<p><i>The closest environmental values and sensitivities to the Barossa offshore development area are submerged shoals and banks, which include Lynedoch Bank (38 km to the south-east), Evans Shoal (62 km to the west) and Tassie Shoal (71 km to the west). The RPS 2017e hydrocarbon spill modelling scenario identifies a further approximately 91 reefs, shoals and banks in the region, which could be variously impacted in the event of a hydrocarbon spill. The impact of a condensate spill on these reefs has not been adequately identified nor have steps to mitigate these impacts. [Con-1082]</i></p>	<p><i>Santos assessed the claim/objection as not valid based on the explainable differences in the EMBA values and sensitivities assessed in the OPP and the Drilling and Completions OPEP.</i></p>	<p><i>The Barossa OPP assessed values and sensitivities across the cumulative environment that may be affected by all Barossa Development scopes e.g. drilling, pipeline installation, Floating Production Storage and Offloading (FPSO) vessel operations. As a result, the EMBA for the OPP is larger than the EMBA for the Drilling and Completions activity and will include additional values and sensitivities not relevant for the Drilling and Completions EMBA. All values and sensitivities relevant to the EMBA for the Drilling and Completions activity, inclusive of submerged shoals and banks, have been identified in Section 3 of the EP and further considered in the impact assessment and control measures in subsequent sections of the EP. [Con-1252]</i></p>	<p><i>No additional EP controls required.</i></p>

<p><i>The threshold of 1g/m2 of condensate used by Santos for the spill modelling is too high – a closure of fisheries would be required once condensate is visible in the water, which may be observed at 0.01g/m2. The modelling of impacts would be significantly changed if a lower threshold for observed impacts is used. It also remains unclear as to how long fisheries would be required to be closed due to ecotoxicity, especially given the enduring impacts of phenanthrenes in marine environments. [Con-1082]</i></p>	<p><i>Santos assessed this claim/objection as not valid based on the appropriate regulatory advice and scientific literature used by Santos to determine this threshold.</i></p>	<p><i>To identify appropriate exposure values to set the outer limit of the EMBA, Santos has followed the advice provided by NOPSEMA in Environment Bulletin Oil Spill Modelling (2019)<sup>1</sup> and scientific literature.</i></p> <p><i>Based on this advice and the literature, a more appropriate metric for measurement of underwater impacts that would be relevant to potential fisheries impacts is concentrations of dissolved and/or entrained hydrocarbons. The corresponding low exposure value threshold for dissolved and entrained hydrocarbons is 10 ppb.</i></p> <p><i>For the Barossa condensate ecotoxicity assessment performed for the Barossa OPP, the results showed that the moderate reliability guideline value for the 99% species protection level for un-weathered condensate was 456 ppb. Based on results of the ecotoxicity assessment of Barossa condensate, the low exposure value of 10ppb used to set the outer limit of the EMBA is conservative. [Con-1252]</i></p>	<p><i>No additional EP controls required.</i></p>
<p><i>The EMBA defined by Santos is grossly inaccurate. The exposure value used by</i></p>	<p><i>Santos assessed this claim/objection as not valid based on the appropriate</i></p>	<p><i>To identify appropriate exposure values to set the outer limit of the EMBA Santos has followed the</i></p>	<p><i>No additional EP controls required.</i></p>

<p><i>Santos to define the EMBA is 1g/m2, however a more appropriate value would be 0.01g/m2, as this is the level at which, for example, the closure of fisheries may be necessary. [Con-1082]</i></p>	<p><i>regulatory advice and scientific literature used by Santos to identify the EMBA.</i></p>	<p><i>advice provided by NOPSEMA in Environment Bulletin Oil Spill Modelling (2019) and scientific literature. Relevant public scientific literature is cited in Tables 7-11, 7-12, 7-13 and 7-14 of the EP.</i></p> <p><i>Barossa spill modelling to inform the extent of the EMBA was performed by an external modelling consultant, who is suitably qualified and experienced in oil spill modelling risk assessment and planning.</i></p> <p><i>For the Barossa condensate ecotoxicity assessment performed for the Barossa OPP, the results showed that the average no-effects concentration for un-weathered condensate was 10,908 ppb. Based on results of the ecotoxicity assessment of Barossa condensate, the low exposure value of 10ppb used to set the outer limit of the EMBA is conservative.</i></p>	
<p><i>In RPS 2017e modelling provided was of Scenario 6, wherein a vessel collision was located less than 15km from the Tiwi Islands, resulting in exposure zones extending to the coastline of Bathurst Island, and even as</i></p>	<p><i>Santos assessed this claim/objection as not valid based on the vessel collision scenario cited not being relevant to the Drilling and Completion EP Operational Area.</i></p>	<p><i>Scenario 6 in the OPP relates to a vessel collision incident during installation of the GEP. The location of the Gas Export Pipeline (GEP) installation vessel activities is not relevant to the Barossa Drilling and Completions EP Operational Area. Oil spill</i></p>	<p><i>No additional EP controls required.</i></p>

<p>far as Darwin in relevant conditions. However, the Tiwi Islands and Darwin do not appear in the EMBA for the Drilling EP, which is a key omission. [Con-1082]</p>		<p>modelling for the EP is based on scenarios that are located in the EP Operational Area, approximately ~285km NNW from Darwin (and ~131km N of Tiwi Islands). The EP EMBA does not extend to the Tiwi Islands or Darwin— refer to Figure 7.3 of the EP. It is therefore appropriate that the EMBA for the EP does not include the Tiwi Islands and Darwin. [Con-1252]</p>	
<p>Santos has failed to qualify with appropriate evidence the ecotoxicity of Barossa condensate, and has therefore failed to:</p> <ul style="list-style-type: none"> <li>• demonstrate that the environmental impacts and risks of the activity will be reduced to ALARP.</li> <li>• demonstrate that the environmental impacts and risks of the activity will be of an acceptable level. [Con-1082]</li> </ul>	<p>Santos assessed this claim/objection as not valid based on information already publicly available in the Barossa OPP.</p>	<p>Appendix M of the Barossa OPP (Toxicity Assessment of Barossa Condensate), which is summarised in section 6.4.10.4 of the OPP, contains a detailed assessment of the ecotoxicity of Barossa condensate. This is an important source of information to demonstrate that environmental impacts and risks of the activity will be reduced to ALARP and an acceptable level. [Con-1252]</p>	<p>No additional EP controls required.</p>
<p>Appendix L to the Project Proposal provides a Toxicity Assessment of Barossa Condensate. The study assessed the toxicity of:</p> <ol style="list-style-type: none"> <li>1. un-weathered Barossa-3 condensate (full suite of</li> </ol>	<p>Santos assessed this claim/objection as not valid based on information already publicly available in the Barossa OPP and the use of the appropriate scientific methodology for</p>	<p>Appendix M of the OPP provides a detailed assessment of the ecotoxicity assessment of Barossa condensate.</p> <p>As discussed in Section 6.4.10.4 of the Barossa OPP, toxicity testing of the unweathered Barossa</p>	<p>No additional EP controls required.</p>



<p>toxicants); and</p> <p>2. weathered Barossa-3 condensate (limited tests involving fish only).</p> <p>Given the presence of tropical coral reefs, seagrass meadows, sponges, plankton, mangroves and other biota in Australian and Indonesian waters, Indonesia's multimillion dollar aquaculture industry; and the fact that modelling predicted that weathered condensate could reach the coast in around 12 days, it is unclear why weathered Barossa condensate was only tested on fish. [Con-1082]</p>	<p>such assessments.</p>	<p>condensate was undertaken by Ecotox Services Australasia (ESA) using a full suite of toxicity tests on multiple tropical trophic levels (7 taxonomic groups) using early life stages of the test organism when organisms are typically at their most sensitive to hydrocarbons.</p> <p>Given the spill modelling did not predict any contact of the water accommodated fraction at the nearest non-transient submerged values/sensitivities within 24 hrs (the period in which the majority of the volatiles would be lost) it was considered that fish would be the most likely value/sensitivity to be exposed to the weathered condensate given the proximity of the Timor Reef Fishery, which is why toxicity testing of the weathered condensate was limited to fish (Jacobs 2017). This is a standard scientific methodology for such assessments. [Con-1252]</p>	
<p>ECNT questions how weathered condensate in particular phenanthrene and naphthalene may interact with marine environments, and over what period of time. A full assessment of</p>	<p>Santos assessed this claim/objection as not valid based on information already publicly available in the Barossa OPP and the use of the appropriate scientific methodology for</p>	<p>Of the polycyclic aromatic hydrocarbons (PAHs) analysed as part of the ecotoxicity assessment of the Barossa condensate (Barossa OPP Appendix M), the low molecular weight PAH, naphthalene, was the only</p>	<p>No additional EP controls required.</p>

<p><i>the scientific literature and the gaps relating to the impact of weathering on condensate toxicity and weathered condensate impacts on a variety of species needs to be investigated. [Con-1082]</i></p>	<p><i>such assessments.</i></p>	<p><i>chemical that was higher in the water accommodated fraction (WAF) weathered condensate compared to the WAF unweathered condensate. All other PAHs remained unchanged, with most being below or near the detection limit in both the weathered and unweathered condensates.</i></p> <p><i>The aquatic toxicity studies undertaken showed that both the unweathered and weathered Barossa condensate were of low toxicity to fish larvae at EC50 (7 days, imbalance) = 23182.2 ppb &amp; EC50 (7 days, biomass) = 24006.3 ppb and EC50 (7 days, imbalance and biomass) &gt; 22 480 ppb, respectively. As the aquatic toxicity results for the WAF unweathered and weathered condensate were similar, further discussion relating to the impact of weathering on condensate toxicity was not considered necessary in the EP. This is a standard scientific methodology for such assessments. [Con-1252]</i></p>	
<p><i>Various unsubstantiated claims are made pertaining to the toxicity of condensate to aquatic species. For instance, in Appendix K</i></p>	<p><i>Santos assessed this claim/objection as not valid based on information already publicly available in the Barossa OPP and well-</i></p>	<p><i>It is well documented in the literature (Fucik et al, 1995)<sup>2</sup> that BTEX compounds have significant acute toxicity effects on aquatic organisms. However, due to the</i></p>	<p><i>No additional EP controls required.</i></p>

<p><i>Santos claims that:</i></p> <p><i>BTEX compounds are acutely toxic to aquatic organisms if exposure is sustained. Because of the volatility of BTEX, aquatic organisms typically only experience short exposure times in the order of 12 hours which may circumvent toxic effects.</i></p> <p><i>However, no evidence is presented that exposure times of 12 hours or less will circumvent toxic effects. [Con-1082]</i></p>	<p><i>documented scientific literature.</i></p>	<p><i>rapid minimisation and degradation processes of BTEX compounds, exposure to aquatic organisms is expected to be short-term and minimised. This is demonstrated by hydrocarbon minimisation of the Barossa condensate following 12 hours of weathering where it was shown that there was a large reduction in benzene and toluene (Barossa OPP, Appendix M).</i></p> <p><i>With regard to the claim that short exposure times in the order of 12 hours or less may circumvent toxic effects, this is demonstrated by the fish biomass/imbalance toxicity tests which showed that neither the unweathered nor weathered Barossa condensate was particularly toxic to fish larvae. [Con-1252]</i></p>	
<p><i>Santos has not provided any evidence in the Drilling EP regarding how long components of condensate will be present in the environment. This is especially important as the Timor Reef Fishery has previously been assessed (RPS 2017e) as having a 100% probability of being impacted by any subsea</i></p>	<p><i>Santos assessed this claim/objection as not valid based on information already publicly available in the Barossa OPP and well-documented scientific literature.</i></p>	<p><i>Section 7.5.3.1 of the EP discusses the weathering characteristics of Barossa condensate. 93% of Barossa condensate is comprised of non-persistent volatile constituents that rapidly evaporate or decay. Napthalene, fluorene and phenanthrene comprise part of the volatile component of the condensate.</i></p> <p><i>Due to the low volatile fraction of the Barossa condensate, it does</i></p>	<p><i>No additional EP controls required.</i></p>

<p><i>release that would occur at the Barossa project. Santos has not adduced any evidence as to the length of time that, in particular, naphthalene, fluorene and phenanthrene may persist in the environment, or of their impacts. Thus, no evidence has been presented as to the longevity of impacts on the Timor Reef Fishery. Following the Sanchi Oil Spill in 2018, a study found that “a certain amount of the high-molecular weight and toxic oil contents such as phenanthrenes still highly remain in the aquatic system even after a long evaporation process, indicating their detrimental potentials to the aquatic organisms”. [Con-1082]</i></p>		<p><i>not contain the persistent high molecular weight (HMW) PAHs (4 to 6 aromatic rings), therefore the weathered residues of the condensate are not considered to present any ecotoxicological threat (RPS 2017e). Naphthalene, phenanthrene and fluorene are all low molecular weight (LMW) PAHs (i.e., contain 3 aromatic rings or less), which have a much lower persistence than the HMW PAHs, although they are more bioavailable due to a higher water solubility. However, fish readily take up lipophilic organic contaminants such as naphthalene from the environment and possess a variety of cellular mechanisms for protection against the deleterious effects of such chemicals (Peters et al., 1997).</i></p> <p><i>As previously mentioned, the WAF weathered Barossa condensate was found to be of low toxicity to fish larvae following 7 days of exposure so no further discussion was considered necessary. This is a standard scientific approach to such assessments. Studies on the half-lives of specific LMW PAHs (i.e. naphthalene, fluorene and phenanthrene) ranged from ~ 3 to 8 days, whereas half-lives of</i></p>	
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<p>Santos has not provided further evidence regarding the toxicity of Barossa condensate, and especially when affected by UV exposure, temperature and pH, which would be relevant to consider if condensate were to be spilled in the open ocean in a low latitude environment. A 2016 study found that "UV irradiance can increase the potency of PAHs through oxygen radical formation and concomitant damage to membranes and DNA". [Con-1082]</p>	<p>Santos assessed this claim/objection as not valid based on the appropriate scientific literature.</p>	<p>Due to the low aquatic toxicity of the weathered Barossa condensate, further discussion of the impacts of physicochemical parameters and UV radiation was not deemed necessary.</p> <p>The potential for photoactivation of a chemical is primarily determined by its ring conjugation and conformation. While ultraviolet radiation (UVR) increases toxicity of some individual PAHs by more than 10 times, other smaller ringed aromatics, as found in the Barossa condensate, including BTEX, naphthalene and phenanthrene are not considered phototoxic. (Mekenyan et al 1994, Overman et al 2018).<sup>4</sup></p> <p>Studies show that the effects of temperature on PAH toxicity have no obvious pattern (Perrichon et al., 2018 &amp; DeLorenzo et al., 2021). It also may be the case that when interactive effects are observed, it is more likely that the PAH exposure adds to the</p>	<p>No additional EP controls required.</p>

		<p><i>negative effects of temperature rather than the temperature changing the toxicity of the PAHs. Although some evidence of the potential for compounding effects between temperature and contaminate exist, the system is dynamic, the synergistic effects are difficult to capture, and further study in this area is necessary.</i></p> <p><i>Likewise with pH, studies have shown that pH may have inhibitory effects on the ability of oysters to detoxify xenobiotics and breakdown reactive oxygen species or inhibitory effects on the immune response of molluscs, and not increase the toxicity effects of PAHs (Liam et al. 2019, Su et al. 2017). Due to the buffering capability of the marine environment, the effects of pH are unlikely to have any impact on the toxicity of the Barossa condensate. [Con-1252]</i></p>	
<p><i>ECNT holds significant concerns about Santos' plans to use dispersants. There has not been any appropriate testing of Barossa condensate combined with dispersants. Given that dispersants can</i></p>	<p><i>Santos assessed this concern as valid in the context of discussion already contained in the Barossa Drilling and Completions OPEP of the pros and cons of SSDI and the recommended action in</i></p>	<p><i>In the first instance, the Barossa Drilling and Completions OPEP does not recommend use of surface chemical dispersants for a condensate spill. The OPEP does however recommend subsea dispersant injection as a potential secondary response strategy as it</i></p>	<p><i>No additional EP controls required.</i></p>

<p><i>increase ecotoxicity, as well as bioavailability of toxicants to marine fauna and flora, we submit that it is inappropriate for Santos to continue these plans.</i></p> <p><i>For example, in 2010, researchers tested the impacts on a pelagic alga (Sargassum) of exposure to Corexit dispersant, finding that:</i></p> <p><i>within the dispersant only and dispersed-oil treatments, Sargassum sank to the bottom within 24–48 hours. In contrast, Sargassum in the oil only and control treatments remained at the surface of the tank for the majority of the experiment.’ Therefore, it appears that in the experiment, the use of dispersant, as opposed to hydrocarbon exposure alone, was the cause of the algae sinking to the bottom.</i></p> <p><i>We question why Santos is suggesting use of SSDI as a method, given that the aim of SSDI is to reduce the amount of oil coming to the surface, as this could impede</i></p>	<p><i>the OPEP to use an Operational Net Environmental Benefit Analysis (NEBA) during a spill incident to determine the most effective response strategies with the least detrimental environmental impacts.</i></p>	<p><i>relates specifically to source control activities. Notwithstanding this recommendation, the OPEP acknowledges the potential shortcomings of subsea dispersant injection (SSDI) and that there is a trade-off to be considered between reducing exposure at the sea-surface to marine life and source-control responders versus the potential to increase entrainment of hydrocarbons in the water column, when considering use of SSDI.</i></p> <p><i>Therefore, the Barossa Drilling and Completions OPEP only considers the use of SSDI as a potential secondary response strategy to assist or enable source control activities should this be determined to be necessary, which would still be subject to the results of the Operational Net Environmental Benefit Analysis (NEBA) during a spill incident, so that the most effective response strategies with the least detrimental environmental impacts can be identified, documented and executed. [Con-1252]</i></p>	
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<p><i>the extensive evaporation of condensate cited by Santos.</i></p> <p><i>There are inconsistencies in Santos' rationale for the use of dispersants. Santos is asserting that based on condensate's properties, that the majority of condensate will evaporate; however, Santos is also proposing to deploy SSDI which could significantly reduce the quantity of condensate that would reach the surface, and therefore also decrease the amount of condensate that would evaporate—significantly increasing the amount of condensate in the water column, and potentially also increase its toxicity. [Con-1082]</i></p>			
<p><i>ECNT is concerned that no evidence base exists to reliably determine the potential scope of impacts of dispersant. This is particularly concerning given Santos' intention to use subsea dispersant injection (SSDI) "if conditions are appropriate". Prior to the BP Deepwater Horizon disaster,</i></p>	<p><i>Santos assessed this concern as valid in the context of discussion already in the Barossa Drilling and Completions OPEP of the pros and cons of SSDI and the recommended action in the OPEP to use an Operational Net Environmental Benefit Analysis (NEBA) during a</i></p>	<p><i>Chemical dispersants listed as approved in the National Plan for Maritime Environmental Emergencies Register of Oil Spill Control Agents (OSCA) are to be minimised for use. OSCA listed dispersants are readily available to Santos through AMOSC, OSRL and AMSA.</i></p> <p><i>If dispersant types additional to those on the Register of OSCA are</i></p>	<p><i>No additional EP controls required.</i></p>



<p><i>sub-sea dispersant injection had never been done. During the response to the BP Deepwater Horizon spill, millions of litres of dispersants Corexit EC9500A and Corexit EC9527A – two dispersants which are currently listed on the Australian Oil Spill Register – were deployed. Since the BP Deepwater Horizon spill, further information has emerged about these dispersants, including that Corexit combined with oil was 52 times more toxic than oil alone. [Con-1082]</i></p>	<p><i>spill incident to determine the most effective response strategies with the least detrimental environmental impacts.</i></p>	<p><i>required, Santos will use its Offshore Division Operations Chemical Selection, Evaluation and Approval Procedure (EA-91-II-10001) before application.</i></p> <p><i>The Santos Offshore Division Operations Chemical Selection, Evaluation and Approval Procedure requires the dispersant to be risk assessed and deemed environmentally acceptable. [Con-1252]</i></p>	
<p><i>To the extent of ECNT's knowledge, the stakeholders that will potentially be most impacted by the use of dispersant have not been consulted on its potential use. This includes Tiwi Island communities and individuals in Indonesia and Timor-Leste. To our knowledge Santos has not provided Tiwi Island communities with adequate information about what would happen in the case of a maritime emergency, and to seek their input as to the</i></p>	<p><i>Santos assessed this claim/objection as not valid based on the consultation being undertaken by Santos with all Tiwi Islands clan groups and additional EP controls that have resulted from these consultations.</i></p>	<p><i>Santos is consulting with all Tiwi Island clan groups for the Barossa Drilling and Completions EP and OPEP, including spill response plans for all credible spill scenarios for the EP.</i></p> <p><i>This consultation includes discussions regarding the appropriate responses to a potential maritime emergency situation associated with the EP. [Con-1252]</i></p>	<p><i>Consultation report (Section 4.73.2.8.8)</i></p>

<p><i>appropriateness of the use of dispersants in their sea country. Further, Santos has not provided Tiwi Island communities with any information about dispersant use, any of the scientific studies regarding dispersants on the National Register or engaged with them about any process for ensuring their participation in decision making about oil spill response. [Con-1082]</i></p>			
<p><i>ECNT noted that it has previously been recommended by the International Tanker Owners Pollution Federation Ltd (ITOPF) that dispersant not be used at all on condensate spills. [Con-1082]</i></p>	<p><i>Santos assessed this claim as not valid based on the cited recommendation being related to the use of surface dispersant for sea surface condensate spills and this not being contemplated as a response strategy in the Barossa Development OPEP.</i></p>	<p><i>ITOPF's recommendation against use of dispersant for condensate spills relates to the use of surface dispersant for sea surface condensate spills. The Barossa Development OPEP Addendum: Drilling and Completions on the other hand only contemplates use of subsea dispersants, through use of SSDI, as a secondary response strategy to assist with source control and would be subject to assessment through application of the operational NEBA. [Con-1252]</i></p>	<p><i>No additional EP controls required.</i></p>
<p><i>There has been inadequate baseline assessment of shoals, coral reefs and marine species and aquaculture industry within</i></p>	<p><i>Santos assessed this claim as not valid due to the available baseline information used to inform this assessment in the EP.</i></p>	<p><i>Santos does not accept your submission. Santos has used the available baseline information to inform the description of the environment in Indonesian and</i></p>	<p><i>No additional EP controls required.</i></p>

<p><i>Indonesian territory, as well as Tiwi fishing practices, and a failure to identify how and when these receptors could be impacted in the event of a major subsea release.</i> [Con-1082]</p>		<p><i>Timor-Leste waters (as described in Section 3.2 of the EP), and the assessment of environmental risks and impacts at these locations. Santos will also consider during its consultation process any other information relevant to the environment that may be affected.</i> [Con-1252]</p>	
<p><i>While the OPP provides an (inadequate) assessment of what could be affected within Australian waters, there is no comparable assessment of the shoals that could be affected, fish species, bird species, or the impact of gas condensate or pollutants on the aquaculture or fishing industries, or upon the thousands of citizens of East Nusa Tenggara and Timor-Leste who depend on the seaweed farming and fishing industries for their food, livelihood and income, if a spill disaster were to occur.</i></p> <p><i>We submit that potential damage to Indonesia and Timor-Leste is reasonably foreseeable and significant, as evidenced within the OPP and former modelling</i></p>	<p><i>Santos assessed this claim as not valid based on the EP containing an appropriate assessment of the environmental values, sensitivities, risks and impacts in Indonesian and Timor-Leste waters as relevant to the Drilling and Completions activity.</i></p>	<p><i>Section 3 of the EP identifies environmental values and sensitivities in Indonesian and Timor-Leste waters, including significant seabed habitats, subsistence fishing and seaweed farming practices. Sections 6 and 7 of the EP assesses the impacts and risks on these environmental values and sensitivities for planned activities and unplanned events respectively. These sections set out the expected and possibly impacts for each relevant environmental value and sensitivity, and how Santos will manage those impacts. The EP therefore contains an appropriate assessment of the environmental values, sensitivities, risks and impacts in Indonesian and Timor-Leste waters as relevant to the Drilling and Completions activity.</i> [Con-1252]</p>	<p><i>No additional EP controls required.</i></p>

<p><i>commissioned by ConocoPhillips. Following the initial decision in Sanda v PTTEP Australasia (Ashmore Cartier) Pty Ltd (No 7) [2021] FCA 237 it was suggested that subsequently, 'in conducting a risk assessment, statutory compliance may not be enough'. [Con-1082]</i></p>			
<p><i>The drilling and completions activities proposed by Santos are a necessary and indispensable component of the Barossa Project. [Con-1082]</i></p>	<p><i>Santos noted this comment.</i></p>	<p><i>The comment is noted. [Con-1252]</i></p>	<p><i>No additional EP controls required.</i></p>
<p><i>The total greenhouse gas emissions of the Barossa Project which would be facilitated by the drilling and completions activities, have not been disclosed by Santos. [Con-1082]</i></p>	<p><i>Santos assessed this claim as not valid based on this consultation being for the Barossa Drilling and Completions EP.</i></p>	<p><i>This consultation is in relation to the Barossa Drilling and Completions EP. Details with regard to greenhouse gas emissions of the Barossa Project will be provided when Santos consults about the Production Operations EP.</i></p> <p><i>However, we provide the below information to assist you in understanding Santos' Barossa Project.</i></p> <p><i>Santos provided in the Barossa OPP an estimated range of total project emissions of 2.1-3.8 Mtpa CO2e. This was accepted by</i></p>	<p><i>No additional EP controls required.</i></p>

		<p><i>NOPSEMA in 2018. This remains within the range of our latest estimate. Santos continues to minimise the design of the Barossa facilities design to minimise emissions to ALARP and an acceptable level. Section 6.3 of the Barossa Drilling and Completions EP provides an estimate of total CO2e emissions for the drilling activity. [Con-1252]</i></p>	
<p><i>The Federal Court has recently held that ancillary but necessary components of projects are required to be assessed as part of the project as whole. In Australian Conservation Foundation Inc v Minister for the Environment [2021] FCA 550, the Court made it clear that assessment ought not be limited to a narrow sense of individuated operations when those operations are so connected and closely associated as to be integral to a broader project. [Con-1082]</i></p>	<p><i>Santos assessed this claim as not valid based on this consultation being for the Barossa Drilling and Completions EP.</i></p>	<p><i>The Barossa Project has received approval through NOPSEMA's acceptance of the OPP. A production licence to extract gas and condensate from the Barossa field has been granted by the National Offshore Petroleum Titles Administrator to Santos (as operator of the JV). Each EP for an activity under the OPP is required to assess the impacts and risks of that particular activity and demonstrate to NOPSEMA that those risks have been reduced to ALARP and an acceptable level. [Con-1252]</i></p>	<p><i>No additional EP controls required.</i></p>
<p><i>We note that Santos has been required by the Northern Territory EPA in the course of its assessment of the Darwin Pipeline</i></p>	<p><i>Santos assessed this claim as not valid based on the following:  This consultation is for the Barossa Drilling and</i></p>	<p><i>The Darwin Pipeline Duplication Project is not "another component part" of the Barossa Project. The Barossa Drilling and Completions activity is regulated by NOPSEMA</i></p>	<p><i>No additional EP controls required.</i></p>

<p><i>Duplication Project (another component part of the Barossa Project) to provide details of the Barossa Project's greenhouse gas estimates of annual and total scope 1, 2 and 3 emissions over the life of the Barossa Project both inside and outside of Australia, including emissions from the point of extraction from the reservoir through to completion of liquefaction.</i></p> <p><i>As such, ECNT considers that Santos is required to provide information both about the greenhouse gas emissions associated with the drilling and completions activities, and the Barossa Project's total emissions to relevant persons in the course of consulting on the Drilling and Completions Environment Plan. [Con-1082]</i></p>	<p><i>Completions EP</i></p> <p><i>The DPD Project is not another component part of the Barossa Project</i></p> <p><i>The DPD Project is subject to a separate regulatory assessment process.</i></p>	<p><i>under the Offshore Petroleum Greenhouse Gas Storage Act and Offshore Petroleum Greenhouse Gas Storage (Environment) Regulations.</i></p> <p><i>This consultation is in relation to the Barossa Drilling and Completions EP. Details with regard to greenhouse gas emissions of the Barossa Project will be provided when Santos consults about the Production Operations EP. However, to assist you in understanding Santos' Barossa Project, see the information provided in item 36.</i></p> <p><i>Section 6.3 of the Barossa Drilling and Completions EP provides an estimate of total CO2e emissions for the drilling activity. [Con-1252]</i></p>	
<p><i>ECNT requested further information on the following:</i></p> <ul style="list-style-type: none"> <li><i>Full scholastic modelling commissioned for the Drilling EP.</i></li> </ul>	<p><i>The information requests will be addressed by Santos in a detailed response provided to ECNT, including links to information already made publicly available by Santos, NOPSEMA and</i></p>	<p><i>Santos provided guidance to the requested information and/or links to available information in the answers to each claim/objection raised by ECNT.[Con-1252]</i></p>	<p><i>No additional EP controls required.</i></p>

<ul style="list-style-type: none"> <li>• <i>Data relating to ecotoxicity of condensate, including on a variety of marine species, longevity of condensate components in environment, and impacts of UV and pH on toxicity of condensate.</i></li> <li>• <i>Data relating to the impacts of dispersant, particularly its interaction with condensate and potential toxicity to marine life.</i></li> <li>• <i>Baseline assessment of shoals, coral reefs and marine species and aquaculture industry within Indonesian territory that may be impacted in the event of a major subsea release.</i></li> <li>• <i>The total greenhouse gas emissions associated with the drilling and completions activities and where these greenhouse gas emissions will occur, including any</i></li> </ul>	<p><i>relevant academic and research organisations.</i></p>		
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<p><i>flaring/venting of greenhouse gas emissions both offshore and onshore.</i></p> <ul style="list-style-type: none"> <li>• <i>The total greenhouse gas emissions associated with the Barossa Project and where these greenhouse gas emissions will occur, both offshore and onshore.</i></li> <li>• <i>The potential impacts and risks of the Barossa Project's greenhouse gas emissions in relation to global warming and climate change, including whether and how those emissions would fit within a carbon budget and emissions reduction scenarios aligned with the temperature goals of the Paris Agreement.</i></li> <li>• <i>The proposed greenhouse gas emissions control measures for the Project, including details of any proposal for carbon capture and</i></li> </ul>			
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<p>storage. [Con-1082]</p>			
<p><b>ECNT correspondence [Con-1261]</b></p> <p>Santos took a period of 6 weeks to provide a response to our correspondence.</p> <p>For the reasons set out below, we will provide a substantive response to your 23-page letter by no later than 10 July 2023 – a period of approximately 5 weeks from receipt of your correspondence.</p> <p>Pursuant to your invitation, we request a meeting either in person or if that is not possible, then via videoconference, at a date convenient to Santos’ representatives and ECNT representatives after the submission of our letter by 10 July 2023.</p>	<p>Santos assessed this claim as not valid due to the information and opportunities that had been provided to ECNT.</p>	<p><b>Santos response [Con-1400]</b></p> <p>Santos has been consulting with ECNT since 11 June 2021. Santos reiterates that on 24 April 2023 ECNT was provided with information on upcoming community consultation drop-in sessions relating to the Drilling and Completions EP, held in Darwin on 27 April and 3 May 2023. ECNT had ample opportunity to avail itself of these consultation sessions.</p> <p>ECNT representatives have also attended certain meetings and consultation sessions held by Santos on the Tiwi Islands on 6-8 February 2023 and 22 March 2023. Therefore, having considered your request for more time, Santos maintains its request for ECNT’s feedback by 15 June 2023.</p> <p>Note: In further correspondence to ECNT [Con-1445] Santos stated it could accommodate an extension until Friday, 23 June 2023 and was available next week for a meeting.</p> <p>Santos provided a detailed response to your 24 April letter, which was appropriate in the</p>	<p>No additional EP controls required.</p>

		<p><i>context of the matters raised by ECNT. Santos considers the risks associated with those matters to be appropriately mitigated by the control measures Santos intends to implement, as outlined on Santos' website (<a href="https://www.santos.com/barossa/">https://www.santos.com/barossa/</a>) and the Drilling and Completions Information Booklet and Fact Sheet attached to our 3 June 2023 letter.</i></p> <p><i>Santos' proposed control measures are more comprehensively described in Revision 3 of the EP available online at NOPSEMA's website (<a href="https://docs.nopsema.gov.au/A831694">https://docs.nopsema.gov.au/A831694</a>)</i></p>	
<p><i>You state that greenhouse gas emissions of the Barossa Project will be provided when Santos consults about the Productions Operations EP). We maintain the position articulated in our correspondence of 24 April 2023, that the drilling and completions activities are a necessary and indispensable component of the Barossa Project. The greenhouse gas emissions</i></p>		<p><i>Greenhouse gas emissions associated with the operations of the Barossa Gas Project will be addressed in the Operations EP and are not indirect environmental impacts of the Drilling and Completions activity.</i></p> <p><i>Consequently, ECNT's requests for information regarding the greenhouse gas emissions associated with other Barossa Gas Project activities are not relevant to the EP. [Con-1400]</i></p>	<p><i>No additional EP controls required.</i></p>

<p><i>of the Barossa Project are an indirect environmental impact of the activity proposed in the Drilling and Completions EP.</i></p> <p><i>As such, if the Drilling and Completions EP fails to address the environmental impacts and risks of the greenhouse gas emissions of the Barossa Project, then it will not meet the requirement in regulation 13(6) that the plan must evaluate all environmental impacts and risks arising directly or indirectly from all operations of the activity and cannot satisfy the requirements set out in regulation 10A.</i></p> <p><i>As such, we invite you to urgently provide detailed information about greenhouse gas emissions, as requested at paragraph 38 our letter of 24 April 2023. [Con-1261]</i></p>			
<p><b>ECNT correspondence [Con-1426]:</b></p> <p><i>ECNT reiterates our previous statement that we will be in a position to</i></p>	<p><i>Santos has provided the ECNT with sufficient information and reasonable time to assess any possible impacts of the Drilling and</i></p>	<p><b>Santos response [Con-1445]:</b></p> <p><i>As previously stated, Santos has been consulting with the ECNT since 2021. The ECNT has been provided with updated</i></p>	<p><i>No additional EP controls required.</i></p>

<p><i>provide a substantive response to your 23-page letter by no later than 10 July 2023.</i></p> <p><i>This timeframe reflects the fact that ECNT has engaged one or more experts to assist in informing our response to the substantive points discussed in your letter and they require a reasonable period of time to engage with these matters.</i></p> <p><i>This period of time (5 weeks) that we are requesting to engage with substantive information provided on 3 June 2023 is less than the 6 weeks Santos took to respond to our correspondence. Each time further information is provided ECNT expects a reasonable time period to consider and respond, as outlined under NOPSEMA’s consultation reg 11A(2).</i></p> <p><i>ECNT reiterates that greenhouse gas emissions of the Barossa project are material to an assessment of the Drilling and Completions EP.</i></p>	<p><i>Completions Environment Plan on the ECNT’s functions, interests and activities, and to provide any feedback it may have</i></p>	<p><i>materials from April 2023. The ECNT has attended the Tiwi Islands consultations, where detailed information on the Drilling and Completions EP was provided.</i></p> <p><i>Santos has also provided detailed responses to the ECNT’s queries (as relevant to the Drilling and Completions EP) and addressed its concerns (on 3 June).</i></p> <p><i>We consider we have provided the ECNT with sufficient information and reasonable time to assess any possible impacts of the Drilling and Completions Environment Plan on the ECNT’s functions, interests and activities, and to provide any feedback it may have.</i></p>	
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<p><i>Santos' refusal on 14 June 2023 to provide information regarding the greenhouse gas emissions associated with the Barossa Gas project that would be enabled by the Drilling and Completion activities means that ECNT is unable to properly provide feedback on how these activities would impact our functions, interests, and activities.</i></p> <p><i>ECNT also reiterates that various information that was requested in our previous correspondence has not been provided, including the full stochastic modelling of a worst-case oil spill for the drilling and completions activity. A "summary of spill modelling results" that is provided in the Drilling and Completions Oil and Pollution Emergency Plan (OPEP) Addendum: Drilling and Completions is insufficient, and ECNT maintains its request for the full modelling.</i></p> <p><i>ECNT's concerns regarding the use of subsea</i></p>			
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<p><i>dispersant injection (SSDI) are not allayed by Santos' response on June 3 2023. ECNT maintains that Santos has not gathered sufficient information that would allow it to conduct an Operation Net Environmental Benefit Analysis (NEBA) during a spill incident, including information regarding the ecotoxicity of dispersants and the ecotoxicity of dispersants under interaction with condensate.</i></p> <p><i>ECNT will be in a position to have a productive meeting with Santos on or after 10 July 2023, by which time we will have corresponded in writing regarding our latest feedback on the Drilling and Completions EP.</i></p>			
<p><b>ECNT correspondence of 10 July 2023 [Con-2337]</b></p> <p><i>ECNT's concerns relating to oil spill scenarios, marine impacts, benthic habitat, protected and significant areas, threatened and migratory fauna, and</i></p>	<p><i>ECNT's letter provides no further response to the information provided by Santos on 3 June. Santos therefore considers its consultation with ECNT on these matters closed.</i></p>	<p><b>Santos response of 24 July 2023 [Con-2338]</b></p> <p><i>You refer to concerns relating to oil spill scenarios, marine impacts, benthic habitat, protected and significant areas, threatened and migratory fauna and socio-economic receptors</i></p>	<p><i>No additional EP controls required</i></p>

<p><i>socio-economic receptors have been outlined at length in previous correspondence to Santos. We maintain these concerns; they have not been assuaged by Santos. In this correspondence, however, we provide further detail regarding our concerns specifically relating to emissions and climate, based on new material that we have been provided since our previous correspondence.</i></p>		<p><i>outlined in previous correspondence to Santos, which we take to be reference to ECNT's 24 April letter.</i></p> <p><i>Santos replied to ECNT's 24 April letter in detail on 3 June. On 8 June, ECNT requested until 10 July to provide a substantive response to Santos' 3 June letter. ECNT's 10 July letter provides no further response to the information provided by Santos on 3 June. Santos therefore considers its consultation with ECNT on these matters closed.</i></p>	
<p><i>The attached report was commissioned by ECNT to inform our analysis of the Darwin Pipeline Duplication Project as well as of the Barossa gas project as a whole, including each of its constituent components.</i></p> <p><i>After considering the report's findings in light of our functions, interests, and activities, ECNT is in a position to provide the feedback below. ECNT submits that the report provides evidence that the Barossa project, of which</i></p>	<p><i>Greenhouse gas emissions associated with the operations of the Barossa Gas Project are not indirect environmental impacts of the drilling and completions activity. Greenhouse gas emissions associated with the operations of the Barossa Gas Project will be addressed in the Production Operations EP.</i></p>	<p><i>We note ECNT's feedback regarding the Barossa Project's emissions at paragraphs 8 to 13 of your letter and at Annex A. However, we reiterate our position in our letters of 3 June and 14 June.</i></p> <p><i>Greenhouse gas emissions associated with the operations of the Barossa Gas Project are not indirect environmental impacts of the drilling and completions activity. Greenhouse gas emissions associated with the operations of the Barossa Gas Project will be addressed in the Production</i></p>	<p><i>No additional EP controls required</i></p>

<p><i>the Drilling is a necessary and enabling part, through its greenhouse gas emissions, poses risks that are unacceptable and that have not been reduced to ALARP.</i></p> <p><i>ECNT finds, on the basis of the expert report provided to us, that the project poses unacceptable risks to the climate and is an unacceptable contribution to global greenhouse gas emissions. ECNT also submits that Santos has not accurately identified climate-related impacts and risks and as such has not demonstrated that they have reduced project risks to an acceptable or ALARP level.</i></p> <p><i>Furthermore, ECNT submits that Santos does not demonstrate how in its current form the project would comply with the relevant legislative requirements to offset the carbon emissions of the project.</i></p> <p><i>The estimated projects emissions of the Barossa</i></p>		<p><i>Operations EP.</i></p> <p><i>The scope of the Drilling and Completions EP is limited to the drilling and completion of Barossa development wells. The drilling and completions activity has no resource recovery component.</i></p> <p><i>NOPSEMA's acceptance of the Drilling and Completions EP does not permit the recovery, production or transportation of reservoir hydrocarbons. There are a number of subsequent petroleum activities that must be authorised under the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009 (Cth) and then undertaken before any natural gas is capable of being recovered.</i></p> <p><i>Consequently, ECNT's feedback regarding the greenhouse gas emissions associated with other Barossa Project activities is not relevant to the Drilling and Completions EP and is beyond the scope of consultation for this EP. You can stay up to date with consultation processes for other activity EPs by monitoring <a href="https://www.santos.com/barossa/">https://www.santos.com/barossa/</a>.</i></p>	
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<p><i>project, of which the Drilling is a necessary and enabling project, are vast. The project's reservoir emissions, gas field production emissions, and pipeline duplication alone total 2.58m tCO2e, and will increase the NT's carbon footprint by 14.9%. This does not include emissions from local use and distribution. Expert analysis has found that at "peak production of 3.7mtpa of gas per annum, the Barossa project produces an annual carbon footprint of 16.26m T-CO2e making it equivalent to the emissions of the 92nd largest country in the world. Just a fraction smaller than Kenya (16.3m t-CO2e) with a population of 49 million." As a peak environment body for the Northern Territory, a function of which is to protect the environment and which has an interest in the Northern Territory's carbon footprint being as small as possible, this project clearly represents an unacceptable risk to the</i></p>			
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<p><i>climate.</i></p> <p><i>Concerningly, Santos has made no attempt in this draft Drilling plan to account for these project emissions. ECNT maintains its position, communicated to Santos in previous correspondence, that greenhouse gas emissions and consequent impact on climate and environmental processes are an indirect impact of the Drilling activities and thus require assessment. In the report contained in Annex A Professor Cawthorne calculates that "The Barossa Project including all related facilities will produce approximately 304 million tonnes of greenhouse gasses over the life of the Barossa gas field and generate 16.2 million tonnes per annum when it reaches peak production," while noting that actual emissions are likely to be higher. How these figures correspond to Santos' own estimates for the project cannot be ascertained, because</i></p>			
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<p><i>Santos have not provided them in their draft Drilling plan.</i></p> <p><i>In order to avoid catastrophic scenarios of warming – i.e., to limit warming to 1.5C— greenhouse gas emissions need to decline sharply globally. However, the projected lifetime of Santos’ proposed project sees the project continuing to emit greenhouse gases beyond the year by which emissions have to be reduced to net zero in order to remain in consistency with Paris Agreement scenarios. The draft plan provided by Santos provides no evidence as to how the emissions facilitated by the Drilling activities can be reconciled with the need for the world to observe a sharp decline in emissions to limit warming to 1.5C. Major logical consistencies arise when considering both the stated emissions reductions commitments of Santos and respective Territory and Federal</i></p>			
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<p><i>Governments, and the carbon profile of the Barossa project. ECNT submits that it is incumbent upon Santos to address these inconsistencies and address the question of the project's emissions profile when seeking approval for an activity that will have these emissions as an indirect impact.</i></p> <p><i>Furthermore, the draft plan provides no evidence as to how the project will be compliant with the requirement to offset reservoir emissions to zero under the Safeguard Mechanism. The expert analysis annexed herein demonstrates that fulfilling these requirements will be exceedingly difficult, if not impossible. As Crawthorne finds, the "total of the reservoir emissions and reduction in operational emissions from the Barossa Project represents a 12.9% increase on the total abatement required from the 219 facilities under the safeguard</i></p>			
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<p><i>mechanism in 2025, it will be the largest abatement / offset requirement of any single facility until 2030". This could also have the likely impacts of constraining the local carbon market and making it more difficult for Australia to meet its climate goals.</i></p> <p><i>Santos has indicated elsewhere that it will seek to mitigate the impact of project emissions, by purchasing offsets and developing carbon capture and storage (CCS) capacity at the Bayu Undan gas field. However, expert analysis demonstrates that the scale of the project's emissions profile makes it "highly plausible that Santos will not be able to find the available offsets to meet their requirements under the Safeguard Mechanism legislation." The viability of CCS is also found to be uncertain. Therefore, in regard to climate impacts, Santos has failed to demonstrate that it has project risks to</i></p>			
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<p><i>an acceptable or ALARP level.</i></p> <p><i>The Safeguard Mechanism does not cover scope 3 emissions of the project, but these are still material to a consideration of the potential risks and impacts thereof. ECNT submits that the emissions enabled by the Drilling activities that will not be required to be offset – which is the majority of them—pose an unacceptable risk to the climate and jeopardise the ability for Australia to meet its Paris Agreement goals.</i></p>			
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**Greenpeace**

- Summary of consultation effort:**
- + On 15 May 2023 Santos emailed Greenpeace to explore whether it may be a Relevant Person and supplied Greenpeace with materials detailing the Activity, risks and impacts and proposed controls, including the Barossa Drilling and Completions Information Booklet and a link to Santos’ website and sought feedback by 15 June 2023. [Con-1195]
  - + On 15 May 2023 Greenpeace emailed Santos an automated response to the email sent by Santos on 15 May 2023. [Con-1201]
  - + On 18 May 2023 Santos emailed Greenpeace providing NOPSEMA’s brochure: *Consultation on offshore petroleum environment plans – Information for the community.* [Con-1205]
  - + On 29 May 2023 Santos emailed Greenpeace and provided a Drilling and Completions EP Fact Sheet. Santos also reminded Greenpeace of the timeframe for provision of feedback by 15 June 2023. [Con-1239]
  - + On 29 May 2023 Greenpeace emailed Santos an automated response to the email sent by Santos on 29 May 2023. [Con-1245]
  - + On 5 June 2023 Greenpeace emailed Santos with feedback regarding Barossa Drilling and Completions EP. Greenpeace claimed it was a Relevant Person and set out its

functions, interests and activities which included, but were not limited to, “protecting the natural environment and preventing environmental harm, such as the potential harm or risk of harm that may be posed by the activities in the Environment Plan.” Greenpeace had not contacted Santos prior to this date. Greenpeace made a number of requests for information about the consultation process, the activities proposed and the Environment Plan. [Con-1256]

- + On 16 June 2023 Santos emailed Greenpeace in response to the feedback and requests in its email of 5 June 2023. Santos requested any further feedback by 23 June 2023 [Con-1399]
- + On 23 June 2023 Greenpeace emailed Santos claiming that Santos’ consultation with Greenpeace was not adequate, requesting further information regarding Santos’ process for identifying relevant persons, enquiring how the project would fit within Australia’s remaining carbon budget and how the project would achieve relevant net zero obligations under the Safeguard Mechanism. Greenpeace advised it required until August 2023 to provide feedback. [Con-1423]
- + On 27 June 2023 Santos emailed Greenpeace in response to Greenpeace’s email of 23 June 2023. [Con-1455]
- + On 11 July 2023 Santos again emailed Greenpeace in response to Greenpeace’s email of 23 June 2023 and withdrew the 27 June 2023 email. [Con-1525]
- + On 24 July 2023 Greenpeace emailed Santos stating it was unclear whether Santos considered it to be a relevant person for the Drilling EP and advising it would provide a further response to Santos by about 4 August 2023. [Con-2339]
- + On 7 August 2023 Greenpeace emailed Santos and provided further correspondence stating why it was a relevant person for the Drilling EP, how it should specifically be consulted for the Drilling EP and requesting specific information. [Con-2341]
- + On 8 August 2023 Santos emailed Greenpeace in response to Greenpeace’s email of 24 July 2023 and correspondence of 7 August 2023. Santos stated that it had treated Greenpeace accordingly under regulation 11A(1)(d) of the OPGGS(E)R and believed it had provided sufficient information and a reasonable timeframe for Greenpeace to provide feedback. [Con-2342]
- + On 15 August 2023 Santos emailed Greenpeace and provided further response to Greenpeace’s correspondence of 7 August 2023. [Con-2343]
- + No further correspondence or feedback was received.

<b>Summary of Objection or Claim</b>	<b>Assessment of Merits</b>	<b>Santos’ Response Statement</b>	<b>EP Reference</b>
<p><b>Greenpeace correspondence [Con-1256]:</b></p> <p>Santos flagged that it considered that Greenpeace may be a “relevant person” as defined in the Environment</p>	<p>Santos noted the comment and will provide information on its consultation efforts.</p>	<p><b>Santos response [Con-1399]:</b></p> <p>Since March 2023, Santos has embarked on a media and advertising campaign in relation to consultation for the EP and has made information publicly available on its website regarding the proposed</p>	<p>No additional EP controls required.</p>

<p><i>Regulations in its correspondence to Greenpeace dated 15/5/23.</i></p> <p><i>Greenpeace confirms that it is a “relevant person” for the purposes of consultation on the Environment Plan. We request written confirmation from Santos that Greenpeace is considered to be a “relevant person”.</i></p> <p><i>We request the following information from Santos:</i></p> <ul style="list-style-type: none"> <li><i>● Detailed information about how Santos determines who is a “relevant person” as defined by r 11A(1) of the Environment Regulations versus who is not;</i></li> <li><i>● Detailed description of Santos’ usual approach to “relevant person” consultation, including any guiding principles underlying that approach;</i></li> <li><i>● Information about how Santos may tailor consultation processes on its Environment Plan so</i></li> </ul>		<p><i>activities, the risks and impacts and proposed controls.</i></p> <p><i>We also note the Barossa Drilling and Completions Environment Plan (Revision 3) was accepted by NOPSEMA in March 2022. A copy of Revision 3 of the EP is available online at NOPSEMA’s website (<a href="https://docs.nopsema.gov.au/A831694">https://docs.nopsema.gov.au/A831694</a>) This document has been publicly available since 15 March 2022.</i></p> <p><i>On 15 May 2023 we supplied Greenpeace with materials detailing the EP activity, risks and impacts and proposed controls, including the Barossa Project Drilling and Completions Information Booklet and a link to Santos’ website. We also explained Santos’ consultation process.</i></p> <p><i>By emails dated 18 and 29 May, Santos supplied copies of NOPSEMA’s Consultation on offshore petroleum environment plans – Information for the community brochure and a Drilling and Completions EP fact sheet, respectively.</i></p> <p><i>Regulation 11A of the Offshore Petroleum and Greenhouse Gas</i></p>	
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<p><i>that the process is “ appropriate for the category of relevant person, and the type of function, activities or interest ” [Con-1256]</i></p>		<p><i>Storage (Environment) Regulations 2009 (Cth) (Environment Regulations) sets out the criteria for a ‘relevant person’.</i></p> <p><i>Santos’ processes are informed and guided by the principles outlined in the NOPSEMA guideline ‘Consultation in the course of preparing an environment plan’ (N-04750-GL2086 A900179; 12/05/2023).</i></p> <p><i>The consultation processes followed by Santos will be described in the EP submitted to NOPSEMA for assessment. It is NOPSEMA’s role to assess whether Santos’ relevant persons consultation process has met the requirements of the Environment Regulations.</i></p> <p><i>Santos has already provided sufficient information for Greenpeace to make an informed assessment of the possible consequences of the EP activity to enable the provision of feedback.</i></p> <p><i>Please provide any feedback by Friday, 23 June 2023 and advise if you wish to meet prior to that date.</i></p>	
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<p><i>The International Energy Agency (IEA) recently released its World Energy Outlook 2022. This outlook contained detailed analysis of fossil fuel markets based on three scenarios: the Net Zero Emissions by 2050 Scenario; the Announced Pledges Scenario; and the Stated Policies Scenario.</i></p> <p><i>Please advise which scenario the Barossa gas project is most consistent with and include full justification to support this response; [Con-1256]</i></p>	<p><i>The comment does not directly relate to the Barossa Drilling and Completions Environment Plan</i></p>	<p><i>Assessment of impacts and risks from greenhouse gas emissions from the Barossa Project and reduction of impacts and risks to as low as reasonably practicable and acceptable levels will be addressed in the Barossa Production Operations EP. The subject of this consultation is the Barossa Drilling and Completions Environment Plan. [Con-1399]</i></p>	<p><i>No additional EP controls required.</i></p>
<p><i>Comprehensive analysis of the environmental impacts likely to be associated with the temperature increase predicted for the scenario outlined in the above point: [Con-1256]</i></p>	<p><i>The comment does not directly relate to the Barossa Drilling and Completions Environment Plan</i></p>	<p><i>Assessment of impacts and risks from greenhouse gas emissions from the Barossa Project and reduction of impacts and risks to as low as reasonably practicable and acceptable levels will be addressed in the Barossa Production Operations EP. The subject of this consultation is the Barossa Drilling and Completions Environment Plan. [Con-1399]</i></p>	<p><i>No additional EP controls required</i></p>
<p><i>Comprehensive information on how the Barossa gas project and the activities within the Environment Plan fit within</i></p>	<p><i>The comment does not directly relate to the Barossa Drilling and Completions Environment Plan</i></p>	<p><i>Assessment of impacts and risks from greenhouse gas emissions from the Barossa Project and reduction of impacts and risks to as low as reasonably</i></p>	<p><i>No additional EP controls required</i></p>

<p><i>the remaining global, national and state carbon budget to limit the average global temperature increase to 1.5°C by 2100 (with a 66% probability); [Con-1256]</i></p>	<p><i>Plan</i></p>	<p><i>practicable and acceptable levels will be addressed in the Barossa Production Operations EP. The subject of this consultation is the Barossa Drilling and Completions Environment Plan.</i></p>	
<p><i>A copy of the technical study into Underwater Noise Impacts on Marine Fauna commissioned from JASCO. While an earlier version of the Environment Plan states that the study has not been made publicly available, Greenpeace contends that we require this information to 1) determine the extent to which our functions, interests and activities are affected by the activities in the Environment Plan, and 2) perform our activities, specifically in relation to providing feedback to Santos; Detailed methodology used in the above JASCO study, including inputs and justifications; [Con-1256]</i></p>	<p><i>The requested study is already publicly available.</i></p>	<p><i>The requested study 'Underwater Noise Impacts on Marine Fauna' (JASCO, 2020) is available in the accepted Dorado Development OPP (Attachment 11) at NOPSEMA's website (<a href="https://www.nopsema.gov.au/offshore-industry/environmental-management/assessment-process/public-comment">https://www.nopsema.gov.au/offshore-industry/environmental-management/assessment-process/public-comment</a>)</i></p>	<p><i>No additional EP controls required</i></p>
<p><i>Comprehensive information showing how the inputs to the worst</i></p>	<p><i>Santos notes the comment and a response has been provided.</i></p>	<p><i>Total spill volumes of condensate are based on data such as gas rates and gas to</i></p>	<p><i>No additional EP controls required.</i></p>

<p>case scenario hydrocarbon spill modelling applicable to the Environment Plan were calculated (such as how the total volume of spilled hydrocarbons was calculated and how the days over which the spill was modelled were determined). [Con-1256]</p>		<p>condensate ratios gathered from Barossa appraisal drilling. Marine Diesel Oil spill volumes are based on conservative estimates of the largest fuel tank volume that could be impacted in a vessel collision scenario. The number of days for which the condensate spill scenario was modelled was based on the estimated timeframe for implementation of a relief well.</p> <p>Further detail about the inputs to the worst case scenarios for hydrocarbon spill modelling can be found in Sections 6.5.1 and 6.5.2 of the Drilling and Completions EP. A copy of Revision 3 of the EP is available online at NOPSEMA's website (<a href="https://docs.nopsema.gov.au/A831694">https://docs.nopsema.gov.au/A831694</a>).[Con-1399]</p>	
<p><b>Greenpeace correspondence [Con-1423]</b></p> <p>Greenpeace believes that our 'relevant person' consultation with the Proponent is already falling short of minimum standards in the following respects:</p>	<p>Santos has provided detailed information (where relevant to the Drilling and Completions EP) in answer to Greenpeace's requests. A more detailed response is provided.</p>	<p><b>Santos response [Con-1598]:</b></p> <p>Santos requested on 15 May that Greenpeace Australia Pacific Limited (Greenpeace) provide it with information as to its functions, interests or activities, if any, that may be affected by the activity to be carried out under the Drilling and Completions EP.</p>	<p>No additional EP controls required.</p>

<ul style="list-style-type: none"> <li>● <i>failure to provide sufficient time to consider additional information; and</i></li> <li>● <i>failure to meet the general principles for effective consultation.</i></li> </ul> <p><i>Reg 11A(3) states that “titleholder[s] must allow a relevant person a reasonable period for the consultation.”</i></p> <p><i>We believe that insufficient time has been provided to us to consider the Proponent’s last correspondence dated 16/6/23. In that correspondence, the Proponent requested our feedback by 23/6/23—only 5 business days later.</i></p> <p><i>Given the complex and technical nature of the issues being raised in consultation we do not consider 5 business days to be sufficient time for us to review, consider and respond to the information provided. Based on our past experience, we would consider a ‘reasonable period’ to be about one</i></p>		<p><i>In that email, to enable Greenpeace to understand the activity to be carried out under the Drilling and Completions EP, Santos provided Greenpeace with information regarding the activity. The email also explained the consultation process under regulation 11A of the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009 (Cth) (OPGGSI Regs) and by email of 18 May, Santos provided Greenpeace with NOPSEMA’s Community Brochure on consultation requirements.</i></p> <p><i>On 29 May, Santos provided further information about the Drilling and Completions EP and explained that it was requesting feedback from all relevant persons by 15 June. This and other information relevant to the Drilling and Completions EP have been publicly available on Santos’ website for some months, with Santos advertising widely about its consultation for the Drilling and Completions EP since March.</i></p> <p><i>We also refer to our letter of 16 June in which Santos provided detailed responses to the</i></p>	
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<p><i>month in most cases. We believe it is more relevant to consider when information was last provided to us when determining whether a 'reasonable period' has been provided.</i></p> <p><i>In this instance, we believe that we will require approximately 6 weeks (i.e. until about 4/8/23) to review, consider and respond to the information provided by the Proponent to date.</i></p> <p><i>In its correspondence dated 16/6/23, the Proponent stated that " Santos' processes are informed and guided by the principles outlined in the NOPSEMA guideline 'Consultation in the course of preparing an environment plan' "</i></p> <p><i>The Consultation Guideline suggests five general principles for effective consultation, intended to be a 'starting point' for undertaking consultation. Greenpeace believes that the Proponent's approach</i></p>		<p><i>queries, issues and feedback Greenpeace had raised. We confirm that Santos has provided detailed information (where relevant to the Drilling and Completions EP) in answer to Greenpeace's requests. It was open to Greenpeace to provide any feedback of how it claimed it would be affected based on the information provided by Santos about the Drilling and Completions EP.</i></p> <p><i>Santos therefore considers that we have provided Greenpeace with sufficient information and reasonable time to assess the impacts of the Drilling and Completions EP, and to provide any feedback it may have.</i></p> <p><i>Santos respectfully disagrees with the points Greenpeace has made regarding the consultation process.</i></p> <p><i>The Drilling and Completions EP will be resubmitted to NOPSEMA when it has been revised and the date will be notified on NOPSEMA's website. We remain willing to meet with you at your convenience.</i></p>	
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<p><i>to consultation falls short on at least two of these principles: communication and transparency.</i></p> <p><i>The Proponent failed to provide Greenpeace with its criteria for determining 'relevant persons'. Additionally, the Proponent neither confirmed nor denied that it considers Greenpeace to be a 'relevant person' for the purposes of this Environment Plan. The Proponent also failed to describe its consultation process in detail.</i></p> <p><i>These responses (or lack of responses) appear to be contrary to the principles outlined in the Consultation Guideline that the Proponent claims to be guided by. It is unreasonable to withhold this type of information from a potential 'relevant person' under a consultation process that is supposed to be genuine, meaningful and encourages two-way engagement.</i></p>			
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<p><i>Greenpeace believes that the apparent lack of transparency exhibited by the Proponent in 'relevant person' consultation could be construed by some as an attempt to hide information, avoid issues that are difficult to address, stifle two-way communication or otherwise cut short consultation to hasten an approval.</i></p> <p><i>The current approach to consultation adopted by the Proponent is not appropriate for Greenpeace's individual needs and does not allow us to adequately assess the possible consequences of the activities within the Information Sheet on our functions, interests or activities. Additionally, by withholding information about the Proponent's consultation process and 'relevant person' criteria, we are unable to make informed suggestions to the Proponent about other potential 'relevant persons'. We believe that</i></p>			
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<p><i>the current consultation process adopted by the Proponent is not conducive to fully discharging its consultation obligations under reg 11A.</i></p> <p><i>We believe that we need a thorough, comprehensive and detailed understanding of the potential environmental risks and impacts posed by the activities in the Environment Plan and the mitigation actions proposed by the Proponent in order to fulfil our functions, interests or activities.</i></p> <p><i>Additionally, we need a thorough, comprehensive and detailed understanding of this information to identify how exactly the Proponent's proposed activities impact the work we are doing, such as recommending policy changes, identifying potential environmental impacts, recommending additional mitigation actions and communicating issues to</i></p>			
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<p><i>the public.</i></p> <p><i>We require all descriptions, statements, justifications, reasonings, etc to be fully referenced and the underlying technical or scientific evidence provided. Without transparent provision of this information, it is impossible for us to adequately assess the activities' impacts on our functions, interests or activities.</i></p> <p><i>As a general guide, we require any additional information provided to us to be at a similar level of detail and supported by a similar level of evidence as that normally provided to NOPSEMA within an environment plan.</i></p> <p><i>We ask that the Proponent sends us an updated version of the Environment Plan. We assume considerable changes have been made to the Environment Plan since the February 2022 Revision 3 version given the additional consultation</i></p>			
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<p><i>undertaken by the Proponent since then.</i></p>			
<p><i>Additional information required:</i></p> <p><i>Having regard to the requirements of r 11A(2) of the Environment Regulations, we again request the following information from the Proponent:</i></p> <ul style="list-style-type: none"> <li>● <i>Detailed information about how the Proponent determines who is a “relevant person” as defined by r 11A(1) of the Environment Regulations versus who is not;</i></li> <li>● <i>Detailed description of the Proponent’s usual approach to “relevant person” consultation, including any guiding principles underlying that approach;</i></li> <li>● <i>Information about how the Proponent may tailor consultation processes on its Environment Plan so that the process is “appropriate for the category of relevant person, and the type of</i></li> </ul>	<p><i>The Barossa Gas Project will meet its obligations regarding greenhouse gas emissions under Australian laws.</i></p>	<p><i>Greenhouse gas emissions for all of the Barossa Gas Project activities are governed under the laws of Australia, which is the state party to the Paris Agreement. The Barossa joint venture partners are not state parties.</i></p> <p><i>Australia has a National Greenhouse and Energy Reporting Scheme, which requires the annual provision of emissions data. The Barossa joint venture will comply with its obligations in this regard to enable Australia as the state party to monitor its carbon budget and its international commitments for emissions reduction, and to make its determinations as to how it manages those commitments across the Australian economy.</i></p> <p><i>The Barossa Gas Project will meet its obligations regarding greenhouse gas emissions under Australian laws.</i></p> <p><i>The changes to the Safeguard Mechanism to which you refer require Barossa to be net-zero reservoir emissions from</i></p>	

<p><i>function, activities or interest”;</i></p> <p><i>Additionally, we note that the Proponent failed to address our question about how the greenhouse gas emissions from the activities within the Environment Plan fit within the remaining state carbon budget to limit the average global temperature increase to 1.5°C by 2100 (with a 66% probability). We again request this information.</i></p> <p><i>Further to this, the Federal Parliament recently passed changes to the Safeguard Mechanism with associated regulatory changes to follow. These changes highlighted the federal government’s intention for new oil and gas fields, such as the Barossa gas field, to have net zero greenhouse gas emissions right from the start. However, the Proponent does not appear to have reduced its expected greenhouse gas emissions within the Environment Plan to net</i></p>		<p><i>commencement of production. This will be covered in the Production EP, on which consultation has not yet occurred. The changes to the Safeguard Mechanism do not apply to the Drilling and Completions EP.</i></p>	
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<p>zero.</p> <p>Please advise what steps have been taken to ensure the greenhouse gas emissions generated by the activities in the Environment Plan will be net zero, or provide justification for failing to reduce them to net zero.</p>			
<p><b>Greenpeace correspondence received 7 August 2023 [Con-2341]</b></p> <p>Greenpeace is a 'relevant person' under reg 25 of the Environment Regulations for the purposes of consultation on the activities in the Environment Plan.</p> <p>The possible consequences of the Proponent's activities on Greenpeace's functions, interests or activities include (but are not limited to):</p> <ul style="list-style-type: none"> <li>harm to Australian marine life, such as whales, marine turtles, seabirds and fish, that we work to protect on behalf of the 1.2 million people</li> </ul>	<p>Santos has treated Greenpeace accordingly under Regulation 11A(1)(d).</p>	<p><b>Santos correspondence of 7 August [Con-2342]</b></p> <p>The categories of "relevant persons" are set out in Regulation 11A(1) of the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009 (Cth). Greenpeace may have functions, interests or activities that may be affected by Santos' Drilling and Completions activity. Santos has treated Greenpeace accordingly under Regulation 11A(1)(d).</p> <p>The information provided regarding Greenpeace's functions, interests and activities is noted.</p>	<p>No additional EP controls required.</p>

<p><i>that we represent; and</i></p> <ul style="list-style-type: none"> <li>• <i>harm to Australian marine environments, such as Marine Protected Areas and benthic habitats, that we work to protect on behalf of the 1.2 million people that we represent.</i></li> </ul> <p><i>For example, acoustics generated during drilling activities could injure or cause behavioural disturbances to whales. An unplanned hydrocarbon spill could reduce water quality within Australian Marine Parks and pollute foraging, nesting, interbreeding and mating habitat for marine turtles. Greenhouse gas emissions generated during drilling activities could accumulate with other global greenhouse gas emissions resulting in environmental harm, such as bleaching of coral reefs at the Ningaloo Coast World Heritage Area.</i></p>			
<p><i>The following is a list of information we have previously requested from the Proponent, but not yet</i></p>	<p><i>Santos previously responded to Greenpeace's requests.</i></p>	<p><b><i>Santos correspondence of 15 August 2023 [Con-2343]</i></b></p> <p><i>Santos has already responded</i></p>	<p><i>No additional EP controls required.</i></p>

<p><i>received. We have provided additional clarifications on some of these requests. Greenpeace requires this information to make an informed assessment of the possible consequences of the activity on our functions, interests or activities. Important contexts for each piece of additional information can be found in our previous 'relevant person' communications.</i></p> <ul style="list-style-type: none"> <li>● <i>Detailed information about how the Proponent determines who is a "relevant person" as defined by reg 25 of the Environment Regulations, including the criteria the Proponent uses in its determination;</i></li> <li>● <i>Information about how the Proponent may tailor consultation processes on its Environment Plan so that the process is "appropriate for the category of relevant person, and the type of function, activities or</i></li> </ul>		<p><i>to these requests, to the extent they are relevant to the Drilling and Completions EP, in our letters of 16 June and 11 July. Santos reiterates the information provided on 16 June and 11 July.</i></p>	
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<p><i>interest”;10</i></p> <ul style="list-style-type: none"> <li>● <i>Comprehensive information showing the inputs to the worst case scenario hydrocarbon spill modelling applicable to the Environment Plan (such as how the total volume of spilled hydrocarbons was calculated and how the days over which the spill was modelled were determined). The Proponent has provided some basic information in relation to this request. However, we require this technical information at a level of detail that would enable the modelling to be reproduced and independently verified.</i></li> <li>● <i>Detailed information about how the scope 1 greenhouse gas emissions from the activities within the Environment Plan fit within the remaining state carbon budget to limit the average global temperature increase to 1.5°C by 2100 (with a 66% probability).</i></li> <li>● <i>Detailed information</i></li> </ul>			
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<p><i>about what steps have been taken to ensure the greenhouse gas emissions generated by the activities in the Environment Plan will be net zero, or provide justification for failing to reduce them to net zero.</i></p> <ul style="list-style-type: none"> <li><i>• We ask that the Proponent sends us an updated version of the Environment Plan. This has not been forthcoming. We believe that there have likely been considerable changes made to the Environment Plan since Revision 3 (February 2022). We need to understand those changes in detail in order to properly assess the possible impacts of the activities on our functions, interests or activities.</i></li> <li><i>• We ask that the Proponent provides written confirmation that it now considers Greenpeace to be a 'relevant person' in accordance with reg 25(1) of the Environment Regulations.</i></li> </ul>			
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<p><i>The Environment Plan states that non-aqueous fluids (NAF) may be used as a contingency for intermediate and/or production hold sections. If holes are drilled with the NAF system, drilled cuttings will be processed to reduce the residual NAF on discharged cutting to &lt;10% weight per weight.</i></p> <p><i>In many countries around the world, oil-based drilling fluids are considered hazardous substances. Consequently, many oil and gas producing regions have enforced strict standards which require either zero NAF content or very limited NAF content (as a concentration) of drill cuttings before they can be discharged into the marine environment. For example:</i></p> <ul style="list-style-type: none"> <li><i>o “The United States Environmental Protection Agency (USEPA) prohibits the release of oil-based drill cuttings in all regions”;</i></li> <li><i>o “Norway stipulates that the cuttings with less</i></li> </ul>	<p><i>All the policies cited by Greenpeace relate to OBMs, which will not be used for the Drilling and Completions activity.</i></p> <p><i>The statement that Santos rejected a control measure to reduce NAF drilling cuttings to &lt;10% weight per weight prior to discharge “based on cost and convenience” is an incomplete and selective representation of Santos’ impact assessment.</i></p>	<p><i>Oil-based muds (OBMs) are different drilling fluids from synthetic-based muds (SBMs), also referred to as non-aqueous fluids (NAF). All the policies cited by Greenpeace relate to OBMs, which will not be used for the Drilling and Completions activity. SBM have a base fluid of synthetic oil with a number of additives depending on the properties required for the drilling fluids. SBMs share the technical properties of OBMs but are free of polynuclear aromatic hydrocarbons and have lower toxicity, faster biodegradability and lower bioaccumulation potential than OBMs. SBMs drill a cleaner hole with less sloughing and smaller volumes of drill cuttings. SBM is recycled as much as possible once returned to the drilling rig. As such, the discharge of &lt;10% oil on cuttings per well for SBM/NAF drilling fluids is not comparable to the emission policies cited by Greenpeace for OBMs.</i></p> <p><i>Santos also reiterates that the base case for the Drilling and Completions activity is to use water based muds (WBMs) for all hole sections. Non-aqueous</i></p>	<p><i>No additional EP controls required.</i></p>
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<p>than 1% oil can be discharged, but there implements a zero discharge policy in the Barents Sea”;</p> <ul style="list-style-type: none"> <li>○ “Brazil does not allow emissions of oil-based drill cuttings and low-mineral oils” (with some exceptions);</li> <li>○ “The North Sea’s emissions policy is developed by the OSPAR (Oslo and Paris Commissions), which specifies that oil-based drill cuttings not only need to contain less than 1% oil, but also pass toxicity tests to determine whether they are hazardous substances. The cut-off values for the toxicity test parameters are as follows:             <ul style="list-style-type: none"> <li>■ <i>Persistence: Half-life of 50 days;</i></li> <li>■ <i>Liability to Bio-accumulate: log octane-water partition coefficient <math>\geq 4</math> or bio-concentration factor <math>\geq 500</math>;</i></li> <li>■ <i>Toxicity: acute LC50 (Lethal Concentration 50)</i></li> </ul> </li> </ul>		<p>fluids (NAF) may also be used for intermediate and/or production hole sections, but only if technical issues are encountered.</p> <p>Santos further disagrees with Greenpeace’s statement that Santos rejected a control measure to reduce NAF drilling cuttings to &lt;10% weight per weight prior to discharge “based on cost and convenience”. This is an incomplete and selective representation of Santos’ impact assessment, and it is incorrect for Greenpeace to make this claim.</p>	
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<p><i>or EC50 (Effective Concentration 50) ≤1 mg/l, long-term NOEC ≤0. Mg/l.”</i></p> <p><i>Thus, Greenpeace contends that reducing the NAF on drill cuttings to &lt;10% weight per weight prior to discharge is not acceptable and is certainly not best practice (which all proponents should aspire to achieve).</i></p> <p><i>Thermomechanical cuttings cleaning technology may allow discharge concentrations to be reduced to around 0.1%—this would be more commensurate with the comparatively lower toxicity/impacts of water based drill fluids.</i></p> <p><i>We note that the Proponent has considered this option on page 213 of the Environment Plan but rejected it based on cost and convenience. Given the internationally recognised environmental risk posed by NAF discharges to the marine environment, we ask that the Proponent provides detailed information</i></p>			
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<p><i>about:</i></p> <ul style="list-style-type: none"> <li>○ <i>The potential causes of “frequent or prolonged cuttings management equipment down time”;</i></li> <li>○ <i>The skip-and-ship limitations and risks (such as limited MODU deck space and high volume of MODU-vessel lifts) and why these could only be sustained for a short period of time; and</i></li> <li>○ <i>How NAF discharges could be reduced to &lt;1% and justification as to why the Proponent has not considered and adopted measures to ensure this occurs.</i></li> </ul>			
<p><i>Vessel speed is a major contributor to marine fauna injury and mortality, with greater speeds presenting a greater risk of mortality. The chance of lethal injury to a large whale as a result of a vessel strike increases from about 20% at 8.6 knots to 80% at 15 knots.<sup>11</sup></i></p> <p><i>Thus, it is highly concerning that no</i></p>	<p><i>Greenpeace’s additional concerns regarding vessel speed are noted.</i></p>	<p><i>Santos considered implementing vessel speed restrictions in the Operational Area and concluded that this was not justified considering there are no marine fauna aggregation areas, migration pathways or biologically important areas in or near the Operational Area, noting that all Activity support</i></p>	<p><i>No additional EP controls required.</i></p>

<p><i>restrictions are placed on project vessel speeds within or outside the project area, besides when marine fauna are actually sighted. This is clearly an unacceptable standard considering that fauna may not be visible from the vessel—hence the high strike rate at high speed. Greenpeace strongly recommends that all vessels operated by the Proponent, operated by its contractors or servicing the project be restricted to a maximum speed of 8 knots (except in the event of an emergency).</i></p>		<p><i>vessels will be required to comply with Division 8.1 (Interacting with cetaceans) of the Environment Protection and Biodiversity Regulations 2000 (Cth), which Santos has also applied to its interactions with marine turtles, through the implementation of the Santos’ procedure for interacting with marine fauna. Vessel speed restrictions outside the Operational Area are outside the scope of the EP.</i></p>	
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**Keep Top End Coasts Healthy**

**Summary of consultation effort:**

- + On 21 April 2023 Keep Top End Coasts Healthy lodged a self-nomination and feedback form (as a potential Relevant Person) via the portal on the Santos website. [Con-1068]
- + On 24 April 2023 Santos emailed Keep Top End Coasts Healthy in response to the form completed on 21 April 2023. Santos advised that it would be in contact again and in the meantime should it have any questions or require further information it should contact Santos via phone or email (details provided). [Con-1142]
- + Santos provided information about the consultation process and the timeframe for provision of feedback (15 June 2023). [Con-1142]
- + On 15 May 2023 Santos emailed Keep Top End Coasts Healthy. Santos provided information about the consultation for the Barossa Drilling and Completions EP and advised the timeframe for provision of feedback from all Relevant Persons (15 June 2023). The Barossa Drilling and Completions Information Booklet was also provided. [Con-1192] Santos stated the purpose of the email is to:
  - seek information to better understand any functions, interests or activities that may be affected by the proposed activities under the EP and how they may be affected;

- explain the purpose of consultation and Santos' regulatory obligations to consult with Relevant Persons;
  - set out Santos' proposed approach to consulting with Relevant Persons;
  - seek feedback on how Santos can provide you with further information that is appropriate and accessible to assess the possible consequences of Santos' proposed drilling and completions activities on you (if a Relevant Person); and/or
  - invite Relevant Persons' feedback regarding the EP.
- + On 16 May 2023 Keep Top End Coasts Healthy emailed Santos an out of office email in response to the email sent by Santos on 15 May 2023. [Con-1200]
  - + On 18 May 2023 Santos emailed Keep Top End Coasts Healthy providing a link to NOPSEMA's brochure: *Consultation on offshore petroleum environment plans – Information for the community*. [Con-1451]
  - + On 29 May 2023 Santos emailed Keep Top End Coasts Healthy a Drilling and Completions Fact Sheet. Santos also reminded it of the timeframe for provision of feedback. [Con-1236]
  - + On 19 June 2023 Santos called Keep Top End Coasts Healthy. It stated it would provide Santos with feedback on 20 June 2023. [Con-1488]
  - + On 26 June 2023 Santos emailed Keep Top End Coasts Healthy advising that the period for providing feedback for the Environment Plan had closed and Santos remains available to discuss Project activities outside this consultation process. [Con-1463]
  - + No further correspondence or feedback was received.

<b>Summary of Objection or Claim</b>	<b>Assessment of Merits</b>	<b>Santos' Response Statement</b>	<b>EP Reference</b>
<i>Nil</i>	<i>Nil</i>	<i>Nil</i>	<i>No additional EP controls required.</i>

**Sea Turtle Foundation**

- Summary of consultation effort:**
- + On 13 April 2023 Santos emailed Sea Turtle Foundation to explain the consultation approach for the Barossa Drilling and Completions Environment Plan (EP), asking if Sea Turtle Foundation would like to be consulted, how it would like to be consulted and what information it required. A Barossa Drilling and Completions Information Booklet was also provided and a link to NOPSEMA's Guideline: *Consultation in the course of preparing an Environment Plan*. Santos also advised that consultation with Relevant Persons for preparation of the EP was planned to conclude by mid-2023. [Con-1041]
  - + On 20 April 2023 Santos emailed Sea Turtle Foundation the Barossa Development Quarterly Update, which included information on the consultation process for this EP. [Con-1066]
  - + On 24 April 2023 Santos emailed Sea Turtle Foundation to advise of opportunities in Darwin on 27 April 2023 and 3 May 2023 to obtain information, provide feedback

- and ask questions on the drilling and completions activity. [Con-1078]
- + On 4 May 2023 Santos called Sea Turtle Foundation and left a voicemail. [Con-1288]
- + On 10 May 2023 Santos emailed Sea Turtle Foundation regarding the Drilling and Completions Environment Plan. [Con-1289]
- + On 10 May 2023 Sea Turtle Foundation emailed Santos with an automatic response advising it would respond the following week. [Con-1290]
- + On 19 May 2023 Santos emailed Sea Turtle Foundation providing a link to NOPSEMA's brochure: *Consultation on offshore petroleum environment plans – Information for the community*. A Barossa Drilling and Completions Information Booklet was also provided. [Con-1206]
- + On 29 May 2023 Santos emailed Sea Turtle Foundation a Drilling and Completions Fact Sheet. Santos also reminded it of the timeframe for provision of feedback. [Con-1243]
- + On 8 June 2023 Santos called Sea Turtle Foundation. Sea Turtle Foundation confirmed it had received correspondence and will provide feedback via email. [Con-1291]
- + On 15 June 2023 Santos emailed Sea Turtle Foundation advising that the period for providing feedback for the Environment Plan had closed and Santos remains available to discuss Project activities outside this consultation process. [Con-1506]
- + No further correspondence or feedback was received.

<b>Summary of Objection or Claim</b>	<b>Assessment of Merits</b>	<b>Santos' Response Statement</b>	<b>EP Reference</b>
<i>Nil</i>	<i>Nil</i>	<i>Nil</i>	<i>No additional EP controls required.</i>

### West Timor Care Foundation

- Summary of consultation effort:**
- + On 19 April 2023 West Timor Care Foundation emailed a letter to Santos regarding the Barossa Drilling and Completions Environment Plan (EP). [Con-1065]
  - + On 24 April 2023 Santos acknowledged receipt of the correspondence from West Timor Care Foundation on 19 April 2023. Santos advised that it would be in contact again and in the meantime should West Timor Care Foundation have any questions or require further information it should contact Santos by phone or email (details provided). [Con-1140]
  - + On 3 June 2023 Santos emailed West Timor Care Foundation in response to its letter of 19 April 2023, providing information about the consultation for the Barossa Drilling and Completions EP and attaching the Barossa Drilling and Completions Information Booklet and Drilling and Completions EP Factsheet. Santos indicated that it was seeking feedback by 15 June 2023. [Con-1258]
  - + On 12 June 2023 West Timor Care Foundation responded to Santos' letter of 3 June 2023, raising a number of matters including a request for translated information and materials, complaints regarding the adequacy of the timeframe for feedback and expressing concerns regarding the sufficiency of information provided and that no



Trans-Boundary Environmental Impact Assessment has been undertaken for this project. [Con-1388]

- + On 16 June 2023 West Timor Care Foundation emailed Santos the letter already provided on 12 June 2023. [Con-1388]
- + On 20 June 2023 Santos emailed West Timor Care Foundation a response to its letter of 12 June 2023, which addressed Santos' consideration that it had provided sufficient information to inform West Timor Care Foundation's assessment of the possible consequences of the Activity to enable the provision of feedback. The letter detailed Santos' considerations regarding the request for translated materials, including online options for translating Santos' website content (noting the website reflects the information previously provided on this EP); the period of time taken to make the request translated materials; and the fact that this request was made only three days before the date by which feedback for this EP had been sought. [Con-1436]
- + On 26 June 2023 West Timor Care Foundation emailed Santos in response to Santos' email of 20 June 2023, disputing Santos rationale for not providing translated materials, disputing the suitability of a meeting via telephone and reiterating its request for a Trans-boundary Environmental Impact Assessment and more information about the impact on livelihoods in the event of an oil spill. [Con-1432]
- + On 27 June 2023 Santos emailed West Timor Care Foundation with a response to its letter of 26 June 2023 disagreeing with the West Timor Care Foundation's disputations of 26 June 2023 and, in respect of the request for a Trans-boundary Environmental Impact Assessment, Santos referred West Timor Care Foundation back to relevant information in its letter of 3 June 2023 which included a summary of the assessment of impacts to West Timor waters and coastline (based on results of stochastic hydrocarbon spill modelling) from an unplanned spill event. In its letter of 3 June 2023 Santos also provided references to further detailed information in Revision 3 of the Drilling and Completions EP available on NOPSEMA's website at the time. Santos considers that the information, and references to more detailed content in Revision 3 of the EP, provided by Santos in its 3 June 2023 letter, while not described as a 'transboundary environmental impact assessment', meets the objectives of such an assessment. Santos also reiterated its offer to meet and addressed concerns regarding a suitable meeting medium. [Con-1513]
- + On 5 July 2023 West Timor Care Foundation emailed Santos seeking to arrange a meeting via zoom on 10 July 2023, as per Santos offer in its letter of 27 June. [Con-1524]
- + On 11 July 2023 Santos emailed West Timor Care Foundation after an initial suggested meeting date could not be arranged and requested an alternative date. [Con-1598]
- + On 19 July 2023 Santos emailed West Timor Care Foundation seeking a preferred date for the meeting. West Timor Care Foundation responded the same day and suggested a meeting on 24 July 2023. [Con-2357]
- + On 22 July 2023 West Timor Care Foundation emailed Santos to request the meeting date be changed to 25 July 2023. [Con-2358]
- + On 23 July 2023 West Timor Care Foundation emailed Santos to request the meeting date be changed to 28 July 2023. [Con-2359]
- + On 24 July 2023 Santos emailed West Timor Care Foundation advising it had amended the meeting invitation, as requested. [Con-2359]
- + On 26 July 2023 West Timor Care Foundation emailed Santos to postpone the meeting to another date that would be advised. Santos emailed an acknowledgement the same day. [Con-2360]
- + On 23 August 2023 Santos emailed West Timor Care Foundation to check if it would still like to have a meeting and, if so, to advise preferred date and time. [Con-2361]
- + No further correspondence or feedback was received.

<b>Summary of Objection or Claim</b>	<b>Assessment of Merits</b>	<b>Santos' Response Statement</b>	<b>EP Reference</b>
<p><b>Correspondence received 19 April 2023 [Con-1065]</b></p> <p>WTCF has never been contacted by Santos to be consulted in relation to the Project. West Timor Care Foundation is concerned that Santos has not understood the extent to which our interests, functions and activities may be affected by the Project.</p> <p>WTCF was established in 2000 to represent and advocate for the interests and welfare of the environment and people of West Timor. The particular focus of WTCF's work since our inception has been to represent and advocate for the interests and welfare of those who depend on the coast of Timor for their livelihood and who have been, or may be, impacted by oil spills from petroleum activities in the Timor Sea.</p> <p>As such. The core reason for being and entire scope</p>	<p>Santos notes the information provided by WTCF</p>	<p><b>Santos response [Con-1258]:</b></p> <p>The purpose of correspondence provided to WTCF is to:</p> <p>2.1 explain Santos' regulatory obligations to consult with relevant persons;</p> <p>2.2 set out Santos' proposed approach to consulting with relevant persons;</p> <p>2.3 provide your organization with information about the EP and answer the questions in your letter;</p> <p>2.4 give your organisation the opportunity to ask further questions and/or request further information; and</p> <p>2.5 invite feedback regarding the EP.</p> <p>Feedback from relevant persons may assist Santos to further identify and/or understand environmental impacts and risks and to reduce these to levels that are acceptable and as low as reasonably practicable. [Con-1258]</p> <p>8. Consequently, Santos is providing information for</p>	<p>No additional EP controls required.</p>

<p><i>of work of the WTCF has the potential to be significantly impacted by the Barossa Gas Project.</i></p> <p><i>One of the core functions of WTCF is to represent individuals in West Timor who are impacted by petroleum activities, including oil spills.</i></p>		<p><i>people, organisations or agencies/authorities to make informed assessments of the possible consequences of the proposed activity on them.</i></p>	
<p><i>West Timor Care Foundation is aware of modelling, although it has not been provided to us directly by Santos, that shows devastating scenarios for the coast of Timor island in the eventuation of a worst-case oil spill scenario from the Barossa project. [Con-1065]</i></p> <p><i>Given the nature of West Timor Care Foundation's extensive experience working with individuals impacted by an oil spill, it is highly relevant to the functions, interests and activities of our organisation that more information is received about the potential</i></p>		<p><i>The Barossa Gas Project is a gas and condensate project, rather than an oil project.</i></p> <p><i>Condensate is a very low viscosity (thin) and low density (light weight) liquid that evaporates quickly, particularly considering both the atmospheric and sea surface temperatures in the Arafura Sea. As such, if spilt on the sea surface, condensate would be expected to rapidly spread out, with a large proportion evaporating. Condensate spills are usually left to evaporate and dissipate at sea rather than using containment or dispersants.</i></p> <p><i>Please refer to Section 7.6.2.1 of Drilling and Completions EP (Revision 3) and Section 3.2 of</i></p>	<p><i>No additional EP controls required.</i></p>

<p><i>consequences of an oil spill at the Barossa gas field and that WTCF has an opportunity to comment on it.</i></p> <p><i>We would like to engage with Santos to discuss ways that this information could be provided to the community in an appropriate forum, and ways that the people WTCF represents can have an opportunity to provide feedback. [Con-1065]</i></p>		<p><i>the Drilling Barossa Development Oil Pollution Emergency Plan (OPEP) Addendum: Drilling &amp; Completions (pp. 268 of the Barossa Development OPEP) for a summary of spill modelling results.</i></p> <p><i>The Barossa Development OPEP is available from NOPSEMA here: <a href="https://docs.nopsema.gov.au/A821499">https://docs.nopsema.gov.au/A821499</a>. This document has been publicly available since 15 March 2022.</i></p> <p><i>Spill modelling performed for the Barossa Drilling and Completions EP does not show any “devastating scenarios” for the coast of West Timor in a worst-case condensate spill event. The potential area affected by a worst case spill event is determined through the use of stochastic spill modelling. Stochastic spill modelling is where hundreds of individual hypothetical spill events are overlayed onto a single map with each event is subject to a different set of ocean and weather conditions.</i></p> <p><i>Stochastic modelling is a planning tool for an unplanned</i></p>	
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		<p><i>spill event, it does not represent the extent of an actual spill event.</i></p> <p><i>While the spill modelling shows that a condensate spill event during Barossa drilling and completions activities could reach the West Timor coastline (refer Figure 3, page 5 of the Drilling and Completions Information booklet), please note the following important information:</i></p> <ul style="list-style-type: none"> <li><i>• The moderate exposure values (MEVA) layer shown on Figure 3 represents the extent of the area in which a spill could impact marine life.</i></li> <li><i>• The environment that may be affected (EMBA), also shown on Figure 3, represents the maximum extent of the spill for the purposes of spill response planning and monitoring, but does not represent impacts to marine life.</i></li> </ul> <p><i>Regarding the spill modelling results as they specifically relate to potential impacts to the West Timor coastline, please note the following:</i></p> <ul style="list-style-type: none"> <li><i>• There is no predicted surface accumulation of condensate along the West Timor coastline.</i></li> <li><i>• The MEVA does not reach the</i></li> </ul>	
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		<p><i>West Timor coastline, and therefore there are no predicted impacts at the West Timor coastline.</i></p> <ul style="list-style-type: none"> <li><i>• There is potential for condensate droplets (below the sea surface) to reach the West Timor coastline after a spill, but not at concentrations that would result in impacts to marine life.</i></li> </ul> <p><i>Please refer to Sections 7.5 and 7.6 of the Drilling and Completions EP (Revision 3) for a full description of spill modelling results and evaluation of potential impacts to environmental and socio-economic receptors within the environment that may be affected from a worst case condensate spill event during Barossa drilling and completions activity [Con-1258].</i></p>	
<p><i>WTCF requests:</i></p> <p><i>a. A detailed description of the environment that may be affected by the activities, including the potential extent and area of a Worst Case Oil Spill.</i></p> <p><i>b. The potential environmental impacts and risks of the activities, including in relation to a</i></p>	<p><i>Relevant documentation has been publicly available since March 2022. The current consultation process is assisting the updating required to this existing information.</i></p>	<p><i>Figure 7-5 of the draft Drilling and Completions EP presents the area that may be affected from a worst case condensate spill as a result of an unplanned loss of well control event, based on the results of spill modelling. Section 3 of the draft Drilling and Completions EP describes in detail the environment that may be affected by a worst case condensate spill event. This information has been</i></p>	<p><i>No additional EP controls required.</i></p>

<p><i>Worst Case Oil Spill.</i></p> <p><i>c. The potential human and economic consequences of a Worst Case Oil Spill, including on seaweed farmers and others who rely on the ocean around West Timor, in the EMBA, for their livelihood. [Con-1065]</i></p>		<p><i>publicly available on the NOPSEMA website since 15 March 2022.</i></p> <p><i>Section 6 of the draft Drilling and Completions EP assesses the impacts of planned Drilling and Completions activities; and Section 7 assesses the impacts and risks of unplanned Drilling and Completions events. Section 7.6.4 of the draft Drilling and Completions EP assesses the environmental impacts and risks of a worst case condensate spill event. This information has been publicly available on the NOPSEMA website since 15 March 2022.</i></p> <p><i>The MEVA does not reach the West Timor coastline. For the EMBA, while the modelling results indicate the potential for condensate droplets (below the sea surface) to reach the West Timor coastline, these droplets are not at concentrations that would impact marine life.</i></p> <p><i>The Drilling and Completions EP has considered the potential environmental impacts of a condensate spill, including on seaweed farming and traditional fishing activities off the West Timor coastline. In the unlikely</i></p>	
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		<p><i>event of a condensate spill, Santos will implement its incident management plan which includes ongoing monitoring of environmental impact. This information has been publicly available on the NOPSEMA website since 15 March 2022.</i></p> <p><i>If West Timor Care Foundation has any further information about the environment that may be affected, Santos would be pleased to consider this information. [Con-1258].</i></p>	
<p><b>Correspondence received 12 June 2023 [Con-1388]</b></p> <p><i>Relevant persons are entitled to be given sufficient information to allow them to make an informed assessment of the possible consequences of the activities on our functions, interests, and activities. We believe this has not occurred.</i></p>	<p><i>Santos has provided WTCF with sufficient information to assess the impacts of the Drilling and Completions Environment Plan, and reasonable time to provide any feedback.</i></p>	<p><b>Santos response [Con-1436]</b></p> <p><i>On 3 June, Santos responded to West Timor Care Foundation’s requests for further information in your letter of 19 April.</i></p> <p><i>By emails dated 3 and 5 June, we also supplied West Timor Care Foundation with materials detailing the EP activity, risks and impacts and proposed controls, including the Barossa Project Drilling and Completions Information Booklet, a link to Santos’ website, the Drilling and Completions EP fact sheet and a brochure entitled Consultation on offshore petroleum environment plans – Information for the community,</i></p>	<p><i>No additional EP controls required.</i></p>



		<p>issued by the regulator, the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA). We also explained Santos' consultation process.</p>	
<p>Specifically, we request that information is provided to West Timor Care Foundation in Bahasa Indonesia, so that we can properly understand the information and importantly so that we can communicate this information to the West Timorese people we represent who may be impacted by this project.</p> <p>To this end, we request the following information in Bahasa Indonesia:</p> <p>a. An explanation of the project for which approval from NOPSEMA is being sought;</p> <p>b. An explanation of potential risks and impacts of the project;</p> <p>c. Information regarding the consultation process.</p> <p>Without this information,</p>	<p>Santos noted the comments and the fact that the request was not made earlier in the consultation period.</p>	<p>Santos notes that the content and substance of the materials provided also appears on Santos' website and that the website content may be translated into Bahasa Indonesia using Google Translate. Further, the extensive request for additional translated material has only been made on 12 June, three days before the date by which feedback was sought (15 June).</p> <p>There was ample opportunity to raise such a request well in advance of 12 June. Your previous letter received on 19 April contained several information requests but made no mention of West Timor Care Foundation requiring information in Bahasa Indonesia. Also, we assume that you have been able to translate what Santos has provided for your members to consider, which has led to your further requests for information.</p>	<p>No additional EP controls required.</p>

<p><i>we consider that we are not able to make an informed assessment of the impacts of the project on the functions, interests, and activities of our organisation or the members we represent.</i></p>			
<p><i>The deadline of June 15<sup>th</sup> is not considered reasonable by us, particularly as we do not currently have all the information needed to consider the impacts.</i></p> <p><i>It may be the case that individuals who may be affected by the project would like to request in-person consultation sessions, as we are aware has been provided to other relevant persons. We cannot know this until information in Bahasa Indonesia is provided and feedback sought.</i></p> <p><i>West Timor Care Foundation is also concerned that no Trans-Boundary Environmental Impact Assessment has been undertaken for this project. As a large area of the EMBA is within waters</i></p>	<p><i>Santos notes the request and an extension of time to comment will be provided.</i></p>	<p><i>Santos has provided sufficient information for West Timor Care Foundation to make an informed assessment of the possible consequences of the EP activity to enable the provision of feedback.</i></p> <p><i>Santos therefore requests West Timor Care Foundation provide any further feedback or information regarding the EP and its concerns by Friday, 23 June 2023. [Con-1436]</i></p>	<p><i>No additional EP controls required.</i></p>

<p><i>that are outside Australia's territory, we believe it is appropriate that this kind of assessment is undertaken. There are relevant provisions for these kinds of assessments in international law and they have occurred elsewhere in the world. Without an impact assessment of the specific harms that may occur to our interests, functions, and activities, we feel we cannot yet appropriately respond to this EP.</i></p> <p><i>Regarding the responses to the concerns raised in our previous letter, WTCF finds them to be inadequate. We still have not been provided any information about the risks of condensate to seaweed farming activities, for example. Even though the MEVA does not reach the coastline it still reaches into our waters where activities central to the livelihood of WTCF members take place. WTCF needs to know the potential impacts of</i></p>			
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<p><i>different levels of condensate, including levels sufficient to be included in the EMBA, as well as the MEVA, on aquacultural activities such as seaweed farming, as well as on individual species. WTCF is aware of the publicly available information referred to in your letter but finds this information insufficient and noted that it does not address our concerns, hence the request for further detail, which has not been provided.</i></p>			
<p><b>WTCF correspondence [Con-1432]</b></p> <p><i>West Timor Care Foundation finds the suggestion that we should use Google Translate to access information regarding this project to be an inappropriate response to our request for information as a relevant person. Information regarding the Barossa project is highly technical and needs to be properly translated. Google</i></p>	<p><i>Santos has provided WTCF with sufficient information to assess the impacts of the Drilling and Completions Environment Plan, and reasonable time to provide any feedback.</i></p>	<p><b>Santos response [Con-1513]</b></p> <p><i>We consider that we have provided West Timor Care Foundation with sufficient information (including answering its questions) about the activity to be carried out under the Drilling and Completions EP, and a reasonable time for you, on behalf of the Foundation, to provide any feedback.</i></p> <p><i>Further, while the West Timor Care Foundation claims that Santos has not provided responses to requests for more</i></p>	<p><i>No additional EP controls required.</i></p>

<p><i>Translate is an inadequate tool for this task.</i></p> <p><i>We note that it is Santos’ job to ensure relevant persons are provided with appropriate information to allow them to sufficiently engage in the consultation process. The request for translated materials emerged from members after the 19 April correspondence was sent, which is why that particular request was not included in that email.</i></p> <p><i>Regarding the suggestion that WTCF has had “ample opportunity” to make requests such as that for translated material, WTCF rejects this entirely. WTCF notes that it made the request for translated materials only 9 days after receiving its first ever correspondence from Santos.</i></p> <p><i>The first contact WTCF ever had from Santos was a reply on 3 June 2023 to our letter received by Santos on 19 April 2023. This means that in total</i></p>		<p><i>information about the impacts on livelihoods in the event of an oil spill, in fact in our 3 June letter, we explained Santos’ spill modelling results as they specifically relate to the potential impacts to the West Timor coastline in the event of a condensate spill, and that:</i></p> <p><i>3.1 there is no predicted surface accumulation of condensate along the West Timor coastline;</i></p> <p><i>3.2 there are no predicted impacts to the West Timor coastline; and</i></p> <p><i>3.3 while there is potential for condensate droplets (below the sea surface) to reach the West Timor coastline after a spill, this would not be at concentrations that would result in impacts to marine life.</i></p> <p><i>We also directed West Timor Care Foundation to relevant parts of revision 3 of the Drilling and Completions EP for further detail and information. This is published on the NOPSEMA website (<a href="https://docs.nopsema.gov.au/A831694">https://docs.nopsema.gov.au/A831694</a>).</i></p> <p><i>We re-iterate that we would be happy to arrange a meeting</i></p>	
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<p><i>WTCF will have had less than 3 weeks to consider all of the appropriate information and speak with all of our members in order to provide feedback on the project before 23 June 2023. This is a vastly inadequate time frame, especially considering the geographical extent of the area in West Timor that may be impacted by the project.</i></p> <p><i>In terms of Santos' offer to hold a meeting via telephone, this is not a suitable method of meeting due to international charges for telephone calling.</i></p> <p><i>WTCF notes as well that Santos has ignored our request for a Trans-Boundary Environmental Impact Assessment and has ignored repeated requests for more information about the impact on livelihoods in the event of an oil spill. These requests are outstanding, and for further information about them see our previous</i></p>		<p><i>with the West Timor Care Foundation this week to discuss West Timor Care Foundation's feedback on the EP.</i></p> <p><i>This could occur via Zoom or Teams or a similar platform to avoid the cost concerns raised at paragraph 5 of your letter or we can explore alternative no or low-cost platforms / mediums that may be suitable. In any event, Santos can accommodate an online or telephone meeting in such a way that West Timor Care Foundation does not incur international call fees.</i></p> <p><i>If West Timor Care Foundation would like to meet with us, please advise as to West Timor Care Foundation's availability and we can confirm suitable arrangements.</i></p>	
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<p>correspondence.</p> <p>7. West Timor Care Foundation does not consider that Santos had adequately engaged in consultation with us regarding this project. We look forward to being in contact again with more feedback once sufficient information has been provided in a format that allows us to communicate this to our members and those in West Timor who may be impacted by the project.</p>			
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**World Wildlife Fund (WWF)**

<p><b>Summary of consultation effort:</b></p> <ul style="list-style-type: none"> <li>+ On 15 May 2023 Santos emailed WWF exploring whether it may be a Relevant Person. Santos provided information about the Drilling and Completions Environment Plan (EP) and consultation process and explained it was requesting feedback from all Relevant Persons by 15 June 2023. The Barossa Drilling and Completions Information Booklet was provided with the email. [Con-1196]</li> <li>+ On 18 May 2023 Santos emailed WWF providing NOPSEMA’s brochure: <i>Consultation on offshore petroleum environment plans – Information for the community</i>. [Con-1453]</li> <li>+ On 29 May 2023 emailed WWF a Drilling and Completions Fact Sheet. Santos also reminded it of the timeframe for provision of feedback. [Con-1240]</li> <li>+ On 23 June 2023 Santos phoned WWF and was unable to be connected.</li> <li>+ On 23 June WWF emailed Santos and stated the system it uses automatically marked the emails Santos had sent as spam, therefore deleting them. WWF asked for them to be forwarded again, so it may review and determine if a response is required. [Con-1425].</li> <li>+ On 24 June 2023 Santos emailed all the previously sent emails again to WWF using an additional email address provided by WWF and requested that confirmation of receipt be provided. [Con-1430]</li> </ul>
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<ul style="list-style-type: none"> <li>+ On 24 and 26 June 2023 WWF provided automated responses. [Con-1444]</li> <li>+ No further correspondence or feedback was received.</li> </ul>			
<i>Summary of Objection or Claim</i>	<i>Assessment of Merits</i>	<i>Santos' Response Statement</i>	<i>EP Reference</i>
<i>Nil</i>	<i>Nil</i>	<i>Nil</i>	<i>No additional EP controls required.</i>
<b>First Nations Peoples</b>			
<b>Croker Island Clans</b>			
<b>Summary of consultation effort:</b>			
<ul style="list-style-type: none"> <li>+ On 21 April 2023 the Environmental Defender's Office wrote to Santos on behalf of a person described as a Traditional Owner from Minjilang on Croker Island saying its client considers themselves a relevant person [Con-1575]. That correspondence expressly noted Santos' call for relevant persons to contact Santos.</li> <li>+ On 17 May 2023 Santos responded to the EDO's letter of 21 April 2023, providing information about the Drilling and Completions EP activities and consultation process. [Con-1578]</li> <li>+ On 5 June 2023 the EDO advised Santos via email that it had been unable to obtain instructions from its client but was making arrangements to travel to Minjilang to obtain those instructions "in the coming weeks". [Con-1581].</li> <li>+ On 16 June 2023 Santos wrote again to the EDO requesting that any feedback be provided by 23 June 2023 [Con-1584].</li> <li>+ On 18 June 2023, the EDO advised by email that it would be travelling to meet with its client on 26 June 2023 but would not be in a position to provide a response by 23 June 2023. [Con-1586].</li> <li>+ On 27 June 2023 the EDO wrote to Santos and advised that it had visited Croker Island on 26 June 2023 and, with its client, held a meeting with eight other Croker Island people and discussed the Barossa Gas Project and the drilling and completion activities. Apart from the EDO's client identified in its letter of 21 April 2023, the EDO did not state whether it represented any other person who attended that meeting and in what capacity it was engaged to speak on their behalf. [Con-1589].</li> <li>+ On 27 and 28 June 2023 Santos had general discussions via phone with the Minjalang Council Service Centre on Croker Island about logistics and transport services in the event a future visit to the Islands was required.</li> <li>+ On 28 June 2023, after having earlier made enquiries to visit Croker Island on 4 July 2023, Santos received an email from the EDO saying that it had been instructed and informed by members of the community that Santos was "not welcome nor permitted to visit" [Con-1590] and [Con-1592]. On the same day Santos responded to the EDO via email advising that Santos was not visiting Croker Island on 4 July 2023 and would not visit without first giving notice. [Con-1590].</li> <li>+ On 30 June 2023 Santos met with the Northern Land Council to discuss the appropriate process for travelling to Croker Island so that Santos could inform Croker Island</li> </ul>			



people about the Barossa Gas Project.

- + On 7 July 2023, Santos obtained approval from the NLC for Santos to visit Croker Island on 13 July 2023 for the purpose of a “preliminary visit to the Croker Island to share some information on Santos and its business activities in northern waters and to gauge level of interest in further consultation sessions.”
- + On 7 July 2023 and twice on 11 July 2023, Santos received further email correspondence from the EDO saying that Santos was not welcome, invited nor permitted to visit Croker Island on 13 July 2023 [Con-1593], [Con-1594]
- + On 10 July 2023 the EDO wrote to Santos summarising its concerns at Santos visiting Croker Island without first communicating with its clients. [Con-1595]
- + On 11 July 2023 Santos emailed the EDO to advise that Santos will be visiting Croker Island on 13 July 2023 and was permitted to do so. Santos further advised that it would not be conducting any formal community meetings and was visiting the Island to help plan for future meetings with the Croker Island communities. [Con-1596]
- + On 11 July 2023 the EDO emailed Santos and advised that the EDO had been instructed and informed that the community had not made a decision about whether Santos would be invited to attend the community at all, or whether an alternative method of consultation, which did involve Santos attending the community, would be more appropriate. [Con-1597]
- + On 13 July 2023 Santos conducted a familiarisation visit to Croker Island and while there held informal discussions with a range of Croker Island people during which Barossa project activities were discussed in general.
- + On 14 July 2023 the EDO emailed Santos and expressed concern at Santos visiting the community on Croker Island, reiterating its claim that Santos was not welcome there until its clients and other members of the community had decided how they wished to be consulted by Santos on its Drilling EP. [Con-2404]
- + On 17 July 2023 Santos emailed the EDO in response to its email of 14 July 2023. Santos stated that it had every right to speak with any members of the community and did not need the EDO’s consent to do so. Santos also stated that it respects the right of community members to make their own decisions about who they engage with and in what circumstances. [Con-2405]
- + On 18 July 2023, the EDO provided further correspondence to Santos reiterating its previous concerns and claims related to Santos speaking with members of the Croker Island community. [Con-2406]
- + During August and September of 2023, Santos coordinated discussions with Croker Island community members with the advice and support of cultural advisers from the broader Arnhem region all of whom hold leadership positions within their own communities and on formal representative bodies including the NLC. One of the advisers is the elected NLC member for Minjilang. The advisers played a key role in liaising with Croker Island Elders and cultural leaders to allow for a process of self-determination in establishing an initial consultative committee.
- + Between 15 and 21 August 2023 the EDO and Santos exchanged emails in relation to a visit to the Croker Islands by a cultural advisor to Santos and the process for future discussions with EDO clients. The EDO requested information on the purpose and outcomes from the visit which Santos advised had been informal for purposes of gathering information on how members of the community wished to be consulted. The EDO also reiterated its previous advice re the process that should be followed by Santos if it wished to communicate with any EDO clients. [Con-2413]
- + On 15 August 2023 the EDO sent a letter to NOPSEMA that was also copied to Santos. The EDO’s letter included information on its clients’ functions, interests and activities and criticisms of the consultation efforts by Santos that had previously been provided in correspondence to Santos. The EDO’s letter also stated that its clients intended to meet with other members of the Minjilang community in order to make a community decision about how they wish to be consulted by Santos, after which

- time its clients intended to communicate with Santos about a proposed consultation process that is culturally appropriate for their community. [Con-2407]
- + On 21 August 2023 Santos and the EDO exchanged emails in relation to an information session on the Barossa Gas Project for Croker Island community members to be held in Darwin on 22 August 2023. The EDO expressed concern that the information session was being undertaken without any lawyers from either the EDO or Santos being present. Santos advised that if EDO clients wanted to meet Santos with their lawyers, Santos would organise a separate meeting for them with their lawyers in attendance. [Con-2414]
  - + On 24 August 2023 NOPSEMA responded to the EDO's correspondence of the same day advising that the matters raised would be considered during the assessment process. [Con-2408]
  - + On 22 August, 1 September and 3 September 2023 Santos met with a range of Croker Island community members in Darwin for the purpose of building relationships ahead of Regulation 11A consultation. Presentations at the meetings focused on providing an overall project overview, summaries of proposed drilling and subsea installation activities, discussions on activity impacts and risks, as well as providing regional context of historic petroleum industry activities in the region.
  - + On 7 and 8 September 2023 the EDO emailed Santos to express concern that a meeting being held in Darwin on 8 September 2023 between Santos and Croker Island community members did not include lawyers and meant their clients could not attend as they did not want to meet Santos without their lawyers also being present. Santos advised that this was not the case and the Croker Island community members who had attended previous meetings without any lawyers being present were happy for this format to continue. Santos reiterated the offer to separately meet with any EDO clients and their lawyers.
  - + The 8 September 2023 meeting was held at the Santos-operated Darwin LNG gas plant, at the request of attendees at the 1 September 2023 meeting. Handouts and maps were provided to attendees who were invited to share these materials with family and community members on Croker Island. [Con-2415]
  - + On 15 September 2023 the Muluruyud Consultative Committee (MCC) met with Santos as part of Regulation 11A consultation. Discussion was held on the overall project, proposed drilling and completions activities and regulatory requirements for consultation on activity impacts and risks. No claims or objections were made about the proposed activities. [Con-2401]
  - + Discussion at the 15 September 2023 meeting also occurred on the identification and management of potential impacts to cultural heritage with the committee considering that these matters should be discussed in an appropriate cultural forum.
  - + On 19 September 2023 the EDO emailed Santos to advise it would be providing further correspondence on behalf of its clients detailing the manner in which they wished to be consulted under Regulation 11A. The email was followed up by a letter provided to Santos on 20 September 2023 that provided further information on the proposed manner for consultation. [Con-2402]
  - + On 23 September 2023 Santos provided a record of proceedings from the 15 September 2023 meeting to the MCC attendees. [Con-2410]
  - + On 26 September 2023 the cultural advisers, on behalf of the Muluruyud Consultative Committee Chair, advised that a meeting of the committee had been held that day and expressed unanimous satisfaction with the consultation MCC responded to Santos via its nominated contacts and confirmed that [Con-2409]
    - o It was satisfied with all of the responses provided by Santos to the actions that arose from the Santos Regulation 11A consultation meeting at Darwin on 15 September 2023.
    - o It decided that the responses provided by MCC Committee members, and First Nations advisors and observers present at the Santos Regulation 11A consultation held in Darwin on 15 September 2023 are to be treated as confidential to NOPSEMA and to Santos and as such should not be made publicly available.

- + On 27 September 2023 Santos responded to the MCC acknowledging its satisfaction with Santos’ responses from the meeting of 15 September 2023. Santos also noted MCC’s request for feedback to remain confidential to NOPSEMA. Santos considers consultation to be complete for this EP. [Con-2422]
- + On 29 September 2023 Santos emailed EDO and provided correspondence in response to the EDO’s letter of 20 September 2023.[Con-2424]
- + On 3 November 2023, the EDO emailed Santos to again express their client’s concerns regarding consultation with the Minjilang community. [Con-2643]
- + On 11 November 2023 Santos emailed EDO and provided correspondence in response to the EDO’s letter of 3 November 2023. Santos confirmed that it had completed consultation with the Minjilang community and noted the communal interest that the EDO’s client holds in common with the Mingilang community. [Con-2650]
- + Santos is committed to appropriate post acceptance consultation for this Activity and will continue to consult with the Croker Island People and the Northern Land Council in accordance with the strategy outlined above and further explained in **Section 4.6.6**. More detail on Santos’ discussions with First Nations peoples and representative bodies is outlined in the post-acceptance consultation implementation strategy for First Nations in **Section 8.10.1**.

<b>Summary of Objection or Claim</b>	<b>Assessment of Merits</b>	<b>Santos’ Response Statement</b>	<b>EP Measure/s Adopted (if applicable)</b>
<p><b>EDO correspondence of 21 April 2023 [Con-1575].</b></p> <p><i>We act for (Note: an individual’s name was supplied but has been removed by Santos from this public section of the EP), a Traditional Owner from Minjilang, Northern Territory.</i></p> <p><i>Santos has issued a public notice stating that it is seeking to identify and consult with relevant persons in relation to the activities that form part of the Barossa Development Drilling and Completions activity. It has requested that relevant persons contact Santos by 22 April 2023.</i></p>	<p><i>Santos noted the EDO’s advice in relate to its client and requested further information to better understand the client’s functions, interests or activities that may be affected by the proposed activities under the EP.</i></p>	<p><b>Santos’ correspondence of 17 May 2023 [Con-1578].</b></p> <p><i>Santos understands from your letter that your client considers himself to be a relevant person under regulation 11A(1)(d) of the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009 (Cth) (Regulations) for the purposes of consultation in respect of the proposed activity under the Barossa Drilling and Completions Environment Plan (EP). It would be helpful for Santos’ consideration of your letter if you could please provide further details as to your client’s “traditional connection to an area of the sea and the marine resources that it holds”. Santos seeks to better understand your client’s functions, interests or</i></p>	<p><i>No additional EP measures required.</i></p>

<p><i>Our client instructs that he has a traditional connection to an area of the sea and the marine resources that it holds which may be affected by the Drilling and Completions activities proposed to be undertaken by Santos. On this basis he considers that he is a relevant person for the purpose of reg 11A(1)(d) of the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009 (Cth) (Regulations).1</i></p> <p><i>He further considers that other members of his community are also likely to have functions, interests and activities that may be affected by the Drilling and Completions activities, but are not aware of the Barossa project or Santos' public notices seeking to identify and consult relevant persons and have therefore been unable to write to Santos to date.</i></p>		<p><i>activities that may be affected by the proposed activities under the EP.</i></p> <p><i>Further, attached is a copy of the Barossa Gas Project Drilling and Completions Information Booklet. This booklet provides information about the proposed activity under the EP, the environment that may be affected, potential environmental impacts and risks and proposed control measures.</i></p> <p><i>Additional information in relation to the proposed drilling and completions activity, FAQs, and certain video content is also available on the Santos website (<a href="http://www.santos.com/barossa/">www.santos.com/barossa/</a>). We ask that you please share this material with your client and provide the website link. This information will assist your client in making an informed assessment of the possible consequences of the activity proposed under the EP. Similarly, if after reviewing the information provided, your client has any feedback about how his functions, interests or activities may be affected by the proposed activities under the EP, Santos would appreciate receiving it.</i></p>	
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<p><b>EDO correspondence of 27 June 2023 [Con-1589].</b></p> <p><i>On 26 June 2023, at the request of (Note: individual's name supplied) we travelled to Minjilang and presented general information to members of the community about the Santos Barossa Project, a map of the EMBA for the Drilling EP and explained the consultation process. Aside from (name supplied), none of the attendees at the meeting had ever heard of the Barossa Project before. They expressed the strong belief that no one else on</i></p>	<p><i>The information provided in this letter regarding the Croker Islanders functions, interests or activities within the EMBA is noted and has been considered in development of this EP.</i></p> <p><i>In response to specific objections and claims, Santos notes that the people and communities of Croker Island did not raise any cultural heritage objection to the proposed activity or the Barossa Gas Project proceeding. Indeed they were critical of the activities of the EDO in Minjilang and</i></p>	<p><i>Santos has treated the Croker Island clans as Relevant Persons for this activity.</i></p>	<p><i>+ BAD-CM-049 has been adopted as a measure to respect the beliefs of First Nations individuals who have concerns related to their cultural and spiritual beliefs that adverse effects to people and the environment may result from the Activity, by introducing the activity to the spirit beings they believe in and the seas in a culturally appropriate manner.</i></p> <p><i>Other measures have also been adopted (Section 8.11) as part of Santos' post-acceptance implementation strategy including but not limited to:</i></p> <p><i>+ Santos will also, through relevant Land Councils (who are relevant persons) and other relevant persons, consult to identify and implement worthwhile First Nations initiatives that could include, but are not necessarily be limited to:</i></p> <ul style="list-style-type: none"> <li><i>• employment of cultural awareness community observers (CACOs), who will conduct cultural awareness inductions for field based staff across each of the major work packages.</i></li> <li><i>• support of ranger programs and studies to help First Nations people preserve environmental and cultural features and values on their country.</i></li> </ul>

<p><i>Minjilang had ever heard of the project before either. The following community members attended the meeting ('attendees'): (Note: the names of nine individuals were supplied)</i></p> <p><i>The attendees informed us that they hold deep and significant concern about the project and its potential impacts on their sea country, marine life, songlines and sacred sites. Further, they informed us that they are shocked and dismayed that they had never heard of the project before the meeting.</i></p> <p><i>As you would no doubt be aware, Rev 3 of the Drilling EP (page 111) stated as follows:</i></p> <p><i>The sea country of the marine park is part of the responsibility of the Yuwurrumu members of the Mandilarri-Ilduji, the Mandalara, the Murran, the Gadura-Minaga and the Ngaynjaharr clans. Sea country is valued for Indigenous cultural identity and Indigenous people have been sustainably using and</i></p>	<p><i>many felt that they had been misled.</i></p> <p><i>The claims and objections raised by the EDO in correspondence are not supported by the Reg 11A consultation meetings undertaken by Santos with the Minjilang community in Darwin and the Mulurruud Consultative Committee who have determined that they have cultural authority to speak on behalf of the Croker Island people and communities.</i></p>		<ul style="list-style-type: none"> <li>• <i>seeking to facilitate employment opportunities for First Nations people as trainee HSE advisors for drilling and completions activities, subject to the availability and participation of First Nations trainees, with a view to them obtaining HSE qualifications and competencies to enable future ongoing employment in HSE. Further, Santos plans to discuss the way in which it might be able to facilitate presentations by the trainee advisers to their communities about HSE management of the drilling and completions activities.</i></li> <li>• <i>periodic community townhalls across regional locations relevant to the Barossa Project, to provide Project updates and to provide an opportunity for feedback from CACOs to assist in the development of any potential improvement programs.</i></li> <li>• <i>Santos to facilitate trips to the drilling site, at intervals (as necessary), taking into account cultural advice as to the most appropriate clan members to attend such trips</i></li> </ul>
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<p><i>managing their sea country, including that within the Arafura Marine Park, for tens of thousands of years (Director of National Parks, 2018b).</i></p> <p><i>Further, during the proceedings of Tipakalippa v NOPSEMA [2022] FCA 1121, counsel for Santos, Mr Stephen Free SC, dealt with this reference in his oral submissions in some detail. He indicated:</i></p> <p><i>'One of the points I want to draw out from this exercise your Honour, is that there is actually quite a bit of detail in explaining different parts of sea country for different traditions owners. They certainly shouldn't all be understood as alluding in any way to the Tiwi Islanders...there is some explanation of particular traditional owners associated with particular sea country. The Tiwi Islanders aren't expressly linked, some other traditional owners are.'</i></p> <p><i>(Transcript, Day 4, P-316)</i></p>			
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<p><i>'Description of the Arafura Marine Park and in the final paragraph you see there "the sea country of the marine park is part of the responsibility of the...I'm sure I'm not even close your Honour, but I'll leave you to read the rest I think...So your Honour that is as I indicated earlier, drawing a connection with specific sea country associated with particular areas and in this case particular groups...'</i> (Transcript, Day 4, P-320)</p> <p><i>People in Minijlang are members of those clan groups named in Rev 3 of the Drilling EP. They are the people who counsel for Santos acknowledged as the 'particular traditional owners associated with particular sea country.'</i></p> <p><i>We are instructed by [individual name supplied but removed by Santos for privacy reasons] to present to Santos a summary of the matters raised by attendees on 26 June 2023. We note that this was our first opportunity to discuss these matters with community</i></p>			
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<p><i>members in Minjilang and that the information gathered is an initial indication of the spiritual and cultural connections that people in Minjilang hold to sea country within the EMBA.</i></p> <p><i>We anticipate that comprehensively recording matters of spiritual and cultural significance is likely to require multiple meetings over a period of time. Further, we note that some stories and information about some sacred sites is gender restricted and could not be shared during the mixed-gender meeting on 26 June 2023. As such, further gender-specific meetings would be necessary to capture that information.</i></p> <p><i>Noting these matters, we obtained the following information from attendees about their sea country interests within the EMBA of the Drilling EP:</i></p> <p><b><i>Sacred sites and songlines</i></b></p> <p><i>Attendees informed us that there are many sacred sites in the sea country around</i></p>			
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<p><i>Minjilang, and that sacred sites are not only on land, but also in the sea.</i></p> <p><i>Attendees advised that there are numerous small islands to the east and north/east of Minjilang which house sacred sites of enormous significance. These include (in their English names) Oxley Island, the islands making up New Year Island, McCluer Island, Grant Island, Wirgungun Island, Lawson Island, Templer Island, Valencia Island and a number of other islands. These places house such important sacred sites, that people are not permitted to go to certain areas within this vicinity for fear of disturbing those sacred sites.</i></p> <p><i>Similarly, attendees informed us that the sea country to the north of Cape Croker and out to the deep water, called Inigarrka, is the most sacred place in the ocean. Again, it is not permitted for anyone to travel in that sea country for fishing or any other purposes</i></p>			
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<p><i>because it is so sacred that it should never be disturbed.</i></p> <p><i>We were informed that this sacred area crosses into the EMBA – it is deep out in sea to the north of Inigarrka, and that this area can never be disturbed or the consequences would be life and death.</i></p> <p><i>We were informed that knowledge of sacred sites and areas where it is impermissible to go in the sea has been passed down through generations of ancestors.</i></p> <p><i>Attendees advised us that important songlines go from land to the sea, and that in particular, there are important songlines that go out into sea country from Inigarrka.</i></p> <p><b>Ancestral beings</b></p> <p><i>Attendees described a rainbow serpent, called Ambidj/Umbidj., who protects the ocean and protects Minjilang. Her sea is to the north of Inigarrka and she travels far north and all the way to the Tiwi Islands</i></p>			
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<p><i>as well. According to Minjilang Dreaming (and accepted by many First Nations groups), Minjilang is the birthplace of the rainbow serpent, Umbidj, and the sea country is very sacred and important because of that.</i></p> <p><i>Attendees warned that Umbidj should not be angered or disturbed. If she is angry, she will destroy Santos' project, create natural disasters and cause people to become sick.</i></p> <p><i>Sacred sites and songlines must be preserved to be passed on to future generations to ensure that culture survives and that future generations are protected by the ancestors. Any disturbance or threat to these sacred sites or songlines was considered a threat to the future of Minjilang people.</i></p> <p><b>Fishing and hunting</b></p> <p><i>Attendees stated that hunting and fishing are a critical part of life for the community in Minjilang. They rely on fish, turtles,</i></p>			
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<p><i>dugong, oysters and other marine food sources. They are also responsible for protecting marine resources from harm and ensuring the availability of those resources for future generations.</i></p> <p><i>Our client and the attendees at the meeting on 26 June 2023 wish to be consulted by Santos about the Drilling EP. As set out above, they are relevant persons pursuant to reg 11A(1)(d) of the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009 (Cth).</i></p> <p><i>Contrary to reg 11(2), Santos has not provided sufficient information to allow any person on Minjilang to make an informed assessment of the possible consequences of the activity on their functions, interests or activities.</i></p> <p><i>By your letter dated 17 May 2023, Santos has requested that the EDO provide information to our client contained in the Drilling Information Booklet (Booklet). We have provided</i></p>			
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<p><i>general information about the Barossa Project, such as its location, the approvals needed by Santos and the EMBA for the Drilling EP to our client and attendees. However, we note that the information contained in the Booklet is highly technical and complex, and as such, necessitates further explanation by those with the technical expertise to deliver such communication in the course of consultation. Further, the obligation is on Santos, not the EDO, to conduct consultation with relevant persons, including to give each relevant person sufficient information to allow the relevant person to make an informed assessment of the possible consequences of the activity on the function, interests or activities of the relevant person.</i></p> <p><i>Further, contrary to reg 11(3), Santos has not allowed a reasonable period for consultation with relevant people on Minjilang. On 17 May 2023 (almost a month after our</i></p>			
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<p><i>initial correspondence on behalf of [individual name supplied but removed by Santos for privacy reasons]), Santos requested further information from our client to ascertain whether he is a relevant person. Then, as we were in the process of obtaining those instructions, Santos wrote on 16 June 2023 giving our client one week to provide feedback about the Drilling EP. By contrast, consultation on the Tiwi Islands has been ongoing for at least four months in circumstances where many people on the Tiwi Islands knew about the project at the time the consultation commenced, including numerous face to face presentations by Santos across eight clan groups.</i></p> <p><i>The attendees at the meeting on 26 June 2023 indicated that they will conduct a community meeting after the conclusion of bush (school) holidays (i.e. after 17 July 2023) in order to make a community decision about how relevant persons wish to be consulted</i></p>			
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<p><i>by Santos. The community will also determine how it wishes to provide input and feedback about how their functions, interests or activities may be affected by the proposed activities under the EP.</i></p> <p><i>Finally, we note you referred in your letter to the 'widespread media and advertising campaign to reach relevant persons'. (Individual's name supplied) identified himself as a relevant person by 21 April 2023 and, at that time, put Santos on notice that members of his community are also likely to be relevant persons and were not aware of the Barossa project. Further, please advise which aspects of this campaign were specifically directed (or relevant) to people in Minjilang.</i></p> <p><i>You indicated that Santos advised the NLC about the proposed activities. In Tipakalippa v NOPSEMA [2022] FCA 1121, Justice Bromberg found that to the extent the Tiwi Land Council had been consulted, it was</i></p>			
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<p><i>consulted 'in its own right and by virtue of the function it was seen to have which may be affected by the Activity' [252]. On appeal, Santos submitted 'Santos does not rely on an argument that consultation with the Tiwi Land Council (TLC) discharged an obligation to consult with the traditional owners of the Tiwi Islands...' The Full Court concluded that Santos was bound by the position it adopted in writing (paragraph [28]).</i></p>			
<p><b>EDO correspondence of 20 September 2023 [Con-2424] Consultation proposal</b></p> <p><i>We refer to our correspondence to you between June and September 2023 in relation to consultation with the Minjilang community.</i></p> <p><i>On 19 September 2023, our clients and other community members in Minjilang participated in a community meeting. The purpose of the community</i></p>	<p><i>Santos has considered and assessed the response. Santos considers that it has met its consultation obligations under Regulation 11A.</i></p>	<p><b>Santos correspondence of 29 September 2023 [Con-2424]</b></p> <p><i>We refer to your letter dated 20 September 2023.</i></p> <p><i>Santos rejects the EDO's assertions in their entirety, and reserves all of its rights.</i></p>	<p><i>No additional measures required</i></p>

<p><i>meeting was to determine how the community wishes to engage in consultation with Santos. This was foreshadowed in earlier correspondence, but there were some delays in the community meeting taking place due to key community members travelling for sorry business.</i></p> <p><i>At the community meeting, the attendees made the following decisions by consensus, and instructed the EDO to write to Santos notifying it of the consensus decisions:</i></p> <p><i>a. The position remains that Santos staff should not attend Minjilang for any reason;</i></p> <p><i>b. Minjilang community wants to be consulted by Santos about the Drilling EP in a manner decided by the community to be appropriate;</i></p> <p><i>c. The manner in which Minjilang community wants to be consulted must be respected and Santos should not</i></p>			
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<p><i>continue to try to meet individuals or small, groups of people, sidelining other members of the community or undermining community decision making processes;</i></p> <p><i>d. The manner in which Minjilang community wants to be consulted is described in detail in Appendix A to this letter.</i></p> <p><i>The following people, including our clients EDO client (name withheld) and EDO client (name withheld), requested that we set out the proposed consultation plan on their behalf and that their names be listed in this letter to Santos (we note that a number of other people attended the meeting and participated in the decision making process, but did not explicitly request their names be included on this list):</i></p> <p><i>a. Minjilang community member [name withheld];</i></p> <p><i>b. Minjilang community member [name withheld];</i></p>			
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<p>c. <i>Minjilang community member [name withheld];</i></p> <p>d. <i>Minjilang community member [name withheld];</i></p> <p>e. <i>Minjilang community member [name withheld];</i></p> <p>f. <i>Minjilang community member [name withheld];</i></p> <p>g. <i>Minjilang community member [name withheld];</i></p> <p>h. <i>Minjilang community member [name withheld];</i></p> <p>i. <i>Minjilang community member [name withheld];</i></p> <p>j. <i>Minjilang community member [name withheld];</i></p> <p>k. <i>Minjilang community member [name withheld];</i></p> <p>l. <i>Minjilang community member [name withheld];</i></p> <p>m. <i>Minjilang community member [name withheld];</i></p> <p>n. <i>Minjilang community member [name withheld]; was unable to attend the meeting in person due to illness. However, she has requested that her name be included in this list and has endorsed the</i></p>			
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<p><i>proposed plan set out in Appendix A.</i></p> <p><i>o. Minjilang community member [name withheld]; was unable to attend the meeting in person due to commitments in Darwin. However, she has requested that her name be included in this list and has endorsed the proposed plan set out in Appendix A.</i></p> <p><i>The way in which Minjilang community seeks to be consulted accords with the Full Federal Court’s decision in Santos NA Barossa Pty Ltd v Tipakalippa [2022] FCAFC 193 and NOPSEMA’s Guideline on Consultation in the Course of Preparing an Environment Plan (<b>Consultation Guideline</b>). In particular, we refer to the following requirements set out in the Consultation Guideline:</i></p> <p><i>a. The requirement that where interests are held communally, in</i></p>			
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<p><i>accordance with tradition, the method of consultation reasonably reflects the characteristics of the interests affected by the titleholder's proposed activity.</i></p> <p><i>b. The emphasis in the Consultation Guideline that consultation processes will differ in each circumstance and that titleholders should, in designing their consultation processes, "carefully consider what the appropriate consultation processes are for each relevant person... adapting those processes to the nature of the authority, persons and organisations to be consulted."</i></p> <p><i>c. The requirement that sufficient information is provided about the environment and impacts on the environment in a form that is readily accessible and appropriate for the relevant person being consulted.</i></p> <p><i>d. The emphasis that</i></p>			
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<p><i>meetings be properly notified and conducted and that consultation occur through engagements that facilitate “genuine and meaningful two-way dialogue between the titleholder and relevant persons.</i></p> <p><i>e. The requirement that all group members should be afforded a reasonable opportunity to participate in consultation and that superficial or token consultation will not be enough.</i></p> <p><i>f. The Consultation Guideline notes that relevant persons may provide titleholders with their views of what constitutes a “reasonable period” to make an informed assessment and provide feedback, and may also provide information about their availability and accessibility issues that should be taken into account by the titleholder.</i></p> <p><i>g. The focus in the Consultation Guideline on</i></p>			
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<p><i>the importance of integrity and that a consultation process should foster respect and trust.</i></p> <p><i>h. The principle of "Communication" on page 7 of the Consultation Guideline which provides that "open and effective engagement should be undertaken during the consultation process to ensure that accurate and relevant information is provided." The principle of "Transparency" on page 7 of the Consultation Guideline which provides that "[a] productive consultation process will establish agreed information and feedback processes."</i></p> <p><i>Our clients and the abovementioned community members request the presence of Environmental Defenders Office lawyers at each meeting in the consultation process.</i></p> <p><i>Further, we are requested to ask Santos or its legal</i></p>			
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<p><i>representatives to pass the content of this letter and Appendix A to Santos Service Supplier [name withheld] who we understand Santos has retained in relation to consultation with the Minjilang community.</i></p> <p><b><i>Meeting between Santos representatives and EDO Client [name withheld]</i></b></p> <p><i>We are instructed that our client, EDO Client [name withheld], met with Santos representatives on Friday 15 September in Darwin. EDO Client [name withheld] was hosted by Santos at the Mercure Hotel in Darwin from Friday 15 September until Tuesday 19 September, when he returned to Minjilang with representatives of the EDO for the purpose of attending the community meeting.</i></p> <p><i>We are instructed that EDO Client [name</i></p>			
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<p><i>withheld] does not consider that he has been consulted by Santos in relation to any of its proposed plans or activities. He instructs that, in his view, consultation must be done with the community together, rather than in small groups, isolated from the rest of the community. The EDO was not provided with any notice of the meeting and EDO Client [name withheld] was not given the option of having his legal representatives present at the meeting.</i></p> <p><i>EDO Client [name withheld] instructs us that he attended the meeting with Santos to voice his general concerns about the Barossa project and not for the purpose of any purported consultation with Santos.</i></p> <p><i>EDO Client [name withheld] has also requested that Santos</i></p>			
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<p><i>advise when he will receive his payment for the trip and requests that the promised payment be made without further delay.</i></p> <p><i>We refer to our correspondence to you of 17 August 2023, 18 August 2023 and 21 August 2023 and reiterate the request made repeatedly by our clients that they be permitted to have their legal representatives present at any meeting with Santos representatives. We have also made this request to Santos' legal representatives Quinn Emanuel on 21 August 2023 and 7 September 2023.</i></p>			
<p><b>EDO Correspondence of 3 November, 2023 [Con-2643]</b></p> <p><b>Re: Minjilang community consultation - Barossa</b></p>	<p><i>Santos considered the response in light of the EDO client [name withheld] having a communal interest shared by the Minjilang community, which was</i></p>	<p><b>Santos Correspondence of 11 November 2023 [Con-2650]</b></p> <p><i>We refer to your letter of 3 November 2023 and to our previous correspondence in</i></p>	<p><i>No additional measure required.</i></p>

<p><b>Drilling and Completions Environment Plan</b></p> <p>We refer to your letter of 29 September 2023.</p> <p>We apologise for our delayed response. We were unable to obtain instructions any sooner due to our client, EDO client (name withheld), travelling to and attending a funeral during the period since your letter, and being without phone reception in remote locations at other times.</p> <p>We are now instructed to raise the following matters in relation to community consultation for the Barossa Drilling and Completions Environment Plan (EP).</p> <p><b>Consultation obligations are ongoing</b></p> <p>EDO client (name withheld) wishes to be consulted on the EP, as a relevant person, and in accordance with the consultation process set out in our letter dated 20 September 2023.</p>	<p>consulted and had confirmed satisfactory completion of consultation.</p>	<p>relation to this matter. We are instructed to respond as follows:</p> <p>We <b>enclose</b> a copy of Santos's Barossa Gas Project quarterly update, dated October 2023 (publicly available on Santos's website here: <a href="https://www.santos.com/about-us/corporate-governance/public-notices/">https://www.santos.com/about-us/corporate-governance/public-notices/</a>). We trust that you will pass this update, and the information in this letter, on to EDO client [name withheld].</p> <p>As noted in the October update, Santos has resubmitted the Development Drilling and Completions Environment Plan to NOPSEMA and, subject to acceptance, plans to recommence drilling activities before the end of 2023.</p> <p>Santos acknowledges your client's request to be consulted as a relevant person. Santos understands that EDO client [name withheld] is a member of the Minjilang community. Santos</p>	
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<p><i>EDO client (name withheld) does not consider that Santos' purported consultation with her to-date has been sufficient. In particular, our client does not consider that sufficient information has been provided to allow her to make an informed assessment of the possible consequences of the EP activities on her functions, interests or activities.</i></p> <p><i>EDO client (name withheld) may have further questions for Santos in relation to the EP once further information is provided.</i></p> <p><i>In this regard, we note that the obligations imposed by reg 11A of the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009 (Environment Regulations) on a titleholder extend up until the date the EP is accepted by NOPSEMA.</i></p> <p><b>Proposed consultation process</b></p>		<p><i>has met its obligations under reg 11A to consult with the Minjilang community. Santos has had a number of interactions with EDO client [name withheld], she has been invited to several information sessions and she has been afforded ample opportunity to engage in consultation prior to the submission of the Environment Plan.</i></p> <p><i>Notwithstanding that Santos has completed reg 11A consultation with the Minjilang community, Santos representatives remain ready and willing to meet with EDO client [name withheld] to discuss the Barossa Gas Project, at a time and place of her choosing.</i></p> <p><i>Santos confirms that it considers that the clan groups of the Croker Island are relevant under reg 11A, and accordingly has completed reg 11A consultation in respect of this group as a relevant person organisation.</i></p>	
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<p>We note that you have not responded to the substance of the request in our letter of 20 September 2023. That was a request of our client, and other Minjilang community members, to be consulted in accordance with the process decided by consensus decision-making and set out in the Appendix to that letter.</p> <p>In your letter of 29 September 2023, you merely referred to your client's blanket rejection of our letter. You did not provide any reasoning for your client's rejection of our client's request. As such, our client requests an explanation as to why your client has rejected the process for consultation outlined in our letter, being the proper process as determined by the Minjilang community.</p> <p>In particular, our client requests a substantive response to paragraphs [3] and [5] of our letter, in relation to the proposed</p>		<p>Having regard to your correspondence of 27 June 2023 (sent on behalf of EDO client [name withheld], but referring to the interests of EDO client [name withheld] and other Minjilang community members), Santos understands that any interests of EDO client [name withheld] (as that term is used in reg 11A) are in the nature of a communal interest which EDO client [name withheld] holds in common with the Minjilang community. As confirmed by Kenny and Mortimer JJ in Santos NA Barossa Pty Ltd v Tipakalippa [2022] FCAFC 193; (2022) 296 FCR 125, reg 11A creates an artificial construct of a 'relevant person' which captures organisations comprised of individuals. Titleholders are not required to consult with each and every person forming part of organisational relevant person.</p> <p>Without limiting the comments above (or being exhaustive), consultation with Croker Island clans has been conducted through</p>	
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<p><i>consultation process and its alignment with NOPSEMA’s Guideline on Consultation in the Course of Preparing an Environment Plan. Our client maintains that she should be afforded the opportunity to have a say in relation to how she is to be consulted under the Environment Regulations.</i></p> <p><i>We are also instructed to reiterate that the proper process for consultation in Minjilang community is (among other things) by way of community meetings. We refer to paragraph [3(c)] of our letter dated 20 September 2023.</i></p> <p><i>We are further instructed that your client appears to have engaged a consultant to hold meetings with individuals in small groups in Minjilang and has continued arranging flights for community members to attend small group meetings in Darwin. In our client’s view, this is not an appropriate way to</i></p>		<p><i>the Mulurryud Consultative Committee (MCC). Your client has familiarity with this, having been a member of the MCC, attended a meeting with Santos at which the process of consultation with the MCC was co-designed, and having been offered the opportunity by virtue of her membership in the MCC to participate in further consultation with Santos through the MCC.</i></p> <p><i>As noted above, notwithstanding this, Santos is happy to meet with EDO client [name withheld] at a time and place of her choosing to discuss any aspects of the Barossa Gas Project. EDO client [name withheld] will also be afforded the opportunity of reg 11A consultation for other activity environment plans in the course of their preparation.</i></p>	
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<p><i>consult the community in relation to the EP, and is contrary to the consultation process set out in our letter.</i></p> <p><b>Next steps</b></p> <p><i>Our client requests to be consulted in relation to the EP, as a relevant person, and in accordance with the process set out in our letter of 20 September 2023.</i></p> <p><i>Please note however that our client is still in the process of returning to Minjilang from a funeral and is currently in Gunbalanya/Oenpelli. As such, flexibility may be required for scheduling future consultation sessions. We will provide you with our client's available dates when we are able to obtain them.</i></p>			
<p><b>Kimberley Land Council (KLC)</b></p>			
<p>+ On 16 June 2023 Santos telephoned and emailed the Kimberley Land Council (KLC). Santos indicated that the KLC may be a Relevant Person for the purposes of consultation on the Barossa Drilling and Completions Environment Plan (EP). Santos provided a Barossa Drilling and Completions Information Booklet, and the KLC was invited to provide information to Santos as to other potential Relevant Persons it was aware of for Santos to consider consulting. Santos also provided a link to</p>			



- NOPSEMA's Guideline: *Consultation in the course of preparing an Environment Plan* and requested a meeting. Santos suggested a meeting be held during the week commencing 26 June and provided contact details for further information. [Con-1401]
- + On 6 July 2023 Santos' relevant consultation adviser telephoned the KLC to introduce himself and flag upcoming consultations for Barossa and other Santos offshore activities.
  - + Santos exchanged emails with the KLC between 10-21 August 2023 to arrange a face-to-face meeting for 22 August 2023. A subsequent telephone call and email from the KLC confirmed cancellation of the 22 August meeting. This meeting was subsequently rescheduled to 29 August 2023 and held as a Teams meeting. [Con-2674][Con-2670]
  - + The scope of the 29 August 2023 meeting included to further discuss the Barossa Gas Project including proposed activities under this Environment Plan. KLC's consultation expectations for Barossa Environment Plans and other Santos Environment Plans were also discussed. The KLC expressed their view that they are not resourced to support the significant volume of Industry consultation, and that an Industry-wide approach to consultation is needed. KLC pointed to future planned forums where opportunities for industry-first nations consultation frameworks could be further explored. Industry-wide discussions about such frameworks are ongoing and remain to be established.
  - + On 9 November 2023 Santos emailed the KLC, referring back to information provided on 16 June 2023, seeking confirmation that it does not intend to provide any input for the purposes of regulation 11A consultation on the D&C EP, including in relation to the potentially affected environment or potential risks and impacts of the drilling and completions activity, prior to resubmitting the EP to the regulator NOPSEMA. Santos followed up the email with a phone call to the KLC on 10 November 2023, and followed up again on 13 November 2023. [Con-2648] No further response was received.
  - + Notwithstanding the information provided and the steps described above, no comments or input were received for this EP. Santos' assessment is that the KLC has been afforded a reasonable period and sufficient information in order to make an informed assessment, and has had a reasonable opportunity to provide input for this EP, about their functions, interests or activities that may be affected (including with respect to any particular First Nations persons or organisations they might have considered required consultation) and/or potential environmental impacts or risks of the Activity.

<b>Summary of Objection or Claim</b>	<b>Assessment of Merits</b>	<b>Santos' Response Statement</b>	<b>EP Reference</b>
<i>Nil</i>	<i>Nil</i>	<i>Nil</i>	<i>No additional EP measures required.</i>

## Northern Land Council (NLC)

- Summary of consultation effort:**
- + On 13 April 2023 Santos emailed NLC to explain the consultation approach for the Barossa Drilling and Completions Environment Plan (EP), asking if NLC would like to be consulted, how it would like to be consulted and what information it required. Santos provided a Barossa Drilling and Completions Information Booklet, and the NLC was invited to provide information to Santos as to other potential Relevant Persons it was aware of for Santos to consider consulting. Santos also provided a link to NOPSEMA's Guideline: *Consultation in the course of preparing an Environment Plan*. Santos also advised that consultation with Relevant Persons for preparation of the EP

- was planned to conclude by mid-2023. [Con-1041]
- + On 20 April 2023 Santos emailed NLC the Barossa Development Quarterly Update, which included information on the consultation process for this EP. [Con-1066]
- + On 24 April 2023 Santos emailed NLC to advise of opportunities in Darwin on 27 April 2023 and 3 May 2023 to obtain information, provide feedback and ask questions on the drilling and completions activity. [Con-1078]
- + On 19 May 2023 Santos emailed NLC providing a link to NOPSEMA’s brochure: *Consultation on offshore petroleum environment plans – Information for the community*. A Barossa Drilling and Completions Information Booklet was also provided. [Con-1206]
- + On 29 May 2023 Santos emailed NLC a Drilling and Completions Fact Sheet. Santos also reminded Northern Land Council of the timeframe for provision of feedback. [Con-1243]
- + On 15 June 2023 NLC emailed Santos its feedback on the Barossa Drilling and Completions EP. [Con-1396]
- + On 20 June 2023 Santos emailed NLC thanking it for its letter of 15 June and welcoming the comments. Santos offered a meeting with the NLC to discuss these comments along with providing a broader project update. [Con-1434]
- + Santos met with the NLC on 30 June 2023 to discuss consultation approaches for remote First Nations communities. As part of that meeting, Santos sought advice from the NLC about other potential First Nations relevant persons who hold community cultural interests (such as a connection to Sea Country) that may be affected by the Activity. The NLC did not provide any feedback or information to assist with Santos’ request.
- + On 24 July 2023 Santos emailed the NLC, providing a response to the NLC’s feedback on 15 June 2023. The NLC acknowledged receipt of the email the same day. [Con-2362]
- + No further correspondence or feedback was received.

<b>Summary of Objection or Claim</b>	<b>Assessment of Merits</b>	<b>Santos’ Response Statement</b>	<b>EP Reference</b>
<p><b>NLC correspondence [Con-1396]</b></p> <p><i>The Environment Plan identifies a number of “highly mobile marine fauna with a wide distribution that may transit the area in low numbers. This includes: Blue, fin and sei whales;</i></p>	<p><i>The information was considered by Santos and included in the Environment Plan.</i></p> <p><i>Santos has assessed the impacts and risks to these species in the Environment Plan and the Oil Pollution Emergency Plan, Santos considers the existing</i></p>	<p><b>Santos correspondence [Con-2362]</b></p> <p><i>Santos notes and welcomes the information provided.</i></p>	<p><i>No additional measures required</i></p>

<p><i>Olive Ridley, loggerhead, leatherback and flatback turtles; whale sharks, seabird and migratory shorebirds; and fish and sharks. [Con-1396]</i></p>	<p><i>proposed measures reduce the impacts and risks to ALARP and acceptable levels and no additional measures are required.</i></p>		
<p><i>In the Kenbi (Cox Peninsula) Land Claim No 37 (which led to the grant of the Kenbi Aboriginal Land Trust) the Land Commissioner identified a number of culturally significant species to Larrakia people. A sacred sites map included at Appendices 8 of the Report is extracted below: [Con-1396]</i></p>	<p><i>The information is noted. Cox Peninsula is outside the Activity EMBA.</i></p>	<p><i>Santos notes and welcomes the information provided.</i></p>	<p><i>No additional measures required</i></p>
<p><i>The Land Council urges Santos to implement the highest standard measures to reduce impacts and risks to marine fauna, especially those referred to above. [Con-1396]</i></p> <p><i>The Land Council is particularly concerned about the risks associated with marine diesel, gas and non-hydrocarbon spills. [Con-1396]</i></p> <p><i>As identified in the map</i></p>	<p><i>Santos notes the concerns raised and NLC's request to Santos to implement the highest standard measures to reduce impacts and risks to marine fauna.</i></p> <p><i>Santos has assessed the impacts and risks to these species in the Environment Plan and the Oil Pollution Emergency Plan, Santos considers the existing proposed measures reduce the impacts and risks to ALARP and acceptable</i></p>	<p><i>The EP has identified the environmental values and sensitivities within the operational area and the EMBA in Section 3.2. They include threatened and migratory fauna, socio-economic receptors and cultural features. The potential impacts and risks to these values (which include but are not limited to whales, turtles, birds, sharks, rays and fish) from planned and unplanned events are addressed in Section 6 and Section 7 of the EP.</i></p> <p><i>Management controls which</i></p>	<p><i>No additional measures required</i></p>

<p>above, there are numerous sacred sites across the Cox Peninsular that are significant to the Traditional Owners and custodians. These sites include reefs such as Igibidjit (site 14) and Moedranyini (site 3) and the shoreline Wilar dreaming (yams) at Imabulk (site 31), Djirringili (site 27) Guligi (site 30) and Kidjerikidjeri (site 35). Windirr (site 4) has an oyster dreaming. Bridjibin (site 13) has a clamshell dreaming. [Con-1396]</p> <p>The High Court noted in Northern Territory v Griffiths (deceased) &amp; Anors [2019] HCA 7 (Timber Creek case) that degradation to a particular area of the landscape must be understood in the context of the wider country it is situated in. The majority in the Timber Creek Case held:</p> <p>“The answer his Honour gave was that an impairment of an Aboriginal person’s spiritual connection to land</p>	<p>levels and no additional measures are required.</p>	<p>demonstrate that risk outcomes have been reduced ALARP and are acceptable are provided in Sections 6 and 7 of the EP.</p> <p>The process for demonstrating ALARP and the acceptability of management controls through the OPGGS(E)R is designed to achieve application of the highest environmental standards.</p> <p>The OPEP has also been developed to ensure timely and effective response in the unlikely event of a hydrocarbon spill. The response strategies are identified under a NEBA process so the most effective response strategies with the lowest environmental consequences can be identified, documented and Santos can prepare.</p> <p>The OPEP meets all relevant requirements of the Commonwealth OPGGSIR. It is consistent with the National, Northern Territory (NT) and State (WA) systems for oil pollution preparedness and response, being the National Plan for Maritime Environmental Emergencies (AMSA, 2020) managed by AMSA, the NT Oil Spill Contingency Plan (NT DoT, 2014), Territory Emergency Plan (NT Government,</p>	
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<p><i>is not to be understood by reference to what occurs on a particular lot or lots..... But each act was also to be understood by reference to the whole of the area over which the relevant rights and interests had been claimed. His Honour accepted that account must be taken of the extent to which spiritual attachment to land has already been impaired, but said that a further sense of loss "which does not specifically relate to an act or parcel of land" may be felt.</i></p> <p><i>"The earlier acts, which were not compensable, punched holes in what could be likened to a single large painting – a single and coherent pattern of belief in relation to a far wider area of land. The subsequent compensable acts punched further holes in separate parts of the one painting, and the damage done was not to be measured by reference to the holes created by the</i></p>		<p><i>2021) and the WA State Hazard Plan for Maritime Environmental Emergencies (SHP-MEE) (WA DoT, 2021). The EMBA from unplanned spills from the drilling and completion activities does not contact the NT coastline or NT coastal waters.</i></p>	
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<p><i>compensable acts alone, but by reference to the effect of those holes in the context of the wider area: for example, an area which, as the trial judge found, remained important to the Ngaliwurru and Nungali Peoples despite the fact that the area was no longer able to be used as a ritual ground.” [Con-1396]</i></p> <p><i>In this decision for the Upper Daly River Land Claim, the Aboriginal Land Commissioner noted at page 88:</i></p> <p><i>5.4.1 ...a site should not be considered simply as a particular physical feature of a landscape – such as a billabong or a hill – occupying relatively little space, but rather as a place the location of which is indicated by reference to the particular physical feature but which is not delineated by that feature. A broad approach to the concept of ‘site’ should be taken. The land around a site is important. [Con-</i></p>			
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<p>1396]</p> <p><i>These named sites and others on the Cox Peninsular are environmentally sensitive and the dangers associated with drilling and completions on the Barossa Gas Project could cause detrimental impacts. As such, the Land Council supports Santos in implementing the most conservative measures possible to protect these delicate landscapes and sites.</i></p> <p><i>In addition, any serious damage to these sites are at risk of breaches of the Sacred Sites Act 1989 (NT) and liable to prosecution by the Aboriginal Areas Protection Authority. [Con-1396]</i></p>			
<b>Tiwi Land Council (TLC)</b>			
<p><b>Summary of consultation effort:</b></p> <ul style="list-style-type: none"> <li>+ On 13 April 2023 Santos emailed TLC to explain the consultation approach for the Barossa Drilling and Completions Environment Plan (EP), asking if Tiwi Land Council would like to be consulted, how it would like to be consulted and what information it required. A Barossa Drilling and Completions Information Booklet was also provided, and the TLC was invited to provide information to Santos as to other potential Relevant Persons it was aware of for Santos to consider consulting. Santos also provided a link to NOPSEMA’s Guideline: <i>Consultation in the course of preparing an Environment Plan</i>. Santos also advised that consultation with Relevant Persons for preparation of the EP was planned to conclude by mid-2023. [Con-1041]</li> </ul>			

- + On 20 April 2023 Santos emailed TLC the Barossa Development Quarterly Update, which included information on the consultation process for this EP. [Con-1066]
- + On 24 April 2023 Santos emailed TLC to advise of opportunities in Darwin on 27 April 2023 and 3 May 2023 to obtain information, provide feedback and ask questions on the drilling and completions activity. [Con-1078]
- + On 19 May 2023 Santos emailed TLC providing a link to NOPSEMA’s brochure: *Consultation on offshore petroleum environment plans – Information for the community*. A Barossa Drilling and Completions Information Booklet was also provided. [Con-1206]
- + On 29 May 2023 Santos emailed TLC a Drilling and Completions Fact Sheet. Santos also reminded TLC of the timeframe for provision of feedback. [Con-1243]
- + On 20 June Santos emailed TLC following up its previous emails seeking to confirm whether TLC had any feedback on Barossa Drilling & Completions activity as Santos was currently finalising consultation on this activity. The following link was again provided for all project information <https://www.santos.com/barossa/https://www.santos.com/barossa/>. [Con-1505]
- + TLC representatives attended and facilitated Tiwi clan consultation sessions on a number of occasions and the records of their participation are included in the Tiwi clan consultation records.
- + No response or feedback was received.

<b>Summary of Objection or Claim</b>	<b>Assessment of Merits</b>	<b>Santos’ Response Statement</b>	<b>EP Reference</b>
Nil	<p><i>Refer to consultation with Tiwi clans below.</i></p> <p><i>Representatives of TLC have attended and facilitated Tiwi clan consultation sessions.</i></p> <p><i>TLC has made no separate submission.</i></p>	<p><i>Santos’ consultation with Tiwi clans has resulted in additional EP controls which are detailed in the relevant sections of the EP and Oil Pollution Emergency Plan (OPEP).</i></p> <p><i>The additional controls relate to notification prior to commencement of drilling activities and in the event of a spill incident as well as spill response training and provision of assessment kits to perform sampling and monitoring.</i></p>	<p><i>Section 7.9 of EP for additional measures.</i></p> <p><i>Activity Notifications Table (Table 8.4).</i></p> <p><i>Table 5-7 of OPEP for additional measures.</i></p>

**Tiwi Islands Clan Groups and Traditional Owners**

- + Santos adopted a staged approach to consultation with Tiwi Islands Clan Groups and Traditional Owners.



- + Santos understands approximately seven Tiwi people are represented by the Environmental Defenders Office (EDO). Before and throughout the consultation period, the EDO on behalf of various of its clients has corresponded with Santos in relation to the consultation process. See Con-1551 to Con-1574 inclusive, Con-1576, Con-1577, Con-1579, Con-1580, Con-1582, Con-1583, Con-1585, Con-1587, Con-1588 and Con-1591.
- + Consultation activities were conducted in person, primarily through discussions or presentations.
- + Written consultation materials were also made available or supplied.
- + Santos used visual aids, maps, videos, animations to present information regarding the Activity and the project more generally.
- + On 7 January 2023, Santos provided notice (by half-page advertisement in the NT News) of community sessions scheduled on the Tiwi Islands for 6, 7 and 8 February.
- + Between 6 and 8 February 2023 (inclusive), Santos attended the Tiwi Islands and held community engagement sessions in Milikapiti, Pirlangimpi and Wurrumiyanga to seek feedback from the clan members as to how they would like to be consulted. Santos received feedback during those sessions to the effect that consultation should occur through clan group meetings, with approximately a month's notice of consultation sessions to allow time to consider information and then re-group.
- + Santos representatives remained on the Tiwi Islands on 9 and 10 February 2023 and were available to answer questions regarding the project and proposed activities (including risks and impacts), the consultation process and consultation preferences, and to receive any feedback.
- + Between 20 and 24 March 2023 (inclusive), Santos held initial clan consultation sessions with Tiwi Islands clans, at three locations around the Tiwi Islands (Milikapiti, Pirlangimpi and Wurrumiyanga). Information regarding this EP and the Activity was communicated to clan members and feedback was sought. One session was held for each clan group, however other clan group members attended some meetings with the approval of the clan trustee. In total, approximately 756 clan members attended these sessions. Notice for these consultation sessions was provided on 18 February 2023 (by full page advertisement in the NT News). Santos also advertised the sessions on social media and the Tiwi Noticeboard Facebook page. [Con-1003, Con-1004, Con-1005, Con-1006, Con-1007, Con-1008, Con-1009, Con-1010]
- + Between 26 and 28 April and 4 and 5 May 2023, Santos held follow up clan consultation sessions with Tiwi Islands clans, at three locations around the Tiwi Islands (Milikapiti, Pirlangimpi and Wurrumiyanga), during which the information regarding this EP was communicated to clan members and feedback was sought. One session was held for each clan group, however other clan group members attended some sessions with the approval of the clan trustee. In total, approximately 820 clan members attended these sessions. Notice for these consultation sessions was provided a month prior on 29 March 2023 (by full page advertisement in the NT News). Santos also advertised the sessions on social media and the Tiwi Noticeboard Facebook page on 28 March 2023. [Con-1537, Con-1538, Con-1539, Con-1540, Con-1541, Con-1542, Con-1543]
- + Between 13 and 16 June 2023 (inclusive), Santos held final consultation sessions with Tiwi Islands clans, at three locations around the Tiwi Islands (Milikapiti, Pirlangimpi and Wurrumiyanga), during which the information regarding this EP was communicated to the clan members and the manner in which their feedback was intended to be addressed in this EP was communicated to clan members. In total, approximately 679 clan members attended these sessions. Notice for these consultation sessions was provided a month prior on 13 May 2023 (by full page advertisement in the NT News). Santos also publicised the sessions on social media and the Tiwi Noticeboard Facebook page on 12 May 2023. [Con-1544, Con-1545, Con-1546, Con-1547, Con-1548, Con-1549, Con-1550]
- + Tiwi Islands clan members were encouraged to provide their name and contact details to Santos if they wished to however, were not obliged to do so. Therefore, in some cases, questions or feedback received by Santos is can be attributed to an identified specific individual and in other cases this information is not available. Santos

- respected confidentiality and anonymity requests.
- + On 4 July 2023 the EDO emailed Santos, attaching a letter sent on behalf of three Tiwi clients. [Con-1570]
  - + On 27 July 2023 Santos emailed the EDO, attaching a letter in response to the EDO’s correspondence of 4 July 2023. [Con-2394]
  - + On 13 September 2023 the EDO emailed Santos, providing a letter in response to Santos’ correspondence of 27 July 2023. The EDO stated that its clients did not think that sufficient consultation had occurred to meet the obligations under the Regulations and specifically Santos had not engaged with the substance of the issues and concerns raised in the EDO’s letter of 27 July 2023. [Con-2395]
  - + On 22 September 2023, further to Santos’ response provided to the EDO on 27 July 2023, Santos emailed the EDO in response to the EDO’s letters of 4 July 2023 and 13 September 2023. Santos stated that it has discharged its obligations to allow Tiwi Islands clan groups and traditional owners, as relevant persons, a reasonable period for consultation (being over three months), and to give those relevant persons sufficient information to allow them to make an informed assessment of the possible consequences of the activity on their functions, interests or activities. [Con-2403]
  - + Further, Santos notes that the EDO’s clients’ interests are of a communal nature shared in common with other Tiwi Island people.
  - + A detailed chronology of steps taken to consult with the Tiwi Islands clan groups and Traditional Owners is included at **Appendix I**.

<b>Summary of Objection or Claim</b>	<b>Assessment of Merits</b>	<b>Santos’ Response Statement</b>	<b>EP Reference</b>
<i>Tiwi Islands clans have requested to be notified prior to the start of drilling at Barossa.</i>	<i>Santos notes this request and has adopted measures in response to this request.</i>	<i>Santos will notify Tiwi Resources (on behalf of Tiwi Islands Traditional Owners Clan Groups) at least 10 days before the re-commencement of drilling activity.</i>	<i>Activity Notifications Table (Table 8.4).</i>
<i>Tiwi Islands clan members have requested to be trained in spill response.</i>	<i>Santos notes this request and has adopted measures in response to this request.</i>	<i>Santos will deliver three-hour rapid assessment training in consultation with Tiwi Rangers groups prior to the commencement of the activity. The training will be tailored specifically for Tiwi Rangers. Additional on-the-job training will be provided post-spill to additional personnel (if required).</i>	<i>The Drilling and Completions Oil Pollution Emergency Plan (OPEP) has been updated to reflect the training that will be made available to Tiwi Islands Ranger groups (Table 7.5).</i>
<i>Tiwi Islands clan members</i>	<i>Santos notes this request</i>	<i>Santos will make rapid</i>	<i>The Drilling and Completions Oil Pollution Emergency Plan (OPEP) has been updated</i>

<p><i>requested spill kits be located on the Tiwi Islands.</i></p>	<p><i>and has adopted measures in response to this request.</i></p>	<p><i>assessment kits available on the Tiwi Islands, to perform sampling and monitoring if a Drilling and Completions spill occurs that has the potential to reach the Tiwi Islands (noting that spill modelling does not predict contact with the Tiwi Islands).</i></p> <p><i>The kits will contain:</i></p> <ol style="list-style-type: none"> <li><i>1. Rapid Assessment Team Document Holder – Containing all the relevant documentation and ‘How to Guides’.</i></li> <li><i>2. Rapid Oil Sampling Kit – Used to take samples of possible hydrocarbons for lab analysis.</i></li> <li><i>3. Wildlife Sampling Kit – Used to take samples of deceased wildlife for lab analysis.</i></li> <li><i>4. PPE Kit – To protect team members when collecting samples.</i></li> </ol>	<p><i>to reflect the training that will be made available to Tiwi Islands Ranger groups (Table 7.5)</i></p>
<p><i>Tiwi Islands clan members have requested to be notified as soon as practicable in the event of a spill event.</i></p>	<p><i>Santos notes this request and has adopted measures in response to this request.</i></p>	<p><i>Santos will notify clan members who requested to be notified via phone call within eight hours of a spill incident being identified.</i></p>	<p><i>Representatives have been listed as external stakeholders to be notified in the unlikely event of a spill in the Drilling and Completions OPEP (Section 7.1).</i></p>
<p><i>Tiwi Islands clan members raised concerns about potential impacts to marine life in the event of a hydrocarbon spill. Tiwi</i></p>	<p><i>Santos notes this feedback and has assessed the impacts and risks to marine life in the Environment Plan and the Oil Pollution</i></p>	<p><i>Santos acknowledges feedback received with respect to concerns about potential impacts to marine life in the event of a hydrocarbon</i></p>	<p><i>No additional EP measures required.</i></p>

<p><i>people have a particular interest in turtles as a food source.</i></p>	<p><i>Emergency Plan, Santos considers the existing proposed measures reduce the impacts and risks to ALARP and acceptable levels and no additional measures are required.</i></p>	<p><i>spill.</i></p> <p><i>The likelihood of a worst-case condensate spill is extremely low. Wells are designed with essential engineering and safety control measures to prevent a loss of containment occurring. Spill modelling performed by Santos also demonstrates that a worst-case condensate spill does not reach the Tiwi Islands, as shown by the EMBA in the Drilling &amp; Completions fact sheet.</i></p> <p><i>In the unlikely event of a worst-case hydrocarbon spill, Santos will implement response strategies contained in the Drilling and Completions oil pollution emergency plan (OPEP) to reduce potential impacts to marine life to as low as reasonably practicable and to an acceptable level.</i></p> <p><i>Condensate has the potential to impact marine life in the event of an unplanned release of condensate from a well during well construction.</i></p> <p><i>Many factors affect the extent of condensate impact on marine life, including the spill location, volume, duration, type, trajectory, season and atmospheric and oceanic conditions. Depending on how much condensate is released</i></p>	
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		<p><i>and the extent of exposure, condensate can cause stress to marine life, such as seabirds and marine mammals, including irritation of eyes/mouth and illness. In extreme situations with large volumes of condensate spill in an enclosed area, the impact could be fatal.</i></p> <p><i>Two areas are relevant to marine life impact associated with the drilling and completions activity at Barossa:</i></p> <ul style="list-style-type: none"> <li>• <i>The “MEVA” is an area surrounding the drilling site of the Barossa project which is used to inform environmental assessment, identify potential environmental consequences and develop spill response plans.</i></li> <li>• <i>The “EMBA” is a broader area surrounding the MEVA which represents the broadest area which could be affected by an unplanned ‘worst case’ spill event during drilling without any spill response actions. The EMBA is larger than the MEVA.</i></li> </ul> <p><i>A condensate release could impact on benthic organisms, fish, coral and invertebrates. Other</i></p>	
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		<p><i>marine life such as turtles, whales (including the pygmy blue whale) and seabirds which infrequently transit through the MEVA or EMBA may also be adversely impacted by a spill of condensate but these species are less likely to be present in the MEVA. A spill is not anticipated to impact key areas for marine turtle breeding and nesting.</i></p> <p><i>The impacts of one of Australia's largest oil spills have been assessed over a number of years. The results of scientific monitoring after the Montara oil spill can be found at:</i></p> <p><i><a href="https://www.dcceew.gov.au/environment/marine/marine-pollution/montara-oil-spill/scientific-monitoring-studies">https://www.dcceew.gov.au/environment/marine/marine-pollution/montara-oil-spill/scientific-monitoring-studies</a>.</i></p> <p><i>Environmental monitoring following the Montara oil spill has found no significant long-lasting impacts.</i></p> <p><i>Adopted prevention and mitigation control measures in the Drilling and Completions EP (Section 7.6.3), including the Drilling and Completions OPEP, are considered sufficient to reduce the risks and impacts to marine life from a worst-case condensate spill to as low as reasonably practicable and to an acceptable</i></p>	
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		level.	
<p><i>Tiwi Island clans raised concerns about the impacts of natural disasters, including tsunamis, earthquakes and volcanoes, on drilling activity.</i></p>	<p><i>Santos notes this feedback. The Barossa wells are designed and will be drilled in accordance with regulatory requirements and international standards, and a regulator accepted Safety Case, to reduce the risk of impacts from a natural disaster to as low as reasonably practicable.</i></p> <p><i>Wells engineering design safeguards and drilling safety control measures are considered sufficient to reduce the risk of potential impacts from natural disasters to as low as reasonably practicable and to an acceptable level.</i></p> <p><i>No additional measures required.</i></p>	<p><i>Santos acknowledges feedback received with respect to concerns about natural disasters on the drilling activity.</i></p> <p><i>Historical evidence shows that wells do not leak because of earthquakes (both in the area where the Barossa wells are planned, which is not near any major faults, and around the world).</i></p> <p><i>It is also very unlikely that the drilling would cause an earthquake based on the depth of the wells, the relatively small number of wells being drilled into the field, the location of the operations, the low level of seismic activity in the area, and on historical effects of drilling activities in Australia.</i></p> <p><i>Tsunamis do not affect drilling rigs or vessels located in deeper water such as the Barossa field, where the water depth is over 200m. Waves created by tsunamis cause damage when the wave reaches land and the shallower water causes a large wave to form above the normal level of the ocean.</i></p> <p><i>The Barossa wells are designed</i></p>	<p><i>No additional EP measures required.</i></p>

		<p><i>and will be drilled in accordance with regulatory requirements and international standards, and a regulator accepted Safety Case, to reduce the risk of impacts from a natural disaster to as low as reasonably practicable.</i></p> <p><i>Wells engineering design safeguards and drilling safety control measures are considered sufficient to reduce the risk of potential impacts from natural disasters to as low as reasonably practicable and to an acceptable level.</i></p>	
<p><i>Tiwi Island clan members requested to be able to visit the drilling site to see what is happening.</i></p>	<p><i>Santos notes this feedback and will consider opportunities to facilitate trips to the drilling site, at intervals (as necessary), taking into account cultural advice as to the most appropriate clan members to attend such trips</i></p>	<p><i>Santos will facilitate trips to the drilling site, at intervals (as necessary), taking into account cultural advice as to the most appropriate clan members to attend such trips.</i></p>	<p><i>As part of other measures adopted (Section 8.11) Santos will offer to facilitate trips to the drilling site, at intervals (as necessary), taking into account cultural advice as to the most appropriate clan members to attend such trips</i></p>
<p><i>Tiwi Island clan members raised concerns about the impact of drilling on their dreaming totems (including turtle totems).</i></p>	<p><i>Santos notes this feedback. Impacts to marine species, that are also of cultural significance, from the Activity have been assessed to have a consequence of minor to negligible, and impacts and risks have been reduced to ALARP and</i></p>	<p><i>Santos acknowledges the feedback as to the potential impact of drilling on the dreaming totems of some Tiwi people.</i></p> <p><i>Santos intends to continue to discuss with the Tiwi Islands clan members the way in which they might be able to facilitate an introduction of the drilling</i></p>	<p><i>BAD-CM-049 has been adopted as a measure to respect the beliefs of First Nations individuals who have concerns related to their cultural and spiritual beliefs that adverse effects to people and the environment may result from the Activity, by introducing the activity to the spirit beings they believe in and the seas in a culturally appropriate manner.</i></p>



	<p><i>acceptable levels. No additional measures required.</i></p> <p><i>For those Tiwi Clan members that do have concerns in relation to their cultural and spiritual beliefs, Santos acknowledges the recommendations by Tiwi people as suggested to Dr Corrigan and has considered them for adoption where practicable and appropriate and has adopted a measure to respect the beliefs of First Nations individuals.</i></p>	<p><i>activities to the dreaming totems of the concerned clan members.</i></p>	
<p><i>Tiwi Islands clan members raised concerns about the drilling having an impact on their spiritual dreaming which protects the Tiwi Islands to the effect that disaster would strike the Tiwi Islands because of the drilling.</i></p>	<p><i>Santos notes this feedback. Santos also observes that similar concerns were not raised by all Tiwi Clan members.</i></p> <p><i>For those Tiwi Clan members that do have concerns in relation to their cultural and spiritual beliefs, Santos acknowledges the recommendations by Tiwi people as suggested to Dr Corrigan and has and has adopted a measure to</i></p>	<p><i>Santos acknowledges the feedback as to the potential impact of drilling on the spiritual dreaming of some Tiwi people.</i></p> <p><i>Santos intends to continue to discuss with the Tiwi Islands clan members the way in which they might be able to facilitate an introduction of the drilling activities to the spiritual dreaming of the concerned clan members.</i></p>	<p><i>BAD-CM-049 has been adopted as a measure to respect the beliefs of First Nations individuals who have concerns related to their cultural and spiritual beliefs that adverse effects to people and the environment may result from the Activity, by introducing the activity to the spirit beings they believe in and the seas in a culturally appropriate manner.</i></p>

	<p><i>respect the beliefs of First Nations individuals.</i></p>		
<p><i>Tiwi Islands clan members noted the impacts of the Montara oil spill and asked whether there was a chance of an oil spill for the Barossa Project.</i></p>	<p><i>Santos notes this query and has assessed the Montara project and incident as not comparable to the Barossa gas project. No additional measures required.</i></p>	<p><i>Santos was not involved in the Montara oil spill in August 2009. It resulted from a series of operator and regulatory failures which have now been comprehensively addressed through improved practices across the industry and improved regulatory regimes, now administered by NOPSEMA.</i></p> <p><i>More detail as to the initiatives undertaken by governments, regulators and industry following the Montara oil spill are available in the Australian Government Report on the implementation of the recommendations from the Montara Commission of Inquiry (September 2017):</i>  <a href="https://www.industry.gov.au/sites/default/files/2022-09/australian-government-report-on-the-implementation-of-the-recommendations-from-the-montara-commission-of-inquiry.pdf">https://www.industry.gov.au/sites/default/files/2022-09/australian-government-report-on-the-implementation-of-the-recommendations-from-the-montara-commission-of-inquiry.pdf</a>.</p> <p><i>Barossa is very different from Montara. Barossa is a gas and condensate field rather than oil. The well design and type of drilling rig for the Barossa field are different to those used at the Montara field. For example, the Barossa wells will not be</i></p>	<p><i>No additional EP measures required.</i></p>

		<p><i>suspended for the rig to depart the field and return at a later date (as occurred at Montara). Further, the aspects of well design and operations at Montara which were significant contributors to the Montara spill are not permitted under the current regulatory regime and Santos' drilling standards and procedures.</i></p> <p><i>The likelihood of a gas and condensate spill event during Barossa drilling is remote. The drilling at Barossa is subject to strict regulation, including in respect of the design of the wells and safety shutdown systems, regular inspection and maintenance schedules and operation by well-trained and highly competent staff. Well blowout events during development drilling, that could result in a spill, have been reported at a frequency of approximately one event for every 29,000 wells drilled.</i></p> <p><i>The Australian Government, along with PTTEP Australasia (operator of the Montara oil field), developed a long-term environmental monitoring program to understand the longer-term impacts of the</i></p>	
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		<p><i>Montara oil spill on the marine environment. There were seven scientific monitoring studies under the environmental monitoring program. Santos understands the key findings include:</i></p> <ul style="list-style-type: none"> <li>○ <i>no confirmed reports of impacts to marine wildlife in the vicinity of the oil spill;</i></li> <li>○ <i>presence of hydrocarbons in submerged marine banks in the region of the spill but the levels identified were very low and significantly lower than would be expected to cause biological effects;</i></li> <li>○ <i>no evidence of hydrocarbon residue on beaches, coral reefs or seagrass beds at any of the study sites; and</i></li> <li>○ <i>no evidence of the Montara spill having long-term impacts on seas snakes or marine turtles in the region.</i></li> </ul> <p><i>More detail as to the scientific monitoring following the Montara oil spill can be found at:</i>  <a href="https://www.dcceew.gov.au/environment/marine/marine-pollution/montara-oil-spill/scientific-monitoring-studies">https://www.dcceew.gov.au/environment/marine/marine-pollution/montara-oil-spill/scientific-monitoring-studies</a>.</p>	
Tiwi Islands clan members	Santos notes this question.	Barossa is a gas and condensate	No additional EP measures required.

<p><i>queried how Santos intended to clean up any spill caused by the drilling activities.</i></p>	<p><i>Response measures to an unplanned spill event are addressed in the Barossa Development Oil Pollution Emergency Plan. Santos considers the measures adopted in the OPEP to reduce impacts and risk to ALARP and acceptable levels.</i></p>	<p><i>field.</i></p> <p><i>Condensate is a very low viscosity (thin) and low density (light weight) liquid that evaporates quickly, particularly considering both the atmospheric and sea surface temperatures in the Arafura Sea. As such, if spilt on the sea surface, condensate would be expected to rapidly spread out, with a large proportion evaporating. Condensate spills are usually left to evaporate and dissipate at sea rather than using containment or dispersants.</i></p> <p><i>The International Tanker Owners Pollution Federation (ITOPF), which advises industry and governments worldwide about marine hydrocarbon spill cleanup, states: "Condensates typically break up naturally in wind and waves with the majority evaporating within a matter of days. Traditional containment and recovery operations are not typically recommended. Any attempt to concentrate the condensate would reduce the rate of evaporation and, if the concentration of vapour becomes high, could cause the oil to ignite." ITOPF goes on to say: "Dispersants are ineffective on condensate spills as they will</i></p>	
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		<p><i>'herd' the sheen rather than promote the formation of droplets in the water column. Spills of condensate in the marine environment are best left to evaporate and dissipate at sea."</i></p> <p><i>In the event of a spill, up to 57% of the condensate is expected to evaporate over the first few hours/days and up to 79% after a few days, depending on weather conditions, sea state and time of year.</i></p> <p><i>Santos is required to prepare an Oil Pollution Emergency Plan (OPEP) for each drilling activity, which forms part of the Environment Plan (EP) and is assessed by the offshore regulator (NOPSEMA). The OPEP sets out the process to manage a spill. The OPEP identifies and prioritises spill response strategies for all potential spill events and describes how Santos prepares to respond in the remote event of a spill. The response strategies in the OPEP are based on spill modelling, which is used to forecast the potential extent of a range of spill scenarios for each drilling activity.</i></p> <p><i>The first priority under the OPEP when responding to a spill event is</i></p>	
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		<p><i>to employ source control strategies, which include shutting in the well at the Blow Out Preventers to prevent loss of gas and condensate from the well into the environment.</i></p> <p><i>For condensate that has already been released to the environment the recommended primary response strategy under the OPEP is to monitor and evaluate the situation. Numerous resources are used to monitor the behaviour and direction of any released condensate, such as real-time, updated spill trajectory modelling, tracking buoys, vessel surveillance, aerial surveillance, satellite imagery and water quality monitoring to determine the effectiveness of the source control methods which may be required.</i></p> <p><i>Because of the low viscosity (thin nature) of condensate, natural weathering processes are most effective and have the highest net environmental benefit when compared to other recovery strategies which require human intervention.</i></p> <p><i>It is unlikely that condensate from a spill at Barossa associated with drilling and completions activity</i></p>	
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		<p>would reach any shoreline. The closest distance from the edge of the predicted movement of a spill to the edge of the Tiwi Islands (Seagull Island) is 54km.</p>	
<p>Tiwi Islands clan members asked whether Santos would provide insurance to cover all costs to clean up a spill and rehabilitate the sea and coastline affected, and compensate Tiwi people for their loss of food as a result of such a spill. Tiwi Islands clan members also queried who would receive the insurance and compensation in such circumstances.</p>	<p>Santos notes this request.</p>	<p>Santos and its Barossa joint venture partners are required to demonstrate a minimum level of financial assurance to be able to cover costs when responding to a spill event. The offshore regulator, NOPSEMA, will not accept the Drilling and Completions Environment Plan without Santos first demonstrating a minimum level of financial assurance for a spill response.</p> <p>Santos relies on a combination of its own financial resources and insurance to meet its financial assurance requirements, including third party liability insurance for its activities.</p> <p>For each OPEP there is a comprehensive scientific monitoring program to measure impacts to the physical/biological environment and socio-economic receptors. The results of monitoring inform the extent of impacts.</p> <p>Whether any claim or any</p>	<p>No additional EP measures required.</p>



		<p><i>compensation may be available will depend on the specific circumstances. Any claim would be determined based on the evidence (as with any claim).</i></p>	
<p><i>Tiwi Islands clan members asked what happens if there is a gas leak.</i></p>	<p><i>Santos notes this request.</i></p>	<p><i>If a gas leak from a well was to occur during well construction, any escaped gas would rapidly float to the sea and then disperse into the atmosphere. Operations would be suspended to identify and control the source of the leak.</i></p> <p><i>The greatest risk from a gas leak is the safety of the workers on the drilling rig, nearby support vessels and their crew, due to the potential ignition of gas resulting in fire or explosion. Santos has detailed emergency response and evacuation procedures designed to protect the safety of all in such a situation, including trained firefighting teams.</i></p>	<p><i>No additional EP measures required.</i></p>
<p><i>Tiwi Islands clan members have raised concerns as to how Santos will prevent turtles getting killed by Santos' ship's propellers and how Santos would specifically protect turtles.</i></p>	<p><i>Santos notes this request.</i></p> <p><i>Santos has assessed the impacts and risks to these species in the Environment Plan. Santos considers the existing proposed measures reduce the impacts and risks to ALARP and acceptable levels and no additional measures are</i></p>	<p><i>Santos must adhere to practices under relevant legislation and regulations to avoid collisions with turtles and other marine fauna. This includes reducing vessel speeds and maintaining minimum distances when marine fauna is sighted. Interactions between vessels associated with the drilling and completions activity for the Barossa project and marine fauna</i></p>	<p><i>No additional EP measures required.</i></p>

	<p><i>required.</i></p>	<p><i>are considered under the current Drilling and Completions EP.</i></p> <p><i>Any unplanned interactions with marine fauna in the drilling operational area are expected to be limited to a small number of individual animals transiting through the area. The operational area does not intersect any biologically important area or habitat critical to the survival of any marine fauna species. The risk to marine turtles in the drilling operational area is very low.</i></p> <p><i>All Santos contracted vessels are required to maintain a marine fauna sighting record and record any interactions with marine fauna.</i></p>	
<p><i>Tiwi Islands clan members have provided feedback that they do not want Santos' helicopters flying over the Tiwi Islands including because they do not want to be able to hear the helicopters. Some Tiwi Islands clan members also do not want Santos to fly helicopters over Seagull Island to protect the seagulls from being killed.</i></p>	<p><i>Santos notes this request and has committed to not conduct planned flights over the Tiwi Islands (including Seagull Island) unless required for safe operations or emergency response.</i></p>	<p><i>Santos will not fly any helicopters directly over the Tiwi Islands (including Seagull Island), unless there is an emergency.</i></p> <p><i>The only time a helicopter may need to fly over the Tiwi Islands is in the unlikely event of an emergency where there is a requirement for the flight time to be completed as quickly as possible (for example if someone falls into the water and Santos needs to conduct a search and rescue operation). Helicopters</i></p>	<p><i>As part of other measures adopted(Section 8.11) Santos has committed to no planned flights over the Tiwi Islands (including Seagull Island) unless required for safe operations or emergency response.</i></p>

		<p><i>may also need to use one of the airports on the Tiwi Islands for an emergency landing if something happens during a flight. Like all aircraft, the helicopter will need to comply with all relevant aviation standards and regulations and will need to go to the nearest place that they can land if there is a serious issue during flight.</i></p> <p><i>Santos intends to continue to discuss this concern with the Tiwi Islands clan members.</i></p>	
<p><i>Tiwi Islands clan members raised concerns about climate change as a risk of the drilling and completions environment plan.</i></p>	<p><i>Santos notes this request Santos has assessed the impacts and risks associated with atmospheric emissions from the Drilling and Completions Activity in the Environment Plan. Santos considers the existing proposed measures reduce the impacts and risks to ALARP and acceptable levels and no additional measures are required.</i></p>	<p><i>Santos is very conscious of limiting the impact of its operations on the environment.</i></p> <p><i>Santos will follow industry practices and procedures to minimise greenhouse gas emissions from fuel combustion and flaring during drilling operations.</i></p> <p><i>The current Drilling and Completions Environment Plan considers the impact and risk of greenhouse gases and atmospheric emissions from drilling and completion operations. Likewise, emissions from production operations will be further considered and assessed in the Barossa Production and Operations</i></p>	<p><i>No additional EP measures required.</i></p>

		<i>Environment Plan.</i>	
<i>Tiwi Islands clan members raised concerns as to whether Santos would keep drilling more wells if they did not find gas in the wells intended to be drilled under this EP.</i>	<i>Santos notes this request.</i>	<p><i>Santos has a high degree of confidence that the wells planned for the Barossa project will successfully encounter gas. This is based on the information gained over a long period of time—since 1973—from different exploration processes, such as seismic acquisition and the exploration wells.</i></p> <p><i>There is provision for eight wells in the current Drilling and Completions EP for the Barossa project, but only six are planned to be drilled (with two additional wells being provisioned in case they are necessary).</i></p>	<i>No additional EP measures required.</i>
<i>Tiwi Islands clan members have asked Santos what happened with the exploration drilling relevant to the drilling on the project.</i>	<i>Santos notes this request.</i>	<p><i>Eight wells have already been drilled in the Barossa field as part of the initial exploration and appraisal of the field. The first well was drilled in 1973, followed by another in 1998, another in 2006, three more in 2014 and 2015 and then the two final wells in 2017. The wells were evaluated and safely decommissioned as planned.</i></p> <p><i>The exploration work confirmed that a large gas reserve exists in the area. After the exploration wells were drilled and safely</i></p>	<i>No additional EP measures required.</i>

		<p><i>decommissioned, equipment at the seabed was removed. The decommissioning process for most wells involved plugging the wells with cement, cutting the casing approximately 2 meters below the seafloor and removing all equipment, before inspecting the wellsite and surrounding seabed with a remotely operated vehicle (a small remote controlled submarine). In 1973, oilfield practices were somewhat different, but the well was still safely and permanently decommissioned.</i></p>	
<p><i>Tiwi Islands clan members have asked whether the Barossa project will significantly increase marine vessel traffic around the Tiwi Islands.</i></p>	<p><i>Santos notes this request.</i></p>	<p><i>Over the construction phase of the project, the number of associated vessels between Darwin Port and the activity area will vary depending on the project activity.</i></p> <p><i>For Drilling and Completions activities, there are estimated to be approximately two vessel movements around the Tiwi Islands per week for 24 – 32 months.</i></p> <p><i>For context, Darwin Port currently has on average 30 commercial vessel movements per week.</i></p>	<p><i>No additional EP measures required.</i></p>
<p><i>Tiwi Island clan members have queried what benefits and employment</i></p>	<p><i>Santos notes this request.</i></p>	<p><i>Santos will consider this request as part of its post acceptance implementation process and</i></p>	<p><i>No additional EP measures required</i></p>

<p><i>opportunities there might be for locals in connection with the drilling activity of the Barossa Project.</i></p>		<p><i>associated strategy and activities</i></p>	
<p><i>Tiwi Island clan members including a representative from the Tiwi Rangers have queried the potential for Santos to work with the Tiwi Rangers in conservation initiatives in relation to turtles.</i></p>	<p><i>Santos notes this request.</i></p>	<p><i>Santos will consider this request as part of its post acceptance implementation process and associated strategy and activities</i></p>	<p><i>As part of other measures adopted (in Section 8.11) as part of Santos post-acceptance implementation strategy, Santos will consider support of ranger programs and studies to help First Nations people preserve environmental and cultural features and values on their country.</i></p>
<p><i>An individual from the Tiwi Islands suggested that Santos should have a male and female within each clan group to act as a liaison for the project. It was suggested that this would make sharing information easier because the liaisons could talk to people about attending meetings and their participation in the process.</i></p>	<p><i>Santos notes this request.</i></p>	<p><i>Santos will consider this request as part of its post acceptance consultation implementation process and associated strategy and activities</i></p>	<p><i>Post-acceptance consultation Implementation Strategy with First Nations (Section 8.10.1)</i></p>
<p><b>Environmental Defenders Office correspondence of 4 July 2023 [Con-1523]</b></p> <p><i>1. We write on behalf of our clients [Note: the names of three individuals provided in the correspondence have been</i></p>	<p><i>Santos has considered and assessed the response. Santos considers that it has met its consultation obligations under Regulation 11A.</i></p>	<p><b>Santos correspondence of 27 July 2023 [Con-2394]</b></p> <p><i>Santos has now submitted the draft Drilling &amp; Completions Environment Plan (D&amp;C EP) to NOPSEMA for assessment, having met its obligations under Regulation 11A to provide</i></p>	<p><i>No additional EP measures required</i></p>

<p><i>removed by Santos from this public document for privacy reasons].</i></p> <p><i>2. We are instructed that:</i></p> <p><i>a. The matters set out in this letter on behalf of our clients also reflect concerns expressed to them by members of their family, clan and community.</i></p> <p><i>b. This letter is also sent with the support of a majority of members of the Jikilaruwu clan group. We note that the Munupi and Malawu clans have not had an opportunity to schedule meetings to have these discussions as a clan group in the time available.</i></p> <p><i>3. The purpose of this letter is to:</i></p> <p><i>a. Outline our clients' concerns in relation to Santos' conduct of consultations; and</i></p> <p><i>b. Respond to information provided during the consultation process to date.</i></p>		<p><i>sufficient information and reasonable time for relevant persons to assess impacts on their functions, interests or activities, and to provide feedback to Santos. Indeed, Santos received feedback from a broad range of Tiwi Islands people and has widely discussed measures that can be taken to address the issues raised.</i></p> <p><i>There will be further opportunities for your clients to provide feedback on the drilling and completions activity as part of the post-acceptance consultation implementation strategy, which is required as part of the D&amp;C EP.</i></p> <p><i>To the extent reasonable and practicable, and within its regulatory compliance obligations, Santos will continue to respectfully address feedback and incorporate appropriate controls to ensure impacts and risks are as low as reasonably practicable and at an acceptable level.</i></p> <p><i>You have had many months during the consultation sessions on the Tiwi Islands (where feedback on the environment that may be affected including social and cultural issues were specifically sought) and weeks</i></p>	
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<p>4. We have outlined in previous correspondence, most recently on 5 and 13 June 2023, that our clients required time to consider the information provided during the consultations to date, discuss it with family and clan and community members and provide instructions, taking into account the communication challenges we have raised with you on multiple occasions. On this basis, we confirmed that we would provide a response on behalf of our clients by 30 June 2023.</p> <p>5. Due to delays in obtaining instructions, we provide this letter on 4 July. We have not, by today's date been able to obtain instructions from all of our clients. Accordingly, there may be additional issues that our clients wish to raise, in addition to the matters set out in this letter.</p> <p>6. In this regard, we reserve our clients' rights to raise additional issues with Santos. Those issues</p>		<p>after the last D&amp;C EP consultation to obtain instructions from your clients. Santos will of course continue to engage with your clients should any new issues be raised by them as part of its obligation for post-acceptance consultation.</p>	
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<p><i>may, in addition to those discussed below, include our clients' concerns as to whether the environment plan for the Barossa Drilling and Completions activities (Drilling and Completions EP), and the consultation process that Santos is purportedly conducting in relation to it, comply with the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009 (Cth) (Environment Regulations).</i></p>			
<p><i>Concerns in relation to the purported consultation process</i></p> <p><i>Interpretation and presentation of information</i></p> <p><i>7. The March consultation meetings were conducted by Santos in English without independent and professional interpreters despite repeated requests both prior to those meetings and during (at least) the Jikilaruwu meeting on 23 April and the Malawu meeting on 24</i></p>	<p><i>Santos notes the response.</i></p>	<p><i>In response to your allegations at paragraphs 7 to 19, Santos considers that it has consulted appropriately, in line with the requests made during pre-consultation in February, including making arrangements for transportation and rescheduling meetings where required because of sorry business.</i></p> <p><i>Further, in relation to the issues you raised about interpreters, as explained in previous correspondence, during consultation sessions, questions were asked of Santos personnel in English, and Tiwi Islanders engaged with Santos outside of</i></p>	<p><i>No additional EP measures required</i></p>

<p><i>March.</i></p> <p><i>8. These requests were made by our clients on the basis of discussions with clan and family members. They were motivated by concerns that:</i></p> <p><i>a. many of the participants attending the Tiwi consultations speak English as a second or third language and may not be able to understand the content being delivered without interpretation; and</i></p> <p><i>b. professional interpretation is particularly important in circumstances where information that is technical or complex, and those delivering it are not experienced in effective cross-cultural or plain language communication.</i></p> <p><i>9. In correspondence to lawyers acting for Santos dated 3 April 2023, we raised our clients' concerns about the interpretation provided at the March consultation meetings regarding the Drilling EP.</i></p>		<p><i>those sessions in English, notwithstanding the opportunities provided by Santos for language translation if this was preferred.</i></p>	
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<p><i>In brief, this correspondence stated that:</i></p> <p><i>a. Repeated requests for interpretation were made by participants during the March consultation meetings and concerns were raised by participants that family members could not understand the content being delivered and were confused.</i></p> <p><i>b. Santos engaged two Tiwi people for community liaison services at the March meetings, however neither are professional and registered interpreters. Both are also employed by Santos. It was apparent to our clients that neither were able to provide professional interpreter services. Concerns were raised about their capacity to interpret and the accuracy of the information being conveyed. On one occasion, the community liaison staff were not in attendance for most of the meeting.</i></p>			
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<p>10. Aboriginal Interpreter Service (AIS) interpreters were engaged by Santos for later consultation meetings. However, our clients and members of their families and communities continued to have concerns about the sufficiency of interpretation arrangements, and the impact this had on levels of comprehension amongst attendees at consultation meetings.</p> <p>11. At some consultation meetings in April and June, AIS interpreters were made available. However, the majority of the information presented on those occasions was still presented in English, without translation. We are instructed that our clients also had the following concerns on these occasions:</p> <p>a. Concerns that Santos representatives presenting information were not pausing to allow time for interpretation. As a result, to interpret what was</p>			
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<p><i>being said, the interpreter would have had to interrupt the speaker as they were speaking, which culturally would have been disrespectful. Accordingly, interruptions were not made and the relevant information was not interpreted.</i></p> <p><i>b. Concerns that in order to access interpretation services during the meetings, individuals were required to request an interpreter by publicly stating that they were not able to comprehend the information conveyed in English. In practice, this would, in most circumstances, have required calling out in front of clan and family members to identify that they required interpretation: something which would have been shameful and culturally inappropriate for some clan members. Accordingly, attendees who required interpretation may not have been provided with it</i></p>			
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<p><i>because there was no culturally appropriate method of requesting interpretation services available.</i></p> <p><i>12. These concerns were raised in person with lawyers acting for Santos at consultation meetings on 26 and 28 April 2023.</i></p> <p><i>13. Our clients also have concerns about the format in which information was presented at consultations, in particular:</i></p> <p><i>a. Much of the information presented was not explained in plain language. Very often technical terms and expressions were used. For example at the Munupi consultation meeting on 26 April 2023 the following statement was made (as recorded in verbatim notes taken by EDO lawyers at that meeting):</i></p> <p><i>We are seeking feedback on the potentially affected environment, which includes the community, the heritage value of places and social and</i></p>			
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<p><i>cultural features. We will speak about the impacts and risks of activities and the proposed control measures identified. This will be considered in the EP for drilling and completions. We are also going to be doing consultation focused on another part of activities – SURF (subsea installation activities).</i></p> <p><i>b. A significant amount of information was presented through videos in which information was read out at a speed which made it difficult for participants to follow.</i></p> <p><i>c. Questions were often taken on notice during meetings. While some questions were followed up, in many cases answers were not provided orally but were instead addressed in a written FAQ document. This creates an additional barrier for community members who have difficulty with comprehension in written English.</i></p>			
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<p><i>2 No interpreter was available for the Jikilaruwu meeting on 28 April 2023.</i></p> <p><i>d. Comprehension was further impacted by the presentation of information for more than one environment plan during the same consultation meeting, despite repeated requests by our clients that this not occur.</i></p> <p><i>14. Our clients further requested a copy of the videos and printed material used by Santos at the March consultation meetings on 3 April (which were, with the exception of a brief section in one video, all in English). To date, these have not been provided.</i></p> <p><i>15. Our clients are concerned that the lack of effective interpretation, the technical complexity of information provided and the way that information has been presented has resulted in an inability of some participants to understand the</i></p>			
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<p><i>information presented. If participants cannot understand the information presented, it cannot be said that they have been provided with sufficient information to make an informed assessment of the possible consequences of the activity on their functions interests or activities.</i></p> <p><i>16. Further, in our clients' view, the approach adopted by Santos to date with respect to interpretation and presentation of complex information is inconsistent with the following requirements set out in NOPSEMA's Guideline on Consultation in the Course of Preparing an Environment Plan (Consultation Guideline):</i></p> <p><i>a. The emphasis that meetings be properly notified and conducted or that consultation occur through engagements that facilitate "genuine and meaningful two-way dialogue between the titleholder and relevant</i></p>			
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<p>persons.</p> <p><i>b. The requirement that all group members should be afforded a reasonable opportunity to participate in consultation and superficial or token consultation will not be enough.</i></p> <p><i>c. The principle of “Communication” on page 7 of the Consultation Guideline which provides that “open an effective engagement should be undertaken during the consultation process to ensure that accurate and relevant information is provided”.</i></p> <p><i>Conduct of meetings and transportation issues</i></p> <p><i>17. The ability of Tiwi people from various clans to attend the March consultations was impacted by transport issues due to road closures (as a result of wet season weather conditions) and limited transport options available to travel to and between communities (see paragraphs 18-19 of our</i></p>			
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<p><i>letter to Santos dated 3 April 2023). Our clients' concerns about transport issues affecting the ability of clan members to attend meetings was set out ahead of the March consultations in emails to Santos dated 20 and 21 March 2023.</i></p> <p><i>18. In addition, we are instructed that the conduct of the meetings has been significantly impacted by sorry business. We refer to emails sent on behalf of our clients on 3 and 17 April advising of funerals and cultural events impacting on consultation dates in April.</i></p> <p><i>19. Although some consultation meetings during this period were rescheduled to avoid direct conflicts on days where funerals would take place at the location that funerals were being held, meetings taking place in other locations on dates immediately post and prior went ahead.</i></p> <p><i>We are instructed that</i></p>			
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<p><i>proceeding with these consultation meetings so close to funerals during periods of sorry business rather than allowing family and community space to mourn and engage in cultural practices did not show respect or consideration of the impact of pressing ahead on Tiwi people. Holding meetings during these periods, we are instructed, also increased pressure on Tiwi people during periods of mourning and ceremony and limited the capacity of attendees to engage with and discuss the content being delivered during consultations presentations.</i></p>			
<p><i>Response to information provided during consultation to date</i></p> <p><i>20. Santos has published a copy of Revision 3 dated 11 February 2022 of its Drilling and Completions Environment Plan BAD-200-00032 (Revision 3 of the Drilling EP) on its website as part of the</i></p>	<p><i>Santos notes the concerns of the EDO's clients about the adverse effects they believe could arise from disturbance to spiritual beings of cultural significance and has adopted culturally appropriate measures as recommended by Dr Corrigan and a number of senior and authoritative</i></p>	<p><i>In response to paragraphs 20 to 43, Santos notes that it has provided information and answered the questions you have asked in your letter relevant to the D&amp;C EP during Santos' 3 months of consultation with the Tiwi Islands people, including in the FAQs available publicly.</i></p> <p><i>The FAQs version published on 14 June is the most recent version of</i></p>	<p><i>BAD-CM-049 has been adopted as a measure to respect the beliefs of First Nations individuals who have concerns related to their cultural and spiritual beliefs that adverse effects to people and the environment may result from the Activity, by introducing the activity to the spirit beings they believe in and the seas in a culturally appropriate manner.</i></p> <p><i>Other measures have also been adopted (Section 8.11) as part of Santos post-acceptance implementation strategy including but not limited to:</i></p> <ul style="list-style-type: none"> <li><i>+ Santos will also, through relevant Land Councils (who are relevant persons) and other relevant persons, consult to identify and implement worthwhile First</i></li> </ul>

<p><i>documents that form part of the consultation.</i></p> <p><i>21. On the basis of representations made at the Jikilaruwu clan group meeting on 14 June 2023, our clients understand that it is Santos' intention to revise this document to take into consideration the concerns raised by Tiwi people at the consultation meetings and information sessions that have taken place between March and June this year.</i></p> <p><i>22. Our clients' understanding of how Santos intends to update the Drilling and Completions EP reflects the following:</i></p> <p><i>a. Answers given orally at information sessions in March 2023 and during consultation meetings between April and June 2023;</i></p> <p><i>b. The FAQ document published by Santos in relation to the Drilling and Completions EP. This document was updated prior to the consultation</i></p>	<p><i>Tiwi Islanders.</i></p>	<p><i>the document and hardcopies were available at the June consultation sessions.</i></p> <p><i>Further, Santos confirms that it has considered your clients' feedback in the preparation of its D&amp;C EP.</i></p>	<p><i>Nations initiatives that could include, but are not necessarily be limited to:</i></p> <ul style="list-style-type: none"> <li><i>• employment of cultural awareness community observers (CACOs), who will conduct cultural awareness inductions for field based staff across each of the major work packages.</i></li> <li><i>• support of ranger programs and studies to help First Nations people preserve environmental and cultural features and values on their country.</i></li> <li><i>• seeking to facilitate employment opportunities for First Nations people as trainee HSE advisors for drilling and completions activities, subject to the availability and participation of First Nations trainees, with a view to them obtaining HSE qualifications and competencies to enable future ongoing employment in HSE. Further, Santos plans to discuss the way in which it might be able to facilitate presentations by the trainee advisers to their communities about HSE management of the drilling and completions activities.</i></li> <li><i>• periodic community townhalls across regional locations relevant to the Barossa Project, to provide Project updates and to provide an opportunity for feedback from CACOs to assist in the development of any potential improvement programs.</i></li> <li><i>• Santos to facilitate trips to the drilling site, at intervals (as necessary), taking into account cultural advice as to the most appropriate clan members to attend such trips</i></li> </ul>
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<p><i>meetings that took place on 14 June. We understand this to be the most recent version of the document; and</i></p> <p><i>c. The table displayed on screen at the consultation meetings on 14 June and 16 June and provided in the form of a handout at the consultation sessions on the same date labelled "Tiwi Consultation Feedback".</i></p> <p><i>23. The matters set out below reflect our clients' concerns in relation to:</i></p> <p><i>a. matters that have been raised by our clients or their community to which they consider that Santos has provided no response;</i></p> <p><i>b. matters that have been raised by our clients or their community to which they consider that Santos has provided a response that is incomplete or insufficient to address their concerns;</i></p> <p><i>24. Our clients note that this letter does not exhaustively address the</i></p>			
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<p><i>matters that are of concern to them and their community. As noted above, our clients reserve the right to raise additional issues at a later date.</i></p> <p><i>8 These concerns were raised at consultation meetings, including by [Name provided in correspondence but removed by Santos for privacy reasons] during the Munupi consultation meeting on 26 April 2023.</i></p> <p><i>25. However, our clients are particularly concerned that the information provided by Santos to date fails to deal with their concerns in relation to the following impacts of the activities the subject of the Drilling and Completions EP:</i></p> <p><i>a. Impacts on cultural and spiritual connections to their sea country;</i></p> <p><i>b. Impacts on marine species and the marine environment; and</i></p> <p><i>c. Climate impacts</i></p>			
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<p><i>resulting from Greenhouse Gas (GHG) emissions (including GHG emissions from the broader Barossa Project).</i></p> <p><i>26. Each of these are set out in turn, below.</i></p> <p><i>Cultural impacts</i></p> <p><i>27. Our clients hold significant concerns about the potential impact of the activities set out in the Drilling and Completions EP (Drilling and Completions activities) on sea country to which they have cultural and spiritual connections.</i></p> <p><i>28. Concerns that were raised in relation to this issue are not limited to, but include:</i></p> <p><i>a. Concerns that disturbance to important ancestral spirits and beings, including Ampiji, could result in loss of protection of the Tiwi Islands and result in exposure to natural disasters and reduced access to marine food sources;</i></p>			
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<p><i>b. Concerns about impacts from the Drilling and Completions activities on access to freshwater as a result of disturbance to subterranean aquifer connections to and between places to which Tiwi people are spiritually and culturally connected.</i></p> <p><i>c. Concerns that impacts on cultural and spiritual connections to sea country are not being considered by Santos in assessing the potential impacts of the project.</i></p> <p><i>29. The concerns of our clients and members of their community about potential impacts from the Drilling and Completions activities on cultural values were set out in detail in the evidence filed in Tipakalippa v National Offshore Petroleum Safety and Environmental Management Authority &amp; Anor (2022) VID 306/2022. We have summarised some of the central ways in which these concerns were expressed below, noting that this summary</i></p>			
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<p><i>is non-exhaustive.</i></p> <p><i>30. In Tipakalippa, concerns were raised by elders and senior law men and women that drilling activities will disturb Ampiji, an ancestral being located in sea country, resulting in impacts on the environment and on Tiwi people:</i></p> <p><i>a. "If this drilling happens, it will disturb Ampiji. If Ampiji is disturbed, then something will happen. There could be tidal waves or king tides. They could come up and wash over us.";</i></p> <p><i>b. "Ampiji is the caretaker and we are her caretakers. Ampiji is getting angry and giving warnings about the drilling. When the sea is interrupted like that it can be dangerous." ... "If this project goes ahead, Ampiji will be very angry: all hell will break loose. Bad things will happen in our community and to the people responsible for the project. We might have tidal waves, king tides.".</i></p>			
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<p>c. <i>“Santos has upset the Ampiji already. She knows that they have started drilling. There have been two earthquakes since they started drilling. One right near us and one out past the drilling that people felt all the way in Darwin. That is Ampiji – she is awake and she is angry.”</i></p> <p>d. <i>“Who knows what will happen with this drilling, if it goes ahead. The drilling will probably disturb the three serpents. It will go to them and wipe them out. Just imagine, they will be shooting up out of the water like a cyclone, making a big wave, they will do damage.”</i></p> <p>31. <i>We are also instructed that impacts of drilling activities, in particular loud noises, vibrations and damage to the seabed could harm imunga: spiritual places that are often connected to other sites, marine species and to Tiwi people. One client expressed concerns that this could impact on the</i></p>			
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<p><i>health of land and sea country and access to food through traditional hunting and fishing.</i></p> <p><i>32. Our clients consider that responses by Santos representatives indicate that Santos has misconceived the nature of the environmental value being described and how it would be impacted by the Drilling and Completions activities. For example, efforts were often made to reassure participants at consultation meetings and in written handouts that drilling infrastructure would be safe in the event of cyclones, storms and earthquakes. This fails to address the concern being expressed that harm to the cultural and spiritual connections to country could cause these events and/or that Tiwi people and their land and sea country would lose the protection of ancestral spirits, making them vulnerable to the impacts of natural disasters.</i></p> <p><i>33. Concerns were also</i></p>			
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<p><i>expressed in Tipakalippa that potential impacts from the Drilling and Completions activities related to marine species and the marine environment could also impact on Tiwi people:</i></p> <p><i>a. "We are deeply connected to our country and the sea through our totems and our skin names. If something happens to your totem it affects you too. If something bad happens to your totem, then you can get sick...That's why we have to look after these animals, it's very important to look after your totems."</i></p> <p><i>b. "We Tiwi people are connected to our land and sea. We have spiritual connections to the land and sea. If someone drills a hole in the sea, then they are drilling holes in our body."</i></p> <p><i>c. "Where the Barossa field is, that's our water, that map of the area of impact, that's our water. Our</i></p>			
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<p><i>spiritual connection is there. Our cultural connection is there. Our Ampiji is there. Our turtles, our fish, our dugong and whales.” ... “That is why, we should have a say in the drilling. What happens there is our history, our present and our future.”</i></p> <p><i>D. “There are ramifications to our sea if we do not do the right thing spiritually. Someone could die or get sickness from this drilling going ahead.” “Because we are part of the land and the sea, our body is part of it. If this drilling starts, then that is killing our body. They are drilling through us, through our very being.” ... “There are spiritual repercussions. Because we did not give them permission and authority to drill, we will get sick. Sickness will come to the Tiwi people, whether physical or spiritual.” ... “Disturbing the sea has a domino effect on other things on the life of the sea animals and on our lives and our</i></p>			
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<p>very existence, including the spirit world. Disturbing the sea is disturbing the spirit world.”</p> <p>34. In our clients’ view, neither the responses given to questions at the Munupi and Jikilaruwu clan group meetings, nor in the FAQ document, indicate that Santos:</p> <p>a. Understands the nature of the cultural and spiritual connections being asserted by our clients and other members of their community, or how they may be impacted by the Drilling and Completions activities;</p> <p>b. Has considered the potential impact of the Drilling and Completions activities on these cultural and spiritual connections and values. Rather, they consider that the impact on cultural and spiritual connections to sea country have been disregarded by Santos; and</p> <p>c. Has given any consideration about how to reduce these impacts to</p>			
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<p><i>as low as reasonably practicable or to an acceptable level.</i></p> <p><i>35. Our clients request that Santos provide a response to these concerns.</i></p> <p><i>Impacts on marine species and the marine environment</i></p> <p><i>36. Our clients continue to hold significant concerns about the potential impact of the activities associated with the Drilling and Completions EP on marine species and the marine environment to which they have cultural and spiritual connections.</i></p> <p><i>37. Concerns that were raised are not limited to, but include:</i></p> <p><i>a. Concerns that drilling activities will impact on a number of marine species, including turtles.</i></p> <p><i>b. Concerns about reports that an incident involving Santos' gas infrastructure in Western Australia resulted in deaths of marine creatures, including</i></p>			
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<p><i>dolphins.</i></p> <p><i>c. Concerns about the impact of condensate on the marine environment and on marine creatures in the event of a spill, particularly a loss of well control event.</i></p> <p><i>d. Concerns about leaking gas infrastructure owned by Santos in Western Australia and, whether this could happen with the Barossa Project;</i></p> <p><i>e. Concerns about the impact of chemicals used in Drilling and Completions activities on the marine environment;</i></p> <p><i>f. Concerns about how Santos will respond in the event of a spill incident, including:</i></p> <p><i>i. How quickly Santos will be able to respond to stop the source of the spill in the event of a loss of well control incident;</i></p> <p><i>ii. How Santos would respond in the event of a spill;</i></p> <p><i>iii. Where spill kits would</i></p>			
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<p><i>be located;</i></p> <p><i>iv. Whether dispersants would be used;</i></p> <p><i>38. Due to the importance of marine species to our clients (see above, at paras [28]-[34]) they retain significant concerns about the potential impacts on these species that would result from a spill incident, such as a loss of well control.</i></p> <p><i>A. Even where Santos considers that the risk of an incident occurring is low, our clients remain concerned given that the impacts of such an incident would be catastrophic on them, their country and their culture.</i></p> <p><i>b. Our clients' concerns are not limited to impacts affecting the Tiwi shoreline: they extend to impacts on the marine environment and on marine species to which they have cultural connection in the deeper sea area, including within the environment that may be affected for the Drilling</i></p>			
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<p><i>and Completions EP and in relation to animals that travel in and out of that area.</i></p> <p><i>39. Our clients remain concerned about a number of matters that include the following:</i></p> <p><i>a. Concerns about how impacts on large marine species could be prevented in the event of a loss of well control incident involving the spilling of condensate given the major method of response involves tracking and monitoring the spill;</i></p> <p><i>b. The impact of condensate on coral, coral spawn, smaller marine species, species on the ocean floor and marine species that are breeding and how this could affect ocean ecosystems:</i></p> <p><i>c. Concerns about how impacts from a condensate spill on coral spawn, smaller marine species, species on the ocean floor and marine species that are breeding can be prevented in the event of a</i></p>			
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<p><i>loss of well control incident involving the spilling of condensate given the major method of response involves tracking and monitoring the spill;</i></p> <p><i>d. Concerns about whether Santos' proposal to provide "rapid assessment kits" to Tiwi people for use in the event of a spill would be effective in preventing harm from condensate and gas leaks to marine species at the time that these harms occur;</i></p> <p><i>e. How the source of the leak in the event of a spill or explosion such as a loss of well control incident would be resolved;</i></p> <p><i>f. How quickly the equipment involved in resolving a spill or explosion such as a loss of well control incident would arrive and where it would come from;</i></p> <p><i>g. How decision-making about how to respond to, and clean up, a spill would occur, including for e.g. if Tiwi people would be</i></p>			
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<p><i>consulted about the use of dispersants;</i></p> <p><i>h. Why Tiwi people cannot be notified sooner than 8 hours in the event of a spill;</i></p> <p><i>i. Concerns that in other incidents involving condensate spilling, Santos has not been able to determine impacts on marine species, despite evidence that it caused deaths;</i></p> <p><i>j. Concerns about whether gas leaks impact on marine life and whether this could happen in relation to the Barossa Project;</i></p> <p><i>k. Concerns about the introduction of chemicals into the food chain and ultimately to Tiwi people through hunting and eating seafoods and fish; and</i></p> <p><i>l. How long it would take for condensate to evaporate and whether it could be toxic in its evaporated form.</i></p> <p><i>40. At p8 of the FAQ</i></p>			
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<p><i>document, Santos indicates that it has commissioned [Note: name supplied in correspondence but removed by Santos for privacy reasons] to complete an assessment of the marine turtle behaviours around the Tiwi Islands and that this assessment would be completed “in coming months”. To date, Tiwi people have not been provided with [Note: name supplied in correspondence but removed by Santos for privacy reasons] assessment, or information concerning its conclusions.</i></p> <p><i>41. Our clients also request a copy of the CSIRO report assessing the impact of leaking at Santos’ Legendre facility in WA referred to by Santos representative during the Munupi meeting on 16 June 2023.</i></p> <p><i>42. Further, it is not clear on the basis of information provided at consultations to date that Santos has any intention to make</i></p>			
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<p><i>modifications to the Drilling and Completions EP to address these concerns. Our clients note in particular that Revision 3 of the Drilling EP identifies a number of measures were rejected as control measures for a loss of well control hydrocarbon spill, including the following:</i></p> <p><i>a. Manage the timing of the activity to avoid sensitive biological periods.</i></p> <p><i>42 This was rejected because of financial cost and low probability of the event occurring.</i></p> <p><i>b. Manage the timing to avoid drilling during cyclone season (and prevent cyclonic conditions contributing to spread of the leak).</i></p> <p><i>c. Dedicated spill response resources or facilities in close proximity to the operation area. This was rejected because of financial cost and low probability of the event occurring.</i></p> <p><i>d. A dedicated mobile</i></p>			
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<p><i>offshore drilling unit on standby for the purpose of relief well drilling. This was rejected because of financial cost and low probability of the event occurring.</i></p> <p><i>e. Amend the well design to reduce the volume of hydrocarbons released in the event of a loss of well control.</i></p> <p><i>f. Have additional Santos OWR (oiled wildlife response) trained personnel positioned in Darwin. This was rejected because of financial cost and a determination of insufficient benefit.</i></p> <p><i>g. Pre-hiring or pre-positioning staging areas and responders. This was rejected because of financial cost and a determination of insufficient benefit.</i></p> <p><i>h. Use direct contracts with service providers for wildlife response. This was rejected because of financial cost and a determination of</i></p>			
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<p><i>insufficient benefit.</i></p> <p><i>43. Our clients consider that these questions and concerns should be addressed and further information should be provided.</i></p>			
<p><i>Climate impacts</i></p> <p><i>44. Our clients continue to hold significant concerns about the potential impact of the Drilling and Completions activities as a result of the contribution of their GHG emissions to climate change.</i></p> <p><i>45. Our clients and members of their community have raised concerns about climate change on a number of occasions during the consultation meetings.</i></p> <p><i>Concerns about climate change that have been raised include:</i></p> <p><i>a. Concerns that climate change will impact on marine species and the environment to which Tiwi</i></p>	<p><i>Santos notes the response.</i></p>	<p><i>In relation to paragraphs 44 to 51, those specific concerns will be addressed in greater detail during Santos' consultation on the Barossa Production Operations EP.</i></p>	<p><i>No additional EP measures required</i></p>

<p><i>people are connected;</i></p> <p><i>b. Concerns that climate change will increase extreme weather events and therefore also the risks associated with the project;</i></p> <p><i>c. Concerns about whether Santos' carbon capture and storage (CCS) plans will work;</i></p> <p><i>d. Concerns about whether Santos will be successful in capturing GHG emissions associated with the Drilling and Completions activities and the broader Barossa Project, and when, if ever, CCS will be ready to be implemented;</i></p> <p><i>e. Concerns about whether Santos has a credible plan to mitigate the Barossa Project's GHG emissions; and</i></p> <p><i>f. Concerns about whether CCS technology has been approved.</i></p> <p><i>46. The primary response by Santos to questions about the GHG emissions resulting from the Barossa Project, has been to state</i></p>			
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<p><i>that:</i></p> <p><i>a. Santos will “follow [sic] industry practices and procedures to minimise greenhouse gas emissions from fuel combustion and flaring during drilling operations”; and</i></p> <p><i>b. Information about the potential impacts of GHG emissions from the Barossa Project as a whole, including from production will be considered and assessed at a later time.</i></p> <p><i>47. In the Santos FAQs in response to the question “What are you going to do with the carbon from Barossa?” Santos states:</i></p> <p><i>The CO2 from Barossa will be vented to the air via CO2 removal facilities on the FPSO and at DLNG. The CO2 emissions may be offset by Santos through purchasing carbon credits. Santos is also pursuing the Bayu-Undan CCS project so that the CO2 can be safely and permanently stored in depleted reservoirs at Bayu-Undan instead of</i></p>			
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<p><i>being vented into the air. (emphasis added)</i></p> <p><i>48. This answer is inconsistent with answers given orally at consultation meetings by Santos representatives:</i></p> <p><i>On 23 March 2023 at the Jikilaruwu clan meeting, Santos was asked “what percentage of 18% are you able to capture in the carbon capture and storage?”. The response from Santos representative [Note: name supplied in correspondence but removed by Santos for privacy reasons] was “all reservoir CO2 will be captured.”</i></p> <p><i>49. Our clients consider that Santos has not given a sufficient response to its concerns about the matters set out above at [45].</i></p> <p><i>50. Further, from the information provided to date, our clients are concerned that Santos intends to revise the Drilling and Completions EP without including any</i></p>			
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<p><i>consideration of the potential climate impacts of GHG emissions resulting from the broader Barossa Project.</i></p> <p><i>51. The Drilling and Completions activities are intended to enable gas from the Barossa gas field to be extracted from the project area to be transported and processed at Santos's DLNG facility into liquified natural gas. In our clients' views, it is clear that the Drilling and Completions activities are a necessary and indispensable component of the Barossa Project. Accordingly, our clients consider that the environmental impacts and risks of the GHG emissions that will result from the Barossa Project are required to be considered as, at the very least, an indirect impact of the Drilling and Completions activities. As such, our clients request that Santos respond to their concerns in this regard as part of the</i></p>			
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<p><i>consultation process for the Drilling and Completions EP.</i></p>			
<p><i>Conclusion</i></p> <p><i>52. It is our clients' view that if the Drilling and Completions EP were to be submitted to NOPSEMA without addressing the matters outlined above, it would fail to meet the acceptance criteria in reg 10A of the Environment Regulations because (amongst other things):</i></p> <p><i>a. it would fail to identify all the relevant environment impacts and risks associated with the Drilling EP: reg 10A(b) – (c);</i></p> <p><i>b. it would not demonstrate that the environmental impacts and risks of the Drilling EP will be of an acceptable level: reg 1(c);</i></p> <p><i>c. it would not provide for appropriate environmental performance outcomes, environmental performance standards and measurement criteria:</i></p>			

<p>reg 10A(d);</p> <p>d. it would not demonstrate that the environmental impacts and risks of the Drilling EP have been reduced to as low as reasonably practicable: reg 10A(b);</p> <p>e. it would not demonstrate that the titleholder has carried out the required consultations: reg 10A(g)(i); and</p> <p>f. it would not otherwise comply with the Environment Regulations: reg 10A(h).</p> <p>53. In addition, our clients consider that it is important to express that the conduct of the purported consultations has not been consistent with Tiwi law and custom.</p>			
<p><b>Environmental Defenders Office correspondence of 13 September 2023 [Con-2395]</b></p> <p><b>Barossa Drilling and Completions Environment Plan – Consultation</b></p> <p>We refer to our letter to you</p>	<p>Santos has considered the response. Santos considers that it has met its Regulation 11A obligations for consultation with the Tiwi Islands Clans.</p>	<p>Santos Correspondence of 22 September 2023 [Con-2403]</p> <p>We refer to your letter of 4 July 2023, our response of 27 July 2023, and your letter of 13 September 2023.</p> <p>In your letter of 4 July 2023, you write on behalf of your clients</p>	<p>No additional EP measures required.</p>

<p>on 4 July 2023 and to your letter in response on 27 July 2023.</p> <p><b>Consultation obligations</b></p> <p>Our clients do not agree with Santos' assessment that it has conducted sufficient consultation to meet its obligations under the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009 (Regulations) with respect to its Drilling and Completions Environment Plan (Drilling and Completions EP).</p> <p>Santos has not engaged with the substance of the concerns and questions raised in our letter of 4 July, stating that it has already provided sufficient opportunities for these concerns to be raised. Our clients reject this, and reiterate the concerns set out in paragraphs 7 to 19 of that letter outlining why the purported consultation to date has been inadequate due to, among other things, a lack of effective interpretation, poor</p>		<p>[names removed]. You state at paragraph 5:</p> <p>Due to delays in obtaining instructions, we provide this letter on 4 July. We have not, by today's date been able to obtain instructions from all of our clients. Accordingly, there may be additional issues that our clients wish to raise, in addition to the matters set out in this letter.</p> <p>Neither we nor Santos has received any further correspondence in relation to this matter until 13 September 2023, more than two months after your statement above, and over a month after our client</p> <p>provided its response. This is in circumstances where both you and your clients have been on notice since at least May 2023 as to Santos's timeline for final feedback,<sup>1</sup> and on notice since 27 July 2023 that Santos resubmitted the D&amp;C EP to NOPSEMA. In any event, your letter of 13 September 2023 does not raise any new information, objections or claims, but merely restates the complaints made in your letter of 4 July 2023, to which Santos has already responded.</p> <p>Santos does not agree with your</p>	
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<p><i>communication and transportation issues. These concerns have not been adequately addressed by your letter in response.</i></p> <p><i>For example, in response to concerns raised about the availability and quality of interpretation at meetings, your client states that “questions were asked of Santos personnel in English”. This is not disputed: some community member on the Tiwi Islands are comfortable communicating in English, others are not. Your response fails to deal with concerns set out in detail about community members for whom this is not the case, concerns about the technical, difficult and complex way that information was presented both orally and in written form, and the repeated requests made by community members for better interpretation.</i></p> <p><i>Our 4 July letter is a summary of our clients’ concerns following discussions between family, clan and community</i></p>		<p><i>assertion that it has not provided information and answered the questions from the 4 July 2023 letter. In particular, we are instructed that:</i></p> <ul style="list-style-type: none"> <li><i>• during the three months of consultation with the Tiwi Islands clan groups, feedback from the consultations was included in the D&amp;C EP, if any risks were raised that were not already addressed in the EP; and</i></li> <li><i>• feedback in relation to the ‘environment’ including social and cultural features was specifically sought over the three months of consultation on the D&amp;C EP and also prior to consultation in February 2023. The feedback which was provided, including proposed mitigation measures, was included in the D&amp;C EP.</i></li> </ul> <p><i>In relation to matters set out in your letter of 13 September 2023:</i></p> <p><i>In respect of your complaints in relation to consultation, Santos has clearly more than discharged its obligations to allow Tiwi Islands clan groups and traditional owners, as relevant persons, a reasonable period for consultation (being over three months), and to give those relevant persons sufficient information to allow</i></p>	
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<p><i>members. As noted in that letter (and in other correspondence, including on 5 and 12 June) this was necessary due to deficiencies in the purported consultation process and our clients' need to have discussions between family, clan and community members without Santos present before communicating with Santos' representatives.</i></p> <p><i>Our clients reasonably requested, but have not received, a response to the substance of the matters raised in the 4 July letter. No reasonable explanation has been provided by Santos as to why it refuses to address the matters raised in that letter.</i></p> <p><i>Our clients reject the assertion that "further opportunities" to provide feedback as part of a "post-acceptance consultation implementation strategy" would address these concerns.</i></p> <p><i>Accordingly, our clients consider that Santos had not</i></p>		<p><i>them to make an informed assessment of the possible consequences of the activity on their functions, interests or activities.</i></p> <p><i>Contrary to what you are seeking to do, the process of consultation under reg 11A is not a negotiation over the terms of the EP. Santos has already confirmed, in our letter of 27 July 2023, that it has assessed the objections and claims raised by your clients and has considered these matters in the preparation of the D&amp;C EP. It is a matter for NOPSEMA, in the exercise of its statutory function, to determine whether it is reasonably satisfied that the environment plan demonstrates the consultation has been carried out according to reg 11A, and such measures that Santos has adopted or proposed to adopt because of that consultation are appropriate.</i></p> <p><i>In these circumstances, Santos declines to provide your clients with a copy of the most recent revision of the D&amp;C EP, as submitted to NOPSEMA.</i></p>	
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<p><i>(and has still not) met its consultation obligations under the Regulations at the time it submitted its draft Drilling and Completions EP to NOPSEMA.</i></p> <p><b><i>Failure to respond to concerns and queries about risks, impacts and description of the affected environment</i></b></p> <p><i>Similarly, our clients do not consider that your letter adequately addresses their concerns about the lack of information provided during the purported consultation process including regarding cultural impacts, impacts on marine species and the marine environment, and climate impacts set out at paragraphs 20-52 of the 4 July letter.</i></p> <p><i>Firstly, our clients do not agree that the queries raised at paragraphs 20-43 have been answered by the information provided at meetings on the Tiwi Islands, or in the publicly available FAQs documents (including the 14 June FAQ document, which is referred to in the 4</i></p>			
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<p><i>July letter). Our clients have set out in detail in the 4 July letter which queries they consider have not been addressed, noting that in some cases Santos has failed to provide an adequate response because it has misconceived the nature of the concern being raised.</i></p> <p><i>Your letter dated 27 July does not engage with the substance of the matters raised. Our clients reject that it is sufficient for Santos to simply assert that it has considered their feedback in the preparation of the Drilling and Completions EP in circumstances where no information has been provided about how this has occurred, and what steps Santos has taken to respond to the feedback that it has considered.</i></p> <p><i>Given Santos states that it has considered the matters raised by our clients in the preparation of the Drilling and Completions EP, please provide our clients with the document submitted to NOPSEMA so that they may</i></p>			
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<p><i>consider that claim.</i></p> <p><i>Secondly, our clients reject Santos' assertion that the concerns raised at paragraphs 44-51 of the 4 July letter can be dealt with at a later time in relation to the Barossa Production Operations EP, and not in relation to the Drilling and Completions EP.</i></p> <p><b>Conclusion</b></p> <p><i>Our clients maintain that in circumstances where their reasonable concerns and requests for further engagement have been ignored by Santos, the Drilling and Completions EP, as purportedly submitted to NOPSEMA in July 2023, cannot meet the acceptance criteria in Regulation 10A for the reasons set out in paragraph 52 of the 4 July letter. In these circumstances, our clients consider that the Drilling and Completions EP should not have been submitted to NOPSEMA and cannot be accepted.</i></p> <p><i>Our clients request a copy of the revised version of the</i></p>			
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<p><i>Drilling and Completions EP as submitted to NOPSEMA be provided without delay and no later than 18 September 2023.</i></p> <p><i>We have copied representatives of NOPSEMA to this correspondence.</i></p>			
<b>Infrastructure Operators</b>			
<b>Darwin Port</b>			
<p><b>Summary of consultation effort:</b></p> <ul style="list-style-type: none"> <li>+ On 13 April 2023 Santos emailed Darwin Port to explain the consultation approach for the Barossa Drilling and Completions Environment Plan (EP), asking if Darwin Port would like to be consulted, how it would like to be consulted and what information it required. A Barossa Drilling and Completions Information Booklet was also provided and a link to NOPSEMA’s Guideline: <i>Consultation in the course of preparing an Environment Plan</i>. Santos also advised that consultation with Relevant Persons for preparation of the EP was planned to conclude by mid-2023. [Con-1041]</li> <li>+ On 14 April 2023 Darwin Port emailed Santos in response to email on 13 April 2023. Darwin Port appreciated the opportunity but did not have any comments on the EP. [Con-1046]</li> <li>+ On 20 April 2023 Santos emailed Darwin Port the Barossa Development Quarterly Update, which included information on the consultation process for this EP. [Con-1066]</li> <li>+ On 24 April 2023 Santos emailed Darwin Port to advise of opportunities in Darwin on 27 April 2023 and 3 May 2023 to obtain information, provide feedback and ask questions on the drilling and completions activity. [Con-1078]</li> <li>+ On 2 May 2023 Santos emailed Darwin Port in response to email on 14 April 2023. As requested, Santos will continue to consult Darwin Port on the project. Santos requested Darwin Port confirm it did not have any specific input on the EP. [Con-1093]</li> <li>+ On 19 May 2023 Santos emailed Darwin Port providing a link to NOPSEMA’s brochure: <i>Consultation on offshore petroleum environment plans – Information for the community</i>. A Barossa Drilling and Completions Information Booklet was also provided. [Con-1206]</li> <li>+ On 29 May 2023 Santos emailed Darwin Port a Drilling and Completions Fact Sheet. Santos also reminded it of the timeframe for provision of feedback. [Con-1243]</li> <li>+ No further correspondence or feedback was received.</li> </ul>			
<b>Summary of Objection or</b>	<b>Assessment of Merits</b>	<b>Santos’ Response Statement</b>	<b>EP Reference</b>

<b>Claim</b>			
<i>Nil</i>	<i>Nil</i>	<i>Nil</i>	<i>No additional EP measures required.</i>
<b>NT Ports and Marine</b>			
<b>Summary of consultation effort:</b>			
<ul style="list-style-type: none"> <li>+ On 13 April 2023 Santos emailed NT Ports and Marine to explain the consultation approach for the Barossa Drilling and Completions Environment Plan (EP), asking if NT Ports and Marine would like to be consulted, how it would like to be consulted and what information it required. A Barossa Drilling and Completions Information Booklet was also provided and a link to NOPSEMA’s Guideline: <i>Consultation in the course of preparing an Environment Plan</i>. Santos also advised that consultation with Relevant Persons for preparation of the EP was planned to conclude by mid-2023. [Con-1041]</li> <li>+ On 20 April 2023 Santos emailed NT Ports and Marine the Barossa Development Quarterly Update, which included information on the consultation process for this EP. [Con-1066]</li> <li>+ On 24 April 2023 Santos emailed NT Ports and Marine to advise of opportunities in Darwin on 27 April 2023 and 3 May 2023 to obtain information, provide feedback and ask questions on the drilling and completions activity. [Con-1078]</li> <li>+ On 4 May 2023 Santos called NT Ports and Marine and left a voicemail. [Con-1363]</li> <li>+ On 11 May 2023 Santos emailed NT Ports and Marine to follow up Santos’ call on 4 May 2023. [Con-1364]</li> <li>+ On 19 May 2023 Santos emailed NT Ports and Marine providing a link to NOPSEMA’s brochure: <i>Consultation on offshore petroleum environment plans – Information for the community</i>. A Barossa Drilling and Completions Information Booklet was also provided. [Con-1206]</li> <li>+ On 29 May 2023 Santos emailed NT Ports and Marine a Drilling and Completions Fact Sheet. Santos also reminded it of the timeframe for provision of feedback. [Con-1243]</li> <li>+ On 9 June 2023 Santos called NT Ports and Marine as a reminder regarding feedback for the EP and seeking provision of any feedback. [Con-1269]</li> <li>+ No further correspondence or feedback received.</li> </ul>			
<b>Summary of Objection or Claim</b>	<b>Assessment of Merits</b>	<b>Santos’ Response Statement</b>	<b>EP Reference</b>
<i>Nil</i>	<i>Nil</i>	<i>Nil</i>	<i>No additional EP measures required.</i>
<b>Industry Associations</b>			
<b>Amateur Fisherman’s Association of the NT (AFANT)</b>			

**Summary of consultation effort:**

- + On 13 April 2023 Santos emailed the Amateur Fisherman’s Association of the NT (AFANT) to explain the consultation approach for the Barossa Drilling and Completions Environment Plan (EP), asking if AFANT would like to be consulted, how it would like to be consulted and what information it required. A Barossa Drilling and Completions Information Booklet was also provided and a link to NOPSEMA’s Guideline: *Consultation in the course of preparing an Environment Plan*. Santos also advised that consultation with Relevant Persons for preparation of the EP was planned to conclude by mid-2023. [Con-1041]
- + On 20 April 2023 Santos emailed AFANT the Barossa Development Quarterly Update, which included information on the consultation process for this EP. [Con-1066]
- + On 24 April 2023 Santos emailed AFANT to advise of opportunities in Darwin on 27 April 2023 and 3 May 2023 to obtain information, provide feedback and ask questions on the drilling and completions activity. [Con-1078]
- + On 28 April 2023 Santos called AFANT and left a voicemail. [Con-1132]
- + On 19 May 2023 Santos emailed AFANT providing a link to NOPSEMA’s brochure: *Consultation on offshore petroleum environment plans – Information for the community*. A Barossa Drilling and Completions Information Booklet was also provided. [Con-1206]
- + On 23 May 2023 AFANT emailed Santos requesting a meeting with Santos in response to Santos’ emails on 15 May 2023 and 18 May 2023. [Con-1215]
- + On 23 May 2023 Santos emailed AFANT confirming it will arrange a meeting with AFANT as requested via email on 23 May 2023. [Con-1220]
- + On 29 May 2023 Santos emailed AFANT a Drilling and Completions Fact Sheet. Santos also reminded it of the timeframe for provision of feedback. [Con-1243]
- + On 29 May 2023 Santos met with AFANT upon request to explain purpose of recent emails on the EP, other coming communications for regulatory approvals documentation and the organi’ation's preferred consultation method. Santos confirmed it would continue to keep AFANT informed and provide opportunities to comment on all approvals in Commonwealth and NT waters.’ AFANT's main interest is with the Darwin Pipeline Duplication Project in NT waters. [Con-1223]
- + No further correspondence or feedback was received.

<b>Summary of Objection or Claim</b>	<b>Assessment of Merits</b>	<b>Santos’ Response Statement</b>	<b>EP Reference</b>
<i>AFANT advised it is possible that recreational fishing charter vessels may operate in the vicinity of the Operational Area, but this would only occur on a very infrequent basis due to the cost and resources required.</i>	<i>AFANT’s advice supports Santos’ assessment that little to no recreational fishing activities occur in the EMBA or Operational Area.</i>	<i>Santos will continue to liaise with AFANT and other relevant organisations and businesses during the development of Eps to assist awareness of any change to the level of recreational fishing activity. [Con-1223]</i>	<i>No additional EP measures required.</i>



[Con-1223]			
<b>Association of Marine Tourism Timor-Leste (AMT-TL)</b>			
<b>Summary of consultation effort:</b>			
<ul style="list-style-type: none"> <li>+ On 21 April 2023 AMT-TL lodged a self-nomination and feedback form (as a potential Relevant Person) via the portal on the Santos website. [Con-1070]</li> <li>+ On 24 April 2023 Santos emailed AMT-TL in response to the form completed on 21 April 2023. Santos advised that Santos would be in contact again and in the meantime should AAMT-TL have any questions or require further information it should contact Santos via phone or email (details provided). [Con-1144]</li> <li>+ On 15 May 2023 Santos emailed AMT-TL, provided information about the consultation for the Barossa Drilling and Completions EP and attached the Barossa Drilling and Completions Information Booklet. Santos invited consultation preferences by 29 May 2023 and indicated that it was seeking feedback for this EP by 15 June 2023. [Con-1189]</li> <li>+ On 18 May 2023 Santos emailed AMT-TL providing NOPSEMA’s brochure: <i>Consultation on offshore petroleum environment plans – Information for the community</i>. Santos also reminded AMT-TL of how and by when feedback was sought and to contact Santos to make any alternate arrangements by 29 May 2023. [Con-1446]</li> <li>+ On 29 May 2023 Santos emailed AMT-TL a Drilling and Completions Fact Sheet. Santos also reminded AMT-TL of the timeframes for provision of consultation preferences and for feedback for this EP. [Con-1233]</li> <li>+ On 16 June 2023 AMT-TL emailed Santos with requests including provision of translated information and materials, a face-to-face meeting in Dili and an extension of the timeframe for feedback until its consultation requests were met. [Con-1397]</li> <li>+ On 22 June 2023 Santos emailed AMT-TL with a response to its email of 16 June 2023, including an extension to the timeframe for feedback to 28 June 2023 and offer to meet during that week or early the week following. [Con-1443]</li> <li>+ On 28 June 2023 AMT-TL emailed Santos in response to Santos’ email of 22 June 2023, which included a statement that AMT-TL’s preference is not to have a meeting until AMT-TL’s request for translated information and materials had been met. [Con-1514]</li> <li>+ On 6 July 2023 Santos emailed AMT T-L in response to AMT T-L’s email of 28 June 2023. [Con-1522]</li> <li>+ No further correspondence or feedback was received.</li> </ul>			
<b>Summary of Objection or Claim</b>	<b>Assessment of Merits</b>	<b>Santos’ Response Statement</b>	<b>EP Reference</b>
<b>AMT-TL correspondence [Con-1397]:</b>  <i>From your email dated 18<sup>th</sup> May 2023, we presume</i>	<i>Santos notes the AMT-TL’s advice.</i>	<i>Advice noted.</i>	<i>No additional EP measures required.</i>

<p><i>that you have accepted the Assosiasaun Turizmu Maritima iha Timor-Lester as a 'relevant person' for the purposes of the consultation in relation to the Drilling and Completions Environment Plan (EP). Please confirm that this is so.</i></p>			
<p><i>Under the current regulatory process, we will not have the opportunity to view and comment on the Drilling EP (prior to its submission to NOPSEMA). We will also not have the opportunity to provide feedback/input on how Santos has responded to our specific comments (which will be presented in the Drilling EP).</i></p>	<p><i>Relevant documentation has been publicly available since March 2022. The current consultation process is assisting the updating required to this existing information.</i></p>	<p><b>Santos response [Con-1443]:</b></p> <p><i>The prior version of the EP (Revision 3), previously accepted by the regulator, the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA), is available online at NOPSEMA's website (<a href="https://docs.nopsema.gov.au/A831694">https://docs.nopsema.gov.au/A831694</a>). It was accepted by NOPSEMA in March 2022, before NOPSEMA's acceptance was set aside by a Federal Court decision in late 2022 (as noted in our email of 15 May). That document has been publicly available since 15 March 2022.</i></p> <p><i>Santos is required by regulation 16 of the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009 (Cth) to provide a statement in the EP of Santos' response, or</i></p>	

		<p><i>proposed response, if any, to each objection or claim you raise. If you raise any specific objections or claims in relation to the drilling and completions activity within a reasonable period, Santos will provide you a response to your objections or claims prior to submitting the EP to NOPSEMA.</i></p>	
<p><i>We note that all the consultation materials provided were in English.</i></p> <p><i>Given the significant ‘challenges’ associated with undertaking public and stakeholder consultation in Timor-Leste (ie. Non-English languages, human development status, literacy levels, limited internet connectivity), we also respectfully request additional communication materials to enable effective and appropriate consultation on the Barossa Offshore Gas Project and Drilling EP. Including:</i></p> <p><i>a) translation of all project and activity-related consultation materials in</i></p>	<p><i>Santos noted the comments and the fact that the request was not made earlier in the consultation period.</i></p>	<p><i>Whilst the materials supplied were in English, Santos notes that information is available on our website and that the website content may be translated into Bahasa Indonesia or Portuguese using Google translate.</i></p> <p><i>We further note that such an extensive request for additional translated material has only been made after the date by which feedback was sought (15 June), rather than earlier. There was ample opportunity to raise any such issue or request well in advance of 15 June.</i></p>	<p><i>No additional EP measures required.</i></p>

<p><i>the accepted and relevant major languages of the country (ie. Tetun, Portugese and Indonesian)</i></p> <p><i>b) a short video (in relevant 3 languages) of the Barossa Offshore Gas Project</i></p> <p><i>c) a 'face-to-face' meeting in Dili, to present, explain and discuss the Barossa Offshore Gas Project, as well as the Drilling and Completions project activity – with translators</i></p>			
<p><i>Santos have advised that the deadline for all comments on the Drilling EP is <b>15 June 2023</b>.</i></p> <p><i>Given the importance of effective and appropriate consultation, we formally request and would be grateful for an extension of the deadline for comment on the Drilling EP, pending the completion of all the relevant stakeholder consultation activities (outlined in paragraph 6).</i></p>	<p><i>Santos notes the request and an extension of time to comment will be provided.</i></p>	<p><i>Santos can accommodate an extension of the feedback period until Wednesday, 28 June 2023.</i></p> <p><i>We are available this week or early next week for a meeting by telephone or videoconference.</i></p>	<p><i>No additional EP measures required.</i></p>
<p><b>AMT-TL correspondence [Con-1514]:</b></p>	<p><i>Santos has provided AMT T-L with sufficient information to assess the</i></p>	<p><b>Santos response [Con-1552]</b></p> <p><i>In the context of your likely</i></p>	

<p><i>The provision of relevant information on the Drilling and Completions EP in accessible languages is key to genuine and informed consultation on the pro. We find the suggestion that we should use Google Translate to translate information regarding this project into Indonesian and Portuguese to be an inappropriate response to our request for information as a relevant person. Information regarding the Barossa project is highly technical and needs to be properly translated. Google Translate is an inadequate tool for this task.</i></p> <p><i>The suggestion to use Google Translate mentions only the Portuguese and Indonesian languages. We note that there is no Google Translate option for Tetun, the language spoken by most of the population. Portuguese is an official language spoken by a small minority of the population, and Indonesian does not have</i></p>	<p><i>impacts of the Drilling and Completions Environment Plan, and reasonable time to provide any feedback</i></p>	<p><i>functions, interests and activities, and taking into account the environment that may be affected, Santos has provided the Assosiasaun Turizmu Maritima iha Timor-Leste with sufficient information to assess the impacts of the Drilling and Completions Environment Plan and reasonable time to provide any feedback it may have.</i></p> <p><i>The Assosiasaun Turizmu Maritima iha Timor-Leste is welcome to contact us at any time and we look forward to receiving and addressing any feedback it may have on the Drilling and Completions Environment Plan.</i></p> <p><i>The Assosiasaun Turizmu Maritima iha Timor-Leste can stay up to date with consultation processes for other activity environment plans by monitoring</i></p> <p><a href="https://www.santos.com/barossa/">https://www.santos.com/barossa/</a>.</p>	
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<p><i>status as an official language and is also spoken by a minority of the population.</i></p> <p><i>We consider the highly technical nature of the project information beyond our capacity to translate appropriately. We consider it part of the Proponent's duty to provide such translation.</i></p> <p><i>Your letter suggests that we have had ample time to request translated material. We note that our request was made in our first communication with Santos subsequent to our confirmation as relevant persons. We believe this was a timely request.</i></p> <p><i>Regarding Santos' offer to hold a meeting, we would prefer to meet at such a time when we have been able to access appropriate information in relevant languages and present informed input.</i></p>			
<p><b>Australian Southern Bluefin Tuna Industry Association (ASBTIA)</b></p>			
<p><b>Summary of consultation effort:</b></p>			

- + On 13 April 2023 Santos emailed ASBTIA to explain the consultation approach for the Barossa Drilling and Completions Environment Plan (EP), asking if ASBTIA would like to be consulted, how it would like to be consulted and what information it required. A Barossa Drilling and Completions Information Booklet was also provided and a link to NOPSEMA's Guideline: *Consultation on offshore petroleum environment plans*. Santos also advised that consultation with Relevant Persons for preparation of the EP was planned to conclude by mid-2023. [Con-1041]
- + On 20 April 2023 Santos emailed ASBTIA the Barossa Development Quarterly Update, which included information on the consultation process for this EP. [Con-1066]
- + On 24 April 2023 Santos emailed ASBTIA to advise of opportunities in Darwin on 27 April 2023 and 3 May 2023 to obtain information, provide feedback and ask questions on the drilling and completions activity. [Con-1078]
- + On 4 May 2023 Santos called ASBTIA but could not leave a message. [Con-1281] and [Con-1278]
- + On 5 May 2023 Santos called ASBTIA and left a voicemail. [Con-1279]
- + On 10 May 2023 Santos emailed ASBTIA regarding the EP. [Con-1280]
- + On 11 May 2023 Santos called ASBTIA. ASBTIA requested an email be forwarded with the information to [sbt\\_research@bigpond.com](mailto:sbt_research@bigpond.com). [Con-1282]
- + On 19 May 2023 Santos emailed ASBTIA providing a link to NOPSEMA's brochure: *Consultation on offshore petroleum environment plans – Information for the community*. A Barossa Drilling and Completions Information Booklet was also provided. [Con-1206]
- + On 23 May 2023 Santos emailed ASBTIA reminding it of the consultation process for the EP and timeframe for feedback (15 June 2023). A Barossa Drilling and Completions Information Booklet and NOPSEMA consultation brochure were also provided. [Con-1283]
- + On 29 May 2023 Santos emailed ASBTIA a Drilling and Completions Fact Sheet. Santos also reminded it of the timeframe for provision of feedback. [Con-1243]
- + No further correspondence or any feedback was received.

<b>Summary of Objection or Claim</b>	<b>Assessment of Merits</b>	<b>Santos' Response Statement</b>	<b>EP Reference</b>
<i>Nil</i>	<i>Nil</i>	<i>Nil</i>	<i>No additional EP measures required.</i>

### Commonwealth Fisheries Association (CFA)

**Summary of consultation effort:**

The Commonwealth Fisheries Association (CFA) was previously consulted for the Barossa Drilling and Completions Environment Plan (EP) but subsequently advised Santos that it does not wish to be provided information during the development of EPs and consultation should occur directly with the relevant commercial fishing industry associations. Santos acknowledges the CFA's stance and will consult directly with the relevant associations.

<b>Summary of Objection or Claim</b>	<b>Assessment of Merits</b>	<b>Santos' Response Statement</b>	<b>EP Reference</b>

<b>Claim</b>			
<i>Nil</i>	<i>Nil</i>	<i>Nil</i>	<i>No additional EP measures required.</i>
<b>Northern Prawn Fishing Industry Pty Ltd (NPMI)</b>			
<b>Summary of consultation effort:</b>			
<ul style="list-style-type: none"> <li>+ On 13 April 2023 Santos emailed NPMI to explain the consultation approach for the Barossa Drilling and Completions Environment Plan (EP), asking if NPMI would like to be consulted, how it would like to be consulted and what information it required. A Barossa Drilling and Completions Information Booklet was also provided and a link to NOPSEMA's Guideline: <i>Consultation on offshore petroleum environment plans</i>. Santos also advised that consultation with Relevant Persons for preparation of the EP was planned to conclude by mid-2023. [Con-1041]</li> <li>+ On 20 April 2023 Santos emailed NPMI the Barossa Development Quarterly Update, which included information on the consultation process for this EP. [Con-1066]</li> <li>+ On 24 April 2023 Santos emailed NPMI to advise of opportunities in Darwin on 27 April 2023 and 3 May 2023 to obtain information, provide feedback and ask questions on the drilling and completions activity. [Con-1078]</li> <li>+ On 28 April 2023 Santos called NPMI providing clarity regarding consultation process. Santos advised it would speak to some of the main fishers and NPMI confirmed it was happy with the approach. [Con-1113]</li> <li>+ On 19 May 2023 Santos emailed NPMI providing a link to NOPSEMA's brochure: <i>Consultation on offshore petroleum environment plans – Information for the community</i>. A Barossa Drilling and Completions Information Booklet was also provided. [Con-1206]</li> <li>+ On 29 May 2023 Santos emailed NPMI a Drilling and Completions Fact Sheet. Santos also reminded it of the timeframe for provision of feedback. [Con-1243]</li> <li>+ On 3 May 2023 Santos emailed NPMI the proposed drilling locations again and confirmed engagement with several fishers. [Con-1154]</li> <li>+ On 9 June 2023 Santos called NPMI as a reminder re feedback for EP. [Con-1269]</li> <li>+ On 11 June 2023 Santos emailed NPMI a fishing fact sheet. [Con-1271]</li> <li>+ No further correspondence or feedback was received.</li> </ul>			
<b>Summary of Objection or Claim</b>	<b>Assessment of Merits</b>	<b>Santos' Response Statement</b>	<b>EP Reference</b>
<i>Nil</i>	<i>Nil</i>	<i>Nil</i>	<i>No additional EP measures required.</i>
<b>Northern Territory Guided Fishing Industry Association (NTGFIA)</b>			
<b>Summary of consultation effort:</b>			



- + On 13 April 2023 Santos emailed NTGFIA to explain the consultation approach for the Barossa Drilling and Completions Environment Plan (EP), asking if NTGFIA would like to be consulted, how it would like to be consulted and what information it required. A Barossa Drilling and Completions Information Booklet was also provided and a link to NOPSEMA’s Guideline: *Consultation on offshore petroleum environment plans*. Santos also advised that consultation with Relevant Persons for preparation of the EP was planned to conclude by mid-2023. [Con-1041]
- + On 20 April 2023 Santos emailed NTGFIA the Barossa Development Quarterly Update, which included information on the consultation process for this EP. [Con-1066]
- + On 24 April 2023 Santos emailed NTGFIA to advise of opportunities in Darwin on 27 April 2023 and 3 May 2023 to obtain information, provide feedback and ask questions on the drilling and completions activity. [Con-1078]
- + On 4 May 2023 Santos phoned NTGFIA regarding the consultation process. [Con-1365]
- + On 19 May 2023 Santos emailed NTGFIA providing a link to NOPSEMA’s brochure: *Consultation on offshore petroleum environment plans – Information for the community*. A Barossa Drilling and Completions Information Booklet was also provided. [Con-1206]
- + On 23 May 2023 Santos emailed NTGFIA as a follow up to the email on 13 April 2023 and following up the phone call on 4 May 2023. Santos confirmed NTGFIA will be consulted during Santos’ preparation of the EP for resubmission. NTGFIA advised it was not likely to have any feedback. Santos provided the Barossa Drilling and Completions Information Booklet as requested. Santos advised the timeframe for provision of feedback (15 June 2023). [Con-1366]
- + On 29 May 2023 Santos emailed NTGFIA a Drilling and Completions Fact Sheet. Santos also reminded it of the timeframe for provision of feedback. [Con-1243]
- + No further correspondence or feedback was received.

<b>Summary of Objection or Claim</b>	<b>Assessment of Merits</b>	<b>Santos’ Response Statement</b>	<b>EP Reference</b>
<i>Nil</i>	<i>Nil</i>	<i>Nil</i>	<i>No additional EP measures required.</i>

**Northern Territory Seafood Council (NTSC)**

- Summary of consultation effort:**
- + On 13 April 2023 Santos emailed NTSC to explain the consultation approach for the Barossa Drilling and Completions Environment Plan (EP), asking if NTSC would like to be consulted, how it would like to be consulted and what information it required. A Barossa Drilling and Completions Information Booklet was also provided and a link to NOPSEMA’s Guideline: *Consultation on offshore petroleum environment plans*. Santos also advised that consultation with Relevant Persons for preparation of the EP was planned to conclude by mid-2023. [Con-1041] As per NTSC’s standing request, the same information was posted to all NT Licence Holders on 14 April.
  - + On 20 April 2023 Santos emailed NTSC the Barossa Development Quarterly Update, which included information on the consultation process for this EP. [Con-1066]
  - + On 24 April 2023 Santos emailed NTSC to advise of opportunities in Darwin on 27 April 2023 and 3 May 2023 to obtain information, provide feedback and ask questions on the drilling and completions activity. [Con-1078]

- + On 28 April 2023 Santos called NTSC and left voicemail. [Con-1112]
- + On 3 May 2023 Santos emailed NTSC following up correspondence on 13 April 2023 and messages on 28 April 2023 regarding the proposed drilling activities. Request to confirm if NTSC would like Santos to organise a couple of dates/times in the next couple of weeks when anyone could call in and provide any input. [Con-1155]
- + On 19 May 2023 Santos emailed NTSC providing a link to NOPSEMA’s brochure: *Consultation on offshore petroleum environment plans – Information for the community*. A Barossa Drilling and Completions Fact Sheet was also provided. [Con-1206]
- + On 19 May NTSC emailed Santos confirming it would include a note and link to resources to Timor Reef Fishery licence holders via email on Friday 26 May 2023. [Con-1211]
- + On 23 May 2023 Santos emailed NTSC thanking it for providing notifications to Timor Reef Fishery licence holders. [Con-1219]
- + On 29 May 2023 Santos emailed NTSC a Drilling and Completions Fact Sheet. Santos also reminded it of the timeframe for provision of feedback. [Con-1243]
- + On 9 June 2023 Santos called NTSC reminding it of the timeframe for provision of feedback. [Con-1269]
- + On 11 June 2023 Santos emailed NTSC a fishing fact sheet. [Con-1270]
- + On 12 June 2023 Santos posted NT Licence Holders a fishing fact sheet. [Con-1272]
- + No further correspondence or feedback received.

<b>Summary of Objection or Claim</b>	<b>Assessment of Merits</b>	<b>Santos’ Response Statement</b>	<b>EP Reference</b>
<i>Nil</i>	<i>Nil</i>	<i>Nil</i>	<i>No additional EP measures required.</i>

**Pearl Producers Association (PPA)**

- Summary of consultation effort:**
- + On 13 April 2023 Santos emailed PPA to explain the consultation approach for the Barossa Drilling and Completions Environment Plan (EP), asking if PPA would like to be consulted, how it would like to be consulted and what information it required. A Barossa Drilling and Completions Information Booklet was also provided and a link to NOPSEMA’s Guideline: *Consultation on offshore petroleum environment plans*. Santos also advised that consultation with Relevant Persons for preparation of the EP was planned to conclude by mid-2023. [Con-1041]
  - + On 20 April 2023 Santos emailed PPA the Barossa Development Quarterly Update, which included information on the consultation process for this EP. [Con-1066]
  - + On 24 April 2023 Santos emailed PPA to advise of opportunities in Darwin on 27 April 2023 and 3 May 2023 to obtain information, provide feedback and ask questions on the drilling and completions activity. [Con-1078]

- + On 4 May 2023 Santos called PPA and left a voicemail. [Con-1356]
- + On 10 May 2023 Santos emailed PPA regarding the EP. [Con-1357]
- + On 19 May 2023 Santos emailed PPA providing a link to NOPSEMA’s brochure: *Consultation on offshore petroleum environment plans – Information for the community*. A Barossa Drilling and Completions Information Booklet was also provided. [Con-1206]
- + On 29 May 2023 Santos emailed PPA a Drilling and Completions Fact Sheet. Santos also reminded it of the timeframe for provision of feedback. [Con-1243]
- + On 8 June 2013 Santos called PPA – no message left. [Con-1358]
- + No further correspondence or feedback received.

<b>Summary of Objection or Claim</b>	<b>Assessment of Merits</b>	<b>Santos’ Response Statement</b>	<b>EP Reference</b>
<i>Nil</i>	<i>Nil</i>	<i>Nil</i>	<i>No additional EP measures required.</i>

**Tourism Top End**

- Summary of consultation effort:**
- + On 13 April 2023 Santos emailed Tourism Top End to explain the consultation approach for the Barossa Drilling and Completions Environment Plan (EP), asking if Tourism Top End would like to be consulted, how it would like to be consulted and what information it required. A Barossa Drilling and Completions Information Booklet was also provided and a link to NOPSEMA’s Guideline: *Consultation on offshore petroleum environment plans*. Santos also advised that consultation with Relevant Persons for preparation of the EP was planned to conclude by mid-2023. [Con-1041]
  - + On 20 April 2023 Santos emailed Tourism Top End the Barossa Development Quarterly Update, which included information on the consultation process for this EP. [Con-1066]
  - + On 24 April 2023 Santos emailed Tourism Top End to advise of opportunities in Darwin on 27 April 2023 and 3 May 2023 to obtain information, provide feedback and ask questions on the drilling and completions activity. [Con-1078]
  - + On 4 May 2023 Santos called Tourism Top End and left a voicemail. [Con-1356]
  - + On 10 May 2023 Santos emailed Tourism Top End regarding the EP. [Con-1337]
  - + On 19 May 2023 Santos emailed Tourism Top End providing a link to NOPSEMA’s brochure: *Consultation on offshore petroleum environment plans – Information for the community*. A Barossa Drilling and Completions Information Booklet was also provided. [Con-1206]
  - + On 29 May 2023 Santos emailed Tourism Top End a Drilling and Completions Fact Sheet. Santos also reminded it of the timeframe for provision of feedback. [Con-1243]

- + On 8 June 2013 Santos called Tourism Top End – no message left. [Con-1358]
- + On 15 June 2023 Santos emailed Tourism Top End advising that the period for providing feedback for the Environment Plan had closed and Santos remains available to discuss Project activities outside of this consultation process. [Con-1508]
- + No further correspondence or feedback was received.

<b>Summary of Objection or Claim</b>	<b>Assessment of Merits</b>	<b>Santos' Response Statement</b>	<b>EP Reference</b>
<i>Nil</i>	<i>Nil</i>	<i>Nil</i>	<i>No additional EP measures required.</i>

**Western Australian Fishing Industry Council (WAFIC)**

**Summary of consultation effort:**

- + On 13 April 2023 Santos emailed WAFIC to explain the consultation approach for the Barossa Drilling and Completions Environment Plan (EP), asking if WAFIC would like to be consulted, how it would like to be consulted and what information it required. A Barossa Drilling and Completions Information Booklet was also provided and a link to NOPSEMA's Guideline: *Consultation on offshore petroleum environment plans*. Santos also advised that consultation with Relevant Persons for preparation of the EP was planned to conclude by mid-2023. [Con-1041]
- + On 20 April 2023 Santos emailed WAFIC the Barossa Development Quarterly Update, which included information on the consultation process for this EP. [Con-1066]
- + On 24 April 2023 Santos emailed WAFIC to advise of opportunities in Darwin on 27 April 2023 and 3 May 2023 to obtain information, provide feedback and ask questions on the drilling and completions activity. [Con-1078]
- + On 10 May 2023 Santos called WAFIC and left a voicemail. [Con-1175]
- + On 19 May 2023 Santos emailed WAFIC providing a link to NOPSEMA's brochure: *Consultation on offshore petroleum environment plans – Information for the community*. A Barossa Drilling and Completions Information Booklet was also provided. [Con-1206]
- + On 22 May 2023 Santos emailed WAFIC providing a reminder of the consultation process and foreshadowing a call to WAFIC on 29 May 2023 to provide an update on the process. [Con-1213]
- + On 29 May 2023 Santos emailed WAFIC a Drilling and Completions Fact Sheet. Santos also reminded it of the timeframe for provision of feedback. [Con-1243]
- + On 31 May 2023 WAFIC emailed Santos advising there is information on WAFIC's website regarding consultation on unplanned events and clarifying consultation for Relevant Persons in the EMBA. [Con-1254]
- + On 8 June 2023 Santos emailed WAFIC to advise that the information on the WAFIC website was clear and had been considered by Santos and indicated that for this EP Santos can demonstrate the likelihood of such events occurring is extremely low. [Con-1260]

+ No further correspondence or feedback was received.			
<b>Summary of Objection or Claim</b>	<b>Assessment of Merits</b>	<b>Santos' Response Statement</b>	<b>EP Reference</b>
WAFIC advised Santos that it did not require consultation to be undertaken with WA commercial fishing Licence Holders for this EP. [Con-1254]	Santos acknowledges that consultation is not required for this EP under WAFIC's consultation approach ( <a href="https://www.wafic.org.au/what-we-do/access-sustainability/oil-gas/consultation-approach-for-unplanned-events/">https://www.wafic.org.au/what-we-do/access-sustainability/oil-gas/consultation-approach-for-unplanned-events/</a> ).	Santos confirmed its understanding of WAFIC's approach to consultation for this EP. [Con-1260]	No additional EP measures are required.
<b>Local Government Authorities</b>			
Nil			
<b>Marine and Coastal Tourism Operators</b>			
Clearwater Island Resort/Tiwi Adventures, Bathurst Island Lodge/Tiwi Island Retreat, Arafura Bluewater Charters			
<b>Summary of consultation effort:</b>			
<ul style="list-style-type: none"> <li>+ On 13 April 2023 Santos emailed the Fishing Tourism Operators listed to explain the consultation approach for the Barossa Drilling and Completions Environment Plan (EP), asking if they would like to be consulted, how they would like to be consulted and what information they required. A Barossa Drilling and Completions Information Booklet was also provided and a link to NOPSEMA's Guideline: <i>Consultation on offshore petroleum environment plans</i>. Santos also advised that consultation with Relevant Persons for preparation of the EP was planned to conclude by mid-2023. [Con-1041]</li> <li>+ On 20 April 2023 Santos emailed Fishing Tourism Operators the Barossa Development Quarterly Update, which included information on the consultation process for this EP. [Con-1066]</li> <li>+ On 24 April 2023 Santos emailed Fishing Tourism Operators to advise of opportunities in Darwin on 27 April 2023 and 3 May 2023 to obtain information, provide feedback and ask questions on the drilling and completions activity. [Con-1078]</li> <li>+ On 28 April 2023 Santos called Clearwater Island Resort and left a voicemail. [Con-1150]</li> </ul>			

- + On 28 April 2023 Santos called Bathurst Island Lodge and left a voicemail. [Con-1129]
- + On 4 May 2023 Santos called Tourism Top End and left a voicemail. [Con-1338]
- + On 4 May and 10 May 2023 Santos called Arafura Bluewater Charters and left a voicemail. [Con-1275]
- + On 10 May 2023 Santos emailed Arafura Bluewater Charters regarding the EP. [Con-1276]
- + On 10 May 2023 Santos emailed Tourism Top End regarding feedback on the EP. [Con-1340]
- + On 19 May 2023 Santos emailed Fishing Tourism Operators providing a link to NOPSEMA's brochure: *Consultation on offshore petroleum environment plans – Information for the community*. A Barossa Drilling and Completions Information Booklet was also provided. [Con-1206]
- + On 29 May 2023 Santos emailed Fishing Tourism Operators a Drilling and Completions Fact Sheet. Santos also reminded them of the timeframe for provision of feedback. [Con-1243]
- + On 8 June 2023 Santos called Tourism Top End but was unable to leave a message. [Con-1339]
- + On 9 June 2023 Santos called Tiwi Island Retreat as a reminder regarding feedback for EP. [Con-1269]
- + On 9 June 2023 Santos called Arafura Bluewater Charters. I advised it was not fishing near the area mentioned and was not interested in further consultation [Con-1287]. A confirmation email was sent by Santos on 15 June. [Con-1509]
- + On 19 June 2023 Santos called Clearwater Island Resort [Con-1480] and on 26 June 2023 emailed Clearwater Island Resort advising that the period for providing feedback for the Environment Plan had closed and Santos remains available to discuss Project activities outside this consultation process. [Con-1457]
- + No further correspondence or feedback was received.

<b>Summary of Objection or Claim</b>	<b>Assessment of Merits</b>	<b>Santos' Response Statement</b>	<b>EP Reference</b>
<i>Nil</i>	<i>Nil</i>	<i>Nil</i>	<i>No additional EP measures required.</i>

### Dreamers Dive Academy Timor

- + On 22 April 2023 Dreamers Dive Academy lodged a self-nomination and feedback form (as a potential Relevant Person) via the portal on the Santos website. [Con-1076]
- + On 24 April 2023 Santos emailed Dreamers Dive Academy in response to the form completed on 22 April 2023. Santos advised that it would be in contact again and in the meantime should Dreamers Dive Academy have any questions or require further information it should contact Santos via phone or email (details provided). [Con-1147]
- + On 15 May 2023 Santos emailed Dreamers Dive Academy, Santos provided information about the consultation for the Barossa Drilling and Completions EP and advised the timeframe for provision of feedback from all Relevant Persons (15 June 2023). The Barossa Drilling and Completions Information Booklet was also provided. [Con-

1184] Santos stated the purpose of the email is to:

- seek information to better understand any functions, interests or activities that may be affected by the proposed activities under the EP and how they may be affected;
- explain the purpose of consultation and 'antos' regulatory obligations to consult with Relevant Persons;
- set out 'antos' proposed approach to consulting with Relevant Persons;
- seek feedback on how Santos can provide further information that is appropriate and accessible to assess the possible consequences of 'antos' proposed drilling and completions activities (if a Relevant Person); and/or
- invite Relevant Persons' feedback regarding the EP.

+ On 15 May 2023 Dreamers Dive Academy emailed Santos an out of office email in response to the email sent by Santos on 15 May 2023. [Con-1200]

+ On 18 May 2023 Santos emailed Dreamers Dive Academy providing NOPSEMA's brochure: *Consultation on offshore petroleum environment plans – Information for the community*. [Con-1205]

+ On 29 May 2023 Santos emailed Dreamers Dive Academy a Barossa Drilling and Completions Fact Sheet. Santos also reminded ACMA of the timeframe for provision of feedback. [Con-1228]

+ On 21 June 2023 Santos followed-up its email with a call to Dreamers Dive Academy which could not be connected. [Con-1490]

+ No further correspondence or feedback was received.

<i>Summary of Objection or Claim</i>	<i>Summary of Objection or Claim</i>	<i>Summary of Objection or Claim</i>	<i>Summary of Objection or Claim</i>
<i>Nil</i>	<i>Nil</i>	<i>Nil</i>	<i>Nil</i>

## Communities

### Individual

#### **Summary of consultation effort:**

- + On 13 April 2023 Santos emailed an individual to explain the consultation approach for the Barossa Drilling and Completions Environment Plan (EP), asking if the individual would like to be consulted, how they would like to be consulted and what information they required. A Barossa Drilling and Completions Information Booklet was also provided and a link to NOPSEMA's Guideline: *Consultation on offshore petroleum environment plans*. Santos also advised that consultation with Relevant Persons for preparation of the EP was planned to conclude by mid-2023. [Con-1041]
- + On 18 April 2023 the individual emailed Santos confirming they would like to be further consulted during Santos' preparation of the EP for resubmission and would like to receive information via email and one-on-one meetings. They requested additional information in relation to marine megafauna, sea country and reports and updates

relating to Indonesia and Timor-Leste and made recommendations on other stakeholders that Santos should consult. [Con-1051]. The requests and recommendations and Santos' responses to each are detailed in the assessment section of this entry.

- + On 20 April 2023 Santos emailed the individual the Barossa Development Quarterly Update, which included information on the consultation process for this EP. [Con-1066]
- + On 24 April 2023 Santos emailed the individual to advise of opportunities in Darwin on 27 April 2023 and 3 May 2023 to obtain information, provide feedback and ask questions on the drilling and completions activity. [Con-1078]
- + On 19 May 2023 Santos emailed the individual providing a link to NOPSEMA's brochure: *Consultation on offshore petroleum environment plans – Information for the community*. A Barossa Drilling and Completions Information Booklet was also provided. [Con-1206]
- + On 29 May 2023 Santos emailed the individual a Drilling and Completions Fact Sheet. Santos also reminded them of the timeframe for provision of feedback. [Con-1243]
- + On 29 May 2023 the individual emailed Santos in response to Santos' email on 15 May 2023 stating they had already provided feedback on 18 April 2023 and also provided further information on its role, functions and interests. [Con-1247]
- + On 13 June 2023 the individual called Santos with a query on the consultation emails that had been sent. [Con-1391] On 14 June 2023 Santos responded to their phone enquiry via an email. [Con-1392]
- + On 15 June 2023 the individual emailed Santos their feedback on the Barossa Drilling and Completions EP. [Con-1395]
- + On 20 June 2023 Santos responded to the individual's email of 29 May 2023 and the information requests made on 18 April. [Con-1441]
- + On 21 June 2023 the individual emailed Santos and made criticisms of the consultation process. [Con-1422]
- + On 24 June 2023 the individual provided feedback to Santos on the Revision 3 of the Environment Plan. [Con-1429]
- + On 3 July 2023 Santos emailed the individual in response to their correspondence received 24 June 2023. [Con-1517]
- + On 24 July 2023 Santos emailed the individual in further response to their correspondence received 24 June 2023. [Con-2363]

<b>Summary of Objection or Claim</b>	<b>Assessment of Merits</b>	<b>Santos' Response Statement</b>	<b>EP Reference</b>
<i>I would particularly like any additional information (technical reports, consultation/meeting reports), on marine megafauna, 'sea country' and also, reports/updates</i>	<i>The information requested is already publicly available.</i>	<b>Santos response [Con-1441]:</b> <i>For the revised EP, no additional technical reports are to be referenced beyond what has already been described in the EP (Rev 3). Santos has previously</i>	<ul style="list-style-type: none"> <li>+ No additional EP measures required.</li> <li>+ Consultation report (<b>Section 4.7</b>)</li> </ul>



<p><i>relating to Indonesia and Timor-Leste (environmental values, uses, activities, impacts and consultation). [Con-1051]</i></p>		<p><i>consulted with you for the EP (Rev 3) between 30 June 2021 and 18 August 2021.</i></p> <p><i>More detailed information is available in the EP (Rev 3), which was accepted by NOPSEMA in March 2022. A copy of the EP (Rev 3) is available online at NOPSEMA's website (<a href="https://docs.nopsema.gov.au/A831694">https://docs.nopsema.gov.au/A831694</a>). This document has been publicly available since 15 March 2022.</i></p> <p><i>Please refer to the Barossa Gas Project Drilling and Completions Information Booklet, and the shorter-form Fact Sheet, which were attached to our previous emails.</i></p> <p><i>Information in relation to the proposed Drilling and Completions activities is also available on the Santos website (<a href="https://www.santos.com/barossa/">https://www.santos.com/barossa/</a>) and includes frequently asked questions.</i></p> <p><i>More detailed information is available in the EP (Rev 3), which was accepted by NOPSEMA in March 2022. A copy of the EP (Rev 3) is available online at NOPSEMA's website</i></p>	
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		<p><i>(<a href="https://docs.nopsema.gov.au/A831694">https://docs.nopsema.gov.au/A831694</a>). This document has been publicly available since 15 March 2022.</i></p> <p><i>Section 3 of the EP (Rev 3) identifies environmental values and sensitivities in Indonesian and Timor-Leste waters, including significant seabed habitats, subsistence fishing and seaweed farming practices.</i></p> <p><i>Section 3.2.5 of the EP (Rev 3) describes threatened and migratory fauna which may occur in the environment that may be affected (EMBA) by the Drilling and Completions activities.</i></p> <p><i>Section 3.2.6 of the EP (Rev 3) refers to the cultural values that may exist within the EMBA (including sea country). Appendix C of the EP, 'Barossa Values and Sensitivities of the Marine Environment', further discusses sea country within the EMBA.</i></p> <p><i>Sections 6 and 7 of the EP (Rev 3) present relevant information from relevant technical reports and Santos' analyses and assessments in relation to potential environmental</i></p>	
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		<p><i>impacts and risks of Drilling and Completions activities within the EMBA, including for planned activities and unplanned events.</i></p> <p><i>Sections 6 and 7 of the EP (Rev 3) present relevant information from relevant technical reports and Santos' analyses and assessments in relation to potential environmental impacts and risks of Drilling and Completions activities within the EMBA, including for planned activities and unplanned events.</i></p> <p><i>Santos has sought, and continues to seek, information about aspects of the environment that may be affected by the Drilling and Completions activities (including sea country) through consultation with relevant persons. Santos does not propose to share meeting / consultation reports relating to other consultations as requested.</i></p> <p><i>Certain information will be published in the consultation section of Rev 4 of the EP which will be published and available for public viewing at</i></p>	
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		<p><i>NOPSEMA’s website upon resubmission. This may include information in relation to ecological, socio-cultural and Indigenous ‘sea country’ aspects, however any relevant person that provides information during the course of consultation has the ability to request that particular information not be published on NOPSEMA’s website</i></p>	
<p><i>Based on the Barossa OPP identification of stakeholders and also, the EMBA and MEVA for the EP (which includes the waters of Indonesia and Timor-Leste), I strongly recommend that Santos also consult with relevant and key government and non-government marine stakeholders in Indonesia and Timor-Leste, including: relevant government agencies (fisheries, environment, blue economy, tourism); relevant sub-national (provincial) government agencies – ie. Maluku Province, East Nusa Tenggara Province; maritime industry</i></p>	<p><i>It is NOPSEMA’s role to assess whether relevant persons consultation process has met the requirements of the Environment Regulations.</i></p>	<p><i>Santos takes steps to identify and consult with relevant government and non-government marine stakeholders that may be affected by impacts and risks of Drilling and Completions activities, having regard to regulation 11A(1) of the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009 (Cth) (Environment Regulations) and the NOSPEMA guideline ‘Consultation in the course of preparing an environment plan’ (N-04750-GL2086 A900179; 12/05/2023).</i></p> <p><i>It is NOPSEMA’s role to assess whether Santos’ relevant persons consultation process has met the requirements of the</i></p>	<ul style="list-style-type: none"> <li>+ No additional EP measures required.</li> <li>+ Consultation report (<b>Section 4.7</b>)</li> </ul>

<p><i>associations – particularly fisheries (operating in WPP 718), mariculture and marine tourism (particularly coral reef diving, liveaboard cruise industry, whale tourism operators); regional fisheries and regional development forums – WorldFish, IOTC, ATSEA; marine conservation organisations – Coral Triangle Centre (Bali), WWF-Indonesia, Conservational International (Timor-Leste) marine research institutes/universities – ie. LIPI (Indonesia), Universitas Lelemuku Saumlaki, Universitas Nusa Cendana, Universidade Nacional Timor Lorosa’e [Con-1051]</i></p>		<p><i>Environment Regulations. [Con-1441]</i></p>	
<p><b>Individual’s correspondence [Con-1422]:</b>  <i>Santos sent this email correspondence, after hours, last night (at 7:26PM on 20 June 2023) – advising of a 23 June 2023 (this Friday) deadline for</i></p>		<p><i>As previously notified, including in our emails of 13 April 2023 and 29 May 2023, Santos was seeking feedback regarding the EP by 15 June 2023.</i></p> <p><i>That said, Santos is happy to arrange a discussion with you this week regarding any further feedback you may have. Please</i></p>	

<p>comments.</p> <p>While Santos has offered a meeting this week (ie. Next 2 days) – unfortunately I am unavailable to meet due to prior commitments and the very short notice you have provided.</p> <p>This is NOT at all appropriate consultation for the Drilling EP – as it fails to recognise the time needed by voluntary organisations and relevant technical experts to submit appropriate technical feedback. [Con-1422]</p>		<p>let us know when would suit you.</p> <p>Santos can accommodate an extension of the feedback period until Friday, 23 June 2023.</p>	
<p><b>Individual and AMSA-NT combined correspondence [Con-1395]</b></p>	<p>The correspondence provided on 15 June 2023 [Con-1395] including comments on behalf of both AMSA-NT and the individual.</p>	<p>Refer also to the AMSA-NT entry [Con-1395] for details of the individual’s comments and Santos’ responses.</p> <p><b>Additional Santos response [Con-1517]</b></p> <p>Santos Barossa Gas Project – Drilling and Completions Environment Plan (EP)</p> <p>Thank you for your two emails of 21 June and your further letter of 23 June sent on behalf of the Australian Marine Sciences Association Northern Territory branch (AMSA-NT) and</p>	<p>No additional measures required.</p>

		<p><i>in your personal capacity as an individual. You have also written to us on 15 June 2023 on behalf of Australian Marine Sciences Association (AMSA).</i></p> <p><i>Santos is sending you this letter in your personal capacity.</i></p> <p><i>Santos is currently considering the matters raised in Attachment 2 of your 23 June letter. The revised Drilling and Completions EP will include a statement of Santos' response, or proposed response, if any, to each objection or claim made by you, as required by the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009 (Cth).</i></p> <p><i>We would be happy to arrange a call to discuss.</i></p>	
<p><b>Correspondence received 24 June 2023:</b></p> <p><b>Individual's Response to Santos – 9 July 2021 (summarised in Drilling EP, Version 3.0)</b> [Note: The individual's workplace details have been redacted by Santos for privacy reasons]</p> <p><b>BAD-200-0003 (Pages 107-</b></p>	<p><i>Santos assessed this claim not valid because maritime boundary discussions between nations are outside the scope of this consultation, and the EP has considered impacts within the MEVA and EMBA.</i></p>	<p><i>Santos has considered all planned impacts of the drilling and completions activities in the operational area, including seabed disturbance and planned discharges.</i></p> <p><i>Impacts to the receptors within the MEVA (biological impacts) and impacts to socio-economic receptors within the EMBA are assessed in relation to a worst</i></p>	<p><i>No additional EP measures required.</i></p>

<p><b>111)</b></p> <p><b>Relevant persons consultation summary (OPGGSI Regulation 16 (b)(i))</b></p> <p><i>[CLAIM 1] There is an unresolved Australia-Indonesia maritime seabed boundary, and that the drilling activity and indeed, the entire Barossa Offshore Gas project would firmly sit within Indonesian territorial waters, if the current seabed boundary (negotiated in 1972) reflected the latest agreed understanding of maritime boundaries under UNCLOS.</i></p> <p><i>Assessment of the merits of objections and claims (OPGGSI Regulation 16 (b)(ii)), information and requests</i></p> <p><i>[CLAIM 1] Santos has reviewed the claim and has determined that there are well established and operational agreements/seabed treaties between the Australian and Indonesian governments. The seabed and its resources are</i></p>		<p><i>case spill event.</i></p> <p><i>With the exception of hydrocarbon spills, environmental risks and impacts from the EP are localised and remain within Australia's Exclusive Economic Zone. In the unlikely event that a hydrocarbon spill enters international or neighbouring country waters, Santos will seek direction and assistance from the DFAT.</i></p>	
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<p><i>governed by the continental shelf regime under international law. In 1971 and 1972, Australia and Indonesia agreed to maritime boundaries establishing the limits of their respective continental shelves. These seabed treaties have been ratified. Australia has jurisdiction over the seabed area relevant to the Barossa project.</i></p> <p><i>The Barossa operational area is located within Australian Commonwealth petroleum production licence NT/L1, as offered in July 2020 by the Commonwealth-Northern Territory Offshore Petroleum Joint Authority in accordance with the Commonwealth Offshore Petroleum and Greenhouse Gas Storage Act 2006.</i></p> <p><i>Statement of response, or proposed response, to the objections and claims (OPGGSI Regulation 16 (b)(iii)), and information and requests</i></p> <p><i>Santos responded to the</i></p>			
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<p><i>individual's claims on 18 August 2021 confirming the information would be taken into consideration in the drafting of the EP.</i></p> <p><i>Australia has current jurisdiction over the seabed area relevant to the drilling activity. Santos is proposing to conduct development drilling activities in accordance with its petroleum production licence, as granted and regulated by the Australian government. Santos will act on any Australian government advice on international boundary and/or petroleum licencing issues should they arise in the future.</i></p> <p><i>Individual's Response</i></p> <p><i>1. According to Indonesian sources, the Australia-Indonesia maritime boundary is currently under formal re-negotiation. 2. Indonesia's top border negotiator confirmed to The Australian Financial Review in 2021 that talks</i></p>			
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<p>to settle the boundary were restarted in December 2019, but stalled over the last year due to the COVID-19 pandemic [see AFR, 19 May 2021 – <a href="https://www.afr.com/policy/foreign-affairs/indonesia-pushes-to-reopen-fractious-maritime-border-talks-20210517-p57skw">https://www.afr.com/policy/foreign-affairs/indonesia-pushes-to-reopen-fractious-maritime-border-talks-20210517-p57skw</a>]</p> <p>3. While the provisions in the 1997 Perth Treaty (and Australia-Indonesia EEZ Boundary) are observed, it was never ratified by Indonesia.</p> <p>4. Further, the AFR report has described the maritime negotiations as “fractious” and suggests that Australia’s seabed boundary is “forecast” to move south, which would affect oil and gas entitlements and ongoing investments. However, unlike the 1997 Perth Treaty, the seabed treaties (and the Australia-Indonesia 1972 Seabed Boundary), and the pathway to renegotiating</p>			
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<p><i>is less assured.</i></p> <p><i>5. Current Drilling EP (and Santos response to Claim 1) fails to recognise or assess any local or significant physical or ecological 'seabed-water column' interactions in the operational area, EMBA and MEVA – including potential impacts on Indonesian EEZ waters. Including no assessment of the potential impact of seabed operational activities (and vessel-related activities) affecting the overlying water column.</i></p>			
<p><i>[CLAIM 2] The waters of the tropical Arafura and Timor Seas (ATS) are 'shared' by Indonesia, Timor-Leste, Papua New Guinea (PNG) and Australia. As such, they are legally defined as a 'semi-enclosed seas' under Article 122 of the 1982 United Nations Convention on the Law of the Sea (UNCLOS). Significantly, Article 123 of UNCLOS places a responsibility and</i></p>	<p><i>Santos assessed this claim as not valid because Santos is responsible for consultation with other relevant persons, comments on the OPP are outside the scope of the consultation for this EP and the revised EP recognises additional international marine parks.</i></p>	<p><i>Appendix C of the EP has been updated to recognise Indonesian and Timor-Leste marine parks within the EMBA. With the exception of hydrocarbon spills, environmental risks and impacts from the EP are localised and remain within Australia's Exclusive Economic Zone. In the unlikely event that a hydrocarbon spill enters international or neighbouring country waters, Santos will seek direction and assistance from</i></p>	<p><i>No additional EP measures required.</i></p>

<p><i>an obligation on countries bordering 'enclosed' and 'semi-enclosed seas' to cooperate in resource management, the protection of the marine environment and marine scientific research.</i></p> <p><i>Assessment of the merits of objections and claims (OPGGSI Regulation 16 (b)(ii)), information and requests</i></p> <p><i>[CLAIM 2] Santos has reviewed the claim and understands that the Australian government is actively involved in the management of the ATS and supports the Arafura and Timor Seas Ecosystems Action (ATSEA) program. Statement of response, or proposed response, to the objections and claims (OPGGSI Regulation 16 (b)(iii)), and information and requests</i></p> <p><i>The Australian government has developed the Australian Marine Parks North Marine Parks Network Management Plan (2018) which includes</i></p>		<p><i>the DFAT.</i></p>	
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<p><i>the Arafura and Timor seas. The plan contemplates a range of Commonwealth as well as international conventions and agreements that relate to protection of the marine environment including UNCLOS. The proposed drilling activity is not within the northern marine parks network. The Australia government is actively involved in the management of the ATS. Santos has consulted with relevant Australian government departments including DFAT, DAWE and DNP. No issue relating to the ATS has been raised. The North Marine Parks Network Management Plan 2018 (Section 3.2.4), which considers the ATS, has been considered in the development of this EP. Acceptable levels of impact and risks have been informed by relevant Australian government management plans, including the Australian Marine Parks North Marine Parks Network Management Plan (Section</i></p>			
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<p>6.8, 7.5 and 7.6).</p> <p><i>Individual's Response</i></p> <p><i>1. No consultation with ATSEA, the recognised inter-governmental regional body with interests/responsibilities for the protection and management of the living resources of the ATS region.</i></p> <p><i>2. Situated in the Timor Sea, the Barossa Offshore Gas Project is currently not only located in a region with a controversial and unresolved maritime boundary between Australia and Indonesia, but it is also located in waters legally defined as a 'semi-enclosed seas' under UNCLOS (Article 122) – which include, significantly, international responsibilities and obligations to cooperate with other bordering littoral nations (ie. Indonesia, Timor-Leste, Papua New Guinea) in understanding, protecting and managing the globally significant marine</i></p>			
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<p><i>ecosystems, biodiversity and resources of these 'semi-enclosed seas' (Article 123).</i></p> <p><i>3. In recognition of these international responsibilities, ATSEA is underpinned by inter-ministerial declaration (signed in 2014 by the 4 littoral nations surrounding the ATS).</i></p> <p><i>4. Barossa OPP failed to recognise the ATS region as a 'semi-enclosed sea' – or recognise the ATSEA forum and its activities.</i></p> <p><i>5. Australia is NOT the appropriate legal body or authority to consult on ATS-wide resources, protection and management – only the Australia EEZ waters of the ATS region. Australia is a 'supporting partner' in ATSEA – but to-date is NOT actively engaged.</i></p> <p><i>6. No recognition or assessment of the potential impacts on the proposed ATS Regional MPA Network.</i></p>			
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<p><i>[CLAIM 3] Transboundary issues are highly relevant in the shared ATS 'semi-enclosed seas', particularly in relation to the Barossa Offshore Gas Project and the offshore oil/gas industry in the Timor Sea. This very high level of 'ecological connectivity' and vulnerability of the ATS 'semi-enclosed seas' and the following relevant 'transboundary' issues should be fully acknowledged and addressed in formal consultation processes, and relevant environmental assessments and Eps for the Barossa Offshore Gas Project:</i></p> <ul style="list-style-type: none"> <li><i>– a). Potential impacts on transboundary, straddling 'fish stocks' and commercial fisheries in the Timor Sea – particularly snapper fisheries.</i></li> <li><i>– b). Potential impacts on known migratory, rare, threatened, endangered, and protected marine species in the Timor Sea –</i></li> </ul>	<p><i>Santos assessed this claim as not valid because the EP does consider impact to water column and impacts beyond Australia's EEZ, and comments on the EPBC Act or future reform are outside the scope of the consultation for this activity.</i></p>	<p><i>Santos has considered all planned impacts in the Operational Area, including seabed disturbance and planned and unplanned discharges to the water column.</i></p> <p><i>Santos has assessed the full potential spatial extent of a worst case spill event with consideration for biological impacts within the MEVA and socio-economic impacts within the EMBA, including those that extend beyond Australia's EEZ.</i></p>	<p><i>No additional EP measures required.</i></p>
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<p><i>particularly cetaceans, sea turtles and sharks/rays.</i></p> <p><i>– c). Potential impacts of maritime transport and marine pollution in the Timor Sea – particularly shipping impacts, oil/gas spills and acoustic noise.</i></p> <p><i>Individual’s Response</i></p> <p><i>1. Completely ignore ATS concerns, ie. ATS uses, values, legal obligations, and consultation with key stakeholders. Instead refer to Australian Government advice.</i></p> <p><i>2. Indonesian boundary – ridiculous to say that Australian oil/gas activities only affect the seabed – and NOT the water column.</i></p> <p><i>3. Timor-Leste stakeholders</i></p> <p><i>4. Given the legal status of the ATS as a ‘semi-enclosed sea’, and th recognised very high levels of ecological connectivity (shared seascapes, species and ocean resources) and vulnerability – the potential for</i></p>			
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<p><i>'transboundary' physical, ecological and economic impacts are highly significant.</i></p> <p><i>5. The assessment and approvals provisions of the EPBC Act do not contain any requirements for transboundary EIA. Neither are there any requirements for the environmental effects of these plans to be subject to any form of EIA (Marsden 2013).</i></p> <p><i>6. Significantly, the inclusion of transboundary EIAs in the Timor Sea is something which has been very clearly (and deliberately) missing in regulatory reform in Australia's offshore oil-gas sector (see legal analysis by Marsden 2013). Rather the industry in Australia has primarily focused on transboundary oil spill preparedness and cooperation (see Lyons 2015, for the Montara spill).</i></p> <p><i>7. Report of the David Borthwick 'Montara Commission of Inquiry'</i></p>			
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<p><i>(Commonwealth of Australia, 2010) emphasized the need for the OPGGS plans to be consistent with the EPBC Act approval, which includes publication of the plans, but fails also to recognize either the practical importance of transboundary EIA, nor that since the Inquiry Report it is now a recognised obligation of customary international law by which Australia is bound, even though the content of such an obligation remains at the discretion of the states concerned (Marsden 2013).</i></p> <p><i>8. One of the proposals made by the Australian Government as noted in the Progress Report of September 2012 is that by June 2013, it would undertake an assessment of whether Australia's</i></p> <p><i>9. international treaty obligations relating to the marine environment that apply to offshore petroleum activities are</i></p>			
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<p><i>sufficiently provided for in the marine environment and offshore petroleum legislative regimes. While this is appropriate, it fails to recognise that Australia's international obligations include customary international law as well as treaty law. This is important where there may be no specific treaty obligations for transboundary EIA. Obligations in treaty law and customary international law are considered below.</i></p> <p><i>10. Treaty law and customary international law may also require the application of EIA in certain circumstances, including in a transboundary context. Under the UN Convention on the Law of the Sea (UNCLOS) for example, Article 206 makes specific provision for EIA, as follows:</i></p> <p><i>11. When states have reasonable grounds for believing that planned activities under their</i></p>			
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<p><i>jurisdiction or control may cause substantial pollution of or significant harmful changes to the marine environment, they shall, as far as practicable, assess the potential effects of such activities on the marine environment and shall communicate reports of the results of such assessments. 37</i></p> <p><i>12. Calls for more specific treaty obligations in the context of offshore oil and gas development have suggested UNCLOS as a framework treaty for this purpose, but have focused on liability rather than precaution, ignoring the importance of transboundary EIA in assisting to prevent disasters in the first place (Marsden 2013).</i></p> <p><i>13. The lack of a formal 'transboundary EIA' to assess potential impacts in the EMBA and MEVA remains a major gap in the Drilling EP (and Barossa OPP).</i></p> <p><i>14. A transboundary EIA</i></p>			
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<p><i>should be undertaken in the Barossa OPP and Eps. Transboundary EIAs to assess potential transboundary environmental impacts are not only accepted globally in other recognised 'shared seas', but have also been undertaken in the Timor Sea (as part of the Timor Gap Agreement).</i></p> <p><i>15. Transboundary considerations (of future LNG projects) are formally addressed and included in the Barossa OPP, as part of the Cumulative Impact Assessment (Table 6-49) – but NOT in the rest of the OPP, or the Drilling EP.</i></p> <p><i>16. Why are transboundary considerations only considered relevant for future LNG activities (eg. In the Cumulative Impact Assessment) but not considered at all for MNES, protected species, migratory species, shared fisheries, shared seascapes and shipping within the MEVA and EMBA?</i></p>			
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<p>17. Failure to include any of the conservation values, marine protected areas, marine threatened species, fisheries, tourism uses in the Indonesian and Timor-Leste waters of the EMBA region. Despite clearly identifying and including these foreign waters within the EMBA (ie. recognised that they have the potential to be impacted), the EP does not assess any ‘transboundary impacts’.</p>			
<p><i>[CLAIM 3a] Potential impacts on transboundary, straddling ‘fish stocks’ and commercial fisheries in the Timor Sea – particularly snapper fisheries.</i></p> <p><i>Assessment of the merits of objections and claims (OPGGS(E) Regulation 16 (b)(ii)), information and requests</i></p> <p><b>[CLAIM 3a]</b> Santos has reviewed the claim and has assessed potential impacts on commercial fisheries in the Timor Sea including the snapper fisheries (Timor Reef and Demersal</p>	<p><i>Santos has assessed this claim as not valid because it is incorrect in claiming that the EP does not consider impacts on fisheries within the Timor Sea.</i></p>	<p><i>Santos has assessed the full potential spatial extent of a worst case spill event with consideration for biological impacts within the MEVA and socio-economic impacts within the EMBA, the potential impacts of the drilling and completions activity on Indonesian commercial and subsistence fishing. In the unlikely event that a hydrocarbon spill enters international or neighbouring country waters, Santos will seek direction and assistance from the DFAT.</i></p> <p><i>Santos as titleholder is responsible for consultation</i></p>	<p><i>No additional EP measures required.</i></p>



<p><i>fisheries; refer to Section 3.2.6.1 and 3.2.6.2). Santos has consulted with relevant Australian government departments responsible for fisheries management being AFMA and NT Department of Industry, Tourism and Trade – Fisheries Division in the development of this plan. Potential impacts to fisheries and fishers (traditional, recreational, and commercial) from planned activities and unplanned events have been assessed).</i></p> <p><i>Statement of response, or proposed response, to the objections and claims (OPGGSI Regulation 16 (b)(iii)), and information and requests</i></p> <p><i>[CLAIM 3a] Santos has reviewed the claim and has assessed potential impacts on commercial fisheries in the Timor Sea including the snapper fisheries (Timor Reef and Demersal fisheries; refer to Section 3.2.6.1 and 3.2.6.2). Santos has consulted with relevant Australian</i></p>		<p><i>with relevant persons.</i></p>	
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<p><i>government departments responsible for fisheries management being AFMA and NT Department of Industry, Tourism and Trade – Fisheries Division in the development of this plan. Potential impacts to fisheries and fishers (traditional, recreational, and commercial) from planned activities and unplanned events have been assessed).</i></p> <p><i>Individual's Response</i></p> <p><i>1. Only NT, WA and Commonwealth-managed fisheries have been assessed. No assessment has been undertaken of the potential impacts on any fisheries in the Indonesian or Timor-Leste waters within the EMBA or MEVA.</i></p> <p><i>2. No assessment of potential impacts on major 'shared fisheries' or 'straddling stocks' within the Timor Sea, and EMBA or MEVA region (eg. Snappers, sharks, sardines and herrings).</i></p> <p><i>3. Significantly, this</i></p>			
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<p><i>includes no assessment of fisheries in the Indonesian Territorial Sea (water column) directly overlying (or adjacent to) the 'operational area' on the seabed (under Australia's jurisdiction).</i></p> <p><i>4. Fisheries resources within the Timor Sea represent a major source of national income for Indonesia and also, importantly provide a major economic resource and source of income and livelihoods for traditional, subsistence and commercial fishers in the region.</i></p> <p><i>5. The waters of Eastern Indonesia contain some of the world's largest shark fisheries. Similarly, the waters of the Timor Sea include some of the most productive fishing grounds for Indonesia. Particularly Fisheries Management Areas (Wilayah Pengelolaan Perikanan or WPP) 718 and 573.</i></p> <p><i>6. Santos has only consulted with Australian</i></p>			
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<p><i>fisheries agencies (AFMA, NT Department of Industry, Tourism and Trade in the development of this EP – it has not consulted with relevant Indonesian fisheries management agencies, research organisations, including international fisheries R&amp;D organisations operating in the Timor Sea (eg. WorldFish, FishWell Consulting, Minderoo Foundation). 7. ATSEA is currently supporting work on the development of a fisheries management plan for WPP 718 that covers the Aru Sea, the Arafura Sea and the eastern part of Timor Sea.</i></p>			
<p><b>[CLAIM 3b]</b> <i>Potential impacts on known migratory, rare, threatened, endangered, and protected marine species in the Timor Sea – particularly cetaceans, sea turtles and sharks/rays.</i></p> <p><i>Assessment of the merits of objections and claims (OPGGSI Regulation 16</i></p>	<p><i>Santos assessed this claim as not valid on the basis that Santos’ application of the Protected Matters Search Tool, Biologically Important Areas and the SPRAT database is appropriate, the claim makes incorrect claims about the EP, the information utilised in developing the EP is</i></p>	<p><i>Marine baseline surveys have been undertaken by Santos for the Operational Area and its surrounds. Santos updated its searches of Protected Matters Search Tool, Biologically Important Areas and the SPRAT database for the revised EP and has updated the EP where necessary. Santos uses these searches to supplement and support the more detailed</i></p>	

<p><i>(b)(iii), information and requests</i></p> <p><i>[CLAIM 3b] Santos has reviewed the claim and has assessed potential impacts on known migratory, rare, threatened, endangered, and protected marine species in the Timor Sea – particularly cetaceans, sea turtles and sharks/rays. Acceptable levels of impact and risks to marine species have been informed by relevant Australian government species recovery plans, threat abatement plans, conservation advice and marine park management plans throughout Sections 6 and 7.</i></p> <p><i>Statement of response, or proposed response, to the objections and claims (OPGGSI Regulation 16 (b)(iii)), and information and requests</i></p> <p><i>Santos has assessed potential impacts on known migratory, rare, threatened, endangered, and protected marine species in the Timor Sea –</i></p>	<p><i>already adequate to inform risk management control, and the claim raises matters outside the scope of this consultation.</i></p>	<p><i>marine surveys and studies undertaken for the Operational Area and its surrounds. The location of BIAs within the EMBA are informed by the SPRAT database maintained by DCCEEW.</i></p> <p><i>The dugong BIA to the north of the Tiwi Islands is outside the EMBA for this EP. The EP never claimed this was within the EMBA. Both revision 3 and the revised EP show BIAs for dugongs at Ashmore reef. The statement in revision 3 that there are no BIAs for dugongs within the EMBA is corrected in the revised EP.</i></p> <p><i>Santos has reviewed Sahiri (2020) which includes modelling results from historical data and suggests no sperm whales were identified in the Operational Area. There is some overlap with sperm whales in the EMBA, however, even considering all seasons, which represents the broadest historical dataset, the spatial distribution falls mainly outside of the EMBA. Whilst the historical data does not intersect the Operational Area, sperm whales have still been identified as present in the Operational Area (sourced from</i></p>	
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<p><i>including cetaceans, sea turtles and sharks/rays (as described in Section 3.2.5). Potential impacts and risks to marine fauna have been assessed as environmentally acceptable and ALARP.</i></p> <p><i>Individual's Response</i></p> <p><i>1. Critical lack of baseline data on major key marine species within the EMBA. Historically, there has been major investment in research in offshore WA waters (particularly by industry). This has not been matched for offshore NT waters.</i></p> <p><i>2. Despite the major data gaps in key marine species within the EMBA, neither the Barossa OPP and the Drilling EP have undertaken critical baseline surveys. Primarily based on original, approved Barossa OPP published in 2018 (by ConocoPhillips), and based on studies up to 2017.</i></p> <p><i>3. A major concern throughout the entire EP is the heavy reliance on the</i></p>		<p><i>DCCEEW SPRAT database), outlined in Table 3-6 of the EP: Threatened and migratory marine fauna that may be present in the Operational Area and/or environment that may be affected. By extension, sperm whales have also been identified as present for the MEVA and EMBA.</i></p> <p><i>Santos acknowledges that there is additional published literature available, however the information utilised for the EP is adequate. The references provided (Waayers et al, 2015 and Thums et al, 2017) have been reviewed and provide no additional information to inform the activities risks or require a change in our management controls. Appropriate control measures have been applied to reduce risks and impacts to ALARP and to acceptable levels. In particular the EP already has controls in place to manage unplanned interactions with marine fauna.</i></p> <p><i>The revised EP will be updated to recognise Indonesian and Timor-Leste marine parks that are within the EMBA.</i></p> <p><i>Feedback regarding production</i></p>	
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<p><i>use of the PMST online tool, SPRAT and Biologically Important Areas' (BIA's) for identifying species of concern. Despite clear evidence (and widespread recognition by the science community and offshore oil/gas industry) that without updated and local-scale data, they are inadequate.</i></p> <p><i>4. Barossa OPP (Table 5-4) identified 18 listed threatened fauna species and 29 listed migratory species (17 of which were also listed as threatened species) that may occur or have habitat with the Barossa Offshore development area (DoEE 2017f). However, there is no assessment for several key endangered species in the ATS (eg. Fin whales, sei whales, bryde whales, all sawfishes).</i></p> <p><i>5. Current assessment of key marine species in the Drilling EP is based on outdated data. Like many industry consultants, Santos have largely relied</i></p>		<p><i>operations emissions and the OPP are outside the scope of the consultation for this EP.</i></p>	
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<p><i>on Commonwealth's 2011 'Biologically Important Areas' data from marine bioregional planning (see BIA metadata). While it was updated in 2016, it omits a significant amount of available species information (peer-reviewed published literature, online data portals – and industry data).</i></p> <p><i>6. The BIA for dugongs (Figure 3-7 in the EP) is incorrect. The EP states "There are no BIAs for dugongs within the EMBA", and after clearly acknowledging that the waters off northern Tiwi islands contains the world's eighth most important aggregation area for dugongs. As such, the EP does not acknowledge that the BIA for dugongs is very clearly out-of-date and requires updating.</i></p> <p><i>7. Similarly no BIAs are identified for sperm whales within the EMBA – this is despite reports of sperm whale feeding and</i></p>			
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<p><i>breeding and also, the results of habitat modelling (Sahri 2020).</i></p> <p><i>8. BIAs only available for a very limited number of key migratory and protected marine species. While BIAs are available for all turtle species and the dugong, BIAs are limited for many other key marine megafauna groups. Including only 5 species of whale (blue whale, pygmy blue whale, humpback, sperm whale, southern right whale), 3 species of dolphin (Australian Snubfin, Indo-Pacific Humpback, Indo-Pacific Bottlenose) and only 6 species of shark (including 3 species of sawfish).</i></p> <p><i>9. BIA maps and datasets are managed by the Australian Government Department of the Environment (the department). The department creates and maintains BIA maps with assistance from research scientists and others who provide data and review BIA information. The</i></p>			
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<p><i>department also maintains the National Conservation Values Atlas.</i></p> <p><i>10. Lack of current data and peer-reviewed literature on key marine species (eg. WAMSI studies in the Kimberley, on turtles, cetaceans). Including turtle tracking and modelling studies looking at key foraging areas (see Waayers et al 2015, Thums et al 2017). Or recent research within the Oceanic Shoals Marine Park, showing the significant role of submerged carbonate reefs in aggregating marine megafauna (ie. 'megafauna hotspots')</i></p> <p><i>11. A major concern is the Drilling EP's failure to incorporate data from relevant, well-known and accessible marine species data portals, eg. Atlas of Living Australia (Australian Museum's national data source for species records), NR Maps (DENR, NT), NEATS Public Portal, Online Marine Turtle Breeding and Migration</i></p>			
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<p><i>Atlas (Queensland DPI), seaturtle.org</i></p> <p><i>12. Significantly, only the Australian EEZ have been assessed for migratory, rare, threatened, endangered and protected marine species in the EP. Hence, for migratory and 'transboundary' key marine species and populations – there is currently no consideration of population-level impacts, impacts on full life cycle of species, or cumulative impacts. For example, the globally-significant green turtle nesting areas on Aru Island, whose migratory routes traverse the EMBA and MEVA into the Australian EEZ.</i></p> <p><i>13. Similarly, no Indonesian datasets, assessments or information has been sourced in the EP for key marine species occurring within the EMBA or MEVA.</i></p> <p><i>14. No recognition of the current 'transboundary species management'</i></p>			
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<p><i>efforts in the ATS (particularly under ATSEA), eg. ATS Regional Turtle Plan of Action.</i></p> <p><i>15. Our changing ocean. Ocean warming and climate change is having major impacts on marine megafauna migrations, feeding and overall, population health. However, the EP includes no recognition or assessment of climate impacts on major migration routes and local movements of marine megafauna in the Timor Sea, particularly cetaceans, sea turtles and sharks/rays.</i></p>			
<p><i>[CLAIM 3c] Potential impacts of maritime transport and marine pollution in the Timor Sea – particularly shipping impacts, oil/gas spills and acoustic noise.</i></p> <p><i>Assessment of the merits of objections and claims (OPGGSI Regulation 16 (b)(ii)), information and requests</i></p>	<p><i>Santos has assessed this claim as not valid as the impacts within the EMBA and MEVA have been assessed, the revised EP assesses the species which are claimed to have not been assessed, and controls to manage interactions with marine fauna are already implemented.</i></p>	<p><i>Santos has assessed the full potential spatial extent of a worst case spill event with consideration for biological impacts within the MEVA and socio-economic impacts within the EMBA.</i></p> <p><i>The claim is incorrect In its statement that Fin Whales and Sperm Whales were not assessed in Revision 3 of the EP, and in any event Brydes Whales, Fin Whales, Sei Whales and</i></p>	<p><i>No additional EP measures required.</i></p>

<p><i>[CLAIM 3c] Santos has reviewed the claim and has assessed potential impacts of maritime transport and marine pollution in the Timor Sea – particularly shipping impacts, oil/gas spills and acoustic noise.</i></p> <p><i>Statement of response, or proposed response, to the objections and claims (OPGGSI Regulation 16 (b)(iii)), and information and requests</i></p> <p><i>Santos has assessed potential impacts of maritime transport and marine pollution in the Timor Sea –including shipping impacts (Sections 6.2, 6.3, 6.5, 6.6, 7.1, 7.2 and 7.3), oil/gas spills (Section 6.8, 7.5, 7.6, 7.7 and 7.8) and acoustic noise (Section 6.1). Potential impacts and risks have been assessed as environmentally acceptable and ALARP.</i></p> <p><i>[CLAIM 4] In developing potential ‘environmental offsets’ for the Barossa Offshore Gas Project, NOPSEMA and the</i></p>		<p><i>Sperm Whales are assessed in the revised EP.</i></p> <p><i>The database and mapping of BIAs is maintained by DCCEEW.</i></p>	
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<p><i>Proponent should also consider UNCLOS obligations and include activities with broader, transboundary environmental and socio-economic benefits. ATSEA23 is currently now being implemented (2019-2023) with US\$10M of GEF/UNDP IW funding with a joint commitment to a 'regional response for improving management and governance of the Arafura and Timor Seas (ATS) ecosystems'. To this end, there remains significant opportunities for the Proponent to help support the development of ATS-wide and 'transboundary' environmental activities... Significantly, the Barossa Offshore Gas Project (with its location, scale and transboundary nature of potential impacts) not only has the potential to protect the ATS's global ecological values (through risk reduction/minimization), but also, has significant opportunities (through</i></p>			
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<p><i>environmental offsets) to potentially support and assist with the improved regional-level, ecosystem-based conservation and management of this globally-significant but vulnerable ecosystem.</i></p> <p><i>Assessment of the merits of objections and claims (OPGGSI Regulation 16 (b)(ii)), information and requests</i></p> <p><i>[CLAIM 4] Santos has reviewed the claim that there are significant opportunities through environmental offsets to potentially support and assist with the improved regional-level, ecosystem-based conservation and management of the globally-significant ATS. Through consultation with the Australian government, including DAWE and DNP, environmental offsets have not been raised. Using the method described in Section 5.1, Santos has conducted an environmental assessment for the proposed drilling</i></p>			
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<p><i>activities and concluded that environmental impacts and risks are acceptable and ALARP. Through reasoned and supported arguments throughout Sections 6 and 7, Santos has demonstrated that there are no other practicable control measures that could reasonably be adopted to reduce impacts or risks further. As such, environmental offsets are not proposed for this petroleum activity.</i></p> <p><i>Statement of response, or proposed response, to the objections and claims (OPGGSI Regulation 16 (b)(iii)), and information and requests</i></p> <p><i>Santos has assessed the claim and concluded that environmental impacts and risks will be managed to levels that are acceptable and ALARP without the requirement for environmental offsets. The Australian government has not identified the requirement for</i></p>			
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<p><i>environmental offsets.</i></p> <p><i>[CLAIM 5] The Proponent (and NOPSEMA) need to recognize the global significance of the 'semi-enclosed' Arafura and Timor Seas and also, it's high levels of 'ecological connectivity' and also, vulnerability to human impacts. In informing the development of Drilling EP (and other Eps) and assessing and considering the overall environmental risk and potential impact of the Barossa Offshore Gas Project, attention is drawn to the following global values and also, vulnerabilities of the region:</i></p> <ul style="list-style-type: none"> <li><i>– Global significance of the marine habitats and ecosystems of northern Australia.</i></li> <li><i>– Global stronghold for marine megafauna.</i></li> <li><i>– Major marine megafauna migration corridor.</i></li> <li><i>– The waters of the Timor Sea also include the</i></li> </ul>			
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<p><i>eastern Indian Ocean migration corridor for the endangered Blue Whale <i>Balaenoptera musculus brevicauda</i> (Austral-Indonesian population).</i></p> <p><i>– The Barossa Offshore Gas Project is in close proximity to the Timor Trough, one of the three major outflow channels of the Indonesian Throughflow, and one of the most important ‘marine megafauna migration corridors’ in the Western Indo-Pacific.</i></p> <p><i>– Globally-significant fisheries within the ATS region, particularly in the Indonesian waters of the ATS.</i></p> <p><i>– Impacts on fisheries stock has major impacts on food security, poverty and human health in the ATS.</i></p> <p><i>Assessment of the merits of objections and claims (OPGGSI Regulation 16 (b)(ii)), information and requests</i></p> <p><i>[CLAIM 5] Santos has reviewed the claim and</i></p>			
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<p><i>recognises environmental significance of the 'semi-enclosed' Arafura and Timor Seas. Relevant environmental sensitives and values are described in Santos' Barossa Development Values and Sensitivities of the Marine and Coastal Environment document (Appendix C) and Section 3 of this Environment Plan.</i></p> <p><i>Statement of response, or proposed response, to the objections and claims (OPGGSI Regulation 16 (b)(iii)), and information and requests</i></p> <p><i>Santos has assessed the claim and recognises the environmental significance of the semi-enclosed Arafura and Timor Seas. The relevant values and sensitives of these seas have been considered in the environmental impact and risks assessment.</i></p> <p><i>In terms of the specific values listed (by the individual):</i></p> <p><i>Marine habitats and ecosystems of northern</i></p>			
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<p><i>Australia are described in Section 3.2.</i></p> <p><i>Marine megafauna are described in Section 3.2.5, including the Blue Whale <i>Balaenoptera musculus brevicauda</i>.</i></p> <p><i>Timor Trough is referenced in Section 3.2 being a notable geophysical feature within international waters.</i></p> <p><i>Significant fisheries are described in Section 3.2.6.1 (Commercial fisheries) and Section 3.2.6.2 (Indonesian commercial and subsistence fishing).</i></p> <p><i>Individual's Response</i></p> <p><i>1. Entire Drilling EP is restricted only to the Australian EEZ – does not recognise or assess the environmental or economic values (or uses, impacts) of the broader Timor Sea, and significantly, the ecosystems within the EMBA or MEVA.</i></p> <p><i>2. Blue Whale data in the EP is very dated for the</i></p>			
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<p><i>Timor Sea. Blue Whales and other baleen whales have recently (May 2022) been recorded very close to the operational area (within the Australian EEZ).</i></p> <p><i>3. Several key cetacean species which are known to occur in the area have not been assessed at all (Brydes Whale, Fin Whale, Sei Whale, Sperm Whale).</i></p> <p><i>4. BIAs are also not only unavailable for many migratory and marine protected species – but many are out-of-date.</i></p> <p><i>[Con-1429]</i></p>			
<p><b>Individual's claims included in AMSA-NT correspondence Con-1429.</b></p> <p><b>According to Indonesian sources, the Australia-Indonesia maritime boundary is currently under formal re-negotiation.</b></p> <p><b>2. Indonesia's top border negotiator confirmed to The Australian Financial Review in 2021 that talks to settle the boundary</b></p>		<p><b>Santos responses [Con-1517] and [Con-2363]</b></p> <p><i>Santos notes your comments regarding the Australia-Indonesia maritime boundary. The Operational Area (meaning the boundaries of petroleum production licence NT/L1) is entirely within the offshore area as defined by the Offshore Petroleum and Greenhouse Gas Storage Act 2006 (Cth), and is there regulated by Australia's National Offshore Petroleum Safety and Environmental</i></p>	

<p><i>were restarted in December 2019, but stalled over the last year due to the COVID-19 pandemic [see AFR, 19 May 2021 - <a href="https://www.afr.com/policy/foreign-affairs/indonesia-pushes-to-reopen-fractious-maritime-border-talks-20210517-p57skw">https://www.afr.com/policy/foreign-affairs/indonesia-pushes-to-reopen-fractious-maritime-border-talks-20210517-p57skw</a>]</i></p> <p><b>3. While the provisions in the 1997 Perth Treaty (and Australia-Indonesia EEZ Boundary) are observed, it was never ratified by Indonesia.</b></p> <p><b>4. Further, the AFR report has described the maritime negotiations as “fractious” and suggests that Australia’s seabed boundary is “forecast” to move south, which would affect oil and gas entitlements and ongoing investments. However, unlike the 1997 Perth Treaty, the seabed treaties (and the Australia- Indonesia 1972 Seabed Boundary), and the pathway to renegotiating is less</b></p>		<p><i>Management Authority (NOPSEMA).</i></p> <p><i>As to paragraph 5 of this claim, Santos has considered all planned impacts of the drilling and completions activities in the operational area, including seabed disturbance and planned discharges (Section 6 of the EP). Impacts to the receptors within the moderate exposure values (MEVA) area (biological impacts) and impacts to socio-economic receptors within the environment that may be affected (EMBA) are assessed in relation to a worst case spill event (Section 7 of the EP). With the exception of hydrocarbon spills (the likelihood of which is remote), environmental risks and impacts from the Drilling and Completions EP are localised and remain within Australia’s Exclusive Economic Zone. The risk assessment and controls for hydrocarbon spills are described in Sections 7.5 to 7.8 of the EP and within the accompanying Barossa Development Drilling and Completions Oil Pollution Emergency Plan (OPEP). In the unlikely event that a hydrocarbon spill enters</i></p>	
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<p><i>assured.</i></p> <p><b>5. Current Drilling EP (and Santos response to Claim 1) fails to recognise or assess any local or significant physical or ecological 'seabed-water column' interactions in the operational area, EMBA and MEVA – including potential impacts on Indonesian EEZ waters. Including no assessment of the potential impact of seabed operational activities (and vessel-related activities) affecting the overlying water column.</b></p>		<p><i>international or neighbouring country waters, Santos will seek direction and guidance from the Commonwealth Department of Foreign Affairs and Trade (DFAT) on the appropriate action.</i></p>	
<p><i>1. No consultation with ATSEA, the recognised inter-governmental regional body with interests/responsibilities for the protection and management of the living resources of the ATS region.</i></p> <p><i>2. Situated in the Timor Sea, the Barossa Offshore Gas Project is currently not only located in a region with a controversial and</i></p>		<p><i>Santos as titleholder is responsible for consultation with relevant persons. The revised EP contains details of all relevant persons we have consulted with.</i></p> <p><i>The Barossa Gas Project Offshore Project Proposal was accepted by NOPSEMA in March 2018 and comments on the Barossa OPP are outside the scope of this consultation.</i></p> <p><i>Appendix C of the revised EP</i></p>	

<p><i>unresolved maritime boundary between Australia and Indonesia, but it is also located in waters legally defined as a 'semi-enclosed seas' under UNCLOS (Article 122) – which include, significantly, international responsibilities and obligations to cooperate with other bordering littoral nations (ie. Indonesia, Timor-Leste, Papua New Guinea) in understanding, protecting and managing the globally significant marine ecosystems, biodiversity and resources of these 'semi-enclosed seas' (Article 123).</i></p> <p><i>3. In recognition of these international responsibilities, ATSEA is underpinned by inter-ministerial declaration (signed in 2014 by the 4 littoral nations surrounding the ATS).</i></p> <p><i>4. Barossa OPP failed to recognise the ATS region as a 'semi-enclosed sea' – or recognise the ATSEA</i></p>		<p><i>recognises Indonesian and Timor-Leste marine parks that are within the EMBA. As above, with the exception of hydrocarbon spills (the likelihood of which is remote), environmental risks and impacts from the Drilling and Completions EP are localised and remain within Australia's Exclusive Economic Zone. The risk assessment and controls for hydrocarbon spills are described in Sections 7.5 to 7.8 of the EP and within the accompanying OPEP. In the unlikely event that hydrocarbon spills enter international or neighbouring country waters, Santos will seek direction and guidance from the Commonwealth DFAT on the most appropriate responses.</i></p>	
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<p><i>forum and its activities.</i></p> <p><i>5. Australia is NOT the appropriate legal body or authority to consult on ATS-wide resources, protection and management – only the Australia EEZ waters of the ATS region. Australia is a ‘supporting partner’ in ATSEA – but to-date is NOT actively engaged.</i></p> <p><i>6. No recognition or assessment of the potential impacts on the proposed ATS Regional MPA Network.</i></p>			
<p><i>1. Completely ignore ATS concerns, ie. ATS uses, values, legal obligations, and consultation with key stakeholders. Instead refer to Australian Government advice.</i></p> <p><i>2. Indonesian boundary – ridiculous to say that Australian oil/gas activities only affect the seabed – and NOT the water column.</i></p> <p><i>3. Timor-Leste stakeholders</i></p>		<p><i>Regarding paragraph 1 of this claim, Santos considers it appropriate to refer to Australian Government advice because the drilling and completions activity is planned to occur in Australian Commonwealth waters and is regulated under Australian laws.</i></p> <p><i>As to paragraph 2 of this claim, Santos has considered all planned impacts of Drilling and Completions activities in the Operational Area, including seabed disturbance and planned</i></p>	

<p>4. Given the legal status of the ATS as a 'semi-enclosed sea', and the recognised very high levels of ecological connectivity (shared seascapes, species and ocean resources) and vulnerability – the potential for 'transboundary' physical, ecological and economic impacts are highly significant.</p> <p>5. The assessment and approvals provisions of the EPBC Act do not contain any requirements for transboundary EIA. Neither are there any requirements for the environmental effects of these plans to be subject to any form of EIA (Marsden 2013).</p> <p>6. Significantly, the inclusion of transboundary EIAs in the Timor Sea is something which has been very clearly (and deliberately) missing in regulatory reform in Australia's offshore oil-gas sector (see legal analysis by Marsden 2013). Rather the industry in Australia has primarily focussed on</p>		<p>and unplanned discharges to the water column (see section 6 and 7 of Revision 3 of the EP). It is incorrect to say that Revision 3 of the EP does not consider the impact of the drilling and completions activity on the water column. The revised EP considers impacts on the water column.</p> <p>As to paragraphs 4 and 12 to 17 of this claim, Santos has assessed the full potential spatial extent of a worst case spill event with consideration for biological impacts within the MEVA and socio-economic impacts within the EMBA, including those that extend beyond Australia's EEZ.</p> <p>Regarding paragraphs 5 to 12 of this claim, your comments on the EPBC Act processes or possible reform of Australia's oil and gas sector are outside the scope of the consultation for this activity.</p>	
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<p><i>transboundary oil spill preparedness and cooperation (see Lyons 2015, for the Montara spill).</i></p> <p><i>7. Report of the David Borthwick 'Montara Commission of Inquiry' (Commonwealth of Australia, 2010) emphasised the need for the OPGGS plans to be consistent with the EPBC Act approval,<sup>26</sup> which includes publication of the plans, but fails also to recognize either the practical importance of transboundary EIA, nor that since the Inquiry Report it is now a recognised obligation of customary international law by which Australia is bound, even though the content of such an obligation remains at the discretion of the states concerned (Marsden 2013).</i></p> <p><i>8. One of the proposals made by the Australian Government as noted in the Progress Report of September 2012 is that by</i></p>			
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<p><i>June 2013, it would undertake an assessment of whether Australia's international treaty obligations relating to the marine environment that apply to offshore petroleum activities are sufficiently provided for in the marine environment and offshore petroleum legislative regimes. While this is appropriate, it fails to recognise that Australia's international obligations include customary international law as well as treaty law. This is important where there may be no specific treaty obligations for transboundary EIA. Obligations in treaty law and customary international law are considered below. 10. Treaty law and customary international law may also require the application of EIA in certain circumstances, including in a transboundary context. Under the UN Convention on the Law of the Sea (UNCLOS) for example, Article 206 makes specific</i></p>			
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<p><i>provision for EIA, as follows:</i></p> <p><i>11. When states have reasonable grounds for believing that planned activities under their jurisdiction or control may cause substantial pollution of or significant harmful changes to the marine environment, they shall, as far as practicable, assess the potential effects of such activities on the marine environment and shall communicate reports of the results of such assessments. 37</i></p> <p><i>12. Calls for more specific treaty obligations in the context of offshore oil and gas development have suggested UNCLOS as a framework treaty for this purpose, but have focused on liability rather than precaution, ignoring the importance of transboundary EIA in assisting to prevent disasters in the first place (Marsden 2013).</i></p> <p><i>13. The lack of a formal 'transboundary EIA' to</i></p>			
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<p><i>assess potential impacts in the EMBA and MEVA remains a major gap in the Drilling EP (and Barossa OPP).</i></p> <p><i>14. A transboundary EIA should be undertaken in the Barossa OPP and EPs. Transboundary EIAs to assess potential transboundary environmental impacts are not only accepted globally in other recognised 'shared seas', but have also been undertaken in the Timor Sea (as part of the Timor Gap Agreement).</i></p> <p><i>15. Transboundary considerations (of future LNG projects) are formally addressed and included in the Barossa OPP, as part of the Cumulative Impact Assessment (Table 6-49) – but NOT in the rest of the OPP, or the Drilling EP.</i></p> <p><i>16. Why are transboundary considerations only considered relevant for future LNG activities (eg. in the Cumulative Impact Assessment) but not</i></p>			
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<p><i>considered at all for MNES, protected species, migratory species, shared fisheries, shared seascapes and shipping within the MEVA and EMBA ?</i></p> <p><i>17. Failure to include any of the conservation values, marine protected areas, marine threatened species, fisheries, tourism uses in the Indonesian and Timor-Leste waters of the EMBA region. Despite clearly identifying and including these foreign waters within the EMBA (ie. recognising that they have the potential to be impacted), the EP does not assess any 'transboundary impacts'.</i></p>			
<p><i>Only NT, WA and Commonwealth-managed fisheries have been assessed. No assessment has been undertaken of the potential impacts on any fisheries in the Indonesian or Timor-Leste waters within the EMBA or MEVA.</i></p> <p><i>2. No assessment of potential impacts on major</i></p>		<p><i>Santos has assessed the full potential spatial extent of a worst case spill event with consideration for biological impacts within the MEVA and socio-economic impacts within the EMBA, including beyond Australia's EEZ into parts of Indonesian and Timor-Leste sovereign waters and impacts to commercial and subsistence fishing activities. Revision 3 of</i></p>	

<p><i>'shared fisheries' or 'straddling stocks' within the Timor Sea, and EMBA or MEVA region (eg. snappers, sharks, sardines and herrings).</i></p> <p><i>3. Significantly, this includes no assessment of fisheries in the Indonesian Territorial Sea (water column) directly overlying (or adjacent to) the 'operational area' on the seabed (under Australia's jurisdiction).</i></p> <p><i>4. Fisheries resources within the Timor Sea represent a major source of national income for Indonesia and also, importantly provide a major economic resource and source of income and livelihoods for traditional, subsistence and commercial fishers in the region.</i></p> <p><i>5. The waters of Eastern Indonesia contain some of the world's largest shark fisheries. Similarly, the waters of the Timor Sea include some of the most productive fishing grounds</i></p>		<p><i>the EP specifically acknowledges Indonesian commercial and subsistence fishing, and the Memorandum of Understanding between the Australian and Indonesian government which allows access for traditional fisherman to an area approximately 770km southwest of the operational area, but within the EMBA (see section 3.3.7.2 of Revision 3, with further information available in Appendix C). Santos has considered and assessed the potential impacts of the drilling and completions activity on Indonesian commercial and subsistence fishing. With the exception of hydrocarbon spills (the likelihood of which is remote), environmental risks and impacts from the Drilling and Completions EP are localised and remain within Australia's Exclusive Economic Zone. The risk assessment and controls for hydrocarbon spills are described in Sections 7.5 to 7.8 of the EP and within the accompanying OPEP. In the unlikely event that a hydrocarbon spill enters international or neighbouring country waters, Santos will seek direction and guidance from the</i></p>	
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<p>for Indonesia. Particularly Fisheries Management Areas (Wilayah Pengelolaan Perikanan or WPP) 718 and 573.</p> <p>6. Santos has only consulted with Australian fisheries agencies (AFMA, NT Department of Industry, Tourism and Trade in the development of this EP – it has not consulted with relevant Indonesian fisheries management agencies, research organisations, including international fisheries R&amp;D organisations operating in the Timor Sea (eg. WorldFish, FishWell Consulting, Minderoo Foundation).</p> <p>7. ATSEA is currently supporting work on the development of a fisheries management plan for WPP 718 that covers the Aru Sea, the Arafura Sea and the eastern part of Timor Sea.</p>		<p>Commonwealth DFAT on the appropriate action.</p> <p>Santos as titleholder is responsible for consultation with relevant persons. The revised EP contains details of all relevant persons we have consulted with. Santos feels it has sufficient information to assess the impacts to environmental values and sensitivities.</p> <p>We note AMSA-NT's comments regarding the development of a fisheries management plan for WPP 718.</p>	
<p>1. Critical lack of baseline data on major key marine species within the EMBA.</p>		<p>Regarding paragraphs 1 and 2 of this claim, critical marine baseline surveys have been</p>	

<p><i>Historically, there has been major investment in research in offshore WA waters (particularly by industry). This has not been matched for offshore NT waters.</i></p> <p><i>2. Despite the major data gaps in key marine species within the EMBA, neither the Barossa OPP and the Drilling EP have undertaken critical baseline surveys. Primarily based on original, approved Barossa OPP published in 2018 (by ConocoPhillips), and based on studies up to 2017.</i></p> <p><i>3. A major concern 'throughout the entire EP is the heavy reliance on the use of the PMST online tool, SPRAT and Biologically Important Areas' (BIA's) for identifying species of concern. Despite clear evidence (and widespread recognition by the science community and offshore oil/gas industry) that without updated and local-scale data, they are</i></p>		<p><i>undertaken by Santos for the Operational Area and its surrounds, as summarised in section 3.2.2 of Revision 3 of the EP. Santos strongly refutes that there is a lack of baseline data on major marine species or that surveys have not been undertaken. Santos feels it has sufficient information to assess the impacts to environmental values and sensitivities.</i></p> <p><i>As to paragraphs 3 to 9, usage of the Protected Matters Search Tool, Biologically Important Areas and the SPRAT database is accepted practice. Santos updated its searches of these tools and databases for the revised EP and has updated the EP where necessary. Santos does not rely solely on these tools, but they supplement and support the more detailed studies undertaken for the Operational Area and its surrounds. This is common, accepted practice by offshore project proponents. The location of BIAs within the EMBA are informed by the SPRAT database maintained by the Department of Climate Change, Energy, the Environment and Water (DCCEEW).</i></p>	
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<p><i>inadequate.</i></p> <p>4. Barossa OPP (Table 5-4) identified 18 listed threatened fauna species and 29 listed migratory species (17 of which were also listed as threatened species) that may occur or have habitat with the Barossa Offshore development area (DoEE 2017f). However, there is no assessment for several key endangered species in the ATS (eg. fin whales, sei whales, bryde whales, all sawfishes).</p> <p>5. Current assessment of key marine species in the Drilling EP is based on outdated data. Like many industry consultants, Santos have largely relied on Commonwealth's 2011 'Biologically Important Areas' data from marine bioregional planning (see BIA metadata). While it was updated in 2016, it omits a significant amount of available species information (peer-reviewed published literature, online data portals – and industry</p>		<p><i>The statement that there are no BIAs for dugongs within the EMBA is from Appendix C in Revision 3, not the main body of Revision 3 of the Drilling and Completions EP. The revised Appendix C does not contain this statement. Figure 3-7 of Revision 3 of the EP does clearly show BIAs for the dugong within the EMBA at Ashmore reef. The waters off northern Tiwi islands which contain the aggregation areas for dugongs are, however, outside the EMBA for both Revision 3 and the revised EP. The Drilling and Completions EP has never claimed or depicted those areas as being within the EMBA.</i></p> <p><i>In relation to paragraph 7, Santos has reviewed Sahiri (2020) which includes modelling results from historical data and suggests no sperm whales were identified in the Operational Area. There is some overlap with sperm whales in the EMBA, however, even considering all seasons, which represents the broadest historical distribution, the distribution falls mainly outside of the EMBA. Whilst the historical data does not intersect the Operational Area,</i></p>	
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<p>data).</p> <p>6. The BIA for dugongs (Figure 3-7 in the EP) is incorrect. The EP states “There are no BIAs for dugongs within the EMBA”, and after clearly acknowledging that the waters off northern Tiwi islands contains the world’s eighth most important aggregation area for dugongs. As such, the EP does not acknowledge that the BIA for dugongs is very clearly out-of-date and requires updating.</p> <p>7. Similarly no BIAs are identified for sperm whales within the EMBA – this is despite reports of sperm whale feeding and breeding and also, the results of habitat modelling (Sahri 2020).</p> <p>8. BIAs only available for a very limited number of key migratory and protected marine species. While BIAs are available for all turtle species and the dugong, BIAs are limited for many other key marine</p>		<p>sperm whales have still been identified as present in the EP (sourced from DCCEEW SPRAT database), outlined in Table 3-6 of the revised EP: Threatened and migratory marine fauna that may be present in the Operational Area and/or environment that may be affected. Similarly, sperm whales have been identified as present in the MEVA and EMBA.</p> <p>In relation to paragraphs 10,11,12 and 14, Santos acknowledges that there is additional published literature available, relevant data that has been collected but not yet published and ongoing studies that will provide information on significant marine species. At any point in time, that will be the case. However, the information utilised in the development of the Drilling and Completions EP is adequate to identify risks and impacts arising from drilling activities and for informing risk mitigation and controls. Santos has followed the recommendations of NOPSEMA relevant to matters protected under Part 3 of the EPBC Act. Some additional work was</p>	
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<p><i>megafauna groups. Including only 5 species of whale (blue whale, pygmy blue whale, humpback, sperm whale, southern right whale), 3 species of dolphin (Australian Snubfin, Indo-Pacific Humpback, Indo-Pacific Bottlenose) and only 6 species of shark (including 3 species of sawfish).</i></p> <p><i>9. BIA maps and datasets are managed by the Australian Government Department of the Environment (the department). The department creates and maintains BIA maps with assistance from research scientists and others who provide data and review BIA information. The department also maintains the National Conservation Values Atlas.</i></p> <p><i>10. Lack of current data and peer-reviewed literature on key marine species (eg. WAMSI studies in the Kimberley, on turtles, cetaceans). Including turtle tracking and modelling studies</i></p>		<p><i>commissioned to improve our understanding of sea turtle utilisation in the operational area and in the vicinity of the Tiwi Islands. Where relevant, this information has been incorporated into the EP. The references provided (Waayers et al, 2015 and Thums et al, 2017) have been reviewed and provide no additional information to inform the activities risks or require a change in our management controls. Appropriate control measures have been applied to reduce risks and impacts to as low as reasonably practicable and to acceptable levels.</i></p> <p><i>As to paragraph 12 of this claim, Santos has assessed the full potential spatial extent of a worst case spill event with consideration for biological impacts in the MEVA and socio-economic impacts in the EMBA that extend beyond Australia's EEZ. The Drilling and Completions EP does acknowledge that while marine turtles are unlikely to inhabit or frequent the deeper offshore waters of the Operational and the MEVA, they do traverse the EMBA. This is further considered</i></p>	
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<p>looking at key foraging areas (see Waayers et al 2015, Thums et al 2017). Or recent research within the Oceanic Shoals Marine Park, showing the significant role of submerged carbonate reefs in aggregating marine megafauna (ie. 'megafauna hotspots')</p> <p>11. A major concern is the Drilling EP's failure to incorporate data from relevant, well-known and accessible marine species data portals, eg. Atlas of Living Australia (Australian Museum's national data source for species records), NR Maps (DENR, NT), NEATS Public Portal, Online Marine Turtle Breeding and Migration Atlas (Queensland DPI), <a href="http://seaturtle.org">seaturtle.org</a></p> <p>12. Significantly, only the Australian EEZ have been assessed for migratory, rare, threatened, endangered and protected marine species in the EP. Hence, for migratory and 'transboundary' key marine species and</p>		<p>in Section 7 of the Drilling and Completions EP and the OPEP.</p> <p>As to paragraph 13 of this claim, Appendix C of the revised EP recognises Indonesian and Timor-Leste marine parks that are within the EMBA.</p> <p>As to paragraph 15 of this claim, the Drilling and Completions EP provides an estimate of atmospheric emissions from the drilling and completions activity. Emissions from production operations are beyond the scope of the Drilling and Completions EP (see Appendix B2 of Revision 3 of the Drilling and Completions EP). It is beyond the scope of this EP to quantify the possible impacts of global greenhouse gas emissions on migration routes and local movements of marine megafauna.</p> <p>Feedback regarding the Barossa OPP, which was approved in March 2018, is outside the scope of this consultation.</p> <p>This feedback does not provide any new information which would necessitate the implementation of additional controls in the revised EP.</p>	
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<p><i>populations – there is currently no consideration of population-level impacts, impacts on full life cycle of species, or cumulative impacts. For example, the globally-significant green turtle nesting areas on Aru Island, whose migratory routes traverse the EMBA and MEVA into the Australian EEZ.</i></p> <p><i>13. Similarly, no Indonesian datasets, assessments or information has been sourced in the EP for key marine species occurring within the EMBA or MEVA.</i></p> <p><i>14. No recognition of the current ‘transboundary species management’ efforts in the ATS (particularly under ATSEA), eg. ATS Regional Turtle Plan of Action.</i></p> <p><i>15. Our changing ocean. Ocean warming and climate change is having major impacts on marine megafauna migrations, feeding and overall, population health.</i></p>			
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<p><i>However, the EP includes no recognition or assessment of climate impacts on major migration routes and local movements of marine megafauna in the Timor Sea, particularly cetaceans, sea turtles and sharks/rays.</i></p>			
<p><i>1. Entire Drilling EP is restricted only to the Australian EEZ – does not recognise or assess the environmental or economic values (or uses, impacts) of the broader Timor Sea, and significantly, the ecosystems within the EMBA or MEVA.</i></p> <p><i>2. Blue Whale data in the EP is very dated for the Timor Sea. Blue Whales and other baleen whales have recently (May 2022) been recorded very close to the operational area (within the Australian EEZ).</i></p> <p><i>3. Several key cetacean species which are known to occur in the area have not been assessed at all (Brydes Whale, Fin Whale,</i></p>		<p><i>Regarding paragraph 1 of this claim, Santos has assessed the full potential spatial extent of a worst case spill event with consideration for biological impacts within the MEVA and socio-economic impacts within the EMBA that extend beyond Australia’s EEZ.</i></p> <p><i>As to paragraphs 2 and 3 of this claim, the Revision 3 of Drilling and Completions EP already implements controls to manage the risk of interactions of all marine megafauna, including the Blue Whale (section 7). Fin Whales and Sperm Whales have been assessed in Revision 3 of the Drilling and</i></p>	



<p><i>Sei Whale, Sperm Whale).</i></p> <p><i>4. BIAs are also not only unavailable for many migratory and marine protected species – but many are out-of-date.</i></p>		<p><i>Completions EP (see Table 3-7). Brydes Whales and Sei Whales are assessed in the Revised EP.</i></p> <p><i>As to paragraph 4 of this claim, the database and mapping of BIAs is maintained by DCCEEW.</i></p>	
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## 5 Impact and risk assessment methodology

OPGGs(E)R 2009 Requirements
Regulation 13 Environmental assessment
<p>Evaluation of environmental impacts and risks</p> <p>13(5) The environment plan must include:</p> <ul style="list-style-type: none"> <li>(a) details of the environmental impacts and risks for the activity; and</li> <li>(b) an evaluation of all the impacts and risks, appropriate to the nature and scale of each impact or risk; and</li> <li>(c) details of the control measures that will be used to reduce the impacts and risks of the activity to as low as reasonably practicable and an acceptable level.</li> </ul> <p>13(6) To avoid doubt, the evaluation mentioned in paragraph (5)(b) must evaluate all the environmental impacts and risks arising directly or indirectly from:</p> <ul style="list-style-type: none"> <li>(a) all operations of the activity; and</li> <li>(b) potential emergency conditions, whether resulting from accident or any other reason.</li> </ul>

Environmental impact and risk assessment refers to a process whereby planned and unplanned events that will or may occur during an activity are assessed for their impacts on the environment (as defined in regulation 4 of the OPGGS(E)R) at a defined location and specified period of time. In addition, unplanned events are assessed on the basis of their likelihood of occurrence which defines their risk level.

Santos has undertaken environmental impact and risk assessments for the planned events (including any routine, non-routine and contingency activities) and unplanned events in accordance with the OPGGS(E)R.

Provided in this section of the EP is information relating to the environmental impact and risk assessment approach, specifically:

- + terminology used
- + summary of the approach.

A full description of the process applied in identifying, analysing and evaluating environmental impacts and risks is documented in Santos' *Offshore Division environmental hazard identification and assessment guideline* (EA-91-IG-00004\_5).

### 5.1 Impact and risk assessment methodology

Common terms applied during the environmental impact and risk assessment process, and used in this EP, are defined in **Table 5.1**.

**Table 5.1: Impact and risk assessment terms and definitions**

Term	Definition
Acceptability	Determined for both impacts and risks. Acceptability of events is in part determined by the consequence of the impact following management controls. Acceptability of unplanned events is in part determined from its risk ranking following management controls. For both impacts and risks, acceptability is also determined from a demonstration of the ALARP principle, consistency with Santos Policies, consistency with all applicable legislation and consideration of information received through consultation when determining management controls.

Term	Definition
Activity	Specific tasks and actions undertaken throughout the lifecycle of oil and gas exploration, development, production and decommissioning.
ALARP	As Low as Reasonably Practicable The term refers to reducing impact and risk to a level that is As Low as Reasonably Practicable. In practice, this means showing through reasoned and supported arguments, that there are no other reasonably practicable options that could reasonably be adopted to reduce impacts or risks further (NOPSEMA Guidance Note: ALARP, dated 24/06/2020 (N-04300-GN01660166 A138249).
Authorised person	Person with authority to make the decision or take the action. Examples are Vessel Master, Superintendent, Supervisor, Person-in-charge, Company Authorised Representative, and Project Manager.
Control measure	Is defined by the OPGGSIR to mean a system, an item of equipment, a person or a procedure, that is used as a basis for managing environmental impacts and risks.
Environment	Is defined by the OPGGS(E)R as: (a) ecosystems and their constituent parts, including people and communities (b) natural and physical resources (c) the qualities and characteristics of locations, places and areas (d) the heritage value of places and includes (e) the social, economic and cultural features of the matters mentioned in paragraphs (a), (b), (c) and (d).
Environmental consequence	A consequence is the outcome of an event affecting objectives. Note 1 An event can be one or more occurrences and can have several cases. Note 2 An event can consist of something not happening. (Reference ISO 73:2009 Risk Vocabulary)
Environmental impact	Defined by the OPGGSIR as any change to the environment, whether adverse or beneficial, wholly or partly resulting from an activity.
ENVID workshop	Environmental hazard identification workshop.
Environmental risk	Applies to unplanned events. Risk is a function of the likelihood of the unplanned event occurring and the consequence of the environmental impact that arises from that event.
Hazard	A situation with the potential to cause harm.
Grossly disproportionate	Where the sacrifice (cost and effort) of implementing a control measure to reduce impact or risk, grossly exceeds the environmental benefit to be gained.
Impact assessment	The process of determining the consequence of an impact (in terms of the consequence to the environment) arising from a planned or unplanned event over a specified period of time.
Likelihood	The chance of an unplanned event occurring.
Non-routine planned event	An attribute of the planned activity that may occur or will occur infrequently during the planned activity. A non-routine planned event is intended to occur at the time.
Planned activity	The activity to be undertaken including the services, equipment, products, assets, personnel, timing, duration and location and aspect of the activity.

Term	Definition
Planned event	An event arising from the activity which is done with intent (i.e., not an unplanned event) and has some level of environmental impact. A planned event could be routine (expected to occur consistently throughout the activity) or non-routine (may occur infrequently if at all). Air emissions, bilge water discharge and drill cuttings discharge are examples of planned events.
Receptor	A feature of the environment that may have values.
Risk	The effect of uncertainty on objectives.
Risk assessment	The process of determining the likelihood of an unplanned event and the consequence of the impact (in terms of economic, human safety and health, or ecological effects) arising from the event over a specified period of time.
Routine planned event	An attribute of the planned activity that results in some level of environmental impact and will occur continuously or frequently through the duration of the planned activity.
Unplanned event	An event that results in some level of environmental impact and may occur despite preventative safeguards and control measures being in place. An unplanned event is not intended to occur during the activity.

## 5.2 Summary of the environmental impact and risk assessment approach

### 5.2.1 Overview

Santos operates under an overarching Risk Policy. The company Risk Management Operating Standard (SMS-LRG-OS01) and supporting Procedure (SMS-LRG-OS01-PD01) underpins the Risk Policy and is consistent with the requirements of *AS/NZS ISO 31000:2018, Risk Management – Guidelines* (ISO, 2018). The key steps to environmental risk management are illustrated in **Figure 5-1**, as defined in the *Santos’ Offshore Division Environmental Hazard Identification and Assessment Guideline* (EA-91-IG-00004\_5).



**Figure 5-1: Hazard identification and assessment guideline**

These steps are considered in activity-specific environmental assessment workshop(s) (ENVID workshop) and in the development of this EP. The workshop involves participants from Santos’ Health, Safety and Environment (HSE), Spill Response and Drilling departments and specialist environmental consultants.

### 5.2.2 Describe the activity and hazards (planned and unplanned events)

The location, timing and scope of the Activity must be understood to define the hazards and determine the impacts from planned events, and the impacts and risks from unplanned events since these have a bearing upon the environment that may be affected by the Activity.

The outcome of this assessment is detailed in the relevant sub-sections of **Sections 6** and **7**.

### 5.2.3 Identify receptors and determine nature and scale of impacts

Santos has developed the *Barossa Drilling and Completions values and sensitivities of the marine environment* (BAA-210-0130, **Appendix C**) reference document which describes the existing environment that may be affected by the Activity. Receptors identified as occurring or potentially occurring within the EMBA for the Barossa Development Drilling Campaign are detailed in **Section 3**.

The extent of impacts from planned events or risks and impacts from unplanned events were assessed using, where required, modelling (for example, hydrocarbon spills) and scientific reports. The expected duration of each event was also defined using subject matter expertise.

### 5.3 Describe the environmental performance outcomes and control measures

As required by the OPGGS(E)R, environmental performance outcomes(s) (EPO), control measures, environmental performance standards (EPSs) and measurement criteria (MC) were identified for the identified environmental impacts and risks.

All reasonably practicable control measures were considered and either accepted for use or rejected based on whether impacts and risks had been reduced to levels considered acceptable and ALARP.

Accepted control measures were allocated in order of preference according to **Figure 5-2**.

Control	Effectiveness	Example
<b>Eliminate</b>		<i>Removal of the risk.</i> Refueling of vessels at port eliminates the risks of an offshore refueling.
<b>Substitute</b>		<i>Change the risk for a lower one.</i> The use of low-toxicity chemicals that perform the same task as a more toxic additive.
<b>Engineering</b>		<i>Engineer out the risk.</i> The use of oil-in-water separator to minimise the volume of oil discharged.
<b>Isolation</b>		<i>Isolate people or the environment from the risk.</i> The use of bunding for containment of bulk liquid materials.
<b>Administrative</b>		<i>Provide instructions or training to people to lower the risk.</i> The use of Job Hazard Analysis to assess and minimise the environmental risks of an activity.
<b>Protective</b>		<i>Use of protective equipment.</i> Containment and recovery of spilt hydrocarbons.

**Figure 5-2: Hierarchy of controls**

### 5.4 Determine the impact consequence level and risk rankings

The consequence level of a potential impact was determined for each planned and unplanned event using the Santos environment consequence descriptors (**Appendix G**) on the basis that all control measures have been implemented.

These detailed environmental consequence descriptions are based on the consequence of the impact to relevant receptors within the categories of:

- + threatened/migratory/local fauna
- + physical environment/habitat
- + threatened ecological communities
- + protected areas
- + socio-economic receptors
- + cultural features.

Consequence descriptors are based on set criteria for each receptor category, and take into consideration the duration and extent of the impact, receptor recovery time and the effect of the impact at a population, ecosystem or industry level.

When assessing impacts to cultural features that are part of the environment that may be affected by the Activity, Santos considered cultural features of the environment as defined under the OPGGS(E)R:

- (a) ecosystems and their constituent parts, including people and communities
- (b) natural and physical resources
- (c) the qualities and characteristics of locations, places and areas
- (d) the heritage value of places

When assessing the consequence level of impact to cultural features, Santos considers the different types of cultural features and types of impacts. For impacts to cultural features, in the form of impacts to marine species that are either a cultural food source or are considered culturally significant to First Nations people, Santos assesses impacts with reference to the consequence assessment for threatened/migratory/local fauna. Similarly, where cultural features are linked to a specific place, impacts to cultural features are assessed with reference to the consequence assessment for physical environment/threatened ecological communities/protected areas as applicable. Where there are concerns raised by individuals about cultural and spiritual beliefs that do not link to a specific location or place, Santos will evaluate impact and risk acceptability with consideration for assessment of impacts from analogous activities (e.g. historical drilling, trawl fishing activity, industrial shipping) and consider culturally appropriate measures in response to concerns raised by individuals.

As planned events are expected to occur during the Activity, the likelihood of their occurrence was not considered during the environmental assessment, and only a consequence level was assigned.

**Table 5.2: Summary environmental consequence descriptors**

Consequence level	Consequence level description
I	<b>Negligible</b> – No impact or negligible impact
II	<b>Minor</b> – Detectable but insignificant change to local population, industry or ecosystem factors
III	<b>Moderate</b> – Significant impact to local population, industry or ecosystem factors
IV	<b>Major</b> – Major long-term effect on local population, industry or ecosystem factors
V	<b>Severe</b> – Complete loss of local population, industry or ecosystem factors AND/OR extensive regional impacts with slow recovery
VI	<b>Critical</b> – Irreversible impact to regional population, industry or ecosystem factors

For unplanned events, the consequence level of the impact was combined with the likelihood of the impact occurring (Table 5.3), to determine a residual risk ranking using the Santos corporate risk matrix (Table 5.4).

**Table 5.3: Likelihood description**

No.	Matrix	Description
F	Almost Certain	Occurs in almost all circumstances OR could occur <i>within days to weeks</i>
E	Likely	Occurs in most circumstances OR could occur <i>within weeks to months</i>
D	Occasional	Has occurred before in Santos OR could occur <i>within months to years</i>
C	Possible	Has occurred before in the industry OR could occur <i>within the next few years</i>
B	Unlikely	Has occurred elsewhere OR could occur <i>within decades</i>
A	Remote	Requires exceptional circumstances and is unlikely even in the long term

**Table 5.4: Santos risk matrix**

		Consequence					
		I	II	III	IV	V	VI
Likelihood	f	Low	Medium	High	Very High	Very High	Very High
	e	Low	Medium	High	High	Very High	Very High
	d	Low	Low	Medium	High	High	Very High
	c	Very Low	Low	Low	Medium	High	Very High
	b	Very Low	Very Low	Low	Low	Medium	High
	a	Very Low	Very Low	Very Low	Low	Medium	Medium

## 5.5 Evaluate if impacts and risks are as low as reasonably practicable

For planned and unplanned events, an ALARP assessment was undertaken to demonstrate that the standard control measures adopted reduce the impact (consequence level) or risk to ALARP. This process relies on demonstrating that further potential control measures would require a disproportionate level of cost/effort in order to reduce the level of impact or risk. If this cannot be demonstrated, then further control measures are adopted. The level of detail included within the ALARP assessment is based upon the nature and scale of the potential impact or risk. For example, more detail is required for a risk ranked as 'Medium' compared with a risk ranked as 'Low'.

## 5.6 Evaluate impact and risk acceptability

Santos considers an impact or risk associated with the activities to be acceptable if each of the following criteria, where relevant, is satisfied:

- + the consequence of a planned event is ranked as I or II; or a risk of impact from an unplanned event is ranked Very Low to Medium
- + an assessment has been completed to determine that sufficient information or studies have been considered to validate the consequence assessment
- + the principles of ecologically sustainable development have been assessed
- + the acceptable levels of impact and risks have been informed by relevant species recovery plans, threat abatement plans and conservation advice
- + performance outcomes, control measures and associated performance standards are consistent with legal and regulatory requirements



- + performance outcomes, control measures and associated performance standards are consistent with the Santos Environment, Health and Safety Policy
- + performance outcomes, control measures and associated performance standards are consistent with industry standards
- + Relevant Persons' feedback has been considered when determining performance outcomes, control measures and associated performance standards taken into consideration performance outcomes, control measures and associated performance standards have been demonstrated to reduce the impact or risk to ALARP.

## 6 Planned activities impact assessment

OPGGs(E)R 2009 Requirements
<b>Regulation 13(5)</b>
The environment plan must include: <ul style="list-style-type: none"> <li>(a) details of the environmental impacts and risks for the activity; and</li> <li>(b) an evaluation of all the impacts and risks, appropriate to the nature and scale of each impact or risk; and</li> <li>(c) details of the control measures that will be used to reduce the impacts and risks of the activity to as low as reasonably practicable and an acceptable level.</li> </ul>
<b>Regulation 13(6)</b>
To avoid doubt, the evaluation mentioned in paragraph (5)(b) must evaluate all the environmental impacts and risks arising directly or indirectly from: <ul style="list-style-type: none"> <li>(a) all operations of the activity; and</li> <li>(b) potential emergency conditions, whether resulting from accident or any other reason.</li> </ul>
<b>Regulation 13(7)</b>
The environment plan must: <ul style="list-style-type: none"> <li>(a) set environmental performance standards for the control measures identified under paragraph (5)(c); and</li> <li>(b) set out the environmental performance outcomes against which the performance of the titleholder in protecting the environment is to be measured; and</li> <li>(c) include measurement criteria that the titleholder will use to determine whether each environmental performance outcome and environmental performance standard is being met.</li> </ul>

An ENVID workshop (as described in **Section 5**) for planned activities was held in June 2021. An additional ENVID workshop was held in June 2023 to assess changes or additional scopes since the acceptance of Revision 3 of the EP. Santos' environmental assessment identified eight causes of environmental impact associated with the planned activities to be undertaken in the Operational Area. The results of the impact assessments are summarised in **Table 6.1** and described in the next subsections.

**Table 6.1: Environmental impact assessment summary**

EP section reference	Hazard	Residual consequence level
<b>6.1</b>	Noise emissions	I - Negligible
<b>6.2</b>	Light emissions	I – Negligible
<b>6.3</b>	Atmospheric emissions	I – Negligible
<b>6.4</b>	Seabed and benthic habitat disturbance	II – Minor
<b>6.5</b>	Interaction with other marine users	I – Negligible
<b>6.6</b>	Operational discharges	II – Minor
<b>6.7</b>	Drilling and completions discharges	II – Minor
<b>7.9</b>	Contingency spill response operations	II – Minor

## 6.1 Noise emissions

### 6.1.1 Description of event

<b>Event</b>	<p>Potential impacts from noise emissions may occur in the Operational Area from:</p> <ul style="list-style-type: none"> <li>+ vessel activities (e.g., vessel engines, thrusters, ROV operations and other machinery)</li> <li>+ MODU activities (e.g., drilling, well construction and machinery, and ROV operations)</li> <li>+ geophysical equipment associated with positioning systems</li> <li>+ flaring</li> <li>+ helicopter activities.</li> </ul>
<b>Extent</b>	<p>Noise emissions will be concentrated around the above-mentioned sources, with studies supporting the assessment of only localised effects; i.e. in the order of 12 km.</p> <p>Underwater noise from flaring will be limited to two to three days per well flowback and is not expected to exceed vessel/MODU operational noise levels.</p> <p>The Barossa Gas Export Pipeline (GEP) installation activity is planned to occur concurrently with drilling activities under this EP within the Drilling Operational Area for a total duration of approximately 4 weeks. GEP activities will be undertaken at least 3.8 km from the drill centres.</p>
<b>Duration</b>	<p>Continuous MODU and vessel noise emissions for the duration of the Activity, with intermittent emissions associated with discrete activities, e.g., flaring, helicopter arrivals, etc. Drilling of each well will take approximately 90 days per well. Subsea vertical tree installation will take approximately 13 days per well. Estimated total duration across the planned 6-well campaign (and two additional contingency production wells) is approximately 2 years.</p> <p>Impulsive noise emissions during use of positioning equipment (LBL, USBL and MBES) will be used periodically for the full duration of each well.</p> <p>Noise from flaring will be limited to two to three days per well flowback.</p>

#### 6.1.1.1 Introduction

During the Activity, noise will be generated by the MODU undertaking drilling activities and flaring, vessels providing support and light well intervention, and helicopters providing support.

The MODU does not have self-propulsion so will not generate noise from propellers. Underwater noise emissions from MODUs primarily originate from on-board equipment vibrations, although some emissions are transmitted directly into the water through vibration of the drill string and potentially also from interaction between the drill bits and the seafloor (Austin *et al.*, 2018). MODU related operations will include:

- + normal drilling operations
- + flaring activities.

During normal operations the vessels will generate continuous noise from propeller cavitation, thrusters, hydrodynamic flow around the hull, and operation of machinery and equipment. Vessel related operations will include:

- + manoeuvring during pre-lay anchoring operations (under dynamic positioning)
- + standby activities related to the MODU
- + resupply activities for the MODU (vessels under dynamic positioning).

Other noise sources will include helicopters that will generate noise during take-off and landing on the MODU, geophysical and positioning equipment that is used to support MODU positioning.

Santos has commissioned a technical study into Underwater Noise Impacts on Marine Fauna (JASCO, 2020a). Santos has used the findings of this study to update the underwater noise emissions impact assessment section of the EP. The majority of the noise sources involved in the Activity are non-impulsive, aside from the noise generated by positioning equipment. Non-impulsive sounds have a longer duration than impulsive ones, and they usually do not have the high peak sound pressure and rapid rise and decay time that impulsive sounds have. However, especially in respect to their auditory effects on marine fauna, the term non-impulsive does not imply long duration signals (JASCO, 2020a).

The relevant terminology for underwater acoustic levels relevant to non-impulsive sources are sound pressure levels (SPL), and accumulated sound exposure levels (SEL).

Previous assessments for the Barossa Development (ConocoPhillips, 2018) examined the noise from an FPSO facility and associated support vessels. The modelling scenarios include the modelling of an operational FPSO facility and an FPSO facility with offloading tanker and a support vessel in attendance located at the proposed FPSO facility site in the Barossa field. This modelling study is the only study conducted within the Barossa area for non-impulsive sources.

Site and operational specific modelling were not conducted for this Activity, therefore the approach taken within this assessment was to contrast the noise associated with the drilling campaign to relevant existing information and thus estimate the range of potential effect. This process was completed through a conservative approach, primarily using the modelling completed for the Barossa Development, but also literature where relevant.

Previous studies do not always contain the most relevant current criteria, for instance the assessment undertaken for the Barossa Development (ConocoPhillips, 2018) applied Southall *et al.* (2007) to assess potential hearing impairment in marine mammals as this was the best available information at the time of the assessment. Results calculated using the approach within Southall *et al.* (2007) cannot be directly contrasted to possible ranges to effect that would result from the application of Southall *et al.* (2019). Where this issue exists, for low-frequency cetaceans, the approach taken within this assessment is to determine the ranges to effect using ranges from the unweighted SEL results but apply the low-frequency hearing group specific threshold from Southall *et al.* (2019). This approach is conservative, as it does not account for the weighting of frequencies for fauna do not hear as well. This approach is not appropriate for mid-frequency and high-frequency cetaceans as is it unrepresentative or justifiable.

The Artisan-1 Exploration Well Drilling EP (Beach, 2020) contains an assessment of an anchored MODU and resupply operations (Koessler *et al.*, 2020, Appendix F). This assessment did not predict a range to Temporary Threshold Shift (TTS) in high-frequency cetaceans (using the Southall *et al.*, 2019 terminology) at ranges beyond 30 m for the most impactful activity, resupply operations. At very close range, the source levels of the vessels involved in the operations dominates over environmental influences, therefore these results are likely applicable to this assessment also.

The relevant other criteria within ConocoPhillips (2018) to the current assessment are as follows:

- + Marine mammal behavioural response criteria are unchanged, with 120 dB re 1  $\mu$ Pa (SPL) still the threshold, however the reference has been updated from National Marine Fisheries Service (NMFS) (2014) to National Oceanic and Atmospheric Administration (NOAA, 2019).
- + Sound exposure guidelines for fish, fish eggs, sea turtles and larvae from Popper *et al.* (2014) remain unchanged. This will be applied for hearing impairment in sea turtles in the absence of the ability to assess the frequency-weighted thresholds presented in Finneran *et al.* (2017).

The Southall *et al.* (2021) paper on behavioural response criteria does not provide new numerical thresholds for onset of behavioural responses for marine mammals, and thus has not been applied in this assessment. This paper does provide significant context and guidance for future work to better determine such thresholds.

A summary of the modelling results within ConocoPhillips (2018) which pertain to this assessment are detailed below. The terminology used to refer to the distances to thresholds are:

- + Rmax, the maximum range to the given sound level over all azimuths
- + R95%, the range to the given sound level after the 5% farthest points were excluded.

Results summary from ConocoPhillips (2018):

- + FPSO in isolation during normal operations:
  - For this scenario, the range to the 120 dB re 1  $\mu$ Pa NMFS (2014) and NOAA (2019) criterion for behavioural responses in marine mammals was 1.33 km (R95%) and 1.42 km (Rmax).
- + FPSO under dynamic positioning (DP) during offload to a tanker, with both the FPSO and tanker represented using a conservative power level approximation for the thrusters of 50% load, attended by a support vessel, also under DP:
  - For this scenario, the range to the marine mammal behavioural response criterion of 120 dB re 1  $\mu$ Pa NMFS (2014) and NOAA (2019) was 8.9 km (R95%) and 11.4 km (Rmax).
- + For both of these scenarios, neither permanent threshold shift (PTS) or TTS was predicted beyond the FPSO extents using the applied criteria in that assessment (Southall *et al.*, 2007).
- + Applying the Southall *et al.* (2019) criteria to the unweighted 24 h SEL results indicates:
  - FPSO in isolation during normal operations: PTS and TTS in low-frequency cetaceans could occur within approximately 20 or 200 m respectively
  - FPSO, tanker and support vessel during offload operations: PTS and TTS in low-frequency cetaceans could occur within approximately 70 or 1860 m respectively.
- + Considering modelling assessments of other similar drilling operations (such as the aforementioned Artisan-1 Exploration Well), and applying a conservative approach, a range to TTS of 50 m for high frequency cetaceans will be used to represent potential effects on odontocetes within this assessment.

### 6.1.1.2 Noise generated by mobile offshore drilling unit

The noise generated by the MODU is similar to that of an FPSO not using its thruster; however, comparing results presented in Austin *et al.* (2018) and Erbe *et al.* (2013) the MODU is expected to be quieter (170.5 dB re 1  $\mu$ Pa m versus a median of 181 dB re 1  $\mu$ Pa m).

The extent of thresholds associated with operations of the MODU can be estimated by considering those determined for the FPSO in isolation during normal operations as detailed in **Section 6.1.1.1**.

### 6.1.1.3 Noise generated by vessels

Vessel operational noise consists of machinery noise (e.g., engine noise) and hydrodynamic noise (e.g., water flowing past the hull, thruster use and propeller singing). Machinery on a ship radiates sound through the hull into the water.

Three types of typical vessel operations will occur, two of which involve dynamic positioning:

- + manoeuvring during MODU anchor handling operations (vessels under dynamic positioning)
- + resupply activities for the MODU (vessels under dynamic positioning).

To represent vessels under dynamic positioning in the presence of the MODU, the modelling scenario in ConocoPhillips (2018) which included three vessels using dynamic positioning – the FPSO offload scenario, has been applied to conservatively estimate ranges to effect. This included both the FPSO and tanker

represented using a conservative power level approximation for the thrusters of 50% load, and a support vessel also using dynamic positioning to maintain station.

The Activity scenario which does not involve dynamic positioning is standby of the support vessel near the MODU. A reasonable representation of vessel noise during this Activity is a vessel under slow transit.

McCauley (1998) measured underwater sound levels from the Pacific Ariki, a 64 m long support vessel with 8000 HP (6,000 kW) main engines during calm conditions in the Timor Sea in 110 m of water while transiting at 11 knots. This measurement determined that the 120 dB re 1  $\mu$ Pa NOAA (2019) criterion for behavioural responses in marine mammals would not be exceeded at approximately 1 km. Vessels when mobile have a shorter range to PTS and TTS thresholds than when stationary, as the sound accumulation is distributed over a wider area. McCauley (1998) calculated the Pacific Ariki to have a monopole source level equivalent to approximately 182 dB re 1  $\mu$ Pa m while holding position using both main engines and an unspecified bow thruster. This dynamic positioning source level is similar to that for the FPSO not using a thruster (181 dB re 1  $\mu$ Pa m), and the source level for the vessel during transit will be lower as it is more efficient. Therefore, using the FPSO without thruster is a reasonable approximation to determine ranges for SEL criteria.

## LWIV

The LWIV will generate noise from the operation of on-board machinery, including diesel engines, cement pumping unit, ventilation fans (and associated exhaust) and electrical generators. Noise will also be generated while the vessel is under DP to maintain position. DP uses satellite navigation and radio transponders in conjunction with thrusters to maintain position rather than anchoring. Whilst there is no direct studies or data for underwater noise relating to a LWIV operating on DP, the LWIV is likely to have similar DP thruster power as a MODU.

McCauley (1998) reported noise levels generated by a semi-submersible rig; during non-drilling periods the typical broadband level encountered was approximately 113 dB (rms) re 1  $\mu$ Pa@125 m with various tones from the machinery observable in the noise spectra. There was significant variation in the broadband noise during non-drilling periods, attributed to the operation of specific types of machinery. During drilling periods, the broadband noise level increased to the order of 177 dB (rms) re 1  $\mu$ Pa@125 m. Studies undertaken in the Arctic on different MODU types (including semi-submersible and drill ships) indicate that noise levels dropped to 117 dB re 1  $\mu$ Pa within 1 km of the MODU and are much lower than those for large commercial vessels operating at normal speeds (Austin et al., 2018).

### 6.1.1.4 Noise generated by acoustic surveying equipment

## LBL / USBL

An LBL or USBL transponder may be installed on the seabed for metrology and surveying of wells and other equipment deployed to the seabed. Transponders typically emit pulses of medium frequency sound, generally within the range 21 to 31 kHz. The estimated SPL would be 180 to 206 dB re 1  $\mu$ Pa at 1 m (Jiménez-Arranz et al., 2017). Transmissions are not continuous but consist of short “chirps” with a duration that ranges from 3 to 4 milliseconds. Transponders will only be active when positioning is required. All transponders/beacons will be recovered to vessel deck after each deployment.

The noise generated will be considerably lower than the DP vessel noise. As underwater sound levels are dependent on the primary (noisiest) sound source rather than being strictly additive, and since the transponders will make little contribution to the overall noise emissions compared to the DP vessel noise as described above, they are not risk assessed further.

## MBES

The representative MBES considered for the survey is an R2Sonic 2024. The transmit power from this echosounder is up to 221 dB re 1  $\mu$ Pa @1m (SPL), with a short (15  $\mu$ s to 1ms) pulse width, however the operational power level and pulse width influence the potential sound fields. This source can be considered an impulsive sound source for impact assessment purposes. Measurements for the R2Sonic 2024 were reported in Martin et al. (2012), who measured a maximum SPL of 162 dB re 1  $\mu$ Pa at 4m, with the system operating at an average pulse length of 0.11ms. The accumulated SEL over 363 measured pulses was 121.5 dB re 1  $\mu$ Pa2s. This sonar generates only high frequency signals, and as such will only be relevant for fauna with sensitivity to signals of approximately 200 kHz or higher, which excludes low-frequency cetaceans, fish, and turtles. The MODU will be located at each drill centre for approximately 6 months before moving to the next drill centre. MBES surveys, and the associated noise source, will occur for up to 4 days over the period the MODU is located at each drill centre.

## SBES

SBESs are less powerful than MBESs, therefore the information supplied for MBES is considered representative of the potential outputs from SBES, noting that SBES equipment will be operational at all times on the MODU and support vessels.

### 6.1.1.5 Noise generated by helicopters

Sound traveling from a source in the air (e.g., a helicopter) to a receiver underwater is affected by both in-air and underwater propagation processes, and processes occurring at the air-seawater surface interface (e.g., wind and waves). The level of noise received underwater depends on source altitude and lateral distance, receiver depth, water depth, and other variables.

Helicopter engine noise is emitted at various frequencies however, the dominant tones are generally of a low frequency below 500 Hz (Richardson et al. 1995). Sound pressure in the water directly below a helicopter is greatest at the surface and diminishes with increasing receiver depth. Noise also reduces with increasing helicopter altitude, but the duration of audibility often increases with increasing altitude, with sound penetrating water at angles  $<13^\circ$ . The noise from the flyover of a Bell 214ST helicopter has been recorded underwater (Richardson et al., 1995), with the maximum recorded sound level for the dominant 22 Hz tone was 109 dB re 1  $\mu$ Pa (SPL) when the helicopter was 152 m from the surface and the hydrophone 3 and 18 m under the surface.

For context, the Bell 214 uses a single powerful Lycoming LTC4B-8 engine (2,930 shaft horsepower (shp); 2,185 kW) (Frawley, 2003), while more the more modern Bell 412, often used as a rescue helicopter in Australia (Air Services Australia, 2020) uses twin 1,250 shp (930 kW) turboshaft engines (Bell Helicopter, 2012). Typical offshore crew change and medivac helicopters in Australia are the Leonardo AW139s (Milne, 2019), which have been measured to be 2dB(A) quieter than the Bell 412 helicopters (Air Services Australia, 2020).

Although helicopters are expected to land/take-off from the MODU several days per week, the duration of helicopter operation within close proximity to the marine environment is limited and intermittent. Further helicopter operations are expected to result in received underwater noise levels lower than those associated with vessel operations.

### 6.1.1.6 Noise from flaring during well flowback

Noise from flaring is caused by high exit velocities of hydrocarbons through the flare.

The noise from in-air flaring is typically reported in A-weighted units to assist with assessing potential effects on humans. For instance, Hantschk & Schorer (2008) reported an A-weighted sound power level ( $L_{WA}$ ) of 108 dB (source level). The underwater noise from flaring has not been estimated, however the concepts of transmission are similar to those for helicopters, with sound penetrating the water at angles  $<13^\circ$ , and

experiencing loss during the transition between air and water. The underwater sound levels can be approximated to be lower than those for a helicopter, and therefore any potential effects less. This approximation is justified by contrasting flaring source level ((108 dBA) with that of a helicopter, an  $L_{WA}$  around 139 dB during take-off or the final stages of approach (flaring) (James and Zoontjens, 2012).

## 6.1.1.7 Summary of noise sources and rationale for assessment

Of the noise sources described in **Sections 6.1.1.1 to 6.1.1.6**, noise from helicopters and flaring are expected to be intermittent during the Activity and underwater received levels will not exceed that of Activity vessels including the MODU.

Therefore, the assessment has focused on the operations of the project support vessels and the moored MODU.

## 6.1.2 Nature and scale of environmental impacts

Potential receptors: threatened, migratory, or local marine fauna (marine mammals, marine turtles, sharks, fish, rays and invertebrates); socio-economic and cultural features.

- + Marine fauna use sound in a variety of functions, including social interactions, foraging, orientation, and responding to predators. Underwater noise can affect marine fauna in three main ways, being:
  - injury to hearing or other organs. Hearing loss may be temporary (TTS) or permanent (PTS)
  - disturbance leading to behavioural changes or displacement of fauna; the occurrence and intensity of disturbance is highly variable and depends on a range of factors relating to the animal and situation
  - masking or interfering with other biologically important sounds (including vocal communication, echolocation, signals and sounds produced by predators or prey).

Receptors with the potential to be impacted by underwater noise include:

- + plankton consisting of fish, coral and invertebrate eggs and larvae
- + benthic invertebrates
- + fish
- + sharks
- + marine mammals (cetaceans and dugongs)
- + marine reptiles

Some of these marine species have cultural significance to First Nations persons either as a traditional food source or for other cultural reasons (as to which, see sections 3.2.8.8 and 3.2.8.9).

The levels of acoustic exposure that may result in injury or behavioural changes in marine fauna is an area of increasing research. Due to differences in experimental design, methodology and units of measure, comparison of studies to determine likely sound exposure thresholds can be difficult. On assessment of the available science, thresholds have been defined for informing the impact assessment, and interpreting the estimated ensonification ranges. These are discussed for each receptor in JASCO (2020a).

The assessment is conducted by comparing modelled received underwater sound levels to defined noise effect criteria, as determined by scientific research and academic papers (JASCO, 2020a), for the identified environmental and social receptors.

Although the relationship between received sound levels and impacts to marine species is the subject of ongoing research, the science underlying noise modelling is well understood (Farcas *et al.*, 2016).



### 6.1.2.1 Marine mammals

There are no known significant feeding, breeding or aggregation areas for marine mammals within the Operational Area, though Omura’s whales (not EPBC listed) have been detected consistently within the Operational Area. The closest significant feature to the Operational Area is the pygmy blue whale distribution range which is approximately 51 km away. The pygmy blue migration BIA is 171 km from the Operational Area, and the pygmy blue foraging BIA is 974km from the Operational Area. Dugongs are not expected to occur in the Operational Area.

Several species of baleen whales may occur in the Operational Area, including the Omura’s, pygmy blue, humpback and Bryde’s whales. Based on their hearing range, these whales have been classified as low-frequency cetaceans. A number of odontocetes (including dolphins) may also be present in the Operational Area. Odontocetes have been classified as high-frequency cetaceans using the hearing group classification from Southall *et al.* (2019).

To better reflect the auditory similarities between closely related species, but also significant differences between species groups among the marine mammals, Southall *et al.* (2007) assigned the extant marine mammal species to functional hearing groups based on their hearing capabilities and sound production. This division into broad categories was intended to provide a realistic number of categories for which individual noise exposure criteria were developed. These groups were revised by NMFS (2018) and most recently by Southall *et al.* (2019). The categorisation as such has proven to be a scientifically justified and useful approach in developing auditory weighting functions and deriving noise exposure criteria for marine mammals. These auditory weighting functions are referred to as frequency weighting. These thresholds that detail receptor noise impacts and behavioural response for continuous noise (vessels and cutting tool), along with the new nomenclature and classifications for marine mammals are summarised in **Table 6.2**. The table details receptor noise impact and behavioural thresholds for continuous noise (vessel), being:

- + Low-frequency cetaceans: which consists of baleen whales such as humpback whales.
- + High-frequency cetaceans: which consists of toothed whales except porpoises and river dolphins.
- + Very High frequency cetaceans: which consists of whales such as pygmy sperm whales.

For non-impulsive noise such as that expected during the drilling activity, NMFS currently uses step function (all-or-none) threshold of 120 dB re 1  $\mu$ Pa SPL (unweighted) to assess and regulate noise-induced behavioural impacts for marine mammals (NOAA, 2019). The behavioural disturbance threshold criteria applied summates the most recent scientific literature on the impacts of sound on marine mammal hearing so considered the most relevant to this Activity. **Table 6.2** details cetacean behavioural, TTS and PTS thresholds for continuous noise.

**Table 6.2: Continuous noise: summary of cetacean impact thresholds as derived from Southall *et al.* (2019) and National Oceanic and Atmospheric Administration (2019)**

Hearing group	NOAA (2019)	Southall <i>et al.</i> (2019)	
	Behaviour	PTS onset thresholds (received level)	TTS onset thresholds (received level)
	SPL (dB re 1 $\mu$ Pa)	Weighted SEL24h (dB re 1 $\mu$ Pa <sup>2</sup> -s)	Weighted SEL24h (dB re 1 $\mu$ Pa <sup>2</sup> -s)
Low-frequency cetaceans	120	199	179
High-frequency cetaceans		198	178

Hearing group	NOAA (2019)	Southall <i>et al.</i> (2019)	
	Behaviour	PTS onset thresholds (received level)	TTS onset thresholds (received level)
	SPL (dB re 1 $\mu$ Pa)	Weighted SEL24h (dB re 1 $\mu$ Pa <sup>2</sup> ·s)	Weighted SEL24h (dB re 1 $\mu$ Pa <sup>2</sup> ·s)
Very High-frequency cetaceans		173	153

$L_e$  denotes cumulative exposure over a 24 hour period and has a reference value of 1  $\mu$ Pa<sup>2</sup>·s

**Table 6-3: impulsive noise: unweighted sound pressure level, SEL<sub>24h</sub> and PK thresholds for acoustic effects on marine mammals**

Hearing group	NOAA (2019)	NMFS (2018); Southall <i>et al.</i> (2019)			
	Behaviour	PTS onset thresholds (received level)		TTS Onset Thresholds (Received Level)	
	SPL (dB re 1 $\mu$ Pa)	Weighted SEL24h (dB re 1 $\mu$ Pa <sup>2</sup> ·s)	PK (Lpk; dB re 1 $\mu$ Pa)	Weighted SEL24h (LE,24h; dB re 1 $\mu$ Pa <sup>2</sup> ·s)	PK (Lpk; dB re 1 $\mu$ Pa)
Low-frequency cetaceans	160	183	219	168	213
mid-frequency cetaceans	160	185	230	170	224

#### Potential impacts from MODU and vessels

Using predicted noise levels as described in **Section 6.1.1.7**, estimated distances from Activity vessels to behavioural and physiological thresholds (as listed in **Table 6.2**) for cetaceans are provided below.

The extent of thresholds associated with operations of the MODU can be estimated by considering those determined for the FPSO in isolation during normal operations:

- + The range to the 120 dB re 1  $\mu$ Pa NOAA (2019) criterion for behavioural responses in marine mammals is approximated to be 1.42 km (R<sub>max</sub>)
- + PTS and TTS in low-frequency cetaceans could occur within approximately 20 or 200 m respectively if the animal remains within that range for 24 h
- + PTS is not predicted in high-frequency cetaceans, although they could experience TTS within 50 m if the animal remains within that range for 24 h.

The extent of thresholds associated with dynamic positioning vessel operations (including the LWIV) are estimated considering the FPSO offload scenario, therefore:

- + the range to the 120 dB re 1  $\mu$ Pa NOAA (2019) criterion for behavioural responses in marine mammals is approximated to be 11.4 km (R<sub>max</sub>)
- + PTS and TTS in low-frequency cetaceans could occur within approximately 70 or 1860 m respectively, if the animal remains within that range for 24 h

- + PTS is not predicted in high-frequency cetaceans, although they could experience TTS within 50 m if the animal remains within that range for 24 h.

These predictions are conservative, as they considered 24 h of operations, whilst resupply activities either typically take less than this, or during the operations there are periods of idle time for the vessels.

The extent of thresholds for a vessel in transit have been estimated using measurements of the Pacific Ariki (McCauley, 1998) and the FPSO operating in isolation, being:

- + the range to the 120 dB re 1  $\mu$ Pa NOAA (2019) criterion for behavioural responses in marine mammals is approximated to be 1 km
- + PTS and TTS in low-frequency cetaceans could occur within approximately 20 or 200 m respectively, if the animal remains within that range for 24 h
- + PTS is not predicted in high-frequency cetaceans, although they could experience TTS within 50 m if the animal remains within that range for 24 h.

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 (Clark *et al.*, 2009).

A qualitative assessment of masking was included in ConocoPhillips (2018), which considered the noise from the FPSO facility operations (including offload), the sound levels recorded during the baseline monitoring program (JASCO, 2015). This assessment determined that pygmy blue whales, Omura's and Bryde's whales will experience masking when in the vicinity of the FPSO facility (and therefore the MODU) and, given the lower vocalisation source levels for the latter two species, the area over which masking will occur will be larger than for pygmy blue whales. Masking from the MODU associated activities is expected to be more relevant for Omura's and Bryde's whales because of their more regular presence within the region encompassing the Barossa field from summer through to early spring, whereas the migratory pygmy blue whales will only be affected for a short period of time.

Generally, the spatial and temporal scale of behavioural response effects on marine mammals would be limited to the localised area surrounding the proposed MODU (thousands of metres) and the periods of intensified activities. These ranges will be greater during resupply operations. Because the operations will be focused at a static site, and therefore only influence a small region within the Timor Sea not known to be a critical habitat, significant effects at the population level are not expected.

The Blue Whale Conservation Management Plan requires that "Anthropogenic noise in biologically important areas will be managed such that any blue whale continues to utilise the area without injury, and is not displaced from a foraging area". The potential for injury to blue whales associated with exceedance of PTS and TTS thresholds from MODU and vessel noise sources is limited to <2km from Activity noise sources within the Operational Area. The pygmy blue migration BIA is 171km from the Operational Area and the pygmy blue foraging BIA is 974km from the Operational Area. As such the Activity is not inconsistent with the requirements of the Blue Whale Conservation Management Plan.

#### Potential impacts from acoustic surveying equipment

The sound levels from survey equipment are described in Section 6.1.1.4. MBES/SBES sound levels are outside the auditory range of low frequency species / baleen whales (e.g. humpback and pygmy blue whales) but within the mid-frequency and high-frequency cetacean marine fauna auditory range (e.g. dolphins). However, PTS and TTS thresholds for these species (Table 1) are only expected to be exceeded close to the

source. Due to the lack of aggregating areas in the Operational Area for these species, individuals are expected to be transitory only, displaying behavioural responses, and moving away from the source, before TTS and PTS thresholds are exceeded.

The source levels for LBL and USBL equipment are below those for the MBES/SBES. As the MBES/SBES will not cause the thresholds for physiological impact to be exceeded (Table 6-4), neither will the LBL/USBL equipment. However, threshold for behavioural disturbance (Table 6-4) could be exceeded within 40 m (McPherson, 2020).

Survey equipment could cause masking of vocalisations of cetaceans due to the overlap in frequency range between signals and vocalisations. Masking will primarily apply to high frequency 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 metres from the sound source.

Given that marine mammal presence is likely to be transitory in nature, the likelihood of an individual remaining within the distances above for any length of time is highly unlikely.

Studies of baleen whales (e.g. humpback whales and blue whales) hearing apparatus suggest that their hearing is best adapted for low frequency sounds (Southall et al. 2019) with peak sensitivity range for humpback whales being <10 kHz. Behavioural avoidance of baleen whales may onset from 140 to 160 dB re 1  $\mu$ Pa (NOAA (2019)). Baleen whales display a gradation of behavioural responses to noise, suggesting that acoustic signals are audible to whales at considerable distances from the source, but indicate that whales are not disrupted from normal activities even during migration (Southall et al. 2007).

Given that survey equipment sound levels are typically below marine mammal TTS and PTS onset thresholds, and there are no significant feeding, breeding or aggregation areas for marine mammals within the Operational Area, the likelihood of noise impacts associated with survey equipment are considered remote and limited to temporary behavioural impacts to individual fauna close to the sound source.

The Blue Whale Conservation Management Plan requires that “Anthropogenic noise in biologically important areas will be managed such that any blue whale continues to utilise the area without injury, and is not displaced from a foraging area”. Given that noise levels from survey equipment are below marine mammal TTS and PTS thresholds, and there is no overlap with pygmy blue whale foraging and migration BIAs, there is no inconsistency with the requirements of the Blue Whale Conservation Management Plan.

### 6.1.2.2 Marine reptiles

The Operational Area does not overlap any BIAs for marine reptiles, however individual turtles and seasnakes may transit through the Operational Area. Marine turtles use sounds for navigation, to avoid predators and to find prey (Dow Piniack, 2012). The closest turtle BIA is >50 km from the Operational Area.

There is a paucity of data regarding responses of turtles to acoustic exposure, and no studies of hearing loss due to exposure to loud sounds. Popper et al. (2014) suggested thresholds for onset of mortal injury (including PTS) and mortality for sea turtles and, in the absence of taxon-specific information, adopted the levels for fish that do not hear well (suggesting this would likely be conservative for sea turtles).

Finneran et al. (2017) presented revised thresholds for marine turtle injury and hearing impairment (TTS and PTS). Their rationale is that marine turtles have best sensitivity at low frequencies and are known to have poor auditory sensitivity (Bartol & Ketten, 2006; Dow Piniak et al., 2012; Martin et al., 2012). Accordingly, TTS and PTS thresholds for marine turtles are likely more similar to those of fishes than to marine mammals (Popper et al., 2014).

While numerical thresholds have been developed for impacts of impulsive noise sources to marine turtles (e.g., Finneran *et al.*, 2017), these were not assessed. Rather, the approach defined by Popper *et al.* (2014), also applied in the Barossa Development OPP (ConocoPhillips, 2018) has been applied.

The recommended criteria for impulsive and continuous sound sources are shown in **Table 6-3** and **Table 6-4**.

**Table 6.3: Acoustic effects of continuous noise on sea turtles**

Potential marine fauna receptor	Popper <i>et al.</i> , 2014	
	Masking	Behaviour
Marine turtle	(N) High (I) High (F) Moderate	(N) High (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 metres, intermediate (I) – hundreds of metres, and far (F) – thousands of metres.

**Table 6-4: 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	(N) High	(N) High	(N) High	>210 dB SEL <sub>24h</sub>
	(I) Low	(I) Moderate	(I) Low	(I) Low	or
	(F) Low	(F) Low	(F) Low	(F) Low	>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 metres, intermediate (I) – hundreds of metres, and far (F) – thousands of metres. Sound Exposure Level (SEL). Zero to peak pressure level (PK).

#### Potential impacts from MODU and vessels

Based on the criteria detailed within **Table 6.3** there is a low risk of any injury to marine turtles from Activity vessel noise. Behavioural changes, such as avoidance and diving, are only predicted for individuals near 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.

#### Potential impacts from survey equipment

The sound levels of survey equipment (Section 6.1.1.4) are below those associated with the PK criteria for injury (PTS and TTS) (Table 6 5) beyond a few metres, and are low enough that SEL criteria will not be reached (McPherson and Wood, 2017).

Recoverable injury and TTS could occur within tens of metres applying the relative risk criteria from Popper et al. (2014) (Table 2). Behavioural changes, such as avoidance and diving, are only predicted for individuals in close proximity to the Activity vessels with acoustic sources on board (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 equipment are all outside of the hearing frequency range for turtles (approximately 50 to 2000 Hz, with highest sensitivity to sounds between 200 and 400 Hz) (Bartol and Ketten, 2006; Yudhana et al., 2010; Lavender et al., 2012, 2014).

Impacts to marine turtles from underwater noise generated by survey 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. Behavioural impacts are extremely unlikely due to the signals all being outside the hearing range for turtles, however if they do occur, they will be limited in extent.

### 6.1.2.3 Sharks, rays and fish

There are no known fish aggregation areas in the Operational Area; however, individuals or schools may pass through. The closest area that is considered likely to support site-attached fish is Lynedoch Bank which is located approximately 38 km from the Operational Area. The closest fish or shark BIA is 506 km from the Operational Area (whale sharks).

#### Potential impacts from MODU and vessels

The criteria defined in Popper *et al.* (2014) for continuous noise sources has been applied to the assessment of impacts to sharks, rays and fish (Table 6.4).

**Table 6.4: Continuous noise: criteria for noise exposure for fish (adapted from Popper *et al.*, 2014)**

Potential marine fauna receptor	Mortality and potentially mortal injury	Impairment			Behaviour
		Recoverable injury	TTS	Masking	
Type 1 Fish: No swim bladder (particle motion detection) includes sharks and rays.	(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
Type 2 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
Type 3 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 metres, intermediate (I) – hundreds of metres, and far (F) – thousands of metres.

Based on this study, vessel noise has a low risk of resulting in mortality for all fish types. The risk of recoverable injury to Type 1 and 2 fish is low, however is moderate for TTS and behavioural impacts when fish are within tens of metres of an Activity vessel (Popper *et al.*, 2014). For Type 3 fish, recoverable injury

and TTS may occur within 60 m of the source (McPherson *et al.*, 2019), with a high risk of behavioural impacts occurring within tens of metres of an Activity vessel (Popper *et al.*, 2014).

Potential impacts from survey equipment

Potential impacts from survey equipment on fish have been assessed based on available criteria from Popper *et al.* (2014). Impulsive noises from survey equipment could result in physiological impacts to fish located within metres of the sound source, considering the results presented in **Section 6.1.1.4**. The criteria defined in Popper *et al.* (2014) for impulsive noise sources have been adopted (**Table 6-5**).

**Table 6.5: Impulsive noise: criteria for 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 <sub>24h</sub> or >213 dB PK	>216 dB SEL <sub>24h</sub> or >213 dB PK	>>186 dB SEL <sub>24h</sub>	(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 <sub>24h</sub> or >207 dB PK	203 dB SEL <sub>24h</sub> or >207 dB PK	>>186 dB SEL <sub>24h</sub>	(N) Low (I) Low (F) Low	(N) High (I) Moderate (F) Low
Fish: Swim bladder involved in hearing (primarily pressure detection)	207 dB SEL <sub>24h</sub> or >207 dB PK	203 dB SEL <sub>24h</sub> or >207 dB PK	186 dB SEL <sub>24h</sub>	(N) Low (I) Low (F) Moderate	(N) High (I) High (F) Moderate
Fish eggs and fish larvae	>210 dB SEL <sub>24h</sub> 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 metres, intermediate (I) – hundreds of metres, and far (F) – thousands of metres.*

Behavioural impacts to fish from survey equipment noise may occur in individuals located within hundreds of metres of the source. None of the proposed equipment has energy below 19 kHz, 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 metres. However, as these signals are outside the hearing range of most fish in the region, the risk of impact is reduced.

Sharks are known to be highly sensitive to low frequency sounds between 40-800 Hz sensed solely through the particle-motion component of an acoustic field, Popper et al. (2014). Free ranging elasmobranchs (i.e. sharks) are attracted to sounds possessing specific characteristics – irregular pulse, broadband frequency and transmitted with a sudden increase in intensity (i.e. resembling struggling prey).

#### 6.1.2.4 Invertebrates

Benthic invertebrates are unlikely to be negatively impacted from noise generated from vessel operations. There are no thresholds or guidelines regulating the exposure of marine invertebrates to underwater noise.

##### Potential impacts from MODU and vessels

Stress responses to non-impulsive sound exposure have been documented for marine invertebrates. The worst-case consequence for individual animals can be expected to be moderate to major, but due to the limited spatial extent of the affected area population consequences are considered to be minor.

There is no systematic information available if and to which extent marine invertebrates use acoustic cues to communicate with conspecifics or their environment. Anecdotal information indicates no functional relevance of sound for these animals; vibration, such as ground-borne or near-field particle motion, however, can be assumed to have functional relevance as it provides information about potential food availability or approaching predators. This information could potentially be masked by the noise/particle motion emitted by the vessels even though this effect would be limited to the direct vicinity to noise generating sources. The consequence of (acoustic/vibrational) masking is considered to be, in the worst case, moderate for individuals. Due to an expected limited number of individuals experiencing this masking, it would have a negligible on a population level.

There are limited and inconclusive data available on the potential for behavioural responses and noise-induced physical effects on marine invertebrates. Theoretically, behavioural responses as well as significant sensory impairment or injury can have moderate consequences for an individual. In the absence of conclusive scientific information on the scope of these effects and the animals' ability to compensate for the effects, however, it is impossible to assess the consequences of behavioural responses and noise-induced impairment or injury.

Plankton, including fish eggs and larvae, and pelagic invertebrates could drift close to high energy noise sources (for example, bow thrusters). However, any negative impacts that could occur would be restricted to within metres of the sound source.

##### Potential impacts from survey equipment

For impulsive noise and benthic invertebrates, the source is an important consideration in the assessment.

Any negative impacts on plankton and invertebrates that could occur would be restricted to within metres of the sound source. At such a localised extent, impacts would be negligible at an ecosystem or population level.

There are no thresholds or information available for assessing the potential impacts from high-frequency sources such as MBES/SBES on either water column or benthic invertebrates. These sources are often used to assess and quantify plankton densities, including within McCauley et al. (2017), who used a Simrad EK60 echosounder operating at 120 kHz. There are no low-frequency sound sources proposed to be used (e.g. a boomer sub-bottom profiler).

#### 6.1.2.5 Cultural Features

During consultation meetings with Tiwi Clans concerns were raised about the impact of drilling on their dreaming totems (including turtle totems).

Tiwi clients of the EDO also raised concerns about the potential impacts to marine life by noise and lights from the activity; and the potential impacts of loud noises and vibrations that could harm imunga (spiritual



places that are often connected to other sites) and marine species, which could in turn harm Tiwi people. Other concerns were raised by Tiwi clients of the EDO in relation to potential impacts to the health of land and sea country which could in turn impact access to food through traditional hunting and fishing, and that if totemic species (e.g. turtles) are impacted by the Activity this can impact Tiwi people and make them sick.

Santos notes that almost 900 wells have been drilled previously in the region, and there is also significant historical and ongoing industrial shipping and fish trawling activities in the area that may be affected by the Activity in this EP. There is no evidence to support actual adverse effects from the actions of spiritual beings in response to impacts on the environment from those activities.

Santos understands the spiritual protection believed to be afforded to the Tiwi people is broadly maintained by protecting the features of the natural environment and through ceremonial practices alerting the spiritual beings to the presence of people travelling through country and the like.

### Summary of impacts across all potential receptors

Continuous noise levels from the MODU, helicopters and vessels that may cause behavioural responses to marine fauna are expected to generally be confined to the Operational Area and concentrated within a radius of a few hundred metres of the noise source to 11.4 km, depending on the noise sources and operations.

Noise effects to fish of potential commercial value would be restricted to within hundreds of metres of the noise source.

Impulsive noise generated from survey and positioning equipment would be limited to individual marine turtles located within tens of metres of the sound source. Behavioural impacts to fish from survey equipment noise may occur in individuals located within hundreds of metres of the source.

Survey and positioning equipment could cause masking of vocalisations of cetaceans, but would be limited to within hundreds of metres from the sound source.

PTS and TTS thresholds for marine mammals are only expected to be exceeded close to the source. Due to the lack of significant feeding, breeding or aggregating areas for these species and absence of any marine mammal BIAs within the Operational Area, individuals are expected to be transitory only, displaying behavioural responses, and moving away from the source, before TTS and PTS thresholds are exceeded.

No effects to benthic invertebrates expected, including those of commercial value (e.g., scampi).

No biologically important areas occur within the Operational Area.

Feedback from First Nations peoples during consultation of relevance to the EMBA identified concerns about potential impacts from noise generating activities on totemic species and access to food through traditional hunting and fishing.

### 6.1.2.6 Potential Cumulative Impacts

The Barossa GEP Installation EP ([https://info.nopsema.gov.au/activities/353/show\\_public](https://info.nopsema.gov.au/activities/353/show_public)) assessed potential impacts to a range of sensitive marine fauna. Impacts to marine mammals and marine turtles 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, and the closest BIAs are located outside the area predicted to exceed thresholds for behavioural, masking or physiological impacts. 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. And 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 from GEP installation activities is further reduced as the pipeline installation vessels will be slow 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 fauna behavioural responses to noise from drilling operations are expected to generally be confined to the Operational Area and concentrated within a radius of a few hundred metres of the noise source, depending upon the noise sources and operations.

Notwithstanding the potential for overlap of the extent of noise effects from drilling and GEP operations, due to the absence of significant feeding, breeding or aggregations areas and marine fauna BIAs within or adjacent to the Operational Area (the closest marine fauna BIA is >50km from the Operational Area), the short duration of overlap (no more than 4 weeks) and the distance between activities, neither additive or cumulative noise effects from GEP installation activities are expected.

### 6.1.3 Environmental performance outcomes and control measures

The EPO relating to this event is:

- + No injury or mortality to EPBC Act listed marine fauna (EPO-05)
- + No significant impacts to cultural features from the Activity. [EPO-09]

An assessment of the environmental benefits and the potential costs or issues associated with control measures for this Activity are shown in **Table 6.6** to demonstrate the potential impacts from this aspect are ALARP. Control measures that are adopted have associated EPSs and measurement criteria which are presented in **Table 8.2**. Rejected control measures have an ALARP evaluation provided to justify their rejection.

**Table 6.6: Control measure evaluation for noise emissions**

CM reference	Control measure	Environmental benefit	Potential cost/issues	Evaluation
Standard controls				
BAD-CM-001	Procedure for interacting with marine fauna	Reduces risk of physical and behavioural impacts to marine fauna, because if they are sighted, vessels can slow down or move away.	Marine fauna interaction restrictions, such as vessel and helicopter speed and direction, are based on legislated requirements and must be adopted.	<b>Adopted</b> – benefits in reducing impacts to marine fauna outweigh the costs incurred by Santos. Control drives compliance with EPBC Regulations (Part 8).
BAD-CM-037	Marine assurance standard [DC-CM-041]	Assurance process ensures contracted vessels are operated, maintained and crewed in accordance with regulatory requirements and relevant Santos procedures cited in this EP.	Marine assurance is a standard control for all vessels contracted to Santos.	<b>Adopted</b> – benefits in reducing noise impacts.

CM reference	Control measure	Environmental benefit	Potential cost/issues	Evaluation
BAD-CM-040	MODU Planned Maintenance System (PMS). [DC-CM-044]	Regular planned maintenance ensures noise from equipment is reduced to as low as reasonably practicable within design/operating limits.	Regular planned maintenance business as usual activity for safe MODU operations.	<b>Adopted</b> – benefits in reducing noise impacts.
BAD-CM-041	Vessel planned maintenance system [DC-CM-045]	Regular planned maintenance ensures noise from equipment is reduced to as low as reasonably practicable within design/operating limits.	Regulator planned maintenance business as usual activity for safe vessel operations.	<b>Adopted</b> – benefits in reducing noise impacts.
<b>Additional controls</b>				
BAD-CM-049	Cultural Heritage training and cultural ceremony	Shows respect for beliefs of First Nations people.	Time and cost to work with First Nations communities	<b>Adopted</b> – benefits considered to outweigh costs
N/A	Dedicated Marine Mammal Observer (MMO)	Improved ability to spot and identify marine fauna.	Additional cost of contracting several specialist marine fauna observers. Even if marine fauna are identified, noise sources cannot be shut down in the event marine fauna are detected, since they are integral to safe operation of vessels.	<b>Rejected</b> – cost disproportionate to increase in environmental benefit given no biologically important areas overlap the Operational Area (or are close to the Operational Area).

CM reference	Control measure	Environmental benefit	Potential cost/issues	Evaluation
N/A	Manage the timing of the Activity to avoid sensitive periods such as migration (whales), spawning (fish) or nesting (turtles)	Reduces potential impacts to fauna during key life stages.	Reduces the window of opportunity for undertaking the Activity. High costs associated with demobilising and remobilising (Activity will take more than 12 months to complete).	<b>Rejected</b> – not considered necessary or feasible. The Operational Area does not overlap with any BIAs and therefore seasonal presence of species is not expected to be higher at certain times of the year. It is recognised that the Omura’s whale has seasonal variability in the region, but this is not an EPBC listed species. Additionally, given the low potential impacts to individual fauna, significant impacts to migratory or nesting behaviours are not expected, therefore, no impacts at population level are predicted.
N/A	Helicopters will not land or take off if marine megafauna are present in the vicinity of the MODU	Reduces potential impacts to fauna.	May impact safety during landing or take off.	<b>Rejected</b> – increased exposure risk to passengers. Risk of exhausting fuel supplies.

### 6.1.4 Environmental impact assessment

Receptor	Consequence level
Noise from operations of vessels, MODU and equipment	
Threatened, migratory or local fauna	<p>Potential impacts due to underwater noise are limited to within 12 km of operating Activity vessels (LWIV, MODU, support vessel) for all threatened or migratory marine fauna. Within this extent, no BIAs are present or in close proximity to the Operational Area.</p> <p>Several cetacean species may transit through the Operational Area. Behavioural impacts may include increased swimming speed, changes in dive behaviour and/or avoidance of the area. Such impacts will be temporary with no significant impacts to individuals or populations.</p> <p>The operation within the Activity which is associated with the greatest ranges to effect is when vessels are under dynamic positioning, which is either during MODU anchor handling operations or resupply. During these activities, there is potential for TTS to occur within the order of 50 m and 1,860 m from the source for high frequency and low frequency cetaceans, respectively. Further, the potential for PTS in low frequency cetaceans is estimated to be within 70 m of the source. It is, however, anticipated that individuals will show avoidance behaviour in response to the continuous noise sources before respective TTS and PTS thresholds are exceeded.</p> <p>Impulsive noise generated from survey and positioning equipment would be limited to individual marine turtles located within tens of metres of the sound source, noting that the closest marine turtle BIA is &gt;50km from the Operational Area.</p> <p>Behavioural impacts to fish from survey equipment noise may occur in individuals located within hundreds of metres of the source.</p> <p>Survey equipment could cause masking of vocalisations of cetaceans, but would be limited to within hundreds of metres from the sound source.</p> <p>PTS and TTS thresholds for marine mammals are only expected to be exceeded close to the source. Due to the lack of aggregating areas for these species and significant distances to the nearest marine mammal BIA, individuals are expected to be transitory only, displaying behavioural responses, and moving away from the source, before TTS and PTS thresholds are exceeded.</p> <p>In the Recovery Plan for Marine Turtles in Australia, noise interference to marine turtles is dependent on whether the exposure is short (acute) or long-term (chronic). The noise generated by this Activity is acute with impacts restricted to localised changes in behaviour within hundreds of metres of the source. The Operational Area is greater than 50 km from the nearest BIA for marine turtles, and no aggregations are expected. Therefore, potential behavioural impacts to marine turtles are expected to be localised and not significant at the individual and population level.</p> <p>Potential impacts to threatened or migratory shark or ray species are limited to the potential for behavioural responses within hundreds of metres of the source. While there is the potential for TTS within this range, this is not expected due to noise avoidance behaviour.</p> <p>Site attached fish are not expected within approximately 38 km of the Operational Area. Potentially present demersal and pelagic fish are expected to move away from noise at levels that could cause PTS and TTS.</p>

Receptor	Consequence level
Noise from operations of vessels, MODU and equipment	
Physical environment or habitat	Not applicable – noise will not impact the physical environment itself (including the ‘Shelf break and slope of the Arafura Shelf’ KEF that overlaps the Operational Area). Species associated with the continental slope and patch reefs that characterise this KEF (such as demersal fish, whale sharks, sharks and turtles) are unlikely to aggregate within the Operational Area due to the lack of seafloor features. However, potential impacts to these species are described above.
Threatened ecological communities	Not applicable – no threatened ecological communities identified in the area over which noise emissions are expected.
Protected areas	Not applicable – no protected areas identified in the area over which noise emissions are expected.
Socio-economic receptors	The consequence of noise emissions on receptors is assessed as I – Negligible. Impacts to fauna, including fish and other marine species is likely to be limited to temporary behavioural impacts within a 12 km radius around activities, and will not result in significant impacts to marine species at the individual or population level. There is limited activity by Australian commercial fishers that overlaps the Operational Area, and activity by Indonesian commercial fishers is not expected in Perth Treaty waters adjacent to the Operational Area. Given the negligible consequence to species, subsequent impacts to commercial fish stock are not anticipated.
Cultural Features	<p>For assessment of impacts to marine species that are of cultural significance and/or represent a traditional food source for first nations groups, refer to the assessment for threatened, migratory or local fauna.</p> <p>Feedback provided by Tiwi clients of the EDO during consultation raised concerns about their cultural and spiritual beliefs, which were not linked to a specific location or place. It was observed that other Tiwi Islands Relevant Persons did not identify similar concerns.</p> <p>Santos notes that almost 900 wells have been drilled previously in the region, and there is also significant historical and ongoing industrial shipping and fish trawling activities in the area that may be affected by the Activity in this EP. There is no evidence to support actual adverse effects from spiritual beings in response to impacts on people or the environment from these activities.</p> <p>Notwithstanding, in response to the concerns raised by some First Nations people, Santos acknowledges the recommendations by Tiwi people as suggested to Dr Corrigan and has considered them for adoption where practicable and appropriate.</p>
Overall worst-case consequence	I – Negligible

### 6.1.5 Demonstration of as low as reasonably practicable

The use of the MODU and vessels is unavoidable if the operational activities are to proceed as required on a 24-hour-a-day basis.

The vessels are expected to produce similar noise emissions to other marine vessels that frequent or transit through the vicinity of the Operational Area.

The use of helicopters to transfer personnel to and from the MODU is necessary to allow operational activities to occur safely and effectively, with some personnel required to be rotated to and from other locations, and to provide for a rapid method of transferring to and from the MODU in the case of an emergency. A performance standard prohibiting helicopters from landing or taking-off in the presence of marine megafauna would introduce an unacceptable risk to human life.

Intermittent flaring during well flowback is essential for safety reasons.

The use of survey and positioning equipment are required to ensure accurate positioning and safe construction of the Barossa development wells, and safe positioning and operation of the MODU and support vessels.

In relation to spiritual and/or cultural heritage beliefs and connections to sea country and related concerns of some Tiwi Islanders, Dr Corrigan reported the suggestions of a number of senior and authoritative Tiwi Islanders who informed him as to culturally appropriate responses. On the basis that the most appropriate way to show respect for concerns related to spiritual/cultural beliefs is through culturally appropriate measures as recommended by First Nations people, Dr Corrigan's recommendations have been adopted where any First Nations Relevant Person raises similar concerns. Santos considers that the adopted control measure (BAD-CM-049) based on Dr Corrigan's recommendations will reduce environmental impacts and risks to ALARP, as relevant to First Nations individuals who hold these concerns in relation to their beliefs.

All reasonably practicable control measures have been reviewed and those adopted are considered appropriate to manage the impacts such that the residual consequence is assessed to be I – Negligible. The proposed management controls are in accordance with the Santos risk management criteria and are considered appropriate to reduce impacts to ALARP.

## 6.1.6 Acceptability evaluation



Is the consequence ranked as I or II?	Yes – maximum consequence from noise emissions is I – Negligible.
Is further information required to validate the consequence assessment?	No – potential impacts and risks are well understood through the information available.
Are the risks and impacts consistent with the principles of ecologically sustainable development (ESD)?	Yes – Activity evaluated in accordance with Santos’ Offshore Division <i>Environmental Hazard Identification and Assessment Guideline</i> which considers principles of ESD.
Have the acceptable levels of impact and risks been informed by relevant species recovery plans, threat abatement plans and conservation advice and Australian marine park zoning objectives?	<p>Yes – Controls implemented will minimise the potential impacts from the Activity to species identified in recovery plans and conservation advice, as having the potential to be impacted by noise emissions.</p> <p>Consistent with relevant species recovery plans, conservation management plans and management actions set out in <b>Table 3.8</b>, including:</p> <ul style="list-style-type: none"> <li>+ Recovery Plan for Marine Turtles in Australia 2017–2027 (DoEE, 2017)</li> <li>+ Approved Conservation Advice for <i>Balaenoptera borealis</i> (sei whale) (TSSC, 2015a)</li> <li>+ Approved Conservation Advice for <i>Balaenoptera physalus</i> (fin whale) (TSSC, 2015b)</li> <li>+ Marine Bioregional Plan for the North-West Marine Region (CoA, 2012b).</li> <li>+ Conservation Management Plan for the blue whale 2015-2025 (CoA, 2015a)</li> </ul>
Are performance outcomes, control measures and associated performance standards consistent with legal and regulatory requirements?	Yes – management consistent with EPBC Regulations Part 8. Through acceptance of this EP, legislative and regulatory requirements will be met as per <b>Section 1.6.2</b> .
Are performance outcomes, control measures and associated performance standards consistent with Santos’ Environment, Health and Safety Policy?	Yes – aligns with Santos’ Environment, Health and Safety Policy.
Are performance outcomes, control measures and associated performance standards consistent with industry standards?	Yes – the most recent and comparable Drilling Eps accepted by NOPSEMA have been reviewed for consistency with the performance outcomes, control measures and associated performance standards proposed in this EP.
Have Performance outcomes, control measures and associated performance standards taken into consideration Relevant Persons feedback?	<p>Yes – objections and claims raised by Relevant Persons relating to noise emissions from the Activity in the Operational Area have been considered. Additional control measures have been adopted.</p> <p>For those First Nations Relevant Persons who raised concerns in relation to their beliefs about the potential for adverse effects from spiritual beings in response to impacts on people or the environment from these activities, Santos has adopted control measure (BAD-CM-049) which was informed by Dr Corrigan’s recommendations and the suggestions of a number of senior and authoritative Tiwi Islanders about culturally appropriate responses.</p>

<b>Are performance standards such that the impact or risk is considered to be ALARP?</b>	Yes – ALARP assessment conducted, with no additional control measures adopted.
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The consequence of noise emissions on receptors is assessed as I – Negligible. Based on an assessment of Santos’ acceptability criteria and with the control measures in place, potential impacts are considered acceptable.

## 6.2 Light emissions

### 6.2.1 Description of event

<b>Event</b>	<p>Potential impacts from light emissions may occur in the Operational Area from:</p> <ul style="list-style-type: none"> <li>+ safety and navigational lighting on the MODU</li> <li>+ safety and navigational lighting on the vessels</li> <li>+ spot lighting used on an as-needed basis, such as equipment deployment and retrieval</li> <li>+ light from flaring during well flowback.</li> </ul> <p>Lighting will consist of bright white (i.e., metal halide, halogen, fluorescent) lights typical of lighting used in the offshore petroleum and maritime industries, including shipping and fishing.</p>
<b>Extent</b>	<p>Localised light 'spill' on surface waters surrounding the MODU and vessels.</p> <p>Direct line of sight may be visible up to 52.4 km from the MODU (short duration intermittent flaring).</p> <p>The Barossa Gas Export Pipeline (GEP) installation activity is planned to occur concurrently with drilling activities under this EP within the Drilling Operational Area for a total duration of approximately 4 weeks. GEP activities will be undertaken at least 3.8 km from the drill centres.</p>
<b>Duration</b>	<p>Navigational and task lighting is required 24 hours a day for the duration of the Activity. Flaring is a short duration intermittent source of light emission which typically occurs for an average of two to three days during well flowback for each well.</p>

### 6.2.2 Nature and scale of environmental impacts

**Potential receptors:** threatened, migratory or local fauna (marine mammals, marine turtles, sharks, rays, fish and seabirds); socio-economic (including cultural features).

Due to the size and height of the MODU, light from the MODU will be more visible than from the largest Activity vessel and therefore MODU lighting has been used to determine the worst-case distance that light may be visible during the Activity.

Lighting from a MODU was assessed in detail in the *Browse to NWS Project Draft Environmental Impact Statement (EIS)/Environmental Review Document (ERD)* (Woodside, 2019). A line-of-sight assessment was undertaken and predicted that direct light may be visible up to 26.6 km from the rig (derrick lights), increasing to 52.4 km during intermittent emergency flare (best available analogue to well flowback) (Woodside, 2019). At these distances, the light sources would be visible as small points on the horizon. The line-of-sight calculations are considered conservative as they do not allow for attenuation of light with distance.

Lighting impacts are not only related to the amount of artificial light, but also the types of light and the wavelengths that the different light types emit. Measurements of light emitted from a MODU recorded peak wavelengths between 530 to 620 nm, which is within the range that is visible to marine turtles and seabirds (300 to >700 nm) (Woodside, 2019). Light emitted from a natural gas flare recorded peak wavelengths between 750 to 900 nm (Pendoley, 2000 in Woodside, 2019). While this peak is outside the visible spectrum which is most disruptive to wildlife, including marine turtles and seabirds (CoA, 2019), light emissions from gas flares tend to be high intensity which is also an important factor. Therefore, light emissions from gas flares still pose a potential risk to wildlife.

Continuous lighting in the same location for an extended period of time may result in alterations to fauna behaviour, the specific impacts on different fauna groups is described below. The combinations of colour,

intensity, closeness, direction and persistence of a light source are key factors in determining the magnitude of environmental impact (EPA, 2010).

### 6.2.2.1 Marine mammals

While no marine mammal BIAs overlap the Operational Area, individual species are likely to be present. Marine mammals are not known to be attracted to light sources at sea. Cetaceans predominantly use acoustic senses to monitor their environment rather than visual cues (Simmonds *et al.*, 2004).

### 6.2.2.2 Marine reptiles

The Operational Area does not intersect any BIAs for marine reptiles. The closest BIA lies over 50 km away, which is an interesting buffer for flatback turtles outside the area affected by light emissions. Individual species may traverse the Operational Area but only on an infrequent basis.

Marine turtles are particularly sensitive to artificial lighting, which is known to disrupt breeding adult turtles, post-emergent hatchlings and hatchlings dispersing in nearshore waters (Limpus, 1971; Salmon *et al.*, 1992; Limpus, 2007, 2008a, 2008b, 2009a, 2009b; Wilson *et al.*, 2018). However, potential impacts to foraging turtles are limited to local attraction to prey species attracted to light (Kebodeaux, 1994). Marine turtles do not feed during the breeding season (Limpus *et al.*, 2013), and light is not a cue to interesting behaviours. Therefore, potential impacts of artificial light to interesting turtles are not considered likely, and not discussed further.

The *Recovery Plan for Marine Turtles in Australia 2017–2027* (DoEE, 2017) highlights artificial light as a threat to marine turtles. Specifically, the plan indicates that artificial light may reduce the overall reproductive output of a stock, and therefore recovery of the species, by:

- + inhibiting nesting by females
- + disrupting hatchling orientation and sea-finding behaviour
- + creating pools of light that attract swimming hatchlings and increase their risk of predation.

The most significant risk posed to marine turtles from artificial lighting is the potential disorientation of hatchlings following their emergence from nests by light spill on beaches, although breeding adult turtles can also be disoriented (Longcore & Rich, 2016, in EPA, 2010). The nearest turtle nesting beaches are greater than 131 km from the Operational Area.

Adult turtles have been observed feeding on prey presumed to be attracted by lights of oil production platforms in the Gulf of Mexico (Kebodeaux, 1994). However, illuminating fishing nets has been shown to reduce the bycatch of green turtles as they are thought to alert them to the presence of a net (Ortiz *et al.*, 2016). This suggests that, although aggregation of foraging turtles may occur around light sources as a secondary response to effects of light on prey distribution, light does not appear to act as a cue to foraging behaviour.

### 6.2.2.3 Sharks, rays and fish

Fish at the surface of the water have the potential to be impacted by artificial light. The response of fish to light emissions varies according to species and habitat. Experiments using light traps have found that some fish and zooplankton species are attracted to light sources (Meekan *et al.*, 2001), with traps drawing catches from up to 90 m away (Milicich *et al.*, 1992). Lindquist *et al.* (2005) concluded from a study that artificial lighting associated with offshore energy industry activities resulted in an increased abundance of clupeids (herring and sardines) and engraulids (anchovies). These species are known to be highly photopositive. The artificial light serves to focus their marine plankton prey and consequently leads to enhanced foraging success.

Sharks and rays are not known to be significantly attracted to light sources at sea. However, they may be attracted to the fish that are attracted to the light.

#### 6.2.2.4 Seabirds

Seabirds may either be attracted by the light source itself or indirectly as structures in offshore environments tend to attract marine life at all trophic levels, creating food sources and providing artificial shelter for seabirds (Surman, 2002). Offshore light sources may also provide enhanced capability for seabirds to forage at night. Artificial light can disorient seabirds, disrupt natural foraging and migratory behaviours, and potentially cause injury through interaction with infrastructure.

Species with a nocturnal component to their life history, such as fledging shearwaters, are most vulnerable to negative effects of artificial light. Two shearwater species were identified in **Section 3.2.6**, of these, only the wedge-tailed shearwater breeds in Australia. While individuals may be present within the Operational Area, the nearest wedge-tailed shearwater BIA is located more than 700 km from the Operational Area (**Table 3.7**), and the nearest breeding colony further still. At these distances, fledglings are not expected to occur in the Operational Area. While adult shearwaters may traverse the Operational Area, they will not be undertaking behaviours that are vulnerable to impacts of artificial light.

#### 6.2.2.5 Protected and significant areas

The Operational Area is 33 km from the nearest protected area (Oceanic Shoals AMP), which is a submerged receptor. At this distance MODU lighting would only potentially be detectable for short durations while flaring during well flowback.

#### 6.2.2.6 Cultural Features

Information provided by some Tiwi people raised concerns about the potential impacts of lights on marine turtles from the Activity, and potential impacts to marine life generally, and that if totemic species (e.g. turtles) are impacted by the Activity this can impact Tiwi people and make them sick.

#### 6.2.2.7 Potential Cumulative Impacts

The Barossa GEP Installation EP ([https://info.nopsema.gov.au/activities/353/show\\_public](https://info.nopsema.gov.au/activities/353/show_public)) concluded the potential for light impacts to marine fauna to occur within approximately 3.3km of the pipelay vessel, and that substantial adverse impacts from artificial light are otherwise not credible.

Given the negligible light impacts from GEP installation, and considering the absence of significant feeding, breeding or aggregations areas and marine fauna BIAs within the Operational Area, the short duration of overlap and the distance between activities, neither additive or cumulative light effects from GEP installation activities are expected.

### 6.2.3 Environmental performance outcomes and control measures

The EPO relating to this event is:

- + No significant impacts to marine fauna from lighting emissions. (EPO-08)
- + No significant impacts to cultural features from the Activity. [EPO-09]

An assessment of the environmental benefits and the potential costs or issues associated with control measures for this Activity are shown in **Table 6.7** to demonstrate the potential impacts from this aspect are ALARP. Control measures that are adopted have associated EPSs and measurement criteria which are presented in **Table 8.2**. Rejected control measures have an ALARP evaluation provided to justify their rejection.

**Table 6.7: Control measure evaluation for light emissions**

CM reference	Control measure	Environmental benefit	Potential cost/issues	Evaluation
<b>Standard controls</b>				
BAD-CM-034	Minimum lighting for safe work and navigation	Light spill from unnecessary lighting reduced, further lowering potential additional light pollution to the environment, thus reducing the potential impacts to fauna.	Lighting is required to ensure safe working conditions, and to alert other users of the sea to the MODU and vessel presence.	<b>Adopted</b> – requirement to comply with maritime and safety regulations.
<b>Additional controls</b>				
N/A	Manage the timing of the Activity to avoid sensitive periods	Negligible due to the remote offshore location, absence of receptors in vulnerable life stages, and nature and scale of potential light impacts ie. Temporary and short duration.	As the Activity will be greater than 12 months in duration there would be a high cost to demobilise and remobilise the MODU and vessels.	<b>Rejected</b> – the high financial cost would be grossly disproportionate to negligible environmental benefits. The Operational Area is not located in an area that is likely to cause impact to turtle nesting or hatching, or seabird breeding, and therefore timing the Activity to avoid this would not change the potential environmental impacts
N/A	Implement light management actions recommended in the National Light Pollution Guidelines for Wildlife Including Marine Turtles, Seabirds and Migratory Shorebirds (DoEE, 2020), including: <ul style="list-style-type: none"> <li>+ switch off outdoor/deck lights when not in use</li> <li>+ use available block-out blinds on portholes and windows not necessary for</li> </ul>	Would result in reduced light spill from internal lighting onto the sea surface, potential reduce overall light emissions, and reduce the consequence of any seabird interactions.	Potential re-engineering of vessel (lighting management systems and blackout blinds).	<b>Rejected</b> – control considered unwarranted considering the Operational Area is not located in an area that is likely to cause impact to turtle nesting or hatching, or seabird breeding, and therefore would not change the potential environmental impacts. 24 hour/day drilling activities require a safe standard of lighting.

CM reference	Control measure	Environmental benefit	Potential cost/issues	Evaluation
	<p>safety or navigation at night</p> <p>+ shielding/shrouding on external lights</p>			
N/A	Change the wavelength of outdoor lights to avoid wavelengths within the peak sensitivity of turtles and seabirds	Negligible due to the absence of turtle and seabirds in vulnerable life stages within the Operational Area.	High cost to change MODU and vessel lights. Navigational lighting colours are stipulated by law. Working and egress areas are required to be illuminated for health and safety reasons.	<b>Rejected</b> – the high financial cost would be grossly disproportionate to negligible environmental benefits. Health and safety reasons, and maritime regulations, dictate lighting requirements.
N/A	Limit or exclude night-time operations	Would reduce light emissions to the marine environment.	Would double the duration of the Activity resulting in significant financial costs.  Minimum maritime and safety lighting would still be required.	<b>Rejected</b> – the high financial cost would be grossly disproportionate to negligible environmental benefits.
N/A	Use of dark, matte surfaces on MODU and vessels	Would reduce reflection and scattering of light resulting in skyglow.	Additional cost to repaint surfaces. Some areas may require lighter surfaces to manage heat conduction for health and safety. Unlikely to result in a material light reduction.	<b>Rejected</b> – the high financial cost would be grossly disproportionate to negligible environmental benefits. May compromise health and safety in some circumstances.
N/A	No flaring	Eliminates artificial light associated with flaring.	There is no safe and feasible alternative to flaring to complete wells safely.	<b>Rejected</b> – no flaring would introduce an unacceptable safety risk.

## 6.2.4 Environmental impact assessment

Receptor	Consequence level
Light emissions	
Threatened, migratory or local fauna	<p>Sensitive receptors that may be impacted by light emissions in the same location for an extended period of time include fish at the surface, marine turtles and seabirds.</p> <p>The National Light Pollution Guidelines for Wildlife Including Marine Turtles, Seabirds and Migratory Shorebirds (DoEE, 2020) states a 20 km threshold provides</p>

Receptor	Consequence level
	<p>a precautionary limit based on observed effects of sky glow on marine turtle hatchlings and fledgling seabirds.</p> <p>The closest turtle BIA is &gt;50 km from the Operational Area. The closest land from which seabirds may fledge is around 131 km (Tiwi Islands), which do not support breeding colonies of wedge-tailed shearwaters, the species most vulnerable to impacts to artificial light.</p> <p>Therefore, night-time Activity lighting from the Activity is expected to have a negligible impact on breeding or hatchling turtles and seabirds. Considering the distance from the nearest nesting beach and wedge-tailed shearwater breeding colony, the density of post-dispersal turtle hatchlings and wedge-tailed shearwater fledglings in the Operational Area is also considered low.</p> <p>In considering the distance to the nearest marine turtle BIA (&gt;50 km), impacts to turtles from operational Activity lighting are expected to be restricted to localised attraction and temporary disorientation, but with no long-term or residual impact. It is considered that the Activity will not compromise the objectives as set out in the Recovery Plan for Marine Turtles in Australia 2017–2027 (DoEE, 2017).</p> <p>Fish and sharks have been shown to be attracted to artificial light sources however, the Activity is unlikely to lead to large-scale changes in species abundance or distribution. Overall, a short-term localised increase in fish activity is expected to occur as a result of lighting from the MODU and vessels and from flaring during well flowback; however, with negligible impacts to the local fish population. Impacts to transient fish and sharks will therefore be limited to short-term behavioural effects with no decrease in local population size or area of occupancy of species, loss or disruption of critical habitat, or disruption to the breeding cycle.</p> <p>Therefore, the consequence level for threatened, migratory or local fauna is considered to be I – Negligible.</p>
Physical environment or habitat	Not applicable – no impacts to physical environments and/or habitats from light emissions are expected. Impacts from light are not predicted at the seabed and therefore no impact to the ‘Shelf break and slope of the Arafura Shelf’ KEF and its values is predicted.
Threatened ecological communities	Not applicable – no threatened ecological communities identified in the area over which light emissions are expected.
Protected areas	Not applicable – the Operational Area does not intercept any protected areas.
Socio-economic receptors	<p>The consequence of light emissions on receptors is assessed as I – Negligible. Impacts to fauna, including fish and other marine species is likely to be limited to localised, temporary behavioural impacts and will not result in significant impacts to marine species at the individual or population level.</p> <p>In considering the distance to the nearest marine turtle BIA (&gt;50 km), impacts to turtles from operational Activity lighting are expected to be restricted to localised attraction and temporary disorientation, but with no long-term or residual impact. Given the negligible consequence to species, subsequent impacts to socio-economic receptors including commercial fishing are not anticipated.</p> <p>Lighting is not expected to cause an impact to other socio-economic receptors other than to act as a visual cue for avoidance of the area by other marine users for safety purposes.</p> <p>The consequence level for socio-economic receptors is considered to be I – Negligible.</p>



Receptor	Consequence level
Cultural Features	For assessment of impacts to marine species that are of cultural significance, and concerns about potential impacts to Tiwi people if totemic species are harmed, refer to the assessment for threatened, migratory or local fauna.
Overall worst-case consequence	I – Negligible

### 6.2.5 Demonstration of as low as reasonably practicable

Artificial lighting is required 24 hours a day for operational and navigational safety during the Activity. All reasonably practicable control measures have been reviewed and those adopted are considered appropriate to manage the impacts such that the residual consequence is assessed to be I – Negligible. The proposed management controls are in accordance with the Santos risk management criteria and are considered appropriate to manage impacts to ALARP.

### 6.2.6 Acceptability evaluation

Is the consequence ranked as I or II?	Yes – maximum consequence from light emissions is I – Negligible.
Is further information required to validate the consequence assessment?	No – potential impacts and risks are well understood through the information available.
Are risks and impacts consistent with the principles of ESD?	Yes – Activity evaluated in accordance with Santos' <i>Offshore Division Environmental Hazard Identification and Assessment Guideline</i> which considers principles of ESD.
Have the acceptable levels of impact and risks been informed by relevant species recovery plans, threat abatement plans and conservation advice and Australian marine park zoning objectives?	<p>Yes – consistent with relevant species recovery plans, conservation management plans and management actions set out in <b>Table 3.8</b> include:</p> <ul style="list-style-type: none"> <li>+ National Light Pollution Guidelines for Wildlife Including Marine Turtles, Seabirds and Migratory Shorebirds (DoEE, 2020)</li> <li>+ Marine Bioregional Plan for the North-West Marine Region (CoA, 2012b)</li> <li>+ Recovery Plan for Marine Turtles in Australia 2017–2027 (DoEE, 2017).</li> </ul> <p>The Activity will not compromise the objectives as set out in the Recovery Plan for Marine Turtles in Australia or the National Light Pollution Guidelines for Wildlife Including Marine Turtles, Seabirds and Migratory Shorebirds (DoEE, 2020) as biologically important behaviours of nesting adults and emerging/dispersing hatchlings can continue given the distance from the nearest nesting beaches.</p>
Are performance outcomes, control measures and associated performance standards consistent with legal and regulatory requirements?	Yes – management consistent with International Convention of the Safety of Life at Sea (SOLAS) 1974 and the <i>Navigation Act 2012</i> . Through acceptance of this EP, legislative and regulatory requirements will be met as per <b>Section 1.6.2</b> .
Are performance outcomes, control measures and associated performance standards consistent with Santos' Environment, Health and Safety Policy?	Yes – aligns with Santos' Environment, Health and Safety Policy.

<b>Are performance outcomes, control measures and associated performance standards consistent with industry standards?</b>	Yes – the most recent and comparable Drilling and Completions Eps accepted by NOPSEMA have been reviewed for consistency with the performance outcomes, control measures and associated performance standards proposed in this EP.
<b>Have performance outcomes, control measures and associated performance standards taken into consideration Relevant Person feedback?</b>	Yes – objections or claims raised by Relevant Persons relating specifically to lighting in the Operational Area have been considered. Existing control measures are considered sufficient.
<b>Are performance standards such that the impact or risk is considered to be ALARP?</b>	Yes – ALARP assessment conducted, with no additional control measures adopted.

The consequence of light emissions on receptors is assessed as I – Negligible. Based on an assessment of Santos’ acceptability criteria and with the control measures in place, potential impacts are considered acceptable.

## 6.3 Atmospheric emissions

### 6.3.1 Description of event

<b>Event</b>	<p>Atmospheric emissions may occur from:</p> <ul style="list-style-type: none"> <li>+ hydrocarbon combustion through the MODU flare during well flowback. Other gasses (CO<sub>2</sub> and H<sub>2</sub>S) may also be produced from the reservoir</li> <li>+ hydrocarbon combustion to operate the MODU, vessels and helicopters</li> <li>+ operation of vessel incinerators</li> <li>+ when transferring dry bulk drill products (e.g., barite, bentonite, cement), tank venting is necessary to prevent tank overpressure. The vented air will contain minor quantities of product particles, which will suspend in the air or settle on the sea surface.</li> </ul> <p>Although the MODU and vessels may use ozone-depleting substances (ODS), this will be in a closed rechargeable refrigeration system and there is no plan to release ODS to the atmosphere.</p>
<b>Extent</b>	<p>Localised: The quantities of gaseous emissions are relatively small and will, under normal circumstances, quickly dissipate into the surrounding atmosphere.</p> <p>The Barossa Gas Export Pipeline (GEP) installation activity is planned to occur concurrently with drilling activities under this EP within the Drilling Operational Area for a total duration of approximately 4 weeks. GEP activities will be undertaken at least 3.8 km from the drill centres.</p>
<b>Duration</b>	For the Activity duration, with intermittent emissions associated with discrete activities, e.g., flaring.

### 6.3.2 Nature and scale of environmental impacts

Potential receptors: physical environment (air quality), socio-economic receptors, threatened, migratory or local fauna (seabirds) and cultural features.

The potential impacts from the release of air emissions identified above include:

- + deterioration of local air quality
- + contribution to national greenhouse gas (GHG) levels

These impacts may in turn have indirect impacts on marine species and the environment to which First Nations people are connected.

Hydrocarbon combustion emissions may result in a temporary, localised reduction of air quality. A reduction in local air quality could affect threatened, migratory or local fauna (seabirds), and the workforce. Atmospheric emissions may be harmful, odoriferous or aesthetically displeasing.

Direct GHG emissions associated with the Barossa Development Drilling Campaign activities are detailed in **Table 6.8**. Emissions have been calculated based on forecast fuel usage using the NGER Emissions and Energy Threshold Calculator 2023<sup>26</sup>. The total estimated direct GHG emissions for this petroleum activity is approximately 183,608 t CO<sub>2</sub>-e (over 2 year campaign duration). The total annual Australian GHG emissions for the year from August 2021 to September 2022 are estimated by the Commonwealth Government to be 490.5 Mt CO<sub>2</sub>-e (DCCEEW, 2022). The estimated Barossa Development Drilling Campaign direct emissions are estimated to be approximately 0.04 percent of the total annual Australian GHG emissions.

<sup>26</sup> <https://www.cleanenergyregulator.gov.au/NGER/Forms-and-resources/Calculators#Emissions-and-Energy-Threshold-Calculator-and-user-guide-202223>

**Table 6.8: Estimated direct GHG emissions in tonnes of carbon dioxide equivalent (t CO<sub>2</sub>-e)**

Source	Approximate amount (metric tonnes)	Approximate amount (tonnes)	Approximate fuel usage (kilolitres)	Greenhouse gases			Total Scope 1 emissions per well (t CO <sub>2</sub> e)	Total Scope 1 emissions for all (8) wells (t CO <sub>2</sub> e)
				CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O		
Fuel Use	-	-	4800	12,897	18	74	12,989	103,912
Unprocessed natural gas – flared	-	3,140	-	8,467	417	82	8,966	71,728
Crude oil (including condensates) – flared	350	-	-	992	1	3	996	7,968
<b>TOTAL</b>	<b>350</b>	<b>3,140</b>	<b>4,800</b>	<b>22,356</b>	<b>436</b>	<b>159</b>	<b>22,951</b>	<b>183,608</b>

In consideration of the EPBC Act Section 527E (**Appendix B**), Santos does not consider that there are material indirect GHG emissions associated with this petroleum activity, being limited to the Barossa Development Drilling Campaign. Refer to **Appendix B2** for additional information.

Santos will present in the future Barossa Production Operations EP a greenhouse gas emissions (Scopes 1, 2 and 3) analysis for the 25-year lifecycle of the Barossa Development, which will inform the environmental assessment of greenhouse gas emissions. 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 combustion engines and the flaring of well flowback hydrocarbons could result in deterioration of local air quality, while direct greenhouse gas (GHG) emissions may cause an incremental increase in global GHG concentrations.

GHG emissions refers to gases that trap heat within the atmosphere through the absorption of longwave radiation reflected from the Earth’s surface. The emissions of carbon dioxide (CO<sub>2</sub>), nitrous oxide (N<sub>2</sub>O) and methane (CH<sub>4</sub>), as relevant to this petroleum activity, are recognised as GHG emissions. GHG emissions are linked to global warming and climate change.

Santos recognises the science of climate change and supports the objective of limiting global temperature rise to less than 2°C and pursuing efforts to limit the temperature rise to 1.5°C. In recognition of the global need to reduce GHG emissions, Santos has had a published Climate Change Policy since 2008, guiding the management of emissions and climate change risks. The *Climate Change Act 2022* (Cth) legislates Australia’s emissions reduction targets, including reducing Australia’s net GHG emissions to 43 percent below 2005 levels by 2030 and to net zero by 2050.

Santos has its own emission reduction targets, including a long-term target of achieving net-zero Scope 1 and 2 absolute emissions by 2040. Santos’ strategy focuses on natural gas as a reliable transition fuel source and the development of technologies such as carbon capture and storage and alternative fuels, such as hydrogen, as foundations for its decarbonisation pathway.

Potential impacts as a result of climate change have been modelled by Commonwealth Scientific and Industrial Research Organisation (CSIRO). The modelling indicates that temperatures will increase across Australia; rainfall patterns will change significantly; and extreme events, such as droughts, floods and wildfires, will become more common. These changes are likely to impact on individual species, ecosystems and ecosystem services, such as food and water availability. Within decades, environments across Australia may be substantially different (CSIRO and Bureau of Meteorology, 2015).

To date, the currently observed global warming and the associated anthropogenic climate changes cannot be directly attributed to any one development or activity, as they are the result of net global GHG emissions and GHG sinks that have accumulated in the atmosphere since the industrial revolution began.

It is therefore not possible to directly attribute any one project or activity, such as the Barossa Development Drilling Campaign, to climate change impacts globally or upon potential Australian receptors due to the spatial (global) and temporal (since the industrial revolution) extent of GHG emissions. Therefore, consideration for the purpose of this EP is framed by the contribution that this petroleum activity will make to national and global atmospheric emissions of GHG. This contribution is small, being approximately 0.04 percent of the annual Australian GHG emissions (2021-22 data).

Further, the Barossa Gas Project will be a designated large facility under the NGER Act and as such will be subject to the Safeguard Mechanism. This means that Santos, among other things, will have an obligation to ensure that the net covered emissions of GHGs from the operation of the Barossa Gas Project do not exceed the applicable baseline.

ODS are used in closed refrigeration systems. ODS have the potential to contribute to ozone-layer depletion if accidentally released to the atmosphere. ODS air emissions would only occur in the event of damaged or faulty refrigeration equipment, or due to human error.

Venting of bulk dry drilling products is a necessary safety control, and any dust emissions will be negligible and limited to the immediate vicinity of the MODU.

### 6.3.2.1 Potential Cumulative Impacts

The Barossa GEP Installation EP ([https://info.nopsema.gov.au/activities/353/show\\_public](https://info.nopsema.gov.au/activities/353/show_public)) assessed potential impacts from atmospheric emissions from pipeline installation activities to be negligible given the remote location of the Drilling Operational Area, and the relatively short duration of the Activity.

The estimated Barossa Development Drilling Campaign direct emissions are estimated to be approximately 0.04 percent of the total annual Australian GHG emissions, and given GHG emissions from GEP installation activities within the Drilling Operational Area will be less than this contribution (due to Activity duration of no more than 4 weeks in total), neither additive or cumulative atmospheric emissions effects from GEP installation activities are expected.

### 6.3.3 Environmental performance outcomes and control measures

The EPOs relating to this event are:

- + No unplanned objects, emissions or discharges to sea or air. [EPO-04]
- + No significant changes to air, sediment and water quality. [EPO-06]
- + No significant impacts to cultural features from the Activity. [EPO-09]

An assessment of the environmental benefits and the potential costs or issues associated with control measures for this Activity are shown in **Table 6.9** to demonstrate the potential impacts from this aspect are ALARP. Control measures that are adopted have associated EPSs and measurement criteria which are presented in **Table 8.2**. Rejected control measures have an ALARP evaluation provided to justify their rejection.

**Table 6.9: Control measures evaluation for atmospheric emissions**

CM reference	Control measure	Environmental benefit	Potential cost/issues	Evaluation
Standard control measures				
BAD-CM-011	Bulk solid transfer procedure (tank venting during bulk product (powder) transfer)	Vents are monitored during transfers to observe for excessive powder discharge. Venting prevents over-pressure which would result in a potential larger release of bulk powders to the marine environment during filling.	No additional cost, it is a health and safety requirement to prevent tank over-pressure.	<b>Adopted</b> – the health and safety requirement outweigh the negligible environmental impact.
BAD-CM-019	Waste incineration procedures	Incinerator air emissions minimised by complying with International Convention for the Prevention of Pollution from Ships (MARPOL) Annex VI/ Marine Order 97.	Cost of maintaining certification, equipment and records, and to train staff.	<b>Adopted</b> – procedure ensures compliance with regulatory requirements.
BAD-CM-020	Fuel oil quality	Reduces emissions through use of low sulphur fuel in accordance with MARPOL Annex VI (and Marine Order 97).	None identified.	<b>Adopted</b> – it is a legislated requirement.

CM reference	Control measure	Environmental benefit	Potential cost/issues	Evaluation
BAD-CM-021	Air pollution prevention certification	Reduces emissions by ensuring compliance with MARPOL Annex VI (and Marine Order 97).	Cost of maintaining certification.	<b>Adopted</b> – it is a legislated requirement. The use of offshore marine vessels is unavoidable for this petroleum activity. However, Santos will attempt to minimise emissions by ensuring compliance with MARPOL Annex VI (Prevention of Air Pollution from Ships), which requires vessels to have a valid International Air Pollution Prevention Certificate (for vessels more than 400 tonnage).
BAD-CM-032	Ozone-depleting substance handling procedures	Reduces risk of accidentally releasing ozone-depleting substances.	Cost of maintaining equipment and records, and to train staff.	<b>Adopted</b> – benefit of preventing ODS emissions outweighs procedural compliance costs.

CM reference	Control measure	Environmental benefit	Potential cost/issues	Evaluation
BAD-CM-033	Well flowback procedures – Reduce well flowback to minimum required to clean up wells, i.e. testing to remove solids and mud invasion but not performing extended deliverability testing.	Reduces air emissions to ALARP for the proposed Activity.	Reducing the well flowback forgoes the ability to get detailed reservoir performance data prior to first gas (i.e. production operations).	<p><b>Adopted</b> – Flowback will be reduced to a clean-up criterion (to ensure brine and solids from drilling are recovered) before short step down rate tests. The step down tests are expected to be &lt;12hrs (pending reservoir performance). No extended production tests for assessing reservoir depletion will be performed and maximum rate will only be used to remove solids from the well that the FPSO cannot readily manage.</p>



	<p>Well flowback procedures – Utilise high efficiency burner heads and a specialist noise silenced flare.</p>	<p>Gives the highest likelihood of complete hydrocarbon combustion.</p>	<p>Additional cost for both the gas and oil burners compared to a 'basic' flare.</p>	<p><b>Adopted</b> - The well flowback vendor will provide a high efficiency oil burner for the oil line and a noise silenced flare for the gas line (to reduce velocities and improve flare stability).          The oil burner selected for use, has a demonstrated burning efficiency of greater than 99.99% (SPE, 1996).          In addition, CO<sub>2</sub> content in the gas feed to flare will be monitored. In the event CO<sub>2</sub> trends upwards, flare stability will be monitored and well flowback parameters adjusted to ensure clean and stable flaring.          US EPA Parameters for Properly Designed and Operated Flares (EPA, 2012) was reviewed for relevance to temporary, variable rate well flowback flaring with horizontal flares. Recommendations such as avoiding over-steaming and excess aeration can be adopted given the non-steam and air assisted design of the horizontal flare stack. High wind impacts on flare efficiency are mitigated with the use of a dual flare</p>
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CM reference	Control measure	Environmental benefit	Potential cost/issues	Evaluation
				boom on the MODU. Flare watching will be utilised to monitor for flame lift off or flame stability issues.  Adoption of all the above is considered to reduce the risks of incomplete hydrocarbon combustion to ALARP.
BAD-CM-037	Marine Assurance Standard	Reduces emissions by ensuring contracted vessels are operated, maintained and manned in accordance with industry standards and regulatory requirements.	Cost associated with implementing procedures.	<b>Adopted</b> – benefit of assuring vessels outweighs procedure compliance costs.
BAD-CM-040	MODU planned maintenance system	Reduces emissions by ensuring contracted MODU is operated, maintained and manned in accordance with industry standards and regulatory requirements.	Personnel costs of implementing.	<b>Adopted</b> – benefits of ensuring MODU is maintained outweighs the potential costs.
BAD-CM-041	Vessel planned maintenance system	Reduces emissions by ensuring contracted vessels are operated, maintained and manned in accordance with industry standards and regulatory requirements.	Personnel costs of implementing.	<b>Adopted</b> – benefits of ensuring vessels are maintained outweigh the costs.
BAD-CM-050	Monitoring of support vessel fuel consumption	Active monitoring of fuel consumption informs opportunities to optimize support vessel fuel use efficiencies to reduce fuel use emissions e.g. vessel speed management depending on operational requirements	Administration costs for monitoring and opportunity evaluation activities.	<b>Adopted</b> - Optimised support vessel fuel consumption has emissions reduction and cost reduction benefits.

CM reference	Control measure	Environmental benefit	Potential cost/issues	Evaluation
<b>Additional control measures</b>				
N/A	No bulk product (powder) transfers	Reduces probability of potential impacts to air quality from unintentional release.	Costs associated with additional bulk storage on MODU / LWIV.	<b>Rejected</b> – Bulk product is required to perform the Activity and transfers of bulk product are required as insufficient space is available on a MODU / LWIV to store the full inventory for the campaign. Transfer activities are carried out in accordance with MODU owner’s procedures to reduce the risk of an unintentional release.
N/A	No incineration during activities	Eliminates waste incineration emissions.	Increase in health risk from storage of some wastes. Energy/emissions impacts to transfer waste for onshore disposal. Cost of waste disposal.	<b>Rejected</b> – avoiding incineration will increase cost and environmental impacts (emissions, energy and landfill) of onshore disposal.
N/A	Use incinerators and engines with higher environmental efficiency	Improves air quality by more efficient burning or fuel combustion.	Significant cost in changing MODU / LWIV / vessel equipment.	<b>Rejected</b> – Cost grossly disproportionate to low environmental benefit (impact rated Negligible).
N/A	Removal of all ODS containing equipment	Eliminates potential of ODS emissions occurring.	Lack of refrigeration systems on board the vessels would lead to unacceptable workplace conditions.	<b>Rejected</b> – based on unacceptable workplace conditions (health and safety reasons).

CM reference	Control measure	Environmental benefit	Potential cost/issues	Evaluation
N/A	Alternative fuel type selected for vessels and MODU	Could reduce pollutants associated with marine diesel combustion.	Practical and reliable alternative fuel types (and power sources) have not been identified for the vessels and MODU required for this Activity.	<b>Rejected</b> – not practically feasible.
N/A	Eliminate well flowback	Eliminates air emissions during this petroleum activity.	Not cleaning the wells up would result in loss of recovery from the reservoir as well as potential safety issues with the future production operations facility (FPSO).	<b>Rejected</b> – Cleaning the wells up by flowing is required to prevent damage to the reservoir and remove drilling solids from the wells that may not be able to be handled by the FPSO in the future. Once this is achieved the well flowback will cease. Santos is not planning any extended flowbacks, typical of a well appraisal campaign, during the Activity.
N/A	Monitoring of MODU fuel consumption	Active monitoring of fuel consumption informs opportunities to optimize MODU fuel use efficiencies to reduce fuel use emissions	Administration costs for monitoring activities. MODU fuel consumption is determined by operational and safety requirements with limited opportunities to modify fuel use practices and implement fuel use efficiencies	<b>Rejected</b> – Limited scope to modify MODU fuel consumption and realize potential fuel use efficiencies.

### 6.3.4 Environment impact assessment

Key receptors	Consequence level
<b>Atmospheric emissions</b>	
Threatened, migratory or local fauna	<p>Short-term behavioural impacts e.g. avoidance, to seabirds could be expected if they fly in the vicinity of the location. No decrease in local population size or area of occupancy of species, loss or disruption of critical habitat or disruption to the breeding cycle.</p> <p>The consequence level for threatened, migratory or local fauna (seabirds) is considered to be I – Negligible.</p>
Physical environment/habitat	<p>The Activity will occur in the open ocean and offshore waters. The quantities of atmospheric emissions are relatively small and will, under normal circumstances (i.e., windy conditions), quickly dissipate into the surrounding atmosphere.</p> <p>Greenhouse gas emissions will be released during the Activity accounting for approximately 0.04 percent of annual Australian GHG emissions. Given the relatively small quantity, detectable environmental impacts are not predicted.</p> <p>No impacts will occur to subsea features including the ‘Shelf break and slope of the Arafura Shelf’ KEF and its values that overlaps the Operational Area.</p> <p>The consequence level for physical environment/habitat is assessed as I – Negligible.</p>
Threatened ecological communities	Not applicable – no threatened ecological communities identified in the area over which air emissions are expected.
Protected areas	Not applicable – no protected areas over which air emissions are expected.
Socio-economic receptors	<p>Given the negligible consequence to species, subsequent impacts to socio-economic receptors are not anticipated.</p> <p>As the Activity occurs in offshore waters, the air quality in coastal towns or settlements will not be affected.</p> <p>The consequence level for socio-economic receptors is considered to be I – Negligible</p>
Cultural Features	<p>For assessment of impacts to marine species of cultural significance, refer to the assessment for threatened, migratory or local fauna.</p> <p>For assessment of impacts to the physical environment to which First Nations people are connected and have raised concerns, refer to the assessment for the physical environment/threatened ecological communities/protected areas.</p>
Overall worst-case consequence level	I – Negligible

### 6.3.5 Demonstration of as low as reasonably practicable

Atmospheric emissions are largely unavoidable due to operational and health and safety requirements. All reasonably practicable control measures have been reviewed and those adopted are considered consistent with maritime/petroleum industry standards and appropriate to manage the impacts such that the residual consequence is assessed to be I – Negligible. The proposed management controls are in accordance with the Santos risk management criteria and are considered appropriate to manage impacts to ALARP.

### 6.3.6 Acceptability evaluation

<b>Is the consequence ranked as I or II?</b>	Yes – maximum consequence from atmospheric emissions is I – Negligible.
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<p>Is further information required to validate the consequence assessment?</p>	<p>No – potential impacts and risks are well understood through the information available.</p>
<p>Are risks and impacts consistent with the principles of ESD?</p>	<p>Yes – Activity evaluated in accordance with Santos’ <i>Offshore Division Environmental Hazard Identification and Assessment Guideline</i> which considers principles of ESD. Santos concludes that the Activity-related impacts of atmospheric emissions will not compromise the health, diversity or productivity of the environment.</p>
<p>Have the acceptable levels of impact and risks been informed by relevant species recovery plans, threat abatement plans and conservation advice and Australian marine park zoning objectives?</p>	<p>Yes – Marine Bioregional Plan for the North Marine Region (CoA, 2012a) includes consideration of effects of climate change on species.</p>
<p>Are performance outcomes, control measures and associated performance standards consistent with legal and regulatory requirements?</p>	<p>Yes – management consistent with the <i>Climate Change Act 2022</i> (Cth), <i>Ozone Protection and Synthetic Greenhouse Gas Management Act 1989</i> (Cth) (and associated regulations), MARPOL VI/Marine Order 97 and <i>Protection of the Sea (Prevention of Pollution from Ships) Act 1983</i>, and MARPOL VI/Marine Order 97. Through acceptance of this EP, legislative and regulatory requirements will be met as per <b>Section 1.6.2</b>.</p>
<p>Are performance outcomes, control measures and associated performance standards consistent with Santos Environment, Health and Safety Policy?</p>	<p>Yes – aligns with Santos’ Environment, Health and Safety Policy.</p>
<p>Are performance outcomes, control measures and associated performance standards consistent with industry standards?</p>	<p>Yes – the most recent and comparable Drilling and Completions EPs accepted by NOPSEMA have been reviewed for consistency with the performance outcomes, control measures and associated performance standards proposed in this EP. Well flowback procedures are consistent with relevant industry practices defined in <i>Environmentally Safe Burner For Offshore Well Testing Operations</i> (SPE, 1996) and <i>Parameters for Properly Designed and Operated Flares</i> (EPA, 2012). An additional control measure (BAD-CM-050) has been adopted to identify opportunities to optimize fuel use efficiency for support vessels to further reduce GHG emissions from the Activity.</p>
<p>Have performance outcomes, control measures and associated performance standards taken into consideration Relevant Persons feedback?</p>	<p>Yes – objections or claims raised by Relevant Persons relating to Activity atmospheric emissions have been considered. Existing control measures are considered sufficient.</p>
<p>Are performance standards such that the impact or risk is considered to be ALARP?</p>	<p>Yes – ALARP assessment conducted, one additional control measure adopted.</p>

The consequence of atmospheric emissions on receptors is assessed as I – Negligible. Based on an assessment of Santos’ acceptability criteria and with the control measures in place, there will be no substantial change in air quality that may adversely impact the environment, and the potential impacts are considered acceptable.

## 6.4 Seabed and benthic habitat disturbance

### 6.4.1 Description of event

<b>Event</b>	<p>Disturbance to the seabed will occur as a result of:</p> <ul style="list-style-type: none"> <li>+ anchoring of the MODU</li> <li>+ construction of wells</li> <li>+ temporary installation of positioning equipment (i.e. LBL, USBL)</li> <li>+ placement of objects on the seabed such as the riserless mud recovery (RMR) system, spare mooring lines and anchors, temporary survey positioning system etc.</li> </ul> <p>Seabed disturbance may also cause a temporary increase in water quality turbidity.</p> <p>Note that seabed disturbance from the discharge of drill cuttings and fluids is specifically addressed in <b>Section 6.7</b>.</p>
<b>Extent</b>	<p>Localised: within the Operational Area.</p> <p>The Barossa Gas Export Pipeline (GEP) installation activity is planned to occur concurrently with drilling activities under this EP within the Drilling Operational Area for a total duration of approximately 4 weeks. GEP activities will be undertaken at least 3.8 km from the drill centres.</p>
<b>Duration</b>	<p>For the duration of the Activity.</p>

### 6.4.2 Nature and scale of environmental impacts

Potential receptors: physical environment (benthic habitat and KEF); threatened, migratory or local fauna (benthic fauna); and socio-economic (commercial fisheries, maritime heritage) and cultural features.

The MODU will need to moor (anchor) at each of the three drill centres and then kedge between drill centre wells. Due to a government direction to suspend drilling, and resulting impacts to drilling schedule, drilling will occur concurrently with subsea installation activities. The MODU may need to depart a drill centre to make way for subsea infrastructure installation activities. In this case, it will either move to another drill centre and remain on standby for up to 1 month; or depart the Operational Area temporarily before returning. Therefore, for the purposes of assessing impacts and risks, it is assumed that the MODU may need to complete mooring twice at each drill centre.

The MODU's mooring system will involve deploying up to 12 anchors, laid out not normally greater than 1.8 km from the MODU. Each anchor and parts of the connected line will make contact with the seabed. The extent of seabed contact will vary depending on the operation and amount of tension on the mooring line; for example, retrieving/deploying anchors, kedging (skidding) and station keeping. Excess lengths of mooring line may also be temporarily stored on the seabed. Pre-laid anchors may be installed before the MODU arrives in the Operational Area. Due to the catenary curve of the mooring lines, in the order of 500 to 800 m of each mooring line will be in contact with the seabed. The anchor itself has a footprint of approximately 130 m<sup>2</sup>. The total direct seabed disturbance area from the MODU mooring system is estimated to be 1560 m<sup>2</sup>; repeated at each of the three drill centres. In circumstances where anchors need to be reset, this may result in a larger area of disturbance. Allowing for contingency repeat mooring at each drill centre (i.e. twice at each drill centre) this gives a conservative total disturbance footprint of 9,360 m<sup>2</sup> from mooring.

The disturbance footprint of the LBL positioning array is estimated at 10 m<sup>2</sup> at each drill centre. Direct well construction footprints, including placement of the RMR system, are estimated at <5 m<sup>2</sup> per well.

## 6.4.2.1 Physical environment

The Activity will involve equipment being in direct contact with the seafloor and will inevitably result in localised impact to benthic habitat (and associated fauna) in the Operational Area.

As set out above, the conservative total disturbance footprint from mooring (assuming MODU may need to depart for contingency reasons and return to drill centres) is 9,360 m<sup>2</sup>. The footprint from positioning equipment is an additional 10 m<sup>2</sup> per drill centre.

Benthic habitats and fauna assemblages that are expected to be impacted are considered widespread throughout the region (**Section 3.2.3**). Depressions on the seabed caused by the Activity are predicted to infill with sediments and detrital matter over time and recovery and re-colonisation of soft sediment habitats happens in a short period of time (weeks to months).

The Operational Area overlaps the 'Shelf break and slope of the Arafura Shelf' 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 within the Operational Area during the Barossa marine studies program, nor are these topographically distinct features evident from the bathymetry data derived from multiple surveys undertaken across this area.

## 6.4.2.2 Threatened, migratory or local fauna

Habitat modification is identified as a potential threat to several marine fauna species in relevant recovery plans and conservation advice (**Table 3.8**), some of which have cultural significance as totems of cultural food sources; however, seabed disturbance at the proposed scale is not anticipated to significantly affect mobile marine fauna, such as marine mammals, marine reptiles, fish, sharks and rays. No BIAs are present in the Operational Area. The seabed within the Operational Area is predominantly bare sediment and contains low abundance and diversity of infauna.

Based on the habitat preferences (shallower coastal and estuarine waters) of sawfish and the deep offshore marine environment of the Operational Area, it is considered highly unlikely that they will be present in large numbers. It is recognised that individuals may be encountered, as advised by NPF, and four sawfish species were identified within the PMST report for the Operational Area.

The area of seabed to be disturbed within the Operational Area also represents a negligible portion of the habitat available for threatened, migratory or local fauna.

## 6.4.2.3 Socio-economic receptors

Potential impacts to benthic habitats, and subsequently to associated 'fish' species of commercial importance (e.g., scampi), will be localised with the impact to, and displacement of, fish insignificant at a stock level.

Santos completed seabed surveys within the area proposed for seabed disturbance. This survey data was reviewed by maritime archaeologists and while there was no clear evidence of the presence of a shipwreck or aircraft wreck, a number of side scan sonar contacts (anomalies) were identified that could potentially be underwater maritime cultural heritage items such as shipwreck or aircraft wreck debris (Cosmos Archaeology 2023). Further assessment of the location of seabed infrastructure confirmed that disturbance of the seabed at the points of these anomalies will be avoided.

## 6.4.2.4 Cultural Features

Information about potential impacts to cultural features from seabed disturbance was provided during consultation and other information provided to Santos by NOPSEMA in the course of preparing the EP (2022 Statement of Reasons requests).



Consultation meetings with Tiwi Clans identified concerns about the impact of drilling on their dreaming totems (including turtle totems), and about the impact of drilling on their spiritual dreaming which protects the Tiwi Islands and the potential for a disaster to strike the Tiwi Islands because of the drilling.

Tiwi clients of the EDO raised concerns about:

- disturbance to important ancestral spirits and beings, including Ampiji, that could result in loss of protection of the Tiwi Islands and result in exposure to natural disasters, reduced access to marine food sources and that it will cause Tiwi people to become sick. For example, if Ampiji is disturbed, there are concerns that there could be tidal waves or king tide, and that it may also disturb the three serpents who will shoot up out of the water like a cyclone, making a big wave causing a lot of damage.
- damage to the seabed from drilling could also harm imunga: spiritual places that are often connected to other sites, marine species and to Tiwi people. A related concern of the Tiwi clients of the EDO is that harming imunga could also impact on the health of land and sea country and access to food through traditional hunting and fishing.
- the drilling activity as “drilling through us, through our very being”, “that if drilling starts, then that is killing our body” and that “Disturbing the sea has a domino effect on other things, on the life of the sea animals and on our lives and our very existence, including the spirit world. Disturbing the sea is disturbing the spirit world.”

Croker Island clients of the EDO raised concerns about potential impacts to sacred sites and songlines from the Activity, and that any disturbance or threat to these sacred sites or songlines was considered a threat to the future of Minjilang people. Consultation meetings with Croker Island people in Darwin did not identify any sacred sites or songlines within the operational area, and no objections or claims were raised.

Santos notes that almost 900 wells have been drilled previously in the region, and there is also significant historical and ongoing industrial shipping and fish trawling activities in the area that may be affected by the Activity in this EP. There is no evidence to support actual adverse effects from the actions of spiritual beings in response to impacts on the environment from those activities.

Santos understands the spiritual protection believed to be afforded to the Tiwi people is broadly maintained by protecting the features of the natural environment and through ceremonial practices alerting the spiritual beings to the presence of people travelling through country and the like.

#### 6.4.2.5 Potential Cumulative Impacts

The Barossa GEP Installation EP ([https://info.nopsema.gov.au/activities/353/show\\_public](https://info.nopsema.gov.au/activities/353/show_public)) 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 portion of the GEP being installed in the Drilling Operational Area is located in water depths greater than 200 m, which is very unlikely to host benthic primary producer habitat, and the habitats and fauna assemblages that are expected are widespread throughout the region. As noted in **Section 6.4.2.1**, even though the ‘Shelf break and slope of the Arafura Shelf’ KEF overlap the Drilling Operational Area, the seafloor features associated with this KEF were not observed within the Drilling Operational Area during the Barossa marine studies program. Turbidity generated by GEP installation activities will be short-term and localised.

The total direct disturbance footprint from the GEP within the Operational Area is estimated at 15479 m<sup>2</sup> (inclusive of the pipeline and pipeline end terminal). While this is a larger area than the estimated disturbance footprint for drilling activities, the drilling seabed disturbance footprint represents a very small portion of the Shelf break and slope of the Arafura Shelf’ KEF (<0.1.5 %).

When considering the absence of BIAs and significant regional habitats within the Operational Area, the short duration of overlap and the distance between activities, neither additive or cumulative seabed and benthic disturbance effects from GEP installation activities are expected.

### 6.4.3 Environmental performance outcomes and control measures

The EPO relating to this event is:

- + Seabed disturbance limited to planned activities and defined locations within the Operational Area. [EPO07]
- + No significant impacts to cultural features from the Activity. [EPO-09]

An assessment of the environmental benefits and the potential costs or issues associated with control measures for this Activity are shown in **Table 6.10** to demonstrate the potential impacts from this aspect are ALARP. Control measures that are adopted have associated EPSs and measurement criteria which are presented in **Table 8.2**. Rejected control measures have an ALARP evaluation provided to justify their rejection.

**Table 6.10: Control measures evaluation for seabed and benthic habitat disturbance**

CM reference	Control measure	Environmental benefit	Potential cost/issues	Evaluation
<b>Standard control measure</b>				
BAD-CM-003	MODU station keeping system	Maintains the MODU at the desired location and provides for minimising length of mooring line deployed during anchor installation, therefore reducing potential risks to seabed habitat.	No cost/issue identified.	<b>Adopted</b> – safety critical feature that maintains the MODU on location.
BAD-CM-043	MODU move procedure	Eliminates risk of accidental contact with the seabed during MODU move.	Standard operating procedure.	<b>Adopted</b> – integral to safe MODU move procedure
BAD-CM-044	Post Activity ROV survey	Allows for natural recovery of the seabed and benthic habitat over time.	Cost to deploy ROV and recover equipment.	<b>Adopted</b> – intent is to recover equipment placed on the seabed where reasonably practicable to do so.
<b>Additional control measures</b>				
BAD-CM-039	Recovery of deployed equipment	Allows for natural recovery of the seabed and benthic habitat over time.	Cost to recover equipment. Cost to replace equipment left in situ.	<b>Adopted</b> – intent is to recover equipment placed on the seabed where reasonably practicable to do so.
BAD-CM-049	Cultural Heritage training and cultural ceremony.	Shows respect for beliefs of First Nations people.	Time and cost to work with First Nations communities	<b>Adopted</b> – benefits considered to outweigh costs

CM reference	Control measure	Environmental benefit	Potential cost/issues	Evaluation
N/A	Use of alternative MODU with DP so that no anchoring is required	No disturbance to seabed from anchoring.	The water depth is shallower than the minimum safe operating depth for a dynamically positioned MODU with a BOP, and too deep for a jack-up MODU.	<b>Rejected</b> – not technically feasible to use anything but a semi-submersible anchored MODU.

Table 6-15 of the accepted OPP states a number of commitments to manage seabed disturbance during drilling. Of these, two are considered to have been met already and are not included as control measures within this EP:

- + OPP Commitment 1: *The MODU/FPSO facility mooring design analysis will include environmental sensitivity and seabed topography analysis to inform selection of mooring locations to 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).*

As described in **Section 3.2.4**, the seafloor features associated with this KEF have not been observed or recorded in the Operational Area of this EP, therefore the required analysis is considered complete and there are no KEF seabed features to avoid during mooring.

- + OPP Commitment 2: *Shallow Hazards Study report will be completed prior to drilling of the development wells and include a review of seabed features to inform well location.*

**Section 3.2.4** summarises the geophysical and benthic habitat studies undertaken in the Operational Area. As no seabed features of environmental significance have been identified, no further seabed surveys, studies or reports are planned under this EP to inform the placement of wells or MODU anchors. Therefore, this commitment is considered completed.

#### 6.4.4 Environmental impact assessment

Key receptors	Consequence level
Seabed disturbance	
Threatened/migratory fauna	<p>Given the relatively small scale of seabed disturbance and knowledge of the existing environment, significant impacts to threatened/migratory/local marine fauna species will not occur.</p> <p>Marine invertebrates that may inhabit disturbed soft sediment benthic habitats are expected to occur elsewhere within the Operational Area and surrounds and therefore the disturbance is not expected to affect prey availability, or protected fauna species.</p> <p>Habitat modification is identified as a potential threat to several marine fauna species in relevant recovery plans and conservation advice (<b>Table 3.8</b>). However, benthic habitat within the Operational Area is well represented in the wider surrounds, and the Operational Area is not recognised as a BIA for marine fauna.</p> <p>Seabed disturbance is not expected to cause a decrease in local population size, area of occupancy of species, loss or disruption of critical habitat, or disruption to the breeding cycle of any threatened or migratory marine fauna. Hence, the consequence level is considered to be I – Negligible.</p>

Key receptors	Consequence level
Physical environment/ habitat	<p>The conservative total disturbance footprint from mooring (assuming MODU may need to depart and return to drill centres) is 9,360 m<sup>2</sup>. The footprint from positioning equipment is 10 m<sup>2</sup> per well. Well construction footprints are estimated at approximately 5 m<sup>2</sup> per well. The total drilling seabed disturbance footprint is approximately 9450 m<sup>3</sup>.</p> <p>The Operational Area overlaps the 'Shelf break and slope of the Arafura Shelf' 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 within the Operational Area during the Barossa marine studies program, nor are these topographically distinct features evident from the bathymetry data derived from multiple surveys undertaken across this area. The total seabed disturbance footprint from drilling represents a very small portion of this KEF (&lt;0.01%).</p> <p>Species associated with the continental slope and patch reefs that characterise this KEF (such as demersal fish, whale sharks, sharks and turtles) are unlikely to aggregate within the Operational Area due to the lack of seafloor features. However, potential impacts to these species are described above.</p> <p>Localised turbidity caused by seabed disturbance is expected to be minor in nature and limited to within the Operational Area.</p> <p>Given seabed disturbance and associated turbidity caused by the Activity will be detectable, the consequence level is considered to be II – Minor.</p>
Threatened ecological communities	Not applicable – no threatened ecological communities are identified in the area where seabed disturbance could occur.
Protected areas	Not applicable – no protected areas over which seabed disturbance could occur.
Socio-economic	<p>The consequence of seabed disturbance on receptors is assessed as I – Negligible. Given the relatively small scale of seabed disturbance and knowledge of the existing environment, significant impacts to threatened/migratory/local marine fauna species will not occur. Given the negligible consequence to species, subsequent impacts to socio-economic receptors are not anticipated.</p> <p>Seabed disturbance is not expected to impact commercial fisheries based on the small size of disturbance compared with the total available fishing area.</p>
Cultural Features	<p>There are no sacred sites registered or recorded under the NTASS Act or protected under the ATSIHP Act, UCH Act, ALR Act or Environment Protection and Biodiversity Conservation Act 1999 (Cth) that overlap with the Operational Area or EMBA. Of the culturally important sites (including underwater sites) identified by Tiwi People and First Nations people, all of the identified sites are outside the EMBA.</p> <p>For assessment of impacts to marine species of cultural significance, refer to the assessment for threatened, migratory or local fauna.</p> <p>Feedback provided by Tiwi clients of the EDO during consultation raised concerns about their cultural and spiritual beliefs, which were not linked to a specific location or place. It was observed that other Tiwi Islands Relevant Persons did not identify similar concerns.</p> <p>Feedback provided by Croker Island clients of the EDO during consultation also raised concerns about cultural and spiritual beliefs, which were also not linked to a specific location or place. However consultation meetings with Croker Island people in Darwin did not identify any sacred sites or songlines identified as occurring within the operational area or the EMBA, and no objections or claims were raised.</p> <p>Santos notes that almost 900 wells have been drilled previously in the region, and there is also significant historical and ongoing industrial shipping and fish trawling activities in the area that may be affected by the Activity in this EP. There is no evidence to support</p>

Key receptors	Consequence level
	actual adverse effects from spiritual beings in response to impacts on people or the environment from these activities.  Notwithstanding, in response to the concerns raised by some First Nations people, Santos acknowledges the recommendations by Tiwi people as suggested to Dr Corrigan and has considered them for adoption where practicable and appropriate.
Worst-case consequence level	II – Minor

### 6.4.5 Demonstration of as low as reasonably practicable

There are no reasonably practicable alternatives to the use of an anchored MODU in order to undertake the Activity.

In relation to spiritual and/or cultural heritage beliefs and connections to sea country and related concerns of some Tiwi Islanders, Dr Corrigan reported the suggestions of a number of senior and authoritative Tiwi Islanders who informed him as to culturally appropriate responses. On the basis that the most appropriate way to manage concerns related to spiritual/cultural beliefs is through culturally appropriate measures as recommended by First Nations people, Dr Corrigan’s recommendations have been adopted where any First Nations Relevant Person raise similar concerns. Santos considers that the adopted control measure (BAD-CM-049) based on Dr Corrigan’s recommendations will reduce environmental impacts and risks to ALARP, as relevant to First Nations individuals who hold these concerns in relation to their beliefs.

All reasonably practicable control measures have been reviewed and those adopted are considered appropriate to manage the impacts such that the residual consequence is assessed to be II – Minor. The proposed control measures are in accordance with the Santos risk management criteria and are considered appropriate to manage the impacts to ALARP.

## 6.4.6 Acceptability evaluation

Is the consequence ranked as I or II?	Yes – maximum consequence to seabed and benthic habitats is II – Minor.
Is further information required to validate the consequence assessment?	No – potential impacts and risks are well understood through the information available. Extensive marine studies have been completed within the Operational Area to inform the assessment.
Are risks and impacts consistent with the principles of ESD?	Yes – Activity evaluated in accordance with Santos’ <i>Offshore Division Environmental Hazard Identification and Assessment Guideline</i> which considers principles of ESD.
Have the acceptable levels of impact and risks been informed by relevant species recovery plans, threat abatement plans and conservation advice and AMP zoning objectives)?	Yes – while several plans identify habitat modification as a threat to marine fauna, significant impacts are not predicted for this Activity.  Marine Bioregional Plan for the North Marine Region (CoA, 2012a) includes consideration of the ‘Shelf break and slope of the Arafura Shelf’ KEF. Significant impacts to this KEF are not predicted for this Activity.
Are performance outcomes, control measures and associated performance standards consistent with legal and regulatory requirements?	Yes – through acceptance of this EP, legislative and regulatory requirements will be met as per <b>Section 1.6.2</b> .
Are performance outcomes, control measures and associated performance standards consistent with Santos’ Environment, Health and Safety Policy?	Yes – aligns with Santos’ Environment, Health and Safety Policy.
Are performance outcomes, control measures and associated performance standards consistent with industry standards?	Yes – the most recent and comparable Drilling and Completions Eps accepted by NOPSEMA have been reviewed for consistency with the performance outcomes, control measures and associated performance standards proposed in this EP.
Have performance outcomes, control measures and associated performance standards taken into consideration Relevant Person feedback?	Yes –specific objections or claims raised by Relevant Persons relating to seabed and benthic habitat disturbance from the Activity, including impacts to cultural features have been considered. Additional control measures have been adopted.  Matters raised by the NPF on potential impacts to sawfish species and scampi fishers have been considered in this section and addressed in <b>Section 3.2.8.8</b> .  For those First Nations Relevant Persons who raised concerns in relation to their beliefs about the potential for adverse effects from spiritual beings in response to impacts on people or the environment from these activities, Santos has adopted control measure (BAD-CM-049) which was informed by Dr Corrigan’s recommendations and the suggestions of a number of senior and authoritative Tiwi Islanders about culturally appropriate responses.
Are performance standards such that the impact or risk is considered to be ALARP?	Yes – ALARP assessment conducted, with additional control measures adopted.

The consequence of seabed and benthic habitat disturbance is assessed as II – Minor. Based on an assessment of Santos’ acceptability criteria and with the control measures in place, potential impacts are considered acceptable.

## 6.5 Interactions with other marine users

### 6.5.1 Description of event

<b>Event</b>	<p>Sources of impact to other marine users may occur as a result of:</p> <ul style="list-style-type: none"> <li>+ Exclusion zones for vessels on standby and frequently moving through the Operational Area</li> <li>+ MODU petroleum safety zone during drilling activities</li> <li>+ the ongoing presence of wellheads</li> <li>+ helicopter operations</li> <li>+ ROVs.</li> </ul> <p>Other marine users within the Operational Area are most likely to include commercial shipping and fishing.</p>
<b>Extent</b>	<p>Operational Area.</p> <p>The Barossa Gas Export Pipeline (GEP) installation activity is planned to occur concurrently with drilling activities under this EP within the Drilling Operational Area for a total duration of approximately 4 weeks. GEP activities will be undertaken at least 3.8 km from the drill centres.</p>
<b>Duration</b>	<p>Temporary and intermittent interaction with third party vessels when transiting the Operational Area.</p>

### 6.5.2 Nature and scale of environmental impacts

Potential receptors: socio-economic (primarily commercial fisheries and shipping traffic).

There are four Commonwealth fisheries and five NT fisheries that overlap the Operational Area (**Section 3.2.7**). An analysis of the current fishery closures, depth range of Activity, historical fishing effort data, fishing methods and consultation feedback (refer to **Section 3.2.8.8**) has revealed there is a low potential for interaction with commercial fisheries. Only the Northern Prawn Fishery, Timor Reef Fishery and Offshore Net and Line Fishery are likely to be active in the Operational Area, albeit in low density.

Indonesian and Timorese traditional fishers, as well as Australian recreational fishers, are expected to transit and fish in the EMBA. Subsistence and modern Indonesian fishing are permitted in the Perth Treaty Area adjacent to but outside the Operational Area (refer to **Section 3.2.7.2**). During MODU operations a 500m petroleum safety zone (PSZ) will be in place around the MODU and a 2.5km cautionary zone. The closest drill centre is approximately 15km from the southern boundary of the Perth Treaty area so there is no potential for activity exclusion zones to overlap the Perth Treaty area and impact Indonesian fishing activity.

The closest shipping lane and energy industry facility (Santos' Bayu-Undan Platform) are approximately 60 km and 409 km from the Operational Area respectively. There are no designated military/defence exercise areas within the Operational Area. Hence, general shipping traffic within the Operational Area is expected to be low.

Tourism and recreational or traditional fishing are not expected in the Operational Area given the water depths and distance from land. Consultation feedback from organisations with knowledge of recreational fishing in NT waters, indicated that while it is possible that recreational fishing charter vessels may operate in the vicinity of the Operational Area, this would only occur on a very infrequent basis due to the cost and resources required to mount such a long distance operation. One charter operator has advised they visit the area around Evans Shoal 1-2 times per year, which is outside the Operational Area.

Other marine users may be inhibited by the temporary presence and activities of the moored MODU and/or vessels. The ongoing presence of the wellheads and associated 500 m PSZ may be an inconvenience for a limited number of marine users, i.e. commercial fishers.

Helicopter operations within the Operational Area will be infrequent and unlikely to interfere with other marine users.

### 6.5.2.1 Potential Cumulative Impacts

The GEP installation vessel will have a 500 m petroleum safety zone (PSZ) established around the vessel during installation activities, in addition to the PSZs established at each of the drill centres for the duration of the drilling campaign.

While the additional PSZ for the GEP installation vessel will result in an incremental increase (500 m radius) in the exclusion area for other marine users, the low intensity of fishers and other marine users activity, and the short duration of overlap between the GEP installation and drilling activities inside the Operational Area are not expected to result in additive or cumulative effects to marine users from GEP installation activities.

### 6.5.3 Environmental performance outcomes and control measures

The EPO relating to this event is:

- + No significant impacts to other marine users. [EPO-01]

An assessment of the environmental benefits and the potential costs or issues associated with control measures for this Activity are shown in **Table 6.11** to demonstrate the potential impacts from this aspect are ALARP. Control measures that are adopted have associated EPSs and measurement criteria which are presented in **Table 8.2**. Rejected control measures have an ALARP evaluation provided to justify their rejection.

**Table 6.11: Control measures evaluation for interaction with other marine users**

CM reference	Control measure	Environmental benefit	Potential cost/issues	Evaluation
Standard control measures				
BAD-CM-015	Maritime notices	Maritime notifications ensure marine users are informed of the proposed activities, reducing the likelihood of unplanned interactions.	Negligible costs.	<b>Adopted</b> – it is a regulatory requirement.



CM reference	Control measure	Environmental benefit	Potential cost/issues	Evaluation
BAD-CM-016	Support vessel	Minimises the risk of a third-party vessel colliding with the MODU and vessels through visual identification and communication with other vessels.	Significant cost to charter support vessels. MODU safety case requires a standby vessel during drilling for emergency response purposes and therefore the cost is not identified as an issue.	<b>Adopted</b> – benefits considered to outweigh costs.
BAD-CM-022	Santos Relevant Persons consultation	Relevant Persons consultation ensures marine users are aware of the proposed activities, reducing the likelihood of unplanned interactions; and provides marine users an opportunity to request practicable interface control measures.	Cost to prepare and distribute information, and to address any feedback provided.	<b>Adopted</b> – benefits considered to outweigh costs.
BAD-CM-024	MODU identification systems	MODU automatic identification systems (AIS) aid in their detection at sea by third party vessels, thereby reducing the potential for interaction and collision.	Standard maritime navigational equipment; SOLAS regulated and therefore the cost is not identified as an issue.	<b>Adopted</b> – it is a regulatory requirement.
BAD-CM-034	Minimum lighting for safe work and navigation	Ensures the MODU and vessels are seen by other marine users, thereby reducing the potential for interaction and collision.	Standard maritime safety and navigational equipment; regulatory requirement and therefore the cost is not identified as an issue.	<b>Adopted</b> – it is a regulatory requirement.

CM reference	Control measure	Environmental benefit	Potential cost/issues	Evaluation
BAD-CM-035	No fishing from MODU or vessels	Avoids impacts to fish stocks.	Negligible costs.	<b>Adopted</b> – benefits considered to outweigh costs. Standard Santos commitment for its offshore activities.
BAD-CM-036	Seafarer certification	Demonstrates appropriately trained and competent personnel to navigate vessels to reduce interaction with other marine users.	Costs associated with personnel time in obtaining qualifications.	<b>Adopted</b> – it is a regulatory requirement.
BAD-CM-038	Petroleum Safety Zone (500 m) and Cautionary Zone (2.5 km) established	PSZ and CZ alert other marine users to the presence of the MODU and wellheads, thereby reducing the likelihood of vessel collision and fishing gear snagging.	Negligible costs; regulatory requirement. Excludes commercial fishers from prospective fishing grounds.	<b>Adopted</b> – it is a regulatory requirement; exclusion area is insignificant compared to the expansive fishing grounds.
<b>Additional control measures</b>				
N/A	Eliminate the use of vessels	Would eliminate potential impacts to other marine users.	Not technically feasible to conduct a drilling operation without support vessels given the need to transfer large volumes of equipment and products.	<b>Rejected</b> – not technically feasible.
N/A	Manage the timing of the Activity to avoid marine users	Would eliminate potential impacts to other marine users. Northern Prawn Fishery (NPF) scampi fishing occurs between December and February.	Not considered reasonably practicable as the drilling activity is longer than 12 months in duration. Significant costs to demobilise/re-mobilise the MODU and vessels.	<b>Rejected</b> – marine users could be present in the Operational Area at any time of the year. The area that marine users will be excluded from is small when

CM reference	Control measure	Environmental benefit	Potential cost/issues	Evaluation
				<p>compared to the large area available for their use.</p> <p>As detailed in <b>Section 3.2.8.8</b>, Santos understands scampi fishing occurs in the northern extremity of the Operational Area and surrounding deep water (where drilling and vessel activities will not occur). Hence, avoidance of the fishing period is not considered necessary.</p>
N/A	Dedicated guard vessel in place during the Activity to reduce potential for collision or interference with other marine users	Identifies and communicates with approaching third-party vessels to ensure exclusion (safety) zone is observed, preventing potential interaction or interference.	Significant additional cost of guard vessel, and emission (fuel use) for the duration of activities/campaign.	<b>Reject</b> – Cost grossly disproportionate to benefit, given the location of the Activity has low usage by commercial fishers and does not overlap with any commercial shipping lanes or areas of tourism.

## 6.5.4 Environmental impact assessment

Key receptors	Consequence level
Interaction with other marine users	
Threatened/migratory fauna	Not applicable – related to socio-economic receptors only.
Physical environment/ habitat	
Threatened ecological communities	

Key receptors	Consequence level
Protected areas	
Socio-economic receptors	<p>Commercial fishing, shipping and other incidental marine traffic in the area is expected to be low. The area that marine users will be excluded from is small when compared to the large area available for their use. Marine users within the Operational Area have coexisted with previous Barossa petroleum activities (e.g., exploration drilling) and other nearby marine users (e.g., military exercises). Communication before and during the Activity will reduce the likelihood of unplanned interaction with other marine users.</p> <p>The Operational Area is approximately 131 km north of the Tiwi Islands and 285 km north-northwest of Darwin, NT. Water depths over the Operational Area range from approximately 204 m to 376 m. Consultation feedback indicated that fishing charter vessels may undertake activities at Evans Shoal (inside the EMBA but outside the Operational Area) on an infrequent (1-2 times a year) basis. Otherwise, there are no records of recreational or traditional fishing occurring in the Operational Area.</p> <p>Interactions with Indonesian or other international vessels in the Perth Treaty area are not expected because there are no planned vessel activities outside the Operational Area or the EEZ limit. In any event, activity by Indonesian commercial fishing vessels is not expected in Perth Treaty waters adjacent to the Operational Area.</p> <p>Hence, the consequence level for potential interaction with other marine users is considered to be I – Negligible.</p>
Overall worst-case consequence	I – Negligible

### 6.5.5 Demonstration of as low as reasonably practicable

There are no alternatives to the use of a MODU and vessels to undertake the Activity, and a 500 m PSZ around the MODU/drill centres is required in accordance with the OPGGS Act. No objections or claims have been raised by Relevant Persons about the PSZ.

All reasonably practicable control measures have been reviewed and those adopted are considered appropriate to manage the impacts such that the residual consequence is assessed to be I – Negligible. The proposed control measures are in accordance with the Santos risk management criteria and are considered appropriate to manage impacts to ALARP.

## 6.5.6 Acceptability evaluation

Is the consequence ranked as I or II?	Yes – maximum consequence from interaction with other marine users is I – Negligible.
Is further information required to validate the consequence assessment?	No – potential impacts and risks are well understood through the information available and Relevant Persons consultation.
Are the risks and impacts consistent with the principles of ecological sustainable development?	Yes – Activity evaluated in accordance with Santos' <i>Offshore Division Environmental Hazard Identification and Assessment Guideline</i> which considers principles of ESD.
Have the acceptable levels of impact and risks been informed by relevant species recovery plans, threat abatement plans and conservation advice and Australian marine park zoning objectives?	Not applicable.
Are performance outcomes, control measures and associated performance standards consistent with legal and regulatory requirements?	Yes – management consistent with the International Convention for the SOLAS 1974, <i>Marine Safety (Domestic Commercial Vessel) National Law Act 2012 (Cth)</i> , <i>Navigation Act 2012 (Cth)</i> and the OPGGS Act (requirement for a PSZ). Through acceptance of this EP, legislative and regulatory requirements will be met as per <b>Section 1.6.2</b> .
Are performance outcomes, control measures and associated performance standards consistent with Santos' Environment, Health and Safety Policy?	Yes – aligns with Santos' Environment, Health and Safety Policy.
Are performance outcomes, control measures and associated performance standards consistent with industry standards?	Yes – the most recent and comparable Drilling and Completions Eps accepted by NOPSEMA have been reviewed for consistency with the performance outcomes, control measures and associated performance standards proposed in this EP.
Have performance outcomes, control measures and associated performance standards taken into consideration Relevant Person feedback?	Yes – requests relating to managing Activity interaction with other marine users including the NPF and NTSC have been considered in <b>Section 3.2.8.8</b> .
Are performance standards such that the impact or risk is considered to be ALARP?	Yes – ALARP assessment conducted, with no additional control measures adopted.

The consequence of interaction with other marine users is assessed as I – Negligible. Based on an assessment of Santos' acceptability criteria and with the control measures in place, potential impacts are considered acceptable.

## 6.6 Operational discharges

### 6.6.1 Description of event

Event	<p>Potential impacts may occur in the Operational Area from operational discharges of:</p> <ul style="list-style-type: none"> <li>+ deck drainage/runoff</li> <li>+ sewage and grey water</li> <li>+ food wastes</li> <li>+ cooling water</li> <li>+ bilge water</li> <li>+ brine (if a reverse osmosis unit is used for water treatment)</li> <li>+ ballast water.</li> </ul> <p><i>Deck drainage</i></p> <p>Drainage water on offshore facilities (i.e., MODU, LWIV and vessels) consists of rainwater, seawater and wash-down water. Such discharge may potentially contain small residual quantities of oil, grease and detergents if present or used on the decks.</p> <p>Assessment of the unplanned spillage of hydrocarbons and other environmentally hazardous liquids is discussed in <b>Section 7</b>.</p> <p><i>Sewage and grey water</i></p> <p>The volume of sewage and grey water is directly proportional to the number of persons on-board the MODU and vessels. Up to 30 to 40 L of sewage/grey water may be generated per person (pp) per day. Approximately 140 persons onboard the MODU and 18 persons per vessel (up to four vessels) results in an estimated 8,480 L/day. The LWIV has approximately 90 persons onboard and would generate lower volumes of all types of operational discharges compared to the MODU.</p> <p><i>Food waste</i></p> <p>Putrescible waste potential discharge to sea is estimated to consist of approximately 1 L of food waste pp per day. Approximately 140 persons onboard the MODU and 18 persons per vessel (up to four vessels) results in an estimated 212 L/day.</p> <p><i>Cooling water</i></p> <p>Seawater will be used as a heat exchange medium for the cooling of machinery engines. Seawater is drawn from the ocean and flows counter current through closed-circuit heat exchangers, transferring heat from engines and machinery to the seawater. The seawater is then discharged to the ocean (i.e., it is a once-through system). Cooling water temperatures may vary depending on engine workload and activity.</p> <p><i>Bilge water</i></p> <p>While in the Operational Area, the MODU and vessels may discharge oily bilge water after treatment to 15 ppm oil in water via an IMO approved oily water filter system.</p> <p><i>Brine</i></p> <p>Brine generated from the water supply systems on board the MODU and vessels will be discharged to the ocean at a salinity of approximately 10% higher than seawater. The volume of the discharge depends on the requirement for fresh (or potable) water and will vary between the MODU/vessels and the number of people on board.</p> <p>The effluent may contain scale inhibitors to control inorganic scale formation, such as the formation of calcium carbonate and magnesium hydroxide, in water-making plants. Other water purification and plant cleaning chemicals may be used and discharged to sea after completion of the cleaning process.</p> <p><i>Ballast water</i></p> <p>Ballast water could potentially be discharged to the marine environment from the MODU or vessel ballast tanks.</p>
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	<p><i>Firefighting foam</i></p> <p>Firefighting foam used on board the MODU and vessels will not be discharged to sea during testing of the firefighting system in the Operational Area.</p>
<p><b>Extent</b></p>	<p>The small volumes of operational discharges may cause localised nutrient enrichment, organic and particulate loading, ecotoxicological effects, and increase water temperature and salinity around discharge points and in the direction of the prevailing current. The environment that may be affected by operational discharges will likely be contained within the Operational Area.</p> <p>The Barossa Gas Export Pipeline (GEP) installation activity is planned to occur concurrently with drilling activities under this EP within the Drilling Operational Area for a total duration of approximately 4 weeks. GEP activities will be undertaken at least 3.8 km from the drill centres.</p>
<p><b>Duration</b></p>	<p>During the period of the Activity, localised changes to water quality will occur, however, water quality conditions will return to normal within minutes to hours of cessation of discharges.</p>

## 6.6.2 Nature and scale of environmental impacts

Potential receptors: physical environment (water quality, benthic habitats including KEF), threatened, migratory or local fauna (marine mammals, marine turtles, sharks, rays and fish (pelagic) and seabirds); socio-economic, and cultural features.

### 6.6.2.1 Physical environment

Small volumes of operational discharges will be released to the marine environment and result in a localised reduction in water quality.

Discharges will be temporary (minutes to hours), localised and limited to surface waters. The discharges are expected to be dispersed and diluted rapidly.

The Operational Area occurs within the ‘Shelf break and slope of the Arafura Shelf’ 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 within the Operational Area during the Barossa marine studies program, nor are these topographically distinct features evident from the bathymetry data derived from multiple surveys undertaken across this area. Hence, operational discharges are unlikely to impact the KEF. Species associated with the continental slope and patch reefs that characterise this KEF (such as demersal fish, whale sharks, sharks and turtles) are unlikely to aggregate within the Operational Area due to the lack of seafloor features. However, potential impacts to these species are described below.

Specifics of potential impacts to water quality from operational discharges are as follows.

#### Eutrophication impacts from sewage, grey water and putrescible wastes

Discharges of macerated food waste, treated sewage and grey water can result in localised increases in nutrient concentrations (e.g., ammonia, nitrite, nitrate and orthophosphate), organics (e.g., volatile and semi-volatile organic compounds, oil and grease, phenols and endocrine-disrupting compounds) and inorganics (e.g., hydrogen sulphide, metals and metalloids, surfactants, phthalates and residual chlorine). Increased biological oxygen demand on the receiving waters may promote localised elevated levels of phytoplankton due to nutrient inputs and bacteria activity due to organic carbon inputs. This could subsequently impact higher order predators.

However, dispersion and dilution of discharges is expected to be rapid, as the discharges are of low volume. The organic components of discharges are subject to biodegradation through bacterial action, oxidation and evaporation, and the Operational Area is located in deep offshore waters dominated by high currents, resulting in short-term changes to surface water quality within the Operational Area. Modelling of wastewater discharges from an FPSO was undertaken for the Barossa Development (ConocoPhillips, 2018) and indicated that discharges would be mixed to very low levels (1:5,000 dilution with regard to oil/grease, total suspended solids and coliform bacteria) within a maximum distance of 53 m (based on higher flow rates

expected during commissioning). The volumes and discharge rates expected during this drilling activity would be much less and therefore likely to result in dilution within a smaller radius.

In a study of sewage discharge in deep ocean waters, Friligos (1985) reported no appreciable differences in the inorganic nutrient levels between the outfall area and background concentrations suggesting rapid uptake of nutrients and/or rapid dispersion in the surrounding waters. Similar studies (Parnell, 2003) concluded similar results with rapid dispersion and dilution within hours of discharge.

### Salinity increases

The desalination of seawater results in a discharge of brine with a slightly elevated salinity (around 10% higher than seawater). On discharge to the sea, the desalination brine, being of greater density than seawater, is expected to sink and disperse in the currents. The volume of the discharge depends on the requirement for fresh (or potable) water and the number of people on board.

Most marine species are able to tolerate short-term fluctuations in salinity in the order of 20 to 30% (Walker & McComb, 1990), and it is expected that most pelagic species would be able to tolerate short-term exposure to the slight increase in salinity caused by the discharged brine.

### Changes in temperature

Cooling water will be discharged at a temperature above ambient seawater temperature. Upon discharge it will be subjected to turbulent mixing and transfer of heat to the surrounding waters. Cooling water discharge to the marine environment could result in a localised and temporary increase in the ambient water temperature which may cause alteration of the physiological processes (particularly enzyme-mediated processes) in marine biota.

Cooling water discharge points vary for the MODU and each vessel. However, they all adopt the same discharge design, which permits cooling water to be discharged above the water line to facilitate cooling and oxygenation of this wastewater stream before mixing with the surrounding marine environment.

Temperature dispersion modelling undertaken for the Barossa Development (RPS APASA, 2017) for an FPSO shows that the temperature of discharged water will decrease rapidly as the discharge mixes with the receiving waters, returning to within 3°C of ambient water temperature within approximately 12 m of the discharge location (horizontally) and less than 70 m below the sea surface. The discharge volumes from an FPSO would be expected to be much higher rates than those of a MODU and vessels used for this Activity due to the difference in size and equipment type used, and it is considered unlikely to extend beyond the area described by this modelling.

### Contamination from releases of bilge water

Discharges of oily bilge water could result in a localised reduction in water quality with impacts on protected marine fauna and plankton. If not properly managed, the discharge of oily water has the potential to create an oil sheen on surface waters and a temporary localised decline in water quality and toxic effects to marine fauna. Toxicity to marine organisms would be from small amounts of dissolved hydrocarbons in the oily water drainage after treatment. Given that oil and grease residues in oily water drainage will be in low concentrations, the potential for impact is low and would be further reduced due to the strong tidal movements experienced in the region and the naturally turbid environment.

### Toxicity

Discharges from vessel and MODU systems may include typical chemicals used within standard maritime sewage systems, desalination systems and residues of those used for cleaning decks. Discharges are expected to be intermittent and similar to other permitted discharges from vessels.

On discharge to the marine environment, the low volumes of these types of chemicals are expected to rapidly disperse in the offshore marine environment. There may be a localised and temporary (hours) reduction in water quality in the immediate vicinity of the release.



Toxic environmental effects on environmental receptors along the food chain, namely, plankton, fish, marine reptiles, birds and cetaceans are therefore not expected in deep open waters.

### 6.6.2.2 Threatened, migratory or local fauna

As discussed in the sections above, the extent of impact for planned discharges is localised, and rapid dilution is predicted to occur within the offshore waters. Marine fauna within the Operational Area, some of which have cultural significance as totems of cultural food sources, are likely to be transient. If contact does occur with marine fauna, it will be for a short duration likely not of sufficient duration to cause a toxic effect.

Discharges may cause changes to behaviour in marine fauna (avoidance or attraction). Fish and oceanic seabirds may be attracted to the discharge of macerated food scraps. However, such discharges would be isolated occurrences, so no prolonged influence on faunal behaviour is expected.

### 6.6.2.3 Cultural Features

During consultation with Tiwi Clans, concerns were raised about potential impacts from the Activity on totemic species and marine species that provide a food source for traditional fishing and hunting.

Other Tiwi people also provided information to Santos that impacts to totemic species could also affect Tiwi people by making them sick.

### 6.6.2.4 Potential Cumulative Impacts

The Barossa GEP Installation EP ([https://info.nopsema.gov.au/activities/353/show\\_public](https://info.nopsema.gov.au/activities/353/show_public)) assessed potential impacts to the marine environment from planned discharges from the GEP installation vessel as negligible. Any potential impacts from planned discharges from the GEP installation vessel is expected to be highly localised resulting in temporary decreases in water quality.

Given the nature of the planned GEP installation vessel discharges, the relatively small volumes that could be released to the marine environment, the high levels of dilution in open water and the nature of the marine environment near the Operational Area, the short duration of overlap and the distance between activities, neither additive or cumulative operational discharges effects from GEP installation activities are expected.

## 6.6.3 Environmental performance outcomes and control measures

The EPOs relating to this event include:

- + No significant changes to air, sediment and water quality. [EPO-06]
- + No significant impacts to cultural features from the Activity. [EPO-09]

An assessment of the environmental benefits and the potential costs or issues associated with control measures for this Activity are shown in **Table 6.12** to demonstrate the potential impacts from this aspect are ALARP. Control measures that are adopted have associated EPSs and measurement criteria which are presented in **Table 8.2**. Rejected control measures have an ALARP evaluation provided to justify their rejection.

**Table 6.12: Control measures evaluation for operational discharges**

CM reference	Control measure	Environmental benefit	Potential cost/issues	Evaluation
Standard control measures				
BAD-CM-004	Waste (garbage) management procedure (food waste)	Ensures food waste is disposed to sea in accordance with MARPOL Annex V (and	Cost of compliance with MARPOL. Significant health risks from storing putrescible	<b>Adopted</b> – health risks outweigh any potential environmental impacts; permissible

CM reference	Control measure	Environmental benefit	Potential cost/issues	Evaluation
		Marine Order 95: Marine pollution prevention – garbage).	waste onboard in a tropical environment.	activity by maritime regulations.
BAD-CM-006	Deck cleaning product selection	Ensures deck cleaning products are not harmful to the marine environment according to MARPOL Annex V (and Marine Order 93: Noxious liquid substances).	Personnel costs of implementing. Limits deck cleaning products available for use.	<b>Adopted</b> – benefits of ensuring MODU/ vessels are compliant outweighs the potential costs.
BAD-CM-007	Chemical selection procedure (fluorine-free firefighting foam)	Reduces potential impacts from firefighting foam by preventing discharge during testing.	No cost.	<b>Adopted</b> – benefits the environment by preventing firefighting foam discharge.
BAD-CM-026	Sewage treatment system	Ensures sewage is treated and discharged in accordance with MARPOL Annex VI (and Marine Order 96: Marine pollution prevention – sewage).	Cost of compliance with MARPOL.	<b>Adopted</b> – benefits of ensuring MODU/ vessels are compliant outweighs the potential costs; permissible activity by maritime regulations.
BAD-CM-027	Oily water treatment system	Ensures oily water is treated and discharged in accordance with MARPOL Annex I (and Marine Order 91: Marine pollution prevention – oil).	Cost of compliance with MARPOL.	<b>Adopted</b> – benefits of ensuring MODU/ vessels are compliant outweighs the potential costs; permissible activity by maritime regulations.
BAD-CM-037	Marine Assurance Standard	Industry compliant discharge practices by ensuring contracted vessels are operated, maintained and manned in accordance with industry standards and regulatory requirements.	Cost associated with implementing procedures.	<b>Adopted</b> – benefit of assuring vessels outweighs procedure compliance costs.
<b>Additional control measures</b>				
N/A	Zero discharge of deck water	Would eliminate potential contaminants being discharged to sea.	Increased safety risks from wet deck not draining. Large amounts of water on a vessel's deck can also cause stability issues (free surface effect).	<b>Rejected</b> – safety considerations outweigh the environmental benefit for a remote offshore location. It is a

CM reference	Control measure	Environmental benefit	Potential cost/issues	Evaluation
				permissible maritime discharge.
N/A	Zero discharge of bilge water	Would eliminate treated oily water from being discharged to sea.	Costs associated with containment and onshore disposal of oily water.  Storage of oily water would create an additional hazard for working on deck.	<b>Rejected</b> – safety considerations outweigh the environmental benefit for a remote offshore location; discharge of treated oily water is a permissible maritime discharge.
N/A	Zero discharge of sewage	Would eliminate treated sewage from being discharged to sea.	Significant health risks from storing sewage onboard.  Costs associated with containment and onshore disposal of sewage.  Storage of sewage would create an additional hazard for working on deck.	<b>Rejected</b> – health and safety considerations outweigh the environmental benefit for a remote offshore location; discharge of treated sewage is a permissible maritime discharge.
N/A	Zero discharge of cooling water	Would eliminate seawater at higher temperature from being discharged to sea.	N/A.	<b>Rejected</b> – not technically feasible to operate a MODU or vessel without cooling water; or to install a cooling skid onboard the MODU or vessels.
N/A	Restrict use of desalination plant; or zero discharge of brine water	Would eliminate or reduce brine from being discharged to sea.	Cost associated with transporting potable water offshore.  Health risks associated with limited supply of potable water.  Costs associated with containment and onshore disposal of brine.  Storage of brine would create an additional hazard for working on deck.	<b>Rejected</b> – health and safety considerations outweigh the environmental benefit for a remote offshore location; use of ‘water making’ system and discharge of waste brine is a permissible maritime discharge.
N/A	Zero discharge of putrescible waste	Would eliminate putrescible waste from being discharged to sea.	Significant health risks from storing putrescible (food) waste onboard in a tropical environment.  Costs associated with containment (cold	<b>Rejected</b> – health and safety considerations outweigh the environmental benefit for a remote offshore location; discharge of

CM reference	Control measure	Environmental benefit	Potential cost/issues	Evaluation
			storage) and onshore disposal of waste.	food waste is a permissible maritime discharge.
N/A	Mandatory closed drain system on vessels	Would eliminate untreated deck drainage from being discharged to sea.	Increased cost due to treatment system and vessel modification requirements.	<b>Rejected</b> – costs significantly outweigh the environmental benefit given the minor impacts expected from planned discharges.
N/A	Zero discharge of brine water	Would eliminate potential impacts from brine discharges by storing on-board for onshore disposal.	Cost associated with transporting waste brine water, space required for additional containment on primary vessels could create hazards for working on deck by limiting available space.	<b>Rejected</b> – Cost grossly disproportionate to environmental benefit. Limited benefit to be gained, given low impact. No detectable change in water quality expected. Water making and brine discharge permitted maritime practice.

#### 6.6.4 Environmental impact assessment

Key receptors	Consequence level
<b>Operational discharges</b>	
Threatened, migratory or local fauna	<p>Sensitive receptors that may be impacted include plankton, fish at sea surface, marine turtles and mammals, and seabirds. Impacts to water quality will be 628haracter and will occur only as long as the discharges occur (i.e., no sustained impacts), therefore recovery will be measured in hours to days. Consequently, only short-term behavioural impacts are expected with no decrease in local population size, area of occupancy of species, loss or disruption of habitat critical or disruption to the breeding cycle.</p> <p>Given the nature of the planned operational discharges, the relatively small volumes that could be released to the marine environment, the high levels of dilution and the nature of the marine environment near the Operational Area, the consequence level for threatened, migratory or local fauna is considered to be II – Minor.</p>
Physical environment or habitat	<p>Operational discharges are predicted to quickly dilute and disperse in the offshore environment. Water quality changes will be 628haracter and will occur only as long as the discharges occur. Any effects on water quality are expected to be within the surface waters only and have no effect on seabed receptors (including the ‘Shelf break and slope of the Arafura Shelf’ KEF that overlaps the Operational Area). Species associated with the continental slope and patch reefs that 628haracterize this KEF (such as demersal fish, whale sharks, sharks and turtles) are unlikely to aggregate within the Operational Area due to the lack of seafloor features. However, potential impacts to these species are described above.</p> <p>Given the nature of the planned operational discharges, the relatively small volumes that could be released to the marine environment, the high levels of dilution and the nature of the marine environment near the Operational Area, the consequence level for physical environment or habitat is considered to be II – Minor.</p>

Key receptors	Consequence level
Socio-economic receptors	<p>Given the controls in place to manage the discharges in accordance with regulatory requirements, impacts to marine species are not predicted.</p> <p>There is limited activity by Australian commercial fishers that overlaps the Operational Area, and activity by Indonesian commercial fishers is not expected in Perth Treaty waters adjacent to the Operational Area. Given the negligible consequence to species, subsequent impacts to socio-economic receptors including commercial fishing are not anticipated.</p> <p>Operational discharges will be of a relatively small scale and will be highly diluted. Therefore, the consequence to socio-economic receptors is assessed as Minor (II).</p>
Threatened ecological communities	Not applicable – no threatened ecological communities identified in the area over which operational discharges are expected.
Protected areas	Not applicable – no protected areas identified in the area over which operational discharges are expected.
Cultural Features	For potential impacts to marine species of cultural significance or that provide a traditional food source, and concerns that any harm to totemic species may bring sickness to Tiwi people, refer to the assessment for threatened, migratory or local fauna.
Overall worst-case consequence	II – Minor

### 6.6.5 Demonstration of as low as reasonably practicable

A MODU and vessels are required to undertake the Activity.

On-board treatment of most wastes and their subsequent discharge to the marine environment is consistent with legislative requirements (such as MARPOL) and considered environmentally acceptable.

All reasonably practicable control measures have been reviewed and those adopted are considered appropriate to manage the impacts such that the residual consequence is assessed to be II – Minor. The proposed control measures are in accordance with the Santos risk management criteria and are considered appropriate to manage impacts to ALARP.

## 6.6.6 Acceptability evaluation

Is the consequence ranked as I or II?	Yes – maximum planned operational discharge consequence is rated II – Minor.
Is further information required to validate the consequence assessment?	No – potential impacts and risks are well understood through the information available.
Are risks and impacts consistent with the principles of ESD?	Yes – Activity evaluated in accordance with Santos’ <i>Offshore Division Environmental Hazard Identification and Assessment Guideline</i> , which considers principles of ESD.
Have the acceptable levels of impact and risks been informed by relevant species recovery plans, threat abatement plans and conservation advice and Australian marine park zoning objectives?	Yes – consistent with relevant species recovery plans, conservation management plans and management actions set out in <b>Table 3.8</b> , including: <ul style="list-style-type: none"> <li>+ Recovery Plan for Marine Turtles in Australia 2017–2027 (DoEE, 2017)</li> <li>+ Wildlife Conservation Plan for Migratory Shorebirds (CoA, 2015c)</li> <li>+ Marine Bioregional Plan for the North-West Marine Region (CoA, 2012b).</li> <li>+ Conservation Management Plan for the blue whale 2015-2025 (CoA, 2015a)</li> </ul>
Are performance outcomes, control measures and associated performance standards consistent with legal and regulatory requirements?	Operational discharges are compliant with the requirements of the <i>Protection of the Sea (Prevention of Pollution from Ships) Act 1983</i> (Cth), which in Australian waters reflects MARPOL, and is enacted by: <ul style="list-style-type: none"> <li>+ Marine Order 91 (Marine pollution prevention – oil)</li> <li>+ Marine Order 95 (Marine pollution prevention – garbage)</li> <li>+ Marine Order 96 (Marine pollution prevention – sewage).</li> </ul>
Are performance outcomes, control measures and associated performance standards consistent with Santos’ Environment, Health and Safety Policy?	Yes – aligns with Santos’ Environment, Health and Safety Policy.
Are performance outcomes, control measures and associated performance standards consistent with industry standards?	Yes – the most recent and comparable Drilling and Completions Eps accepted by NOPSEMA have been reviewed for consistency with the performance outcomes, control measures and associated performance standards proposed in this EP.
Have performance outcomes, control measures and associated performance standards taken into consideration Relevant Person feedback?	Yes – objections or claims raised by Relevant Persons relating to Activity operational discharges have been considered. Existing control measures are considered sufficient.
Are performance standards such that the impact or risk is considered to be ALARP?	Yes – ALARP assessment conducted, with no additional control measures adopted.

The consequence of operational discharges on receptors is assessed as II – Minor. Based on an assessment of Santos’ acceptability criteria and with the control measures in place, potential impacts are considered acceptable.

## 6.7 Drilling and completions discharges

### 6.7.1 Description of event

Event	<p>Potential impacts may occur in the Operational Area from:</p> <ul style="list-style-type: none"> <li>+ drilling discharges: drilling fluids drilled solids (or cuttings) lost circulation materials</li> <li>+ cement discharges</li> <li>+ residual drilling fluid discharges (brines)</li> <li>+ blowout preventer and subsea vertical (Christmas) tree control fluid discharges</li> <li>+ well completion discharges</li> <li>+ formation water</li> <li>+ miscellaneous chemicals such as tracer dyes and cement spacer</li> <li>+ tank cleaning discharges</li> <li>+ residual bulk products.</li> </ul> <p>During the Activity, the estimated discharge volumes that could be expected per well:</p> <ul style="list-style-type: none"> <li>+ 7,700 m<sup>3</sup> of water-based drill fluids (inclusive of 100 m<sup>3</sup> of completion fluids)</li> <li>+ 1,300 m<sup>3</sup> of water-based cuttings including lost circulation materials</li> <li>+ 440 m<sup>3</sup> of NAF-based cuttings discharged at surface (if contingency NAF used; there will be no bulk discharges of NAF)</li> <li>+ aqueous-based lost circulation material (LCM) may also be pumped downhole at times</li> <li>+ 150 m<sup>3</sup> of cement slurry during cementing of conductors and casings</li> <li>+ 130 m<sup>3</sup> of cement (wet) from flushing tanks and lines, cement spacer and/or a cement job not meeting technical and safety standards</li> <li>+ 200 m<sup>3</sup> of residual non-recyclable water-based drilling fluids (brines)</li> <li>+ 60 to 600 L of control fluids</li> <li>+ 2,385 m<sup>3</sup> of formation water at oil in water content &lt;30 mg/L</li> <li>+ 100 m<sup>3</sup> of heated water from well completion</li> <li>+ 80 m<sup>3</sup> each of residual bulk barite, bentonite and brine.</li> </ul> <p>Cutting discharge volumes are calculated based on the expected wellbore section sizes and lengths and include some contingency. The total volume of drilling fluid and cement is an estimate based on previous drilling and completion programs. There are many variables during drilling campaigns that could cause the abovementioned volumes to change; for example, re-spud or side-tracking could be required and/or the interval length could change. Some of these variations could cause the estimated discharge volumes to increase or decrease, in particular the need for re-spud or side-track.</p> <p>Any formation water produced during well flowback would be discharged to the marine environment following oil filtration. The volume of formation water is expected to be low, but volumes depend on well performance and reservoir properties. However, the discharge will be limited to the duration of the well flowback.</p> <p>Unused bulk barite and bentonite stock on-board the MODU will be managed in according with the decision list in <b>Table 6.13</b>, if discharged.</p>
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<b>Extent</b>	<p>Drilling discharges with larger particle sizes such as large drill cuttings are expected to settle directly around the MODU and wells, whereas discharges with finer particles such as drilling muds could be carried with prevailing currents before settling.</p> <p>The seabed area affected by drill cuttings is expected to be localised with the higher concentration of cuttings in the immediate vicinity of the wells. Turbidity from drilling-related discharges is expected to affect water quality near the MODU periodically during drilling.</p> <p>Well flowback discharges including formation water are expected to dissipate rapidly and be diluted within the Operational Area.</p> <p>The Barossa Gas Export Pipeline (GEP) installation activity is planned to occur concurrently with drilling activities under this EP within the Drilling Operational Area for a total duration of approximately 4 weeks. GEP activities will be undertaken at least 3.8 km from the drill centres.</p>
<b>Duration</b>	<p>Water quality changes are expected to recover within hours to days following cessation of drilling and completion discharges.</p> <p>Sediment deposition will occur during the Activity, with finer particles continuing to settle for approximately two weeks following the drilling activity, with ecological recovery of the benthic habitat expected within months to a year.</p>

### 6.7.1.1 Drilling discharges

The Activity will use WBM for all hole sections, however as a contingency, non-aqueous fluids (NAF) may also be used for intermediate and/or production hole sections should technical issues be encountered (**Section 2.3**). These drill fluids will be discharged as follows:

- + The WBM will be discharged at the seabed for the riser-less surface holes. The fluids used for the 20-inch hole section may be partly drilled using a RMR system, in which case some of the WBM will be discharged at the sea surface. WBM used in intermediate and production holes will be discharged at the sea surface.
- + If the intermediate/production holes are drilled with the contingency NAF system, drilled cuttings will be processed through primary and secondary solids control equipment (SCE) to reduce the amount of residual NAF on discharged cuttings to less than 10% (weight per weight (w/w); i.e., mass percentage of NAF on dry cuttings). Remaining volumes of NAF will be transported to the mainland for reconditioning and recycling or disposal onshore.

As detailed in **Section 6.7.1.11**, the fluids and components of the drilling and completion fluids will be selected in accordance with the *Offshore Division Drilling Chemical Selection and Approval Process* (EA-91-II-00007) to ensure that environmentally acceptable products are used or the risks can be demonstrated to be ALARP from the use of other chemicals.

The total estimated volumes of drill cuttings generated per well during the Activity is approximately 1,300 m<sup>3</sup> of water-based cuttings. Drill cuttings associated with the surface hole sections will be discharged at the seabed, unless the RMR system is used for the 20-inch section (as mentioned above), in which case those cuttings will be processed over primary SCE and discharged at the sea surface. Drill cuttings from the deeper well sections will be recirculated to the MODU for processing over primary SCE and discharged at the sea surface. The total estimated volumes of NAF based cuttings generated if the contingency is required for both intermediate and production holes is approximately 440 m<sup>3</sup> per well. NAF based drill cuttings will be recirculated to the MODU for processing over primary and secondary SCE and discharged at the sea surface.



## 6.7.1.2 Lost circulation material

Lost circulation can occur in any hole interval and varies in severity. Lost circulation occurs when the drilling fluid flows into natural geological fissures, fractures or caverns. In the surface interval, when drilling riserless, it is often not necessary to take any action to cure the losses as they often self-cure once sufficient cuttings have entered the loss zone.

For losses that have to be cured, there is a choice of options available. Conventional LCM additives such as granular and fibrous material are usually pumped into the loss zone in the first instance. When conventional LCM additives fail to plug the loss zones it may be necessary to pump speciality lost circulation additives, such as cement or cross-linked polymers to heal the loss zones. By design the LCM enters the loss zone thereby plugging it and allowing drilling operations to re-commence. Typically, the LCM additives remain in the subsurface loss zone and do not return to surface. On some occasions the lost circulation is cured before all the material pumped enters the loss zone. When this occurs, the lost circulation material remains in the wellbore until it is usually circulated back to the surface where it is discharged along with the cuttings.

## 6.7.1.3 Cement discharges

Cement will be used to form permanent barriers and fix casings in place before drilling ahead with subsequent sections in the well. Cement in the annular space between casing and formation will form a seal to ensure the circulation system remains closed. Cement may also be used to seal a lost circulation zone, plug the wells from which a sidetrack may be drilled and when abandoning the wells.

The majority of cement pumped remains downhole, but minor volumes may be discharged at the seabed (when cementing conductor or surface casing) or at surface (when flushing lines or tanks). Some cement may be mixed and discharged as part of cement unit commissioning before the start of a campaign if the cement unit/pump has not been used before or in a considerable period of time.

Once drilling begins, approximately 150 m<sup>3</sup> of cement slurry per well (consisting of wet cement and cementing additives) may be discharged to the seabed during cementing of conductors and casings. Excess cement may also be released to the seabed if contingency activities are required, such as sidetrack drilling (where cement is used for plugs set for side-tracking) or well abandonment (where cement plugs are installed to create permanent barriers).

During drilling, approximately 130 m<sup>3</sup> of unplanned discharge of cement slurry (consisting of wet cement and cementing additives) at sea surface may be required as a contingency in the event of contamination or if technical issues with the cement system are experienced.

It is intended to transfer any excess dry bulk cement left over at the end of the Activity to the next operator using the rig.

Additives are required to create a wet cement mixture that meets technical and performance criteria. Cement additives are generally non-toxic or low toxicity, and include products such as extenders, retarders, antifoamers, dispersants and surfactants. Any surplus cementing additives at the end of the Activity will not be discharged to the marine environment and will be returned to shore for reuse or disposal.

## 6.7.1.4 Residual drilling fluid discharges

Excess sweeps and mud will be retained in the surface mud pit system, in the event that WBM is required to be pumped while running surface casing. Once the surface casing is run and cemented, surface residual volumes will be discharged to the marine environment, in order to change over to a NAF based system (if required). Non-recyclable water-based fluid would be discharged at the sea surface via the master mud pit dump valve, estimated at up to 200 m<sup>3</sup> per well.

#### 6.7.1.5 Blowout preventer and Subsea Vertical (Christmas) tree control fluid discharges

A BOP will be installed before drilling the production hole sections, and subsea vertical (Christmas) trees will be installed on each of the wells once drilling is complete. The BOP and subsea vertical (Christmas) trees will be routinely checked by completing pressure and function testing. Each function test will release control fluid (approximately 60 to 600 L) to the marine environment. The control fluids are subject to the *Santos Offshore Division Drilling Chemical Selection and Approval Process (EA-91-II-00007)* described in **Section 6.7.1.11**.

#### 6.7.1.6 Well completion

At the end of drilling and evaluation activities, the wells will be completed in preparation for production resulting in well flowback discharges as described in **Section 2.3.7**. Well flowback discharges will be analysed and separated on the MODU. Well flowback discharges (including formation water and 100 m<sup>3</sup> per well of water-based well completion fluids) will be treated to reduce oil-in-water content to <30 mg/L before discharged to sea. Other chemicals such as methanol and MEG may also be injected into the flow stream and either flared or discharged to sea. The wells will be flowed up to a maximum rate of 120 MMscf/d for up to 24 to 36 hours during well flowback activities for each well. Volumes will be dependent on well performance and reservoir properties.

Water condensed from steam used to heat the fluids via a steam exchanger in the well flowback package will also be discharged to sea. It is estimated that approximately 100 m<sup>3</sup> of heated water at a notional temperature of 60°C could be discharged to sea per well flowback. The discharge rate would be notionally 2 to 3 m<sup>3</sup> per hour.

#### 6.7.1.7 Formation water

Formation water may be produced from the reservoir during well flowback and discharged to sea. Produced water will be treated as part of the well flowback discharges via a water treatment package to reduce the oil-in-water content to <30 mg/L before discharged to sea. The volume of formation water discharged to sea will be a percentage of the total volume of well flowback discharged. The total volume of formation water discharged during well flowback is estimated as 2,385 m<sup>3</sup> based on conservative calculations using the anticipated minimum PFW rate for the Barossa field at 1,590 m<sup>3</sup>/d for a maximum duration of 36 hours (RPS 2017).

#### 6.7.1.8 Miscellaneous chemicals

Miscellaneous chemicals such as tracer dyes, scale inhibitors and additives may be used during cementing operations, equipment leak detection and well completion activities. Miscellaneous chemicals in residual water-based fluid systems, brine, completion chemicals, cement and cement spacer within MODU mud pits and surface tanks that is no longer required will be diverted overboard.

Chemicals used during drilling that are planned to be discharged to sea are subject to the *Santos Offshore Division Drilling Chemical Selection and Approval Process (EA-91-II-00007)* described in **Section 6.7.1.11**.

#### 6.7.1.9 Tank cleaning

At stages during the Activity, tanks may need to be cleaned, including mud pits (i.e., tanks used to mix and hold brine, sweeps or WBM), cement mixing/holding tanks and bulk storage tanks. Cleaning may be required to remove or flush 'dead' or residual volumes of WBM, or settled inert solid material and also if switching between WBM and NAF. The cement system will need to be flushed to prevent curing inside the cement unit and pipework after each cement job is completed. In most instances, tanks and pipework would be flushed with seawater or drill water and the diluted fluid discharged to sea surface.

### 6.7.1.10 Residual bulk products

Unmixed bulk drilling fluid solid additives (barite and bentonite), brine and drill water will be managed in accordance with the decision list in **Table 6.13**.

**Table 6.13: Decision list for managing bulk powders<sup>27</sup> and brines remaining on the mobile offshore drilling unit at the end of drilling campaign**

Trigger	Fate of stock	Reasoning
Well is not the last well in the MODU schedule and ongoing use of the product is anticipated.	Retain stock Stock will be retained on-board for use in the next well, or may be sent for temporary storage on a supply vessel. This option eliminates overboard disposal.	These products are expensive. Santos' preferred option is to use all stock in subsequent wells in the MODU schedule to minimise Activity costs and reduce discharges.
Well is the last well in the MODU schedule and the next Operator is willing to buy the stock.	Sell stock Stock will be retained on-board or may be sent for temporary storage on a supply vessel for use by the next Operator. This option eliminates overboard disposal.	It may be possible for Santos and the next Operator using the MODU to transfer ownership of the unmixed stock. The implementation of this option is dependent on demand and commercial agreements.
Well is the last well in the MODU schedule and selling the stock to the next Operator is not an option.	Minimise stock Santos will have measures in place to reduce the stock requiring disposal at the end of the Activity.	Stock minimisation measures will be put in place without compromising the minimum bulk stock required for well control or dealing with lost circulation. or dealing with lost circulation.
Well is the last well in the MODU schedule, selling the stock to the next Operator is not an option but another Santos operated MODU is in proximity and can take on stock.	Transfer stock to alternative MODU This option eliminates overboard disposal.	Stock can be transported to an alternate MODU dependent on whether: <ul style="list-style-type: none"> <li>+ Santos has another MODU operating in the region</li> <li>+ alternative MODU can use the product</li> <li>+ travel distance and cost associated with transporting the stock to the alternative MODU are not prohibiting</li> <li>+ alternate MODU has the capacity to take on additional stock.</li> </ul>

### 6.7.1.11 Drilling fluid and chemical selection

A risk-based approach to select chemical products ranked under the Offshore Chemical Notification Scheme (OCNS) is applied for those chemicals used and discharged to the marine environment. This scheme lists and ranks all chemicals used in the exploration, exploitation, and associated offshore processing of petroleum on the United Kingdom Continental Shelf.

<sup>27</sup> Bulk powders include any of the following: barite and bentonite.

Chemicals are ranked according to their calculated Hazard Quotients by the Chemical Hazard Assessment and Risk Management (CHARM) mathematical model, which uses aquatic toxicity, biodegradation and bioaccumulation data. The Hazard Quotient is converted to a colour banding with Gold and Silver colour bands representing the least environmentally hazardous chemicals. Chemicals not amenable to the CHARM model (such as inorganic substances, hydraulic fluids or chemicals used only in pipelines) are assigned an OCNS grouping based on the worst-case ecotoxicity data with Group E and D representing the least hazard potential.

The Santos *Offshore Division Drilling Chemical Selection and Approval Process (EA-91-II-00007)* accepts CHARM ranked Gold/Silver, or non-CHARM ranked E/D chemicals for use and discharge without a detailed environmental risk assessment. The same applies to chemicals that are on the OSPAR Pose Little or No Risk to the Environment (PLONOR) List. The PLONOR List, agreed upon by the OSPAR Convention (Convention for the Protection of the Marine Environment of the North-East Atlantic), contains a list of substances that will pose little or no risk to the environment in offshore waters. If chemicals are ranked lower than Gold, Silver, E or D (CHARM ranked purple, orange, blue or white, or non-CHARM A, B or C ranked chemicals) and no alternatives are available, a risk assessment is conducted providing technical justification for their use, and showing that their use and associated risk is acceptable and ALARP.

As described above, investigation of potential alternative chemicals is completed when chemicals are ranked lower than CHARM Gold, Silver, E or D (CHARM ranked purple, orange, blue or white, or non-CHARM A, B or C ranked chemicals). There is a preference for chemical options that are CHARM ranked Gold/Silver, or non-CHARM ranked E/D chemicals and/or chemical that have a low aquatic toxicity, are readily biodegradable and do not bioaccumulate (discussed below).

Any chemicals that may be discharged to the marine environment and not OCNS CHARM or non-CHARM ranked are risk assessed using the OCNS CHARM or non-CHARM models. The chemical is assigned a pseudo ranking based on the available aquatic toxicity, biodegradation and bioaccumulation data (discussed below) and assessed for environmental acceptability for discharge to the marine environment.

#### Ecotoxicity assessment

**Table 6.14** and **Table 6.15** act as guidance in assessing the ecotoxicity of chemicals during the investigation of potential alternatives. **Table 6.14** is used by the United Kingdom Centre for Environment, Fisheries and Aquaculture (Cefas) to group a chemical based on ecotoxicity results, 'A' representing highest toxicity/risk to environment and 'E' lowest. **Table 6.15** shows classifications/categories of toxicity against aquatic toxicity results.

**Table 6.14: Initial Offshore Chemical Notification Scheme 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

*Note: Aquatic toxicity refers to the Skeletonema costatum EC<sub>50</sub>, Acartia tonsa LC<sub>50</sub>, and Scophthalmus maximus (juvenile turbot) LC<sub>50</sub> toxicity tests. Sediment toxicity refers to the Corophium volutator LC<sub>50</sub> test.*

*Source: Cefas Standard Procedure 2019, OCNS 011 NL Protocol PART 1: Core Elements*

**Table 6.15: Aquatic species toxicity grouping**

Category	Species	LC <sub>50</sub> and EC <sub>50</sub> criteria
Category Acute 1: Hazard statement – Very toxic to aquatic life	Fish	LC <sub>50</sub> (96 hrs) of ≤1 mg/L
	Crustacea	EC <sub>50</sub> (48 hrs) of ≤1 mg/L
	Algae/other aquatic plant species	ErC <sub>50</sub> (72 or 96 hrs) of ≤1 mg/L

Category Acute 2: Hazard statement – Toxic to aquatic life	Fish	LC <sub>50</sub> (96 hrs) of >1 mg/L to ≤10 mg/L
	Crustacea	EC <sub>50</sub> (48 hrs) of >1 mg/L to ≤10 mg/L
	Algae/other aquatic plant species	ErC <sub>50</sub> (72 or 96 hrs) of >1 mg/L to ≤10 mg/L
Category Acute 3: Hazard statement – Harmful to aquatic life	Fish	LC <sub>50</sub> (96 hrs) of >10 mg/L to ≤100 mg/L
	Crustacea	EC <sub>50</sub> (48 hrs) of >10 mg/L to ≤100 mg/L
	Algae/other aquatic plant species	ErC <sub>50</sub> (72 or 96 hrs) of >10 mg/L to ≤100 mg/L

Source: United Nations (2019) *Globally Harmonized System of classification and labelling of chemicals (GHS)*, Eighth Revised Edition.

### Biodegradation assessment

The biodegradation of chemicals is assessed using the Cefas biodegradation criteria, which aligns with the categorisation outlined in the United Nations GHS Annex 9 Guidance on Hazards to the Aquatic Environment (2019). The below is used as a guide during the investigation of potential chemical alternatives. Preference is to select readily biodegradable chemicals.

Cefas categorises biodegradation into the groups of:

- + readily biodegradable: results of greater than X% biodegradation in 28 days to an OSPAR harmonised offshore chemical notification format (HOCNF) accepted ready biodegradation protocol
- + moderately biodegradable: results greater than 20% and less than X% to an OSPAR HOCNF accepted ready biodegradation protocol
- + poorly biodegradable: results from OSPAR HOCNF accepted ready biodegradation protocol.

Where X is equal to:

- + 60% in 28 days in OECD 306, marine biodegradability of insoluble substances or any other acceptable marine protocols, or in the absence of valid results for such tests
- + 60% in 28 days (OECD 301B, 301C, 301D, 301F, Freshwater biodegradability of insoluble substances), or
- + 70% in 28 days (OECD 301A, 301E).

### Bioaccumulation assessment

The bioaccumulation of chemicals is assessed using the Cefas bioaccumulation criteria, which aligns with the categorisation outlined in the United Nations GHS Annex 9 Guidance on hazards to the aquatic environment (2019). Preference is to select non bioaccumulative chemicals.

The following guidance is used by Cefas:

- + Non-bioaccumulative/non-bioaccumulating: Log Pow <3, or results from a bioaccumulation test (preferably using *Mytilus edulis*) demonstrates a satisfactory rate of uptake and depuration, and the molecular mass is ≥700
- + Bioaccumulative/Bioaccumulates: Log Pow ≥3, or results from a bioaccumulation test (preferably using *Mytilus edulis*) demonstrates an unsatisfactory rate of uptake and depuration, and the molecular mass is <700.

All drilling and completion chemicals will be selected in accordance with the Santos *Offshore Division Drilling Chemical Selection and Approval Process (EA-91-II-00007)*.

## 6.7.2 Nature and scale of environmental impacts

Potential receptors: physical environment (water quality, benthic habitat, KEF); threatened, migratory or local fauna; socio-economic, and cultural features.

The discharge of cuttings and fluids during the Activity has the greatest potential for exposure to receptors based on the discharge duration. Specifics of potential impacts to water quality from the discharge of cuttings and fluids are as follows.

### 6.7.2.1 Dispersion modelling of drilling fluids and cuttings

To understand the fate of the drill cuttings and fluids Asia-Pacific Applied Science Associates (APASA) undertook a dispersion modelling study for the Barossa appraisal drilling campaign undertaken in NT/RL5 under the *Bonaparte Basin Barossa Appraisal Drilling Campaign EP* (ALL/HSE/PLN/020). Retention Lease NT/RL5 ceases to be in force upon the grant of Petroleum Production Licence NT/L1 which includes the same Graticular Blocks within the licence (Government Notices Gazette C2020G00539). Modelling was based on a release location at the south-west corner of NT/L1, as this represents a conservative point to the nearest environmental receptors (i.e., Evans Shoal, Tassie Shoal and Lynedoch Bank) (APASA, 2012). The modelled release location is also representative of the proposed well locations for the Activity (**Figure 1-1**).

For the near-seabed discharges of cuttings and fluids, the modelling indicated that the larger particulates (diameter >0.15 mm) would settle within 60 m from the release location. Smaller particulates (diameter <0.15 mm) were expected to be carried further away from the release location (up to 3 km to 4 km), due to slower settling velocities and will settle as a very thin layer of sediment. No contact was predicted with shoals and banks.

For particulates discharged near the water surface, the modelling indicated that material would be transported further from the release location as a result of being exposed to ocean current forces for a longer period. Particulates settled over a larger area (maximum total area of 1.27 km<sup>2</sup> and up to 1.2 km from the release location) as a thinner layer when compared with particulates discharged near-seabed.

Predicted deposition values of drill fluids and cuttings from the combined near-seabed and near-surface discharges were shown to decrease with increasing distance from the well. Particulates settled over a range of distances depending on the season, covering a maximum total area of 1.66 to 19.12 km<sup>2</sup>. Within 100 m of the discharge location the average particulate bottom thickness decreased to < 15 mm.

No contact was predicted with shoals and banks from the combined near-seabed and near-surface discharges.

It is expected that the drilling discharges from this Activity will behave in a similar way due to the metocean conditions in the region having an influence on the direction and distance of travel, and the similar release rates of drilling and completion fluids. Distribution of the drilling fluids and cuttings will be concentrated around each well, with the smaller particulates carried further from the release location but settling as a very thin layer.

### 6.7.2.2 Physical environment

Drilling-related discharges will be intermittent during the Activity, with volumes dependent on a range of variables. Their discharge to the marine environment will result in a localised reduction in water quality. This would be expected to be temporary (minutes to hours) and localised around the discharge point. The discharges are expected to be dispersed and diluted rapidly, with concentrations significantly dropping with distance from the discharge point. Detectable changes to ambient water quality outside of the Operational Area are considered unlikely to occur.

Specifics of potential impacts to water quality from the discharge of drilling fluids (WBM and NAF), cement, solid additives (e.g., barite, bentonite), residual hydrocarbons and treated seawater are as follows:

## Water quality – turbidity

Drilling solids (i.e., cuttings), formation water, cement and solid additives (e.g., barite, bentonite) will be discharged during the Activity.

Discharges at the water surface or close to sea level will result in a reduction in water quality from an increase in turbidity. Once discharged, large particles and flocculated solids form a plume that settles quickly on the seabed. Fine-grained unflocculated clay-size particles and other soluble components form another plume in the water column that drifts with the prevailing currents away from the point source and is diluted rapidly in the receiving waters (Neff, 2005). Modelling of similar discharges in this area (APASA, 2012) indicates that particulates discharged near the sea surface will settle over an area of up to 1.27 km<sup>2</sup> and up to 1.2 km from the discharge location as a thin layer. Modelling predictions by APASA (2012) in NT/L1 coincides with observations of a study conducted in the Northwest Shelf which modelled and surveyed the fate of drill cuttings and fluids for three wells with a total discharge volume of 1,543 m<sup>3</sup> (Jones et al. 2021). The study found sporadic and intermittent TSS concentrations up to 10 mg L<sup>-1</sup> ~1000 m from the discharge point lasting over a period of minutes for each discharge event (Jones et al. 2021). In context, during cyclones and storms TSS concentrations of tens or hundreds of mg L<sup>-1</sup> over a few hours are common in tropical shallow water reef environments (Abdul Wahab et al. 2017; Fisher et al. 2015 cited in Jones et al. 2021). It is expected that discharges from this Activity will behave in a similar way with impacts to water quality within a relatively small radius.

Turbidity increases from discharges at the seabed will have less of an effect than discharges at the sea surface with little change in ambient light levels since light will already be limited at this depth. Modelling of similar discharges in this area (APASA, 2012) indicates that the larger particulates discharged at the seabed would settle within 60 m of the release location and smaller particulates within 4 km due to the slower settling velocities.

Cuttings or fluids from development drilling activities will settle rapidly, with only fines discharged at the sea surface being transported further from their release location before they settle.

The radius of impact from this Activity will differ from that modelled due to a difference in volume released and seasonal conditions, but it is expected that the larger particulates will still settle close to the well and the impacts are comparable due to the similarity in metocean conditions, rate of discharge and size of particulates.

## Water quality – toxicity

Cementing discharges (cement, cement slurry, additives and spacers, etc), control fluids and formation water have the potential to result in toxicity effects. Discharge of cement at the sea surface has not demonstrated significant harm to water column flora and fauna (Neff, 2005).

Components of WBM and NAF with potential toxicity to marine flora and fauna include metals associated with inorganic salt components, organic polymers and additional organic additives as well as barite/bentonite weighting agents. Metals present in drilling fluid generally resemble that of marine sediments, albeit with concentrations of some metals higher than clean marine sediments (Neff, 2005). Metals associated with WBM drill cuttings have been shown to have a low bioavailability as they tend to remain in a non-ionic form, remaining bound to other compounds, presenting a low toxicity risk to marine fauna (Neff, 2005). Mercury may be present in barite (barium sulphate) in the form of inorganic and insoluble mercuric sulphide, with concentrations varying substantially depending on the geological origin of the barite. The forms of mercury in barite have very low bioavailability, much lower than methylmercury, and pose little risk of biomagnification (Neff, 2008). In general, the acute toxicity of WBM is low (Neff, 2005).

Cuttings generated using NAFs do not disperse as effectively as those generated with WBM (Neff, 2005) and therefore the extent of impact will be reduced. Toxicity test results from NAFs in one study showed that the olefin and paraffin oil components that made up the synthetic component in the NAF was non-toxic to the water-dwelling organisms studied (Neff *et al.*, 2000). However, sediment toxicity results vary depending on the type of olefin or paraffin.

Toxic impacts from the oil content in formation water is expected to be very localised following treatment by filtration to less than 30 ppm. Any toxic effects that might potentially occur would likely be restricted to small organisms such as plankton, larvae and potentially small fish that become entrained in discharged water resulting in relatively high exposure periods. The period of which formation water may be discharged is short; that is, nominally 24 to 36 hours per well flowback target. Monitoring of PFW discharge at the Stag platform (previously operated by Santos) shows that the discharge of PFW does not significantly affect water quality. At a distance of more than 50 m from the Stag discharge point, the PFW could not be differentiated from background conditions in the marine environment. The hydrocarbon and metal concentrations were also below all ANZECC/ARMCANZ 95% species protection guidelines. These results indicate no significant impact from the release of PFW at the Stag facility and can be compared to the potential discharges from the planned well flowback discharge of formation water in terms of the potential for hydrocarbons and chemicals within the discharge. However, it is recognised that the discharge components will be dependent on the reservoir and hydrocarbon type.

Small volumes of control fluids are intermittently discharged subsea during function testing, the volumes are very small (approximately 60 to 600 L) each time and will therefore be rapidly diluted upon discharge within minutes to hours).

Bioaccumulation is the uptake and retention of xenobiotics (substances that are not natural components of the environment) by organisms from their environment. This process can have significant ecological consequences as pollutants move up the food chain to higher order species. Numerous studies have been carried out in the Gulf of Mexico to test and evaluate a range of biological, biochemical and chemical methodologies to detect and assess chronic sub-lethal biological impacts near long-duration activities associated with energy industry exploration and production. Contaminant concentrations at most locations studied were below levels thought to induce biological responses (Kennicutt *et al.*, 1996). Therefore, discharges associated with this Activity are not expected to have long-term effects due to bioaccumulation.

Modelling of the drill cuttings and fluids (APASA, 2012) indicates a very thin bottom deposition (0.0026 to 0.026 mm) may occur up to 8 km from the release location however the majority of cuttings or fluids from development drilling activities will settle rapidly, within <100 m of the release location. For this Activity, a similar distribution is expected with no contact predicted at shoals or banks from the combined near-seabed and near-surface discharges.

### Benthic habitat

The discharge of cuttings coated in WBM, NAF or cement will result in localised burial of benthic organisms and alteration of the benthic substrate. Cementing has the potential to result in toxicity effects; however, given that cement is inert once set (CIN, 2005), chronic toxicity from exposure to set cement will not occur.

A compilation and review of the findings of 75 studies relating to the discharge of synthetic-based muds, which includes NAF, by the International Association of Oil and Gas Producers (OGP, 2003) concluded that benthic community disturbance is in general very localised and temporary. The effects on soft bottom communities from synthetic-based mud cuttings discharges are rarely seen outside of 250 to 500 m (Jensen *et al.*, 1999).

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. However, tolerance mechanisms may result in depletion of energy reserves and reduced sponge health, suggesting that longer term exposure to such extreme sediment disturbance conditions is likely to result in mortality. The benthic biota around the Operational Area is very similar to that of the wider region, and consists of soft substrates and is devoid of significant bathymetric features (Jacobs, 2016c). No significant seabed features or biota have been found in the immediate region surrounding the Operational Area. No photosynthetic corals were identified in the area during surveys due to the water depths; however, sponges were sparsely observed throughout the area and also in other surveys of the regions (Jacobs, 2016c).

The depth of accumulated sediments will be greatest close to the well location where the heavier particles are deposited and decrease with increase in distance from the source point.

The effects of drilling discharges on the benthic environment are related to the total mass of drilling solids and drilling fluids discharged; the relative energy of the water column; and benthic habitat at the discharge location (Neff, 2005). The effects of drilling fluids and cuttings piles on seabed communities are caused mainly by burial and low sediment oxygen concentrations caused by organic enrichment (Neff, 2005). With increasing thickness of drill cuttings, the number of taxa, abundance, biomass and diversity of macrofauna has been found to significantly reduce (Tranum *et al.*, 2010).

Organic enrichment as a result of WBM drilling cuttings discharge increases bacterial activity. A mild enrichment often sees both an increase in the abundance and diversity of the benthic community in the area of discharge. As more organic enrichment occurs, the seafloor bacteria colonies consume more and more of the oxygen in the sediment, resulting in anoxic conditions. In a highly organic enriched area, the sediment can become anaerobic and both the abundance and diversity of species is much lower than normal (IOGP, 2021).

Recovery of benthic communities from burial and organic enrichment occurs by recruitment of new individuals from planktonic larvae and migration from adjacent undisturbed sediments. Ecological recovery usually begins shortly after completion of drilling and often is well advanced within a year. Hardened cement will provide a surface for colonisation by epifauna. Full recovery may be delayed until concentrations of biodegradable organic matter decrease through microbial biodegradation to the point where surface layers of sediment are oxygenated. Case studies on impacts of WBMs and drilling discharges on soft sediment and benthic fauna are outlined below:

- + For Santos' East Spar development, the area of impact from water-based mud discharges was not more than 100 m from the drill site and short-lived (recovery in less than 18 months) (Sinclair Knight Merz, 1996, 1997; Kinhill, 1998).
- + Benthic monitoring at the Stag production platform (water depth approximately 45 m) indicated that drilling-induced impacts had less of an influence on infaunal assemblages through time than small spatial scale natural variability (Kinhill, 1998).
- + Benthic monitoring at the Santos Van Gogh 3 well location (water depth approximately 350 m) reported sediment deposition one month following drilling extended up to 180 m from the well location along the longest axis and 70 m along the shortest axis (Sea Serpent, 2008). Two months later, monitoring confirmed that the extent of deposition had decreased to a uniform distance of 55 m around the well with a total area reduction of approximately one third (Sea Serpent, 2008). The monitoring revealed that burrow-forming worms and crabs still persisted within the area of sediment deposition (Sea Serpent, 2008).
- + Fauna surveys surrounding the drill centres of three wells in the Northwest Shelf found a high impact zone within a 75 m radius of the well contributed by seabed discharges from tophole drilling (Jones et al. 2021). The high impact zone was largely devoid of all epibenthic fauna and showed a clear loss

of soft corals, sponges, and hydroids (Jones et al. 2021). A medium impact zone, within 200 m of the well, found sponges and soft corals covered by sediment (Jones et al. 2021).

Other case studies from drilling activities on the NWS regarding impacts of NAF cuttings discharge on the marine environment (APPEA, 1998) have shown:

- + Wannea-3/6 – drilled by Woodside in 1994 and found that 11 months after the cessation of drilling, low residual concentrations of hydrocarbons were detected (<200 ppm), reducing to less than 1 ppm within 200 m of the cuttings discharge point.
- + North Rankin-A platform – drilled by Woodside in 1983 and completed in 1991 in water depths of 125 m, with 11 of the 23 wells drilled using low-toxicity oil-based mud. Concentrations of hydrocarbons rapidly decreased from 75,000 ppm beside the platform to 40 ppm at 800 m and 2 ppm at 2 km from the platform in the direction of the prevailing current. Further monitoring conducted in the following years indicated that away from the cuttings pile, the degradation of residual hydrocarbons was occurring successfully with an annual half-life of one year.
- + Mydas-1 and Hawksbill-1 – drilled in 1993 and 1994. Results from studies conducted indicated that impacts to seabed fauna were limited in extent and duration, the extent of contamination was approximately 100 m from the well head in the direction of the prevailing currents, the biomass and densities of some of the common and numerous taxa had decreased by one to two months after drilling, with effects limited to 100 m from the well; in most cases, biomasses and densities of these taxa had recovered six to eight months after drilling.
- + In Bass Strait, studies conducted by Esso Australia Pty Ltd at the Fortescue platform, in a water depth of 70 m, found that sediment concentrations of synthetic or oilbased fluids were highest (average of 9,600 ppm) at the site closest to the platform, but not detectable (<0.2 ppm) at any site beyond 100 m from the platform. Four months after the end of drilling, concentrations had decreased to an average of 230 ppm at the sites closest to the platform, and were not detected at any monitoring station 11 months after drilling. It was concluded that the risks for long-term alteration of benthic infauna from the use of synthetic based fluids were low.
- + In some cases, increased concentrations of NAF-coated cuttings on the seabed have resulted in a decrease in species diversity driven by organic enrichment rather than toxicity, with opportunistic species out-competing other more temperamental species. Microbial degradation of the base fluid in sediments results in oxygen depletion in sediments (Neff *et al.*, 2000), leading to impacts on infaunal communities.

The surface hole section of the well is drilled riser-less. Drill cuttings and unrecoverable WBM drilling fluids/additives from the surface hole sections will be discharged at the seabed at the well location and typically result in a localised area of sediment deposition (cuttings pile) in close proximity to the well site.

A WBM drilling cuttings pile is effectively made up of:

- + a rock fraction (the cuttings)
- + WBM, including:
  - weighting agent (API barite)
  - liquid fraction (the liquid components of the drilling fluids).

Drill cuttings accumulation on seafloor sediments can cause changes in the physical properties and chemical composition of the seabed sediments. These include increased concentrations of organic material, a change in the appearance of the sediment surface, increased sediment grain size and increase in concentrations of metals (relating to weighting agent use).

Barite is one of the main constituents used in WBM, and its use results in elevated levels of barium (Ba) in cuttings. Other chemicals of concern in cuttings, either because of their potential toxicity and/or abundance in WBM are arsenic (As), chromium (Cr), cadmium (Cd), copper (Cu), iron (Fe), lead (Pb), mercury (Hg), nickel (Ni) and zinc (Zn), (Breuer *et al.*, 2004). These metals are present in barite primarily as insoluble mineralised sulphide salts (Trefry *et al.*, 1986; Simpson and Batley, 2007). These solid metal sulphides have limited environmental mobility. Given the low concentrations of stock barite (approx. 80 m<sup>3</sup>) within the WBM formulation, coupled with the low concentrations of heavy metals including mercury and cadmium in stock barite (1 mg/kg and 3 mg/kg dry weight in stock barite, respectively), the overall volumes of heavy metals within the drill fluid discharges are minimal. These concentrations are within the default guideline values for mercury in the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZG, 2018).

Dissolved barium and any heavy metal contaminants present in the barite may slowly leach out of an anoxic cuttings pile (Neff. *Et al*, 2005). Breuer *et al.* (2008) has also observed that metals in cuttings, migrate either upward to the overlying water (Ba, Mn, and Fe), or diffuse downward (Cr, Cu and Pb) where they become incorporated into Fe monosulfides. The exposure of these Fe monosulfides to oxygen as a result of transport of oxygen into the cuttings via bioturbation or advection and/or pile resuspension may then lead to the release of the associated metals into the water column (Saulnier and Mucci, 2000; Huerta-Diaz *et al.*, 1998).

In a stable cuttings pile with little physical disturbance or bioturbation, it is probable that the fraction of the total cuttings pile metals that is in the dissolved, bioavailable fraction remains low. It is probable that some dissolved metals diffuse into the overlying water column and escape from the pile as identified by Neff *et al*, 2005. However, this efflux is not sufficient to raise the concentration of metals above natural background levels to an ecologically significant extent (Hartley *et al.*, 2003). There is no indication that the levels of trace metals in fish and shellfish collected close to offshore installations are significantly above natural background concentrations (Bakke *et al.*, 2013).

Marine fauna that are exposed in the laboratory or field to cuttings in sediments do not bioaccumulate significant quantities of metals (Hartley *et al.*, 2003). There is some evidence of a limited bioavailability of a few metals, such as Pb and Zn, which are present in cuttings piles; however, doubt remains that metal bioaccumulation in marine fauna from cuttings piles is sufficient to cause harmful effects in marine fauna living on or near cuttings piles (OSPAR, 2019).

Modelling of cuttings pile relocation (disturbance and re-deposition) has confirmed that potential impacts of metals are minimal and disturbance of cuttings drilled with WBM is not expected to result in any significant impact (OSPAR, 2019). Generally, impacts from disturbed cuttings drilled with WBM are expected to be minor and resemble the impacts from currently consented cuttings discharges (OSPAR, 2019).

### Key ecological features

The Operational Area occurs within the 'Shelf break and slope of the Arafura Shelf' KEF, of which one of its defined values is continental slope, patch reefs and hard substrate pinnacles. These values were not observed within the Operational Area during the Barossa marine studies program, nor are these topographically distinct features evident from the bathymetry data derived from multiple surveys undertaken across the area. The seabed near the drilling locations is mostly bare sand that supports burrowing infauna and sparse scattering of sponges, which is unlikely to be affected by smothering. Habitat supporting significant benthic communities is not expected near the drilling locations and is not likely to be affected by increased sedimentation or from increased turbidity in the water column. Species associated with the continental slope and patch reefs that characterise this KEF (such as demersal fish, whale sharks, sharks and turtles) are unlikely to aggregate within the Operational Area due to the lack of seafloor features. However, potential impacts to these species are described below.

#### 6.7.2.3 Threatened, migratory or local fauna

Any increases in suspended solids and subsequent decreases in available oxygen surrounding the discharge location may result in a localised impact to organisms present in the water column. Impacts may include

obstructions to respiratory processes and other physiological processes as well as behavioural changes due to a reduction in available oxygen or avoidance of the turbidity plume. The increased particle load in the water column could adversely affect respiratory efficiency of small fish species that become entrained in the turbidity plumes.

The seabed within the Operational Area is predominantly bare sediment and contains low abundance and diversity of infauna. Marine invertebrates may inhabit soft sediments and can contribute to the diet of some fauna. The area of soft sediment habitat that is potentially impacted is small compared with the amount of similar habitat available across the bioregion. Therefore, the disturbance is not expected to affect prey availability, and protected fauna species, significantly. Mobile marine species are expected to either avoid turbid stretches of water or pass through with no significant impacts.

The toxicity of WBM, NAF, formation water, control fluid and cement is considered low and the potential for bioaccumulation of any toxic compounds is negligible. As with all chemicals selected for use in drilling operations by Santos, the chemicals chosen for the Activity will be low aquatic toxicity (for example, EC50/LC50 > 100 mg/L), low bioaccumulation potential (for example, Log Pow <3) and readily biodegradable (for example, more than 60 in 28 days OECD 306), therefore reducing the likelihood of any significant impacts.

Bioaccumulation of chemicals is not expected to occur due to the limited bioavailability of contaminants and the rapid dispersal of discharge plumes in the deep offshore environment.

#### 6.7.2.4 Cultural Features

No feedback was provided about impacts from drilling and completions discharges to cultural features during Tiwi Clan consultations.

Information provided by Tiwiclients of the EDO during preparation of the EP identified concerns with the introduction of chemicals into the food chain from the Activity, that may ultimately pass through to Tiwi people through traditional fishing and hunting of fish and other seafoods.

#### 6.7.2.5 Potential Cumulative Impacts

GEP installation activities will not result in any drilling discharges, therefore neither additive or cumulative effects will result from GEP installation activities in relation to drilling discharges.

### 6.7.3 Environmental performance outcomes and control measures

The EPOs relating to this event include:

- + No injury or mortality to EPBC Act listed marine fauna. [EPO-05]
- + No significant changes to air, sediment and water quality. [EPO-06]
- + No significant impacts to cultural features from the Activity. [EPO-09]

An assessment of the environmental benefits and the potential costs or issues associated with control measures for this Activity are shown in **Table 6.16** to demonstrate the potential impacts from this aspect are ALARP. Control measures that are adopted have associated EPSs and measurement criteria which are presented in **Table 8.2**. Rejected control measures have an ALARP evaluation provided to justify their rejection.

**Table 6.16: Control measure evaluation for drilling discharges**

CM reference	Control measure	Environmental benefit	Potential cost/issues	Evaluation
<b>Standard control measures</b>				
BAD-CM-007	Chemical selection procedure	Ensures only environmentally acceptable drilling products that could be discharged to sea are used.	Cost associated with implementation of procedure. Range of chemicals reduced with potentially higher costs for alternative products.	<b>Adopted</b> – benefit of using environmentally acceptable products outweigh potential costs.
BAD-CM-028	Cuttings management system	Reduces the concentration of drilling mud on cuttings before discharge while drilling with a closed circulating system, thereby reducing the total volume of mud lost to sea. Reduces oil-on-cuttings prior to discharge if using NAF through the use of augers and cuttings dryers.	High cost associated with operating the cuttings management system. Drilling fluids are expensive; hence the intent is to recover and re-use fluids.	<b>Adopted</b> – environmental and cost saving benefits of minimising drilling fluid discharges outweigh the cost of operating the cuttings management system.
BAD-CM-029	Inventory control procedure	Restricts the type and volume of drilling discharges and includes a decision-making framework for managing left-over bulk products (refer to <b>Table 6.13</b> ).	Significant safety risks and/or costs associated with backloading bulk products to vessels for onshore disposal.	<b>Adopted</b> – high safety risks and costs associated with onshore disposal of the specified bulk products are grossly disproportionate to the low environmental impacts of disposal in deep, offshore waters.
BAD-CM-030	Oil content measurement procedure	Ensures oil-on-cuttings is accurately measured as specified in BAD-CM-028-EPS-05.	Cost associated with implementing procedure.	<b>Adopted</b> – environmental benefits of ensuring procedures are followed outweigh costs.
BD-CM-031	Quality control limits for barite	Contaminant concentration limits in barite meet API specifications to minimise the risk of seabed contamination.	None.	<b>Adopted</b> – environmental benefit of using industry acceptable barite outweighs any cost.
BAD-CM-033	Well flowback procedures	Ensures well flowback fluids are appropriately managed and that oil-in-water content in formation water, if produced, is below 30 ppm.	Cost associated with implementation of procedure.	<b>Adopted</b> – environmental benefits of ensuring procedures are followed outweigh costs.

CM reference	Control measure	Environmental benefit	Potential cost/issues	Evaluation
BAD-CM-045	Mud pit wash residue discharge controls	Reduce oil by volume concentrations to reduce impacts from mud pit wash residue discharges.	Cost associated with oil in water treatment package.	<b>Adopted</b> – environmental benefits of ensuring procedures are followed outweigh costs.
BAD-CM-046	Decision list for managing bulk powders and brines remaining on the MODU at the end of the drilling campaign	Optimise resource recovery and reuse where possible	Administrative cost in identifying and assessing options.	<b>Adopted</b> – environmental benefits of ensuring procedures are followed outweigh administrative costs.

CM reference	Control measure	Environmental benefit	Potential cost/issues	Evaluation
<b>Additional control measures</b>				
N/A	Use of RMR for the 30" and entirety of the 20" hole sections	<p>The primary benefit of RMR is the potential reduction of WBM discharged to the environment. RMR returns top-hole cuttings/WBM from the riserless section of the well to the MODU and provides an opportunity to recover and re-use the WBM drilling fluids. RMR does not reduce the volume of cuttings discharged to the sea. Cuttings disposal using RMR occurs from the MODU at (slightly below) sea surface, instead of directly to seabed at the wellhead. Discharging at sea surface rather than at the seabed reduces the accumulation of cuttings around the wellhead, but results in a localised reduction in water quality from increased turbidity and a larger seabed disturbance footprint from sedimentation (albeit at lower sediment concentrations).</p>	<p>Use of RMR in the lower well sections (from the 14 3/4" hole onwards) is not necessary once the BOP is installed as all returns are circulated back to the MODU. Use of RMR in the initial 30" hole (riserless drilling) would require additional time and costs to set the equipment up and with additional running time there is more opportunity for equipment failure which could impede drilling in the lower portion of the 20" hole where RMR is technically necessary. To ensure redundancy of the equipment, a comprehensive inventory of spare parts are on board as well as requirements for preventative maintenance (BAD-CM-040 in <b>Section 8.4</b>) and competent personnel to operate and maintain the equipment.</p>	<p><b>Rejected</b> – the use of RMR in other sections of the well or the entirety of the 20" hole is not technically required and could result in potential downtime of the RMR equipment and subsequent delay in operations. Extended use of the RMR will also lengthen the duration of the drilling campaign. The potential impacts from discharges of drill cuttings and fluids when riserless drilling are considered to be negligible; hence, the additional RMR management costs and drilling downtime risks are considered disproportionately high to the low environmental benefits.</p>
N/A	Reinjection of NAF drill cuttings downhole	Eliminates NAF drill cutting discharges to the marine environment.	Not technically feasible to reinject drill cuttings into subsea wellheads, which are being developed as production wells.	<b>Rejected</b> – not technically feasible.

CM reference	Control measure	Environmental benefit	Potential cost/issues	Evaluation
N/A	Store and transport NAF drill cuttings to shore for disposal	Eliminates drill cutting discharges to the marine environment.	Skip-and-ship involves the back-loading of some or all drilling fluids and cuttings from the MODU into skips on an Activity vessel, which then transfers the fluids/cuttings for discharge at an alternative onshore location. This option introduces safety risks and costs associated with additional lifting operations, energy/emissions vessel movements and onshore landfill disposal.	<b>Rejected</b> – high safety risks and costs associated with skip-and-ship are grossly disproportionate to the low environmental impacts of disposal in deep, offshore waters. NAF selected in accordance with control measure BAD-CM-007 so that only environmentally acceptable drilling products are used.
N/A	Recover and store completion fluids on board the MODU for transport and disposal onshore	Eliminates completion fluid discharges to marine environment.	This would involve back-loading the fluids to vessels for onshore disposal. This option introduces safety risks and costs associated with additional bulk product transfer operations and vessel movements.	<b>Rejected</b> – high safety risks and costs associated with backloading fluids are grossly disproportionate to the low environmental impacts of disposal in deep, offshore waters. Completion fluids (i.e., brines) selected in accordance with control measure BAD-CM-007 so only environmentally acceptable products are used.



CM reference	Control measure	Environmental benefit	Potential cost/issues	Evaluation
N/A	Eliminate NAF	No NAF cuttings discharged to the marine environment.	While WBM is the base case option, NAF is also maintained as an option in the event it is required for reducing wellbore instability risks. Removing this option may introduce unacceptable safety risks and lead to lower technical performance of the wells.	<b>Rejected</b> – the base plan is to drill the wells with a WBM drilling fluid. However, given there have been no directional drilling/development wells in the Barossa field, the option to use NAF (which has wellbore stability technical benefits that WBM cannot provide) must be retained in case the WBM drilling fluid provides inadequate performance. In addition, base oil (a NAF) is needed for the completion of the wells to enable them to flow back to the well test package on initial clean-up post completion although there would be no NAF contaminated cuttings associated with this. Therefore, the option to use NAF cannot be rejected.

<p>N/A</p>	<p>Reduce dry oil-on-cuttings to less than 10% average per well</p>	<p>Reduces the amount of residual NAF being discharged to the marine environment.</p>	<p>Santos will have the equipment and has the experience to reduce dry oil-on-cuttings to ~6.9% w/w (which is considered standard industry practice under the IFC HSE Guidelines 2015). However, in the event of frequent or prolonged cuttings management equipment down time and to prevent an exceedance of the oil-on-cuttings target, Santos would need to divert cuttings to skips for onshore disposal (i.e. skip-and-ship) or suspend drilling operations. Due to skip-and-ship limitations and risks (e.g. limited MODU deck space to store skips, high volume of MODU-vessel lifts, etc.) this operation could only be sustained for a short period of time before drilling would need to be suspended. The need to suspend drilling is made even more likely given the large hole sizes planned for these wells and the significant volume of cuttings (440 m<sup>3</sup> NAF-based cuttings per well). Hence, an oil-on-cuttings target of &lt;10% w/w (dry) provides some contingency (~100 m<sup>3</sup> of cuttings per well) to manage equipment down time without the need to initiate skip-and-ship operations or to suspend drilling. Suspension of drilling increases the risk of</p>	<p><b>Rejected</b> – NAF is a contingency for these wells. Hence, the potential high costs and drilling risks of ensuring a lower oil-on-cuttings target is achieved (including procurement and management of redundant cuttings equipment, skip-and-ship and drilling suspension) is considered disproportionate to the low environmental consequence of discharging additional oiled cuttings to sea. The potential impacts of oil-on-cuttings are well understood and given the nature of the receiving environment potential impacts are expected to be minor.</p>
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CM reference	Control measure	Environmental benefit	Potential cost/issues	Evaluation
			<p>'stuck pipe' events associated with wellbore destabilisation over time. This could have a significant financial impact, as well as potential environmental consequences if the event resulted in a side-tracked interval. Installing and maintaining additional cuttings dryers and augers would be a way of ensuring equipment redundancy. However, this would introduce additional costs for a contingent drilling fluid and cause operational (e.g. safety) risks given the limited MODU deck space and servicing requirements.</p>	
N/A	Do not discharge cement associated with circulating cement back to the mudline	No or reduced cement discharge to the marine environment.	<p>The discharge associated with circulating cement back to the mudline (i.e., releasing cement to the seabed) cannot be eliminated. The conductor must be cemented in place with cement top at the mudline as this equipment is the structural foundation for the well. All subsequent casing strings will distribute axial loads to the conductor along with the BOP. The conductor must be able to withstand the axial force or it will subside which may render a BOP useless.</p>	<b>Rejected</b> – not technically feasible.

CM reference	Control measure	Environmental benefit	Potential cost/issues	Evaluation
N/A	No well clean up or flowback	Reduced quantities of contaminants (i.e., oily-water) entering the marine environment.	Well clean up and flowback is required for several reasons, including to prepare the wells for safe production to the FPSO, assess well productivity, understand reservoir characteristics and performance, and plan for the safe management of the reservoir.	<b>Rejected</b> – not technically feasible.
N/A	Reduce oil-in-water concentration for formation water discharge during well flowback	Reduced quantities of contaminants (i.e., oil) entering the marine environment. Given the well flowbacks are short in duration (24 to 36 hours), lowering the concentration of oil-in-water is unlikely to result in a significant reduction in total oil released to the marine environment; i.e., reducing the oil-in-water limit from 30 ppm to 15 ppm may prevent approximately 2.5 L of oil being released over a 24- to 36-hour period per well for a typical well flowback program.	To reduce oil-in-water a specialised water treatment tank (to enable re-treatment and storage of the water) would need to be mobilised to the MODU before the well flowback. The tank would consume valuable open deck space desirable for safe working conditions, including crew egress. The tank hire and additional oil filtration cartridges would increase Activity costs. MARPOL Annex I (Regulation 56) states for fixed/floating platforms (which includes MODUs) that only the discharge of machinery space drainage and contaminated ballast should be subject to MARPOL, and that discharges including production water discharge, are not subject to these regulations.	<b>Rejected</b> – the higher safety risks and costs associated with additional water treatment are considered grossly disproportionate to the negligible environmental benefit of further reducing oil-in-water content to below 30 ppm.

## 6.7.4 Environmental impact assessment

Key receptors	Consequence level
Drilling and completions discharges	
Threatened, migratory or local fauna	<p>The seabed within the Operational Area is predominantly bare sediment and contains low abundance and diversity of infauna.</p> <p>Marine invertebrates may inhabit soft sediments and can contribute to the diet of some fauna. The area of soft sediment habitat that is potentially impacted is small compared with the amount of similar habitat available across the bioregion. Therefore, the disturbance is not expected to affect prey availability, and protected fauna species, significantly. Recovery of benthic communities usually begins shortly after the end of drilling and is often well advanced within a year. Full recovery may be delayed until concentrations of biodegradable organic matter and residual hydrocarbons (if NAF is used) decrease through microbial biodegradation to the point where surface layers of sediment are oxygenated.</p> <p>For cement discharges, the impacts to the seabed in the immediate vicinity of the MODU will be longer term as the cement permanently changes the seabed and becomes a different type of substrate for fauna to attach to and it is unlikely to return to its previous state. The impacts are low in magnitude owing to the small area that would be affected and therefore would be an insignificant decrease in available habitat for benthic fauna.</p> <p>Mobile marine species are expected to either avoid turbid stretches of water or pass through with no significant impacts. The toxicity of WBM, NAF, formation water, control fluid and cement is considered low and the potential for bioaccumulation of any toxic compounds is negligible. As with all chemicals selected for use in drilling operations by Santos, the chemicals chosen for the Activity will be low aquatic toxicity (for example, EC50/LC50 &gt; 100 mg/L), low bioaccumulation potential (for example, Log Pow &lt;3) and readily biodegradable (for example, more than 60 in 28 days OECD 306), therefore reducing the likelihood of any significant impacts.</p> <p>Marine fauna within the Operational Area are likely to be transient. If contact does occur with any marine fauna, it will be for a short duration due to the rapid dispersion of the plume and the transient fauna movement, such that exposure time may not be of sufficient duration to cause a toxic effect. Impacts will be temporary and the area potentially impacted is small compared with the size of the areas used by these species for foraging. Therefore, no long-term impacts to these species are expected. No decrease in local population size, area of occupancy of species, loss or disruption of critical habitat or disruption to the breeding cycle of any of these protected matters is expected.</p> <p>Fish, sharks and rays may also forage in the soft sediments for marine invertebrates. However, given the small scale of the Activity and the regional availability of habitat, seabed and benthic habitat disturbance from drilling discharges is not expected to affect these species.</p> <p>The increased particle load in the water column could adversely affect respiratory efficiency of fish. The Operational Area is in a high-energy, well mixed deep open water environment and the predicted deposition behaviour of drill fluids and cuttings from the combined near-seabed and near-surface discharges were shown to decrease with increasing distance from the well (APASA, 2012), with particulates settling over a range of distances depending on the season.</p> <p>Drilling and completions discharges to the seabed are not anticipated to significantly affect mobile marine fauna, such as marine mammals, marine reptiles, fish, sharks and rays, given the sparse benthic and epi-benthic communities expected in the Operational Area. Impacts to benthic fauna are discussed above. These are localised and while a decrease in local population size may occur, no loss or disruption of habitat critical to the survival of a species or disruption to the breeding cycle of any of these protected matters is expected. Given the low toxicity of the drilling discharges there are no significant</p>

Key receptors	Consequence level
	<p>impacts expected to threatened and migratory fauna the consequence level for threatened, migratory or local fauna is considered to be II – Minor.</p>
<p>Physical environment or habitat</p>	<p>The seabed within the Operational Area is largely bare sediment and contains low abundance and diversity of infauna.</p> <p>The Operational Area occurs within the ‘Shelf break and slope of the Arafura Shelf’ KEF, of which one of its defined values is continental slope, patch reefs and hard substrate pinnacles. These values were not observed within the Operational Area during the Barossa marine studies program. The seabed near the drilling locations is mostly bare sand that supports burrowing infauna, which is unlikely to be significantly affected by smothering.</p> <p>The selection criteria for chemical preference through the risk assessment process as outlined in Santos Offshore Division Drilling Chemical Selection and Approval Process (EA-91-II-00007) is low aquatic toxicity (for example, EC50/LC50 &gt; 100 mg/L), low bioaccumulation potential (for example, Log Pow &lt;3) and readily biodegradable (for example, more than 60 in 28 days OECD 306), therefore discharges from this Activity are not expected to have significant toxicological impacts on the water or sediment quality for an extended duration.</p> <p>Considering the low sensitivity and widely represented nature of the benthic communities in the drilling locations, potential impacts from discharging cuttings, fluids or cement from the Activity is considered highly localised. Any impacts to benthic communities that may occur are expected to be temporary and no substantial change to benthic habitat is considered likely. Based on other modelling studies completed in the region (APASA, 2012), it is unlikely drilling discharges will contact any shoals, banks or protected areas, due to the distance from the Operational Area. Overall, impacts would likely be temporary, with rapid recolonisation of benthic infauna within the cuttings layer. Epifauna is likely to recolonise within weeks to months.</p> <p>Given the very short duration of each well flowback discharge, the depth of waters and the high degree of dispersal and dilution at the seabed at this depth, seabed loadings of contaminants in formation water are not predicted to reach levels of concern. Given the water depth in the Operational Area and the total treated water discharge for the short duration of each well flowback (24 to 36 hours), it is reasonable to conclude that discharging water with oil at less than 30 ppm will not have a significant environmental impact and the risk to the environment is negligible.</p> <p>For cement discharges, geomorphology of the habitat would be altered, with cement hardening over time and blanketing the existing habitat. Although impacts on the form of the seabed in the immediate vicinity of the MODU will be longer term, the impacts are low in magnitude owing to the small area that would be affected.</p> <p>The consequence level for physical environment or habitat is considered to be II – Minor.</p>
<p>Socio-economic receptors</p>	<p>There is limited activity by Australian commercial fishers that overlaps the Operational Area, and activity by Indonesian commercial fishers is not expected in Perth Treaty waters adjacent to the Operational Area.</p> <p>Given the negligible consequence to species, subsequent impacts to socio-economic receptors including commercial fishing are not anticipated based on the small size of disturbance compared with the total available area.</p> <p>Discharges as a result of this Activity will result in temporary impacts to benthic habitat and a small area close to the well receiving a small area of cement that may harden and be longer term. The consequence level for socio-economic receptors is considered to be II – Minor.</p>
<p>Threatened ecological communities</p>	<p>Not applicable – no threatened ecological communities identified in the area over which discharges are expected.</p>

Key receptors	Consequence level
Protected areas	<p>The Operational Area occurs within the 'Shelf break and slope of the Arafura Shelf' KEF which is considered a component of the Commonwealth marine area MNES. Species associated with the continental slope and patch reefs that characterise this KEF (such as demersal fish, whale sharks, sharks and turtles) are unlikely to aggregate within the Operational Area due to the lack of seafloor features.</p> <p>Given the low toxicity of the drilling discharges and the lack of seafloor features representative of Shelf break and slope of the Arafura Shelf KEF species aggregation habitats the consequence level for protected areas is considered to be II – Minor.</p>
Cultural Features	For assessment of impacts to marine species as a traditional food source, refer to the assessment for threatened, migratory or local fauna.
Overall worst-case consequence	II – Minor

### 6.7.5 Demonstration of as low as reasonably practicable

Drilling and cementing is a requirement of the Activity, and the resultant fluid and solid by-products cannot be eliminated or avoided.

All reasonably practicable control measures have been reviewed and those adopted are considered appropriate to manage the impacts such that the residual consequence is assessed to be II – Minor. The proposed control measures are in accordance with the Santos risk management criteria and are considered appropriate to manage impacts to ALARP.

## 6.7.6 Acceptability evaluation

Is the consequence ranked as I or II?	Yes – maximum consequence from drilling discharges is II – Minor.
Is further information required to validate the consequence assessment?	No – potential impacts and risks are well understood through the information available.
Are risks and impacts consistent with the principles of ESD?	Yes – Activity evaluated in accordance with Santos’ <i>Offshore Division Environmental Hazard Identification and Assessment Guideline</i> which considers principles of ecologically sustainable development.  The consequence against this aspect is II – minor and therefore does not affect the outcomes of the principles of ecologically sustainable development.
Have the acceptable levels of impact and risks been informed by relevant species recovery plans, threat abatement plans and conservation advice and Australian marine park zoning objectives?	Yes – no contact with banks and shoals or nearby AMPs are predicted. Consistent with relevant species recovery plans, conservation management plans and management actions set out in <b>Table 3.8</b> , including: <ul style="list-style-type: none"> <li>+ Sawfish and River Sharks Multispecies Recovery Plan (CoA, 2015a)</li> <li>+ Marine Bioregional Plan for the North Marine Region (DSEWPaC, 2012).</li> <li>+ Conservation Management Plan for the blue whale 2015-2025 (CoA, 2015a)</li> </ul>
Are performance outcomes, control measures and associated performance standards consistent with legal and regulatory requirements?	Through acceptance of this EP, legislative and regulatory requirements will be met as per <b>Section 1.6.2</b> .
Are performance outcomes, control measures and associated performance standards consistent with Santos’ Environment, Health and Safety Policy?	Yes – aligns with Santos’ Environment, Health and Safety Policy.
Are performance outcomes, control measures and associated performance standards consistent with industry standards?	Yes – the most recent and comparable Drilling and Completions Eps accepted by NOPSEMA have been reviewed for consistency with the performance outcomes, control measures and associated performance standards proposed in this EP.
Have performance outcomes, control measures and associated performance standards taken into consideration Relevant Person feedback?	Yes – objections or claims raised by Relevant Persons relating to Activity drilling discharges have been considered. Existing control measures are considered sufficient.
Are performance standards such that the impact or risk is considered to be ALARP?	Yes – ALARP assessment conducted, with no additional control measures adopted.

The consequence of drilling discharges on receptors is assessed as II – Minor. Based on an assessment of Santos’ acceptability criteria and with the control measures in place, potential impacts are considered acceptable.



## 7 Unplanned events risk and impact assessment

OPGGs(E)R 2009 Requirements
<b>Regulation 13(5)</b>
The environment plan must include: <ul style="list-style-type: none"> <li>(a) details of the environmental impacts and risks for the activity; and</li> <li>(b) an evaluation of all the impacts and risks, appropriate to the nature and scale of each impact or risk; and</li> <li>(c) details of the control measures that will be used to reduce the impacts and risks of the activity to as low as reasonably practicable and an acceptable level.</li> </ul>
<b>Regulation 13(6)</b>
To avoid doubt, the evaluation mentioned in paragraph (5)(b) must evaluate all the environmental impacts and risks arising directly or indirectly from: <ul style="list-style-type: none"> <li>(a) all operations of the activity; and</li> <li>(b) potential emergency conditions, whether resulting from accident or any other reason.</li> </ul>
<b>Regulation 13(7)</b>
The environment plan must: <ul style="list-style-type: none"> <li>(a) set environmental performance standards for the control measures identified under paragraph (5)(c); and</li> <li>(b) set out the environmental performance outcomes against which the performance of the titleholder in protecting the environment is to be measured; and</li> <li>(c) include measurement criteria that the titleholder will use to determine whether each environmental performance outcome and environmental performance standard is being met.</li> </ul>

An ENVID workshop (as described in **Section 5**) for unplanned activities was held in June 2021. An additional ENVID workshop was held in June 2023 to assess changes or additional scopes since the acceptance of Revision 3 of the EP. Santos’ environmental assessment identified seven environmental risks associated with unplanned events for this Activity. The results of the environmental risk assessment are summarised in **Table 7.1** and described in the following subsections.

**Table 7.1: Environmental risk assessment summary**

EP Section	Unplanned event	Likelihood	Consequence	Residual risk level
7.1	Release of solid objects	d – Occasional	I – Negligible	Low
7.2	Introduction of invasive marine species	b – Unlikely	III – Moderate	Low
7.3	Marine fauna interaction	b – Unlikely	I – Negligible	Very Low
7.4	Non-hydrocarbon and chemicals release (surface) – liquids	c – Possible	II – Minor	Low
7.6	Hydrocarbon spill – condensate	a – Remote	IV – Major	Low
7.7	Hydrocarbon spill – marine diesel oil	c – Possible	II – Minor	Low
7.8	Minor hydrocarbon release (surface and subsea)	c – Possible	II – Minor	Low

## 7.1 Release of solid objects

### 7.1.1 Description of event

<b>Event</b>	<p>Solid objects such as those listed below can be accidentally released to the marine environment:</p> <ul style="list-style-type: none"> <li>+ non-hazardous solid wastes, such as paper, plastics and packaging</li> <li>+ hazardous solid wastes, such as batteries, fluorescent tubes, medical wastes and aerosol cans</li> <li>+ equipment and materials, such as supplies, hard hats, tools or infrastructure parts.</li> </ul> <p>Release of these solid objects may occur as a result of:</p> <ul style="list-style-type: none"> <li>+ overfull and/or uncovered bins</li> <li>+ incorrectly disposed items</li> <li>+ incidents during transfers of waste or supplies</li> <li>+ dropped objects/lost equipment.</li> </ul>
<b>Extent</b>	<p>The event will only occur within the Operational Area, and all non-buoyant waste material or dropped objects are expected to sink to the seabed and remain within the Operational Area. Buoyant objects could potentially move beyond the Operational Area.</p>
<b>Duration</b>	<p>An unplanned release of solids may occur during operational activities and impacts may occur until the solid degrades.</p>

### 7.1.2 Nature and scale of environmental impacts

Potential receptors: physical environment (water quality, benthic habitats, KEF); threatened, migratory fauna or local fauna (marine reptiles, whales, sharks, fish and rays), and socio-economic receptors and cultural features.

Solids such as plastics have the potential to affect benthic environments and to harm marine fauna through entanglement or ingestion. Marine turtles and seabirds are particularly at risk from entanglement and ingestion. Marine turtles may mistake plastics for food; once ingested, plastics can damage internal tissues and inhibit physiological processes, which can both potentially result in fauna fatality. Floating, non-biodegradable marine debris has been highlighted as a threat to marine turtles, whales and, whale sharks in the relevant recovery plans and approved conservation advice (refer to **Table 3.8**). The recovery plans and approved conservation advice, as well as the *Threat Abatement Plan for the Impacts of Marine Debris on the Vertebrate Wildlife of Australia's Coasts and Oceans* (DoEE, 2018), have specified several recovery actions to help combat this threat.

Release of hazardous solids (for example, wastes such as batteries) may result in the pollution of the immediate receiving environment, leading to detrimental health impacts to marine fauna. Physiological damage can occur through ingestion; or absorption may occur in individual fish and sharks, marine mammals, marine reptiles or seabirds.

The area of potential seabed disturbance due to release of a heavier non-hydrocarbon solids would be restricted to the Operational Area (for example, accidentally dropped equipment). Damage to substrates within the Operational Area and associated infauna and epifauna may occur, however such impact is expected to be restricted to the size of the dropped object.

The seabed within the Operational Area consists of soft substrates and is devoid of significant bathymetric features, sediments are predominantly unconsolidated silty sand (Jacobs, 2016a).

The habitat type in the Operational Area is widely distributed and well represented in northern Australia. While soft sediment benthic habits will not be destroyed, disturbance of the communities on and within them (such as epifauna and infauna) will occur in the event of a dropped object; and depressions may remain

on the seabed for some time after removal of the dropped object as they gradually infill over time. The seafloor of this bioregion is strongly affected by cyclonic storms, long-period swells and large internal tides, which can resuspend sediments within the water column and move sediment across the seafloor.

The Operational Area overlaps the ‘Shelf break and slope of the Arafura Shelf’ 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 within the Operational Area during the Barossa marine studies program, nor are these topographically distinct features evident from the bathymetry data derived from multiple surveys undertaken across this area.

### 7.1.3 Environmental performance outcomes and control measures

The EPO relating to this event is:

- + no unplanned objects, emissions or discharges to sea or air. (EPO-04)

An assessment of the environmental benefits and the potential costs or issues associated with control measures for this Activity are shown in **Table 7.2** to demonstrate the potential risks are ALARP. Control measures that are adopted have associated EPSs and measurement criteria which are presented in **Table 8.2**. Rejected control measures have an ALARP evaluation provided to justify their rejection.

**Table 7.2: Control measures evaluation for release of solid objects**

CM reference	Control measure	Environmental benefit	Potential cost/issues	Evaluation
<b>Standard control measures</b>				
BAD-CM-002	Dropped object prevention procedures	Impacts to environment are reduced by preventing dropped objects and by retrieving dropped objects unless the environmental consequences of the dropped object are negligible or there are risks to safety. Procedure minimises drop risk during lifting operations.	Cost of implementing procedures.	<b>Adopted</b> – environmental benefits of preventing dropped objects outweighs procedural compliance costs.
BAD-CM-004	Waste (garbage) management procedures	Reduces probability of garbage being discharged to sea, reducing potential impacts to marine fauna, and ensures compliance with MARPOL Annex V (and Marine Order 95: Marine pollution prevention – garbage).	Cost of implementing procedures.	<b>Adopted</b> – environmental benefits of ensuring MODU/vessels are compliant outweighs the costs; it is a legislated requirement.

CM reference	Control measure	Environmental benefit	Potential cost/issues	Evaluation
BAD-CM-005	Hazardous chemical management procedures	Reduces the risk of spills and leaks to sea by controlling the storage, handling and clean-up of hazardous chemicals including hydrocarbons.	Cost of implementing procedures.	<b>Adopted</b> – environmental benefits of ensuring MODU/ vessels are compliant outweighs the potential costs.
BAD-CM-007	Chemical selection procedure	Only environmentally acceptable drilling products are used reducing potential impacts in the event of an accidental release.	Cost of implementing procedures. Range of chemicals reduced with potentially higher costs for alternative products.	<b>Adopted</b> – environmental benefit of storing and handling environmentally acceptable products onboard the MODU/vessels outweigh procedural implementation costs.
BAD-CM-008	General chemical management procedures	Reduces the risk of accidental discharge to sea by controlling the storage, handling and clean-up of chemicals.	Cost of implementing procedures.	<b>Adopted</b> – environmental benefits of ensuring procedures are followed outweighs procedural compliance costs.
BAD-CM-009	International Maritime Dangerous Goods Code	Reduces the risk of an environmental incident, such as an accidental release to sea or unintended chemical reaction.	Cost of implementing procedures. Regulatory requirement.	<b>Adopted</b> – it is a legislated requirement.
BAD-CM-011	Bulk solid transfer procedure	Reduces likelihood of an unplanned release occurring during bulk transfer through correct equipment maintenance and integrity to prevent accidental loss of solids.	Cost of implementing procedures.	<b>Adopted</b> – environmental benefits of ensuring procedures are followed outweighs procedural compliance costs.

CM reference	Control measure	Environmental benefit	Potential cost/issues	Evaluation
<b>Additional control measures</b>				
N/A	Eliminate vessel to vessel lifting in field	Reduces the risk of dropped objects.	Eliminating lifting would require MODU/vessels storing more equipment and supplies on-board, and/or additional trips to shore. MODU/vessels will not have enough deck space to store all required equipment, materials, supplies needed for the duration of the Activity.	<b>Rejected</b> – not feasible to eliminate lifting in the field.

### 7.1.4 Environmental impact assessment

<b>Receptors</b>	Physical environment (benthic habitats) Threatened, migratory or local fauna (marine mammals, marine reptiles, sharks, fish and rays)
<b>Consequence</b>	I – Negligible
<p><i>Physical environment (benthic habitats)</i></p> <p>In the event of a dropped object, there will be localised and short-term damage to the seabed. The extent of the impact is limited to the size of the dropped object; given the size of the equipment used, any impact is expected to be very small.</p> <p>Marine invertebrates that may inhabit disturbed soft sediment benthic habitats are expected to occur elsewhere within the Operational Area and surrounds and therefore the disturbance is not expected to affect prey availability, or protected fauna species.</p> <p>The Operational Area overlaps the ‘Shelf break and slope of the Arafura Shelf’ 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 within the Operational Area during the Barossa marine studies program, nor are these topographically distinct features evident from the bathymetry data derived from multiple surveys undertaken across this area. It is, therefore, unlikely that the accidental loss of solids overboard would result in any impact to this seabed feature. Furthermore, the seabed footprint that would be impacted by the Activity represents a small portion of this KEF and is not expected to impact the values of the KEF.</p> <p>No significant seabed features or biota have been found in the Operational Area. Therefore, it is highly unlikely that any objects dropped during the Activity would cause a significant impact to the ecological values associated with the seabed or benthic habitats. The consequence level is therefore considered I – Negligible.</p>	
<p><i>Marine fauna – marine mammals, marine reptiles, seabirds, fish and sharks</i></p> <p>In the event of loss of a solid object, the quantities would be limited by the type of activities planned. If the solid object can be ingested by marine fauna, impacts would be restricted to a small number of individuals, if any.</p> <p><i>Recovery Plan for Marine Turtles in Australia 2017–2027 (Table 3.8)</i> has identified marine debris as a potential threat to marine turtles. There is also a <i>Threat abatement plan for the impacts of marine debris on the vertebrate wildlife of Australia’s coasts and oceans</i> (DoEE, 2018). These plans identify marine debris as potential threats to marine turtles and vertebrate wildlife resulting in potential injury or death and recommend adherence to legislation for the prevention of garbage disposal to prevent impacts.</p>	

<p>The limited quantities associated with this event indicate that, even in a worst-case release of solid waste, impacts to fauna would be limited to individuals and are not expected to result in a decrease of the local population size. The consequence level is therefore considered I – Negligible.</p> <p>Given the negligible consequence on species, subsequent risks or significant impacts to socio-economic receptors (including commercial fish stocks) and cultural features (relating to species with cultural significance) are not anticipated.</p>	
<b>Likelihood</b>	D – Occasional
<p>The proposed control measures will ensure the risks of dropped objects, lost equipment or release of hazardous/non-hazardous solid waste to the environment has been reduced. These control measures will also ensure that legislation for the prevention of garbage disposal from vessels is adhered to as recommended by <i>Threat Abatement Plan for the Impacts of Marine Debris on the Vertebrate Wildlife of Australia's Coasts and Oceans</i>. The likelihood of dropped objects occurring over the duration of the Activity is considered 'Occasional' as it has occurred before in Santos. The risks to socio-economic receptors and cultural features is considered to be low.</p>	
<b>Residual Risk</b>	The residual risk is considered Low

### 7.1.5 Demonstration of as low as reasonably practicable

All reasonably practicable control measures have been reviewed and those adopted are considered appropriate to manage the residual risk to a Low level. The proposed management controls are in accordance with the Santos risk management criteria and are considered appropriate to manage the risk to ALARP.

### 7.1.6 Acceptability evaluation

<b>Is the risk ranked between Very Low to Medium?</b>	Yes – residual risk is ranked Low.
<b>Is further information required to validate the consequence assessment?</b>	No – potential impacts and risks well understood through the information available.
<b>Are risks and impacts consistent with the principles of ESD?</b>	Yes – Activity evaluated in accordance with Santos' <i>Offshore Division Environmental Hazard Identification and Assessment Guideline</i> which considers principles of ESD.
<b>Have the acceptable levels of impact and risks been informed by relevant species recovery plans, threat abatement plans and conservation advice and Australian marine park zoning objectives?</b>	<p>Yes – control measures implemented will minimise the potential impacts from the Activity to species identified in relevant species recovery plans, conservation management plans and management actions set out in <b>Table 3.8</b>, including:</p> <ul style="list-style-type: none"> <li>+ North Marine Parks Network Management Plan 2018 (Director of National Parks, 2018a)</li> <li>+ Threat Abatement Plan for Impacts of Marine Debris on Vertebrate wildlife of Australia's coasts and oceans (DoEE, 2018)</li> <li>+ Recovery Plan for Marine Turtles in Australia (CoA, 2017)</li> <li>+ Approved Conservation Advice for <i>Rhincodon typus</i> (whale shark) (TSSC, 2015d)</li> <li>+ Approved Conservation Advice for <i>Balaenoptera physalus</i> (fin whale) (TSSC, 2015b)</li> <li>+ Approved Conservation Advice for <i>Balaenoptera borealis</i> (sei whale) (TSSC, 2015a)</li> <li>+ Recovery Plan for the Grey Nurse Shark (<i>Carcharias taurus</i>) (DoE, 2014a)</li> <li>+ Sawfish and River Sharks Multispecies Recovery Plan (CoA, 2015b).</li> </ul>

Are performance outcomes, control measures and associated performance standards consistent with legal and regulatory requirements?	Yes – management consistent with MARPOL Annex V and International Maritime Dangerous Goods Code. Through acceptance of this EP, legislative and regulatory requirements will be met as per <b>Section 1.6.2</b> .
Are performance outcomes, control measures and associated performance standards consistent with Santos’ Environment, Health and Safety Policy?	Yes – aligns with Santos’ Environment, Health and Safety Policy.
Are performance outcomes, control measures and associated performance standards consistent with industry standards?	Yes – the most recent and comparable Drilling and Completions EPs accepted by NOPSEMA have been reviewed for consistency with the performance outcomes, control measures and associated performance standards proposed in this EP.
Have performance outcomes, control measures and associated performance standards taken into consideration Relevant Person feedback?	Yes – no objections or claims raised by Relevant Persons relating specifically to unplanned release of solid objects/waste in the operational area.
Are performance standards such that the impact or risk is considered to be ALARP?	Yes – ALARP assessment conducted, with no additional control measures adopted.

The residual risk of an unplanned release of solid objects on receptors is assessed as Low. Based on an assessment of Santos’ acceptability criteria and with the control measures in place, potential risks are considered acceptable.

## 7.2 Introduction of invasive marine species

### 7.2.1 Description of event

<b>Event</b>	Introduction of invasive marine species (IMS) may occur due to: <ul style="list-style-type: none"> <li>+ biofouling on vessels, MODU and external/internal niches (such as sea chests, seawater systems, etc)</li> <li>+ biofouling on equipment that is routinely submerged in water</li> <li>+ discharge of high-risk ballast water.</li> </ul> Once established, IMS have the potential to out-compete indigenous species and affect overall native ecosystem function.
<b>Extent</b>	Localised (seabed and water column within the Operational Area) to widespread if successfully translocated to new areas via ocean currents or equipment transit.
<b>Duration</b>	Temporary to long-term (in the event of successful translocation).

### 7.2.2 Nature and scale of environmental impacts

Potential receptors: physical environment (benthic habitat); threatened, migratory, or local fauna (marine mammals, marine turtles, sharks, fish and rays); socio-economic (commercial fisheries, other marine users, tourism and socio economic receptors (including cultural features)).

IMS are marine flora and fauna that have been introduced into a region that is beyond their natural range but have the ability to survive, and possibly thrive (DAFF, 2011). The majority of climatically compatible IMS to northern Australia are found in south-east Asian countries.

Some IMS pose a significant risk to environmental values, biodiversity, ecosystem health, human health, fisheries, aquaculture, shipping, ports and tourism (DAFF, 2011; Wells *et al.*, 2009). When IMS achieve pest

status, they are commonly referred to as introduced marine pests or IMPs. IMPs can cause a variety of adverse effects in a receiving environment, including:

- + over-predation of native flora and fauna
- + out-competing of native flora and fauna for food
- + human illness through released toxins
- + depletion of viable fishing areas and aquaculture stock
- + reduction of coastal aesthetics
- + damage to marine and industrial equipment and infrastructure.

The above impacts can result in flow on detrimental effects to marine parks, tourism, recreation and cultural features, noting that some native fauna may have cultural significance as dreaming totems or as a traditional food source.

Species of concern are those that are not native to the region, are likely to survive and establish in the region, and are able to spread by human-mediated or natural means. Species of concern vary from one region to another depending on various environmental factors, such as water temperature, salinity, nutrient levels and habitat type. These factors dictate their survival and invasive capabilities.

It is recognised that artificial, disturbed and polluted habitats in tropical regions are susceptible to introductions, which is why ports are often areas of higher IMS risk (Neil *et al.*, 2005). However, in Australia there are limited records of detrimental impact from IMS compared with other tropical regions (such as the Caribbean).

Following their establishment, eradication of IMS populations is difficult, limiting management options to ongoing control or impact minimisation. However, this depends on the environmental conditions and species. For this reason, increased management requirements have been implemented in recent years by Commonwealth and State regulatory agencies.

If an IMS is introduced, species have been known to colonise areas outside of the areas to which it is introduced but this depends on the diversity and extent of suitable habitat for colonisation.

Potential sources for the introduction of marine species into the Operational Area include biofouling on the vessels, including external niches (such as propulsion units, steering gear and thruster tunnels) and internal niches (such as sea chests, strainers, seawater pipe work, anchor cable lockers and bilge spaces). Ballast water is responsible for 20 to 30% of all marine pest incursions into Australian waters; however, research indicates biofouling (the accumulation of aquatic micro-organisms, algae, plants and animals on vessel hulls and submerged surfaces) has been responsible for more foreign marine introductions than ballast water (DAFF, 2011).

Equipment that is submerged in water for periods of time (such as ROVs) may acquire marine pest species, which can be spread if the equipment is not cleaned before use in pest-free areas.

IMS are generally unable to successfully establish in deep water ecosystems (Geiling, 2014), most likely due to a lack of light and suitable habitat to sustain the growth and survival of IMS. Therefore, most IMS are found in tidal and subtidal zones with only a few species known to extend into deeper waters of the continental shelf (Bax *et al.*, 2003). The majority of species introduced to an area outside of their natural range (e.g., via ballast water) will not survive to establish or subsequently become invasive or a pest (Wells *et al.*, 2009).

IMS risks are relevant to all maritime activities, including commercial shipping, fishing, military, petroleum, as well as recreational boating.



### 7.2.3 Environmental performance outcomes and control measures

The EPO relating to this event is:

- + No introduction of marine pest species. [EPO-02]

An assessment of the environmental benefits and the potential costs or issues associated with control measures for this Activity are shown in **Table 7.3** to demonstrate that potential risks are ALARP. Control measures that are adopted have associated EPSs and measurement criteria which are presented in **Table 8.2**. Rejected control measures have an ALARP evaluation provided to justify their rejection.

**Table 7.3: Control measures evaluation for introduction of invasive marine species**

CM reference	Control measure	Environmental benefit	Potential cost/issues	Evaluation
<b>Standard control measures</b>				
BAD-CM-023	Compliance with the <i>Biosecurity Act 2015</i>	The likelihood of introducing IMS is reduced due to assessment procedure, DAFF clearance and management of ballast water.	Cost associated with implementing procedures. Costs associating with reducing the vessel/MODU risk to 'low' (for example, dry docking, hull cleaning or additional costs due to inspections).	<b>Adopted</b> – it is a legislated requirement.
BAD-CM-025	Anti-foulant system	The likelihood of introducing IMS is reduced due to anti-foulant systems being compliant with legislation.	Cost associated with contracting assurance checks of anti-fouling systems. Regulatory requirement.	<b>Adopted</b> – it is a legislated requirement.
BAD-CM-037	Marine Assurance Standard	Contracted vessels are operated, maintained and manned in accordance with industry standards and regulatory requirements.	Cost associated with implementing procedures.	<b>Adopted</b> – benefit of assuring vessels outweighs procedure compliance costs.
<b>Additional control measures</b>				
N/A	Heat treatment of ballast water to eliminate IMS	Would reduce potential for IMS to establish by reducing the potential for IMS present in ballast water.	High cost to implement. High heat required to be effective, could result in injury or mortality of native species if temperature exceeds tolerance thresholds.	<b>Rejected</b> – based on increased risk to marine environment compared with base case risk.

CM reference	Control measure	Environmental benefit	Potential cost/issues	Evaluation
N/A	Restrict vessel operations to using vessels and equipment that have operated in local, state or national waters to reduce potential for IMS	Reduce potential for IMS to be transported from overseas.	Vessels and equipment suitable for the Activity may not be available in state or national waters causing Activity delays and cost increases. An IMS risk assessment is still required for all contracted vessels.	<b>Rejected</b> – potential for significant schedule delays and Activity costs if suitable vessels are not ‘locally’ available. All contracted vessels must be ‘low’ risk of introducing IMS regardless of their origin.
N/A	Mandatory dry docking of vessels/MODU before entering field to clean vessel and/or equipment and remove biofouling	Ensures that the risk of IMS being present on vessel/ MODU or associated equipment is low.	Significant cost and could lead to scheduling delays. May be unjustified depending on MODU/vessel history and condition, and IMS risk management practices.	<b>Rejected</b> – costs disproportionately high compared with environmental benefit given the proposed risk-based management framework, which includes potential dry docking and cleaning if justified based on risk assessment.
N/A	Use an alternative ballast system to avoid uptake or discharge of water	Eliminate need for ballast water exchange, therefore decreasing risk of introducing IMS through ballast water.	Vessels/MODU suitable for the Activity do not have options for alternative ballast system, therefore would require modification at significant cost.	<b>Rejected</b> – costs disproportionately high compared with environment benefit given other controls in place already reduce the risk.
N/A	Zero discharge of ballast water	Would reduce the potential for introducing IMS by implementing a no ballast water exchange policy on vessels.	Ballast water exchange required on the vessels for stability and is safety-critical.	<b>Rejected</b> – on the basis that ballast water exchange is a safety-critical activity for marine operations.

## 7.2.4 Environmental impact assessment

<b>Receptors</b>	Physical environment (benthic habitats and primary producers) Threatened, migratory, or local fauna (marine mammals, marine turtles, sharks, fish and rays) Socio-economic (commercial fisheries, other marine users, tourism) and cultural features.
<b>Consequence</b>	III – Moderate
<p><i>Physical environment (benthic habitats and primary producers)</i></p> <p>The seabed in the Operational Area is largely bare sediment and is devoid of filter feeders (which includes sponges and soft corals) and epifauna (Jacobs, 2016a). A low abundance and diversity of infauna has been sampled in the Operational Area and no features associated with the ‘Shelf Break and slope of the Arafura Shelf KEF’ were identified. However, if IMS are established, the consequence level is considered III – Moderate.</p>	
<p><i>Threatened, migratory, or local fauna (marine mammals, marine turtles, sharks, fish and rays)</i></p> <p>IMS, if successfully established, can outcompete native species for food or space, prey on native species or change the nature of the environment and can subsequently impact on fisheries or aquaculture. Therefore, if established, the consequence level is considered III – Moderate.</p>	
<p><i>Socio-economic (commercial fisheries, other marine users, tourism) and cultural features.</i></p> <p>The introduction of IMS could have a detrimental effect on commercial fisheries, other marine users, tourism and cultural features (including effects on native fauna with cultural significance as totems or as a traditional food source) in the area due to the IMS outcompeting native species for food or space, prey on native species or change the nature of the environment. Therefore, if established, the consequence level is considered III – Moderate.</p>	
<b>Likelihood</b>	B – Unlikely
<p>The pathways for IMS introduction are well known; consequently, standard preventive measures are proposed. The ability for invasive marine species to colonise a habitat depends on several environmental conditions. It has been found that highly disturbed environments (such as marinas) are more susceptible to colonisation than are open water environments where the number of dilutions and the degree of dispersal are high (Paulay <i>et al.</i>, 2002). IMS are more likely to populate shallower areas with favourable substrates. Given water depths across the Operational Area are greater than 200 m, this creates an unfavourable habitat for colonisation (light limiting and low habitat biodiversity with sparse epibiota) and it is distant from shallow coastal habitats, there is a very low likelihood that IMS would be able to survive translocation and subsequently establish and colonise. With control measures in place to reduce the risk of introduction of IMS, the likelihood of introducing an IMS is considered unlikely.</p>	
<b>Residual Risk</b>	The residual risk is considered Low.

## 7.2.5 Demonstration of as low as reasonably practicable

The MODU, vessels and submersible equipment are required for the Activity and no alternatives are feasible. All reasonably practicable control measures have been reviewed and those adopted are considered appropriate to manage the residual risk to a ‘Low’ level. The proposed management controls are in accordance with the Santos risk management criteria and are considered appropriate to manage the risk to ALARP.

## 7.2.6 Acceptability evaluation

Is the risk ranked between Very Low to Medium?	Yes – introduction of IMS residual risk ranking is Low.
Is further information required to validate the consequence assessment?	No – potential impacts and risks well understood through the information available.
Are risks and impacts consistent with the principles of ESD?	Yes – Activity evaluated in accordance with Santos' <i>Offshore Division Environmental Hazard Identification and Assessment Guideline</i> which considers principles of ESD.
Have the acceptable levels of impact and risks been informed by relevant species recovery plans, threat abatement plans and conservation advice and Australian marine park zoning objectives?	Yes – while several plans identify habitat modification (which could occur as a result of IMS establishing) as a threat to marine fauna, significant impacts are not predicted for this Activity and IMS is not identified as a specific threat.
Are performance outcomes, control measures and associated performance standards consistent with legal and regulatory requirements?	Yes – management consistent with the <i>Biosecurity Act 2015</i> and National Biofouling Management Guidelines for the Petroleum Production and Exploration Industry 2009. Through acceptance of this EP, legislative and regulatory requirements will be met as per <b>Section 1.6.2</b> .
Are performance outcomes, control measures and associated performance standards consistent with Santos' Environment, Health and Safety Policy?	Yes – aligns with Santos' Environment, Health and Safety Policy.
Are performance outcomes, control measures and associated performance standards consistent with industry standards?	Yes – the most recent and comparable Drilling and Completions Eps accepted by NOPSEMA have been reviewed for consistency with the performance outcomes, control measures and associated performance standards proposed in this EP.
Have performance outcomes, control measures and associated performance standards taken into consideration Relevant Person feedback?	Yes – requests relating to IMS management and potential environmental impacts to marine fauna or commercial fisheries have been considered.
Are performance standards such that the impact or risk is considered to be ALARP?	Yes – ALARP assessment conducted, with no additional control measures adopted

The residual risk of an unplanned introduction of IMS is assessed as Low. Based on an assessment of Santos' acceptability criteria and with the control measures in place, potential risks are considered acceptable.

## 7.3 Marine fauna interaction

### 7.3.1 Description of event

<b>Event</b>	There is the potential for the MODU, equipment (for example ROV), vessels or helicopters involved in the Barossa Development Drilling Campaign to interact with marine fauna, including potential strike or collision that could result in severe injury or mortality.
<b>Extent</b>	Within the Operational Area.
<b>Duration</b>	During the Activity.

### 7.3.2 Nature and scale of environmental impacts

Potential receptors: threatened, migratory fauna or local fauna (marine mammals, marine turtles, whale sharks, seabirds) and socio-economic receptors via risks to fauna (tourism, recreation) and cultural features.

Marine fauna in surface waters that are most at risk from vessel collision include marine mammals, marine turtles, whale sharks and birds. The Operational Area does not contain any significant feeding, breeding or aggregation areas for marine fauna. Consultation has identified that some marine fauna may have cultural significance.

#### 7.3.2.1 Marine mammals

Cetaceans are naturally inquisitive marine mammals that are often attracted to vessels underway; for example, dolphins commonly 'bow ride' with vessels. There are no BIAs for cetaceans within the Operational Area and therefore it is unlikely that peaks of presence will be observed, but individuals of various species may be encountered at any time of year, including Omura's whales (not EPBC listed) which were frequently present in the area between April and September inclusive, with a peak in June and July (JASCO, 2016).

Collisions between vessels and cetaceans are most frequent on continental shelf areas where high vessel traffic and cetacean habitat occur simultaneously (WDCS, 2004). There have been recorded instances of cetacean deaths as a result of vessel collisions in Australian waters (for example, a Bryde's whale in Bass Strait in 1992) (Simmonds *et al.*, 2004), though the data indicates this is likely to be associated with container ships and fast ferries. Some cetacean species, such as humpback whales, can detect and change course to avoid a vessel (Simmonds *et al.*, 2004).

As presented in Department of the Environment and Energy's National Strategy for Mitigating Vessel Strike of Marine Megafauna (DoEE, 2016), the majority of the reported vessel collisions for whales in Australian waters between 1990 and 2015 have occurred along eastern or south-eastern Australia, with no reported incidences in NT waters (DoEE, 2016).

The International Whaling Commission has compiled a database of the worldwide occurrence of vessel strikes to cetaceans, within which Australia constitutes approximately 7% (35 reports) of the reported worldwide (approximately 471 reports) vessel strike records involving large whales (Peel *et al.*, 2018).

The reaction of whales to the approach of a ship is quite variable. Some species remain motionless when close to a ship while others are known to be curious and often approach ships that have stopped or are slow moving, although they generally do not approach, and sometimes avoid, faster moving ships (Richardson *et al.*, 1995).

Dugongs are not expected to occur in the Operational Area and, therefore, are not considered credible receptors for marine fauna interaction and excluded from further discussion.

### 7.3.2.2 Marine reptiles

Turtle/vessel interactions arising from increased vessel traffic is also recognised as one of several key impacts to marine turtles in the *Recovery Plan for Marine Turtles in Australia 2017–2027* (CoA, 2017). In the recovery plan, vessel disturbance is identified as a risk to flatback turtles. Marine turtles are highly mobile and, given the low speeds of vessels typically used for operations, are likely to be able to move from an area where there is vessel activity. Marine turtles make extensive migrations through the region; and it is possible individual turtles of any of the species known from the region may be encountered in the Operational Area, however the Operational Area does not contain any significant feeding, breeding or aggregation areas for marine turtles.

Marine turtle mortality due to boat strike has been identified as an issue in Queensland waters in the *Recovery Plan for Marine Turtles in Australia 2017–2027* (DoEE, 2017). However, turtles appear to be more vulnerable to boat strike in areas of high urban population where incidents of pleasure crafts are higher.

### 7.3.2.3 Sharks, fish and rays

Large sharks which frequent the upper portions of the water column, such as whale sharks, are most vulnerable to collision with vessels. Whale sharks which have been shown to spend approximately 25% of their time less than 2 m from the surface and greater than 40% in the upper 15 m of the water column (Wilson *et al.*, 2006; Gleiss *et al.*, 2013). Whale sharks, other pelagic fish and demersal fish are likely to exhibit a short-term avoidance to vessels or ROVs. This is likely to be initiated through the vibrations and underwater noise emitted from these activities (**Section 6.1**) rather than the physical presence. Such avoidance is likely to be temporary. The whale shark BIA does not overlap the Operational Area and therefore significant numbers are not expected to be encountered.

### 7.3.2.4 Seabirds

A number of protected species of marine birds may occur at times within the Operational Area (**Table 3.6**). Seabirds may be attracted to the drilling operations due to lighting and operational discharges such as macerated food waste.

Helicopter noise is expected to elicit a behavioural response in birds to avoid collision and, given the relatively low speeds helicopters would be flying at during take-off or landing, a helicopter strike is not likely.

### 7.3.2.5 Cultural Features

During consultation meetings with Tiwi Clans, they raised concerns about the impact of drilling and associated interactions with marine fauna on their dreaming totems (including turtle totems).

Information was provided by Tiwi clients of the EDO about the potential impacts to marine fauna totemic species, such as marine turtles, and that if something bad happens to the totem, it can make Tiwi people sick. They also raised concerns about impacts to turtles from ships propellers, and potential for impacts to seagulls by flying helicopters over Seagull Island.

## 7.3.3 Environmental performance outcomes and control measures

The EPO relating to this event is:

- + no injury or mortality to EPBC Act listed marine fauna. (EPO-05)
- + No significant impacts to cultural features from the Activity. [EPO-09]

An assessment of the environmental benefits and the potential costs or issues associated with control measures for this Activity are shown in **Table 7.4** to demonstrate that potential risks are ALARP. Control measures that are adopted have associated EPSs and measurement criteria which are presented in **Table 8.2**. Rejected control measures have an ALARP evaluation provided to justify their rejection.

**Table 7.4: Control measures evaluation for marine fauna interaction**

CM reference	Control measure	Environmental benefit	Potential cost/issues	Evaluation
<b>Standard Control measures</b>				
BAD-CM-001	Procedure for interacting with marine fauna	Reduces risk of physical and behavioural impacts to marine fauna from vessels because if they are sighted, then vessels can slow down, or move away, and helicopters can increase distances from sighted fauna if required.	Potential delay in vessel and helicopter movement, increasing Activity duration and costs to Santos. Cost associated with implementing procedures. Regulatory requirements under EPBC Regulations 2000.	<b>Adopted</b> – marine fauna interaction restrictions, such as vessel and helicopter speed and direction, are based on legislated requirements and must be adopted.
BAD-CM-016	Support vessel	Additional monitoring capability to identify marine fauna in the vicinity of operational activities.	Cost neutral – support vessel already contracted for operational requirements.	<b>Adopted</b> – further reduces potential risk of unplanned marine fauna interactions.
<b>Additional control measures</b>				
N/A	Adopt further measures to those outlined in 'EPBC Regulations 2000 – Part 8 Division 8.1 during peak periods of ecological sensitivity, for example, additional management considerations for vessels outlined in the <i>Australian national guidelines for whale and dolphin watching</i> (2017)	Negligible due to the absence of BIAs or seasonal aggregations and/or migration of fauna in the Operational Area.	Administrative costs to update existing Santos procedure and induction materials and train personnel. Operational costs through interruption to activities through implementation of controls developed for an industry trying to get close to marine fauna, when Santos' activities aim to avoid fauna.	<b>Rejected</b> – the existing control ensures compliance with legislation. No additional relevant controls have been identified in government or industry guidelines.
N/A	Manage the timing of the Activity to avoid sensitive periods	Negligible due to the absence of BIAs or seasonal aggregations and/or migration of fauna in the Operational Area.	As the Activity will be greater than 12 months in duration there would be a high cost to demobilise and remobilise the MODU and vessels. Protected marine fauna species are present year-round, albeit in low numbers, therefore avoidance is not feasible.	<b>Rejected</b> – the high financial cost would be grossly disproportionate to negligible environmental benefits.

CM reference	Control measure	Environmental benefit	Potential cost/issues	Evaluation
N/A	Restrict vessel operating speeds in the Operational Area	Reduce consequence of collisions (causing harm) and likelihood as fauna have longer to detect and avoid the vessel.	Administrative costs to update existing Santos procedure and induction materials and train personnel.	<b>Rejected</b> – not considered necessary given that there are no marine fauna aggregation areas, migration pathways or BIAs near the Operational Area, noting that vessels will comply with EPBC Regulations – Part 8 Division 8.1 Interacting with cetaceans (and applied for marine turtles), through implementation of the Procedure for interacting with marine fauna (BAD-CM-001).
N/A	Dedicated MMO on vessels (EPBC Policy Statement 2.1 Part B)	Improved ability to spot and identify marine fauna at risk of collision (that may cause harm).	Additional cost of contracting MMO.	<b>Rejected</b> – likelihood of animals being encountered is too low to justify additional cost of MMO, personnel can observe for marine fauna when piloting vessels; cost would be grossly disproportionate to negligible environmental benefits.
N/A	Activities will only occur during daylight hours	Potential for a vessel fauna collision occurring is decreased due to vessel being stationary when visibility is lower at night.	Vessels are required to support 24-hour MODU operations. Would increase the duration of the Activity resulting in significant financial costs.  No other maritime industry has such a restriction.	<b>Rejected</b> – the high financial cost would be grossly disproportionate to negligible environmental benefits.



### 7.3.4 Environmental impact assessment

<b>Key receptors</b>	Threatened, migratory or local fauna (marine mammals, marine reptiles, sharks and seabirds).
<b>Consequence</b>	I – Negligible
<p>In the event of a collision with marine fauna including seabirds, there is the potential for individual animal injury or death.</p> <p>The number of receptors present at the Operational Area is expected to be limited to a small number of transient individuals. No known BIAs intersect with the Operational Area for marine mammals, whale sharks, reptiles or seabirds.</p> <p>The closest protected area is the Oceanic Shoals AMP, being approximately 33 km away.</p> <p>Vessel movements will be of relatively low frequency; albeit, for an extended duration.</p> <p>While injury or death to individual animals would be highly undesirable, this would represent a small proportion of any local population and not beyond any natural variation in population size. According to the Santos consequence descriptor definitions, this would be of Negligible (I) environmental consequence.</p> <p>Given the negligible consequence on species, subsequent risks or significant impacts to socio-economic receptors including tourism and recreation; and cultural features relating to species with cultural significance, are not anticipated.</p>	
<b>Likelihood</b>	B – Unlikely
<p>The likelihood of marine fauna interaction resulting in injury or death is considered unlikely given the implementation of the Santos procedure for interacting with marine fauna; lack of BIAs or significant breeding, nesting and aggregation areas of marine fauna within the Operational Area; and the tendency for marine fauna to move away from vessels and helicopters.</p>	
<b>Residual risk</b>	The residual risk is considered Very Low

### 7.3.5 Demonstration of as low as reasonably practicable

No alternative options to the use of the MODU, vessels and helicopters are possible in order to undertake the Activity.

All reasonably practicable control measures have been reviewed and those adopted are considered appropriate to manage the residual risk to a Low level. The proposed management controls are in accordance with the Santos risk management criteria and are considered appropriate to manage the risk to ALARP.

### 7.3.6 Acceptability evaluation

Is the risk ranked between Very Low to Medium?	Yes – maximum marine fauna interaction residual risk ranking is Very Low.
Is further information required to validate the consequence assessment?	No – potential impacts and risks well understood through the information available.
Are risks and impacts consistent with the principles of ESD?	Yes – Activity evaluated in accordance with Santos’ <i>Offshore Environmental Hazard Identification and Assessment Procedure Guideline</i> which considers principles of ESD.
Have the acceptable levels of impact and risks been informed by relevant species recovery plans, threat abatement plans and conservation advice and Australian marine park zoning objectives?	Yes – control measures implemented will minimise the potential risks and impacts from vessel strike from the Activity. Consistent with relevant species recovery plans, conservation management plans and management actions set out in <b>Table 3.8</b> , including: <ul style="list-style-type: none"> <li>+ Recovery Plan for Marine Turtles in Australia (CoA, 2017)</li> <li>+ Approved Conservation Advice for <i>Rhincodon typus</i> (whale shark) (TSSC, 2015d)</li> <li>+ Conservation Management Plan for the blue whale, 2015–2025 (CoA, 2015a)</li> <li>+ Approved Conservation Advice for <i>Balaenoptera borealis</i> (sei whale) (TSSC, 2015a)</li> <li>+ Approved Conservation Advice for <i>Balaenoptera physalus</i> (fin whale) (TSSC, 2015b)</li> <li>+ Recovery Plan for the Grey Nurse Shark (<i>Carcharias taurus</i>) (DoE, 2014a).</li> </ul>
Are performance outcomes, control measures and associated performance standards consistent with legal and regulatory requirements?	Yes – management consistent with EPBC Regulations Part 8. Through acceptance of this EP, legislative and regulatory requirements will be met as per <b>Section 1.6.2</b> .
Are performance outcomes, control measures and associated performance standards consistent with Santos’ Environment, Health and Safety Policy?	Yes – aligns with Santos’ Environment, Health and Safety Policy.
Are performance outcomes, control measures and associated performance standards consistent with industry standards?	Yes – the most recent and comparable Drilling and Completions EPs accepted by NOPSEMA have been reviewed for consistency with the performance outcomes, control measures and associated performance standards proposed in this EP.
Have performance outcomes, control measures and associated performance standards taken into consideration Relevant Person feedback?	Yes – requests relating to potential marine fauna interaction have been considered. Existing control measures are considered sufficient.
Are performance standards such that the impact or risk is considered to be ALARP?	Yes – ALARP assessment conducted, with no additional control measures adopted

The residual risk of unplanned marine fauna interaction is assessed as Very Low. Based on an assessment of Santos’ acceptability criteria and with the control measures in place, potential risks are considered acceptable.

## 7.4 Non-hydrocarbon and chemicals release (surface) – liquids

### 7.4.1 Description of event

<b>Event</b>	<p>Non-hydrocarbon liquids including miscellaneous chemicals and waste streams (brine, mixed cement, cleaning and cooling agents, stored or spent chemicals and leftover paint materials) are used or stored on-board the MODU/vessels during the Activity.</p> <p>An accidental release of chemicals and other non-hydrocarbon liquids into the marine environment has the potential to occur from:</p> <ul style="list-style-type: none"> <li>+ transferring, storing or using bulk products (e.g., mixed cement)</li> <li>+ mechanical failure of equipment, such as tank or pipework failure</li> <li>+ handling and storage spills and leaks due to insufficient fastening or inadequate bunding</li> <li>+ hose or hose connection failure or leak</li> <li>+ lifting – dropped objects damaging liquid vessels (containers)</li> <li>+ inadequate bunding.</li> </ul> <p>A release of non-hydrocarbon liquids or chemicals may result in impacts to water quality and hence sensitive environmental receptors.</p>
<b>Extent</b>	<p>The maximum volume of non-hydrocarbon liquids or chemicals that could be released during routine operations is likely to be small and limited to the volume of individual containers (e.g., drums) stored on deck of vessels or the MODU. The worst-case credible scenario of an unplanned release would be the disposal of an unsuitable WBM system which cannot be re-used (approximately 100 m<sup>3</sup> in any one pit for a nominal rig), which does not include NAF. Although the release would be intentional, the disposal of a whole mud pit is not planned. These types of releases would occur at the sea surface only.</p> <p>Dilution from discharges in open waters is rapid, with 1 in 1,000 dilution usually occurring within 30 minutes (Costello &amp; Read, 1994). If the spill is not contained on deck, a release to the marine environment would be likely to rapidly disperse within the Operational Area.</p> <p>The environment that may be affected for non-hydrocarbon liquids or chemical release resulting in a decrease in water quality is likely to be restricted to around the MODU and vessels but contained within the Operational Area.</p>
<b>Duration</b>	<p>The duration of the impact is limited to the time the released chemical/liquid takes to disperse to below harmful concentrations. In the ocean, this is expected to be in the order of minutes to hours.</p>

### 7.4.2 Nature and scale of environmental impacts

**Potential receptors:** physical environment (water and sediment quality, benthic habitats); threatened, migratory or local fauna (marine mammals, marine reptiles, sharks and rays, fish and birds), socio economic receptors and cultural features.

#### 7.4.2.1 Physical environment

Non-hydrocarbon liquids or chemicals accidentally released to the marine environment may lead to contamination of the water column near the MODU and vessels. The potential impacts would most likely be highly localised and restricted to the immediate area surrounding the spill, with rapid dispersal to concentrations below impact thresholds likely to occur in the open ocean.

Due to the small volumes and expected rapid dispersal to concentrations below impact thresholds, impacts to water quality are not expected to cause flow-on effects to sediment quality or benthic habitats, including the ‘Shelf Break and Slope of the Arafura Shelf’ KEF on the seafloor (greater than 200 m below the surface) and shoals. There is no emergent or intertidal habitat that could be impacted by a surface spill. Owing to the water depth, any spilled material is unlikely to reach land or affect any of benthic habitats including shallow water shoals given the distance to the nearest shoal is 38 km from the Operational Area.

### 7.4.2.2 Threatened, migratory or local fauna

Changes to water quality could potentially lead to short-term impacts on marine fauna (e.g., pelagic fish and sharks, marine mammals, marine reptiles and seabirds). As summarised in **Table 3.7**, the Operational Area does not overlap any BIAs and therefore only low numbers of animals are expected to be encountered in the Operational Area.

Recovery plans and conservation advice for numerous protected species identify marine pollution and contamination impacts as a threat to the species.

Chemical spills are unlikely to have widespread ecological effects on threatened or migratory fauna, given the nature of the chemicals on board, the small volumes that could be released, and the open-ocean environment of the location. Physical coating of marine fauna, in particular those present at the sea surface (e.g., seabirds), by entrained or surface hazardous liquids and sublethal or lethal effects from toxic chemicals are considered unlikely given the expected low concentrations, small potential volumes and short exposure times.

### 7.4.3 Environmental performance outcomes and control measures

The EPO relating to this event is:

- + No unplanned objects, emissions or discharges to sea or air. [EPO-04]

An assessment of the environmental benefits and the potential costs or issues associated with control measures for this Activity are shown in **Table 7.5** to demonstrate that potential risks are ALARP. Control measures that are adopted have associated EPSs and measurement criteria which are presented in **Table 8.2**. Rejected control measures have an ALARP evaluation provided to justify their rejection.

**Table 7.5: Control measure evaluation for non-hydrocarbon and chemicals release (surface) – liquids**

CM reference	Control measure	Environmental benefit	Potential cost/issues	Evaluation
Standard control measures				
BAD-CM-002	Dropped object prevention procedures	Impacts to environment are reduced by preventing dropped objects and by retrieving dropped objects unless the environmental consequences are negligible or there are risks to safety. Minimises dropped object risk during lifting operations that may cause secondary spill resulting in reduction in water quality.	Cost of implementing procedure.	<b>Adopted</b> – environmental benefits of ensuring procedures are followed outweighs the costs.
BAD-CM-004	Waste (garbage) management procedures	Reduces probability of waste being discharged to sea, reducing potential impacts to marine fauna.	Cost of implementing procedure.	<b>Adopted</b> – environmental benefits of ensuring procedures are followed outweighs the costs.

CM reference	Control measure	Environmental benefit	Potential cost/issues	Evaluation
BAD-CM-005	Hazardous chemical management procedures	Reduces the risk of spills and leaks (discharges) to the sea by controlling the storage, handling and clean-up of hazardous chemicals.	Cost of implementing procedure. Regulatory requirement to manage hazardous chemicals.	<b>Adopted</b> – environmental benefits of ensuring procedures are followed outweighs the costs; plus it is a legislated requirement.
BAD-CM-007	Chemical selection procedure	Selection of environmentally acceptable chemicals reduces the consequence of an unplanned chemical release to sea.	Cost of implementing procedure. Range of chemicals reduced and potential higher chemical costs.	<b>Adopted</b> – environmental benefits of ensuring procedures are followed outweighs the costs and potential reduction of available chemicals.
BAD-CM-008	General chemical management procedures	Potential impacts to the environment are reduced through following correct procedures for the safe handling and storage of chemicals.	Cost of implementing procedure. Appropriate chemical management is also necessary for safety reasons.	<b>Adopted</b> – environmental benefits of ensuring procedures are followed outweighs the costs.
BAD-CM-009	International Maritime Dangerous Goods Code	Dangerous goods managed in accordance with International Maritime Dangerous Goods Code to reduce the risk of an environmental incident, such as an accidental release to sea or unintended chemical reaction.	Cost of implementing procedure. Regulatory requirement to manage dangerous goods.	<b>Adopted</b> – environmental benefits of ensuring procedures are followed outweighs the costs; plus it is a legislated requirement.
BAD-CM-010	Bulk liquid transfer procedure	Bulk liquid transferred in accordance with bulk transfer procedures to reduce the risk of an unintentional release to the sea.	Cost of implementing procedure. Cost of purchasing and maintaining equipment (e.g., bulk hoses and connections).	<b>Adopted</b> – environmental benefits of ensuring procedures are followed outweighs the costs.
BAD-CM-012	MODU and vessel spill response plans	Ensures appropriate spill prevention and clean equipment is available, and crew are competent in its use.	Cost of implementing procedure.	<b>Adopted</b> – environmental benefits of ensuring procedures are followed outweighs the costs.

CM reference	Control measure	Environmental benefit	Potential cost/issues	Evaluation
<b>Additional control measures</b>				
N/A	Eliminate vessel to vessel lifting in field	Reduces the risk of non-hydrocarbons or chemicals (within containers) being accidentally dropped and/or discharged to the marine environment during lifting.	Eliminating lifting would require MODU/ vessels storing more equipment and supplies on-board, and/or additional trips to shore. MODU/ vessels will not have enough deck space to store all required equipment, materials, supplies needed for the duration of the Activity.	<b>Rejected</b> – not feasible to eliminate lifting in the field.

#### 7.4.4 Environmental impact assessment

<b>Receptors</b>	Physical environment (water quality, benthic habitat) Threatened, migratory or local fauna (marine mammals, marine reptiles, sharks, fish, rays and birds)
<b>Consequence</b>	II – Minor
<p>In the event of a non-hydrocarbon liquid or chemical spill, the most likely largest spills would be between 250 litres to 1 m<sup>3</sup> (the size of the largest, most common storage container); but could possibly be up to 100 m<sup>3</sup> (from a loss of a mud pit).</p> <p>Impacts to water quality would be expected but due to the dispersive nature of the ocean environment and water depths, impacts to benthic habitats (including those of the ‘Shelf Break and Slope of the Arafura Shelf ‘KEF) are not predicted. Species associated with the continental slope and patch reefs that characterise this KEF (such as demersal fish, whale sharks, sharks and turtles) are unlikely to aggregate within the Operational Area due to the lack of seafloor features. However, potential impacts to these species are described above.</p> <p>Water quality changes are expected to be short-term and localised due to the selection of environmentally acceptable chemicals and relatively small size of an unplanned spill.</p> <p>Habitat degradation, deteriorating water quality and marine pollution are identified as potential threats to several marine fauna species (that may be present in the Operational Area) in relevant recovery plans and Conservation Advice (<b>Table 3.8</b>) and to matters of national environmental significance (MNES) (DoEE, 2013).</p> <p>A small non-hydrocarbon liquid release is unlikely to have widespread ecological effects, given the nature of the chemicals on board, the small volume that could be released, the Operational Area water depth and transient nature of marine fauna in this area.</p> <p>Potential impacts to the physical environment (water quality) are considered to be Minor (II).</p> <p>Given the minor consequence on the physical environment or species, subsequent impacts to socio-economic receptors including commercial fishing, tourism, recreation; and cultural features relating to species with cultural significance, are not anticipated.</p>	
<b>Likelihood</b>	C – Possible
<p>Santos reviewed non-hydrocarbon liquid spills and leaks from equipment and machinery in recent history (due to split hoses, small leaks, or handling errors). Most of the spills and leaks reported occurred within bunded areas, were less than 100 L, did not reach the marine environment and were cleaned up immediately.</p> <p>The likelihood of a small (less than 100 L) hazardous liquids release occurring with the control measures in place is considered to be Possible I.</p>	
<b>Residual Risk</b>	The residual risk is considered <b>Low</b> .

#### 7.4.5 Demonstration of as low as reasonably practicable

A thorough set of controls has been proposed to minimise the risks of minor hazardous liquid spills and leaks occurring and subsequent environmental consequences should they occur.

All reasonably practicable control measures have been reviewed and those adopted are considered appropriate to manage the residual risk to a Low level. The proposed management controls are in accordance with the Santos risk management criteria and are considered appropriate to manage the risk to ALARP.

## 7.4.6 Acceptability evaluation

Is the risk ranked between Very Low to Medium?	Yes – residual risk is ranked Low.
Is further information required to validate the consequence assessment?	No – potential impacts and risks are well understood through the information available.
Are risks and impacts consistent with the principles of ESD?	Yes – Activity evaluated in accordance with Santos’ <i>Offshore Division Environmental Hazard Identification and Assessment Guideline</i> , which considers principles of ESD.
Have the acceptable levels of impact and risks been informed by relevant species recovery plans, threat abatement plans and conservation advice and Australian marine park zoning objectives?	<p>Yes – consistent with relevant species recovery plans, conservation management plans and management actions set out in <b>Table 3.8</b>, including:</p> <ul style="list-style-type: none"> <li>+ Recovery Plan for Marine Turtles in Australia 2017–2027 (DoEE, 2017)</li> <li>+ Approved Conservation Advice for <i>Rhincodon typus</i> (whale shark) (TSSC, 2015d)</li> <li>+ Conservation management plan for the blue whale, 2015–2025 (CoA, 2015a)</li> <li>+ Approved Conservation Advice for <i>Balaenoptera borealis</i> (sei whale) (TSSC, 2015a)</li> <li>+ Approved Conservation Advice for <i>Balaenoptera physalus</i> (fin whale) (TSSC, 2015b)</li> <li>+ Sawfish and River Sharks Multispecies Recovery Plan (DoE, 2015a)</li> <li>+ Wildlife Conservation Plan for Migratory Shorebirds (CoA, 2015c)</li> <li>+ Approved Conservation Advice for <i>Calidris ferruginea</i> (curlew Sandpiper) (TSSC, 2015e)</li> <li>+ Approved Conservation Advice for <i>Calidris canutus</i> (red knot) (TSSC, 2016b)</li> <li>+ Approved Conservation Advice for <i>Numenius madagascariensis</i> (eastern curlew) (TSSC, 2015f)</li> <li>+ Marine Bioregional Plan for the North Marine Region (CoA, 2012a).</li> </ul>
Are performance outcomes, control measures and associated performance standards consistent with legal and regulatory requirements?	<p>Yes – management consistent with MARPOL Annex V, Marine Order 97; MARPOL Annex III and Marine Order 94 (Marine pollution prevention – packaged harmful substances).</p> <p>Through acceptance of this EP, legislative and regulatory requirements will be met as per <b>Section 1.6.2</b>.</p>
Are performance outcomes, control measures and associated performance standards consistent with Santos’ Environment, Health and Safety Policy?	Yes – aligns with Santos’ Environment, Health and Safety Policy.
Are performance outcomes, control measures and associated performance standards consistent with industry standards?	Yes – the most recent and comparable Drilling and Completions Eps accepted by NOPSEMA have been reviewed for consistency with the performance outcomes, control measures and associated performance standards proposed in this EP.



<p><b>Have performance outcomes, control measures and associated performance standards taken into consideration Relevant Person feedback?</b></p>	<p>Yes – requests from Relevant Persons relating to non-hydrocarbon and chemical release have been considered.</p>
<p><b>Are performance standards such that the impact or risk is considered to be ALARP?</b></p>	<p>Yes – ALARP assessment conducted, with no additional control measures adopted.</p>

The residual risk of an unplanned non-hydrocarbon and chemicals release (surface) is assessed as Low. Based on an assessment of Santos’ acceptability criteria and with the control measures in place, potential risks are considered acceptable.

## 7.5 Overview of unplanned release of hydrocarbons

The potential sources of an unplanned release of hydrocarbons are:

- + loss of well control (LOWC) resulting in a loss of natural gas and liquid condensate (assessed in detail, in **Section 7.6**).
- + loss of containment of MDO (due to a vessel collision event or refuelling incident within the Operational Area (assessed in detail, in **Section 7.7**). All vessels used to undertake activities within the scope of this EP will be fuelled using MDO or lighter (e.g., marine gas oil, automotive diesel). Heavier fuel types, such as intermediate or heavy fuel oil will not be used.
- + minor spills of control fluids, lubricant oils, waste oils and formation fluids (assessed in detail, in **Section 7.8**).

A minor spill of MDO could occur during vessel to MODU refuelling resulting in a discharge of hydrocarbons to the marine environment at the sea surface. Spills during refuelling can occur through several pathways, including fuel hose breaks, coupling failure or tank overfilling. Spills resulting from overfilling will be contained within the MODU bunds and closed drains and will not result in a release of hydrocarbons to the marine environment.

If the refuelling hose is ruptured, the fuel bunkering activity will be stopped by turning off the pump, however, the fuel remaining in the transfer line and the fuel released before the transfer operation was stopped will be released to the marine environment. The maximum volume of such a release is estimated at 10 m<sup>3</sup> based on the transfer hose inventory, spill prevention measures including 'dry break' or 'break away' couplings, rapid shutdown of fuel pumps and spill response preparedness.

Given this volume is far less than that associated with the accidental event of a vessel collision, this release scenario has not been modelled and assessed in detail in the EP as the potential impacts are covered by the much larger vessel collision scenario.

### 7.5.1 Spill scenarios assessed using spill dispersion modelling

Spill trajectory modelling was used to predict the potential extent (and area) of a worst-case spill event for both the LOWC and vessel collision scenarios within the Operational Area (RPS, 2019).

#### 7.5.1.1 Loss of well control

Santos has identified a subsea LOWC as the credible worst-case type of hydrocarbon release scenario that could potentially occur during the Activity and could occur at any time of year. The LOWC scenario that was assessed is:

- + a LOWC of 129 000 m<sup>3</sup> subsea release of Barossa condensate over 90 days.

#### 7.5.1.2 Vessel collision

It is considered credible that a release of MDO to the marine environment could occur as a result of a collision between the support vessels, between a support vessel and the MODU, or between a passing third-party vessel and the MODU or a support vessel. Such events could have sufficient impact to result in the rupture of the hull and MDO tank leading to a release to sea. This is considered credible given the MDO tanks may not be protected or double-hulled, and fuel tank ruptures resulting in a hydrocarbon release have occurred before within the maritime industry.

The AMSA (2015) *Technical guidelines for preparing contingency plans for marine and coastal facilities* recommend that the spill scenario for modelling and impact assessment should be based on the largest single fuel tank volume. The specific vessels to undertake the Activity are yet to be confirmed; however, a review of available vessels indicated the largest single fuel tank is likely to be up to 120 m<sup>3</sup> in capacity. Although the

likely vessel’s largest fuel tank will be smaller, a conservative modelled spill volume of 250 m<sup>3</sup> has been used for this EP. The release is assumed to take place over six hours at any time of year.

### 7.5.2 Spill modelling overview

To determine the spatial extent from potential hydrocarbon spills, modelling was completed for the vessel collision and LOWC scenarios (RPS 2016; 2019).

The spill modelling was performed using an advanced three-dimensional trajectory and fates model using Spill Impact Mapping Analysis Program. This model calculates the transport, spreading, entrainment and evaporation of spilled hydrocarbons over time, based on the prevailing wind and current conditions and the physical and chemical properties. Stochastic modelling was performed, which involved running 100 single spill simulations per season, with a total of 300 simulations for each spill scenario. Each simulation had the same spill information (i.e., release location, volume, duration and hydrocarbon properties) but the start time(s) were randomly varied based on the period of each season between 2010 and 2014. This ensured each spill simulation was exposed to different sets of wind and current conditions.

A five-year (2010 to 2014), previously-verified dataset of currents and winds and detailed hydrocarbon properties were used as inputs (RPS, 2019a). The results from the Barossa marine studies program observed that surface current directions in the area were predominantly toward the south to south-east in summer conditions and to the west to north-west during the winter months (Fugro, 2015). These results aligned well with the modelling inputs used by RPS. Given the lack of shallow or emergent features that may locally affect currents to a significant degree, the current conditions are unlikely to vary significantly at any of the spill locations. The winds influencing the area are driven by broadscale processes and are not expected to vary significantly between spill locations. Therefore, any variations in metocean conditions between spill locations are of a scale that would not significantly influence modelling outcomes.

Deterministic modelling was also performed for the LOWC scenario to understand the potential area of influence that could be expected from the largest single spill event. The worst-case deterministic scenarios selected were:

- + largest swept area of condensate on the sea surface above 10 g/m<sup>2</sup> (moderate exposure value); and
- + greatest dissolved hydrocarbon time-averaged exposure concentration at the Evans and Tassie Shoals (being the nearest known sensitive seabed features).

#### 7.5.2.1 Loss of well control spill modelling

Hydrocarbons that could be released to the environment are natural gas and hydrocarbon liquid (condensate) from a subsea blowout. Key parameters for the scenario modelled are given in **Table 7.7** on the basis of reservoir properties identified during appraisal drilling and on analysis of the time taken to drill a relief well (90 days) (**Table 7.6**).

**Table 7.6: Estimated timeframe for the implementation of a relief well**

Task	Duration (in days)
Total days before arrival, ready to spud/begin relief well operations	36
Drilling relief well	54
<b>Total days from LOWC to ‘well kill’</b>	<b>90</b>

**Table 7.7: Summary of spill scenario modelled for subsea loss of well control scenario**

Parameter	Scenario
Scenario description	Long-term subsea well blowout
Number of seasons assessed	Three seasons: <ul style="list-style-type: none"> <li>+ Summer (December to February)</li> <li>+ Transitional (March, September to November)</li> <li>+ Winter (April to August)</li> </ul>
Number of randomly selected spill start times per season	100
Hydrocarbon type	Barossa condensate
Spill volume (stb/day)	Condensate – 9,190 (day 1) depleting to 8,619 (day 90) Water – 3,434 (day 1) depleting to 3,429 (day 90)
Gas rate (scf/day)	919,000,000 (day 1) depleting to 862,000,000 (day 90)
Condensate to gas ratio (scf/MMscf)	10
Release duration	90 days
Simulation length	110 days

### 7.5.2.2 Vessel collision spill modelling

Stochastic modelling was undertaken at a single location at the south-west corner of the permit area (Operational Area). This location is considered to provide a representative and conservative estimate of the potential environmental impacts and risks to the marine environment based on the geographical location of the nearest sensitive receptors to the east and west of the Operational Area (i.e., Lynedoch Bank, Evans Shoal and Tassie Shoal). The release location is broadly equidistant between these sensitive receptors.

A surface release of 250 m<sup>3</sup> of MDO was modelled from the vessel.

## 7.5.3 Hydrocarbon characteristics

### 7.5.3.1 Barossa condensate

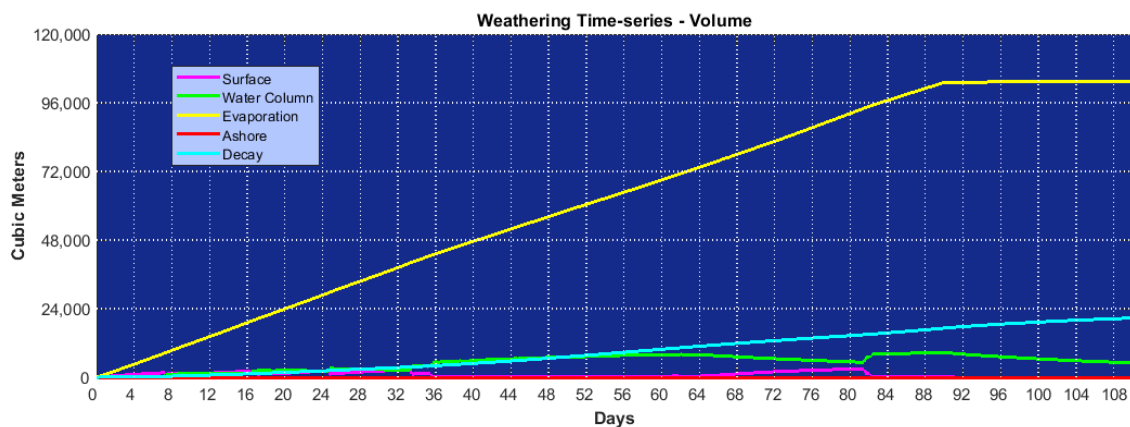
Analysis of an assay obtained during the 2013–14 Barossa Appraisal Drilling Campaign was used to determine the weathering characteristics of the Barossa condensate. Barossa condensate is a low viscosity, Group 1 (non-persistent) hydrocarbon. The condensate would rapidly spread and thin out on the sea surface, with a large proportion of the hydrocarbon evaporating (up to 57% over the first few hours/days and up to 79% after a few days, depending on weather conditions, sea state and time of year) (RPS, 2019a). Only 7% of the condensate is considered persistent, which would eventually breakdown due to decay (RPS, 2019a). Key physical/chemical properties of the Barossa condensate are shown in **Table 7.8**.

**Table 7.8: Properties of Barossa condensate**

Parameter		Barossa condensate
Density (kg/m <sup>3</sup> )		782 (at 16 °C)
API		50.6
Dynamic viscosity (cP)		1.35 (at 10 °C)
Pour point (°C)		-6
Hydrocarbon property category		Group I
Hydrocarbon property classification		Non-persistent
Boiling point °C		
Non-persistent	<180	57
	180–265	22
	265–380	14
Persistent	>380	7

### 7.5.3.2 Barossa condensate weathering

An example of the predicted weathering of Barossa condensate is shown in **Figure 7-1**, which shows the fate and weathering graph for the deterministic trajectory (single spill) that resulted in the largest sea surface exposure above 10 g/m<sup>2</sup>. At the conclusion of the simulation approximately 80% of the spilled condensate had evaporated, 16% had decayed and 3.8% was predicted to remain within the water (assuming no spill response was undertaken).



**Figure 7-1: Predicted weathering and fates graph for the trajectory with the largest sea surface swept area at the 10 g/m<sup>2</sup> exposure value. Results are based on a 129,000 m<sup>3</sup> subsea release of Barossa condensate over 90 days, tracked for 110 days, 6 am 1<sup>st</sup> December 2012 (RPS, 2019a)**

### 7.5.3.3 Marine diesel

A summary of the representative characteristics of MDO, as assessed in this EP, is provided in **Table 7.9**.

**Table 7.9: Summary of MDO characteristics (RPS, 2016)**

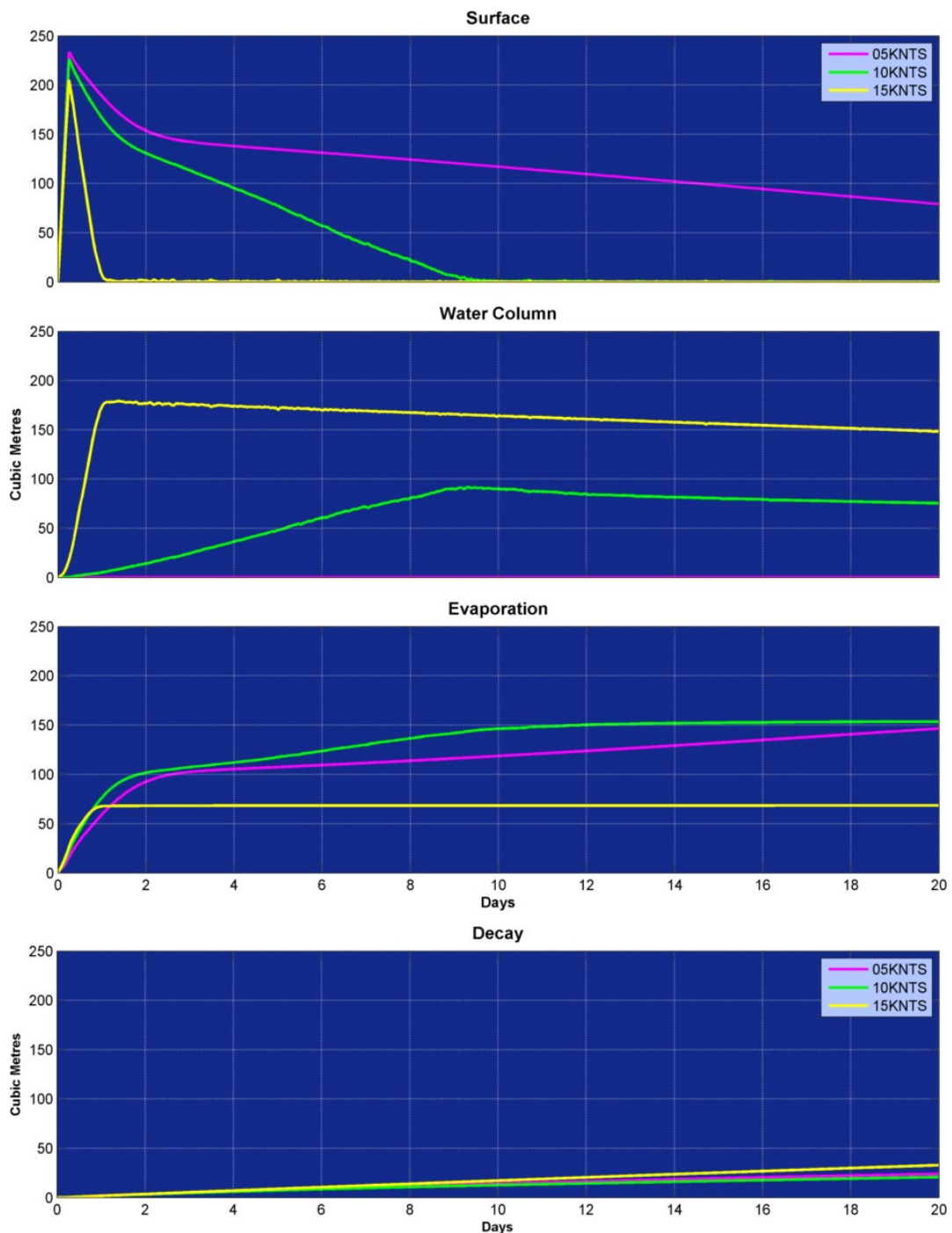
Density at 25 °C (kg/m <sup>3</sup> )	Viscosity at 25 °C (cP)	Component boiling point (°C) % of total			
		Volatile (%) <180	Semi-volatile (%) 180-265	Low volatility (%) 265-380	Residual (%) >380
829	4.0	6	35	54	5

#### 7.5.3.4 Marine diesel weathering

MDO is a mixture of volatile, semi-volatile and low volatility hydrocarbons and approximately 60 to 80% of the MDO is predicted to evaporate within 24 to 48 hours, depending upon the prevailing conditions.

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 to 10 m).

The results of the weathering analyses are presented in **Figure 7-2**.



**Figure 7-2: Predicted weathering and fates for a 250 m<sup>3</sup> release of marine diesel oil (RPS, 2016)**

International Tanker Owners Pollution Federation (2011) and AMOSC (2011) categorise MDO as a light ‘group II’ hydrocarbon. In the marine environment, a 5% residual of the total quantity of MDO spilt will remain after the volatilisation and solubilisation processes associated with weathering. In the marine environment, MDO is expected to behave as follows:

- + MDO will spread rapidly in the direction of the prevailing wind and waves.
- + Evaporation will be the dominant process contributing to the fate of spilled MDO from the sea surface and will account for 60 to 80% reduction of the net hydrocarbon balance.
- + The evaporation rate of MDO will increase in warmer air and sea temperatures.

- + MDO residues usually consist of heavy compounds that may persist longer and will tend to disperse as oil droplets into the upper layers of the water column.

### 7.5.4 Hydrocarbon exposure values

To inform the environmental assessment it is important to understand the profile of the concentrations of hydrocarbons after a spill. To do this NOPSEMA recommends identifying hydrocarbon exposure values that broadly reflect the range of consequences that could occur at certain concentrations (NOPSEMA, 2019). The exposure values that have been applied to this EP are provided in **Table 7.10**.

To identify appropriate exposure values Santos has followed the advice provided by NOPSEMA in *Bulletin #1 Oil Spill Modelling* (2019) and scientific literature. The selected hydrocarbon exposure values are discussed in **Table 7.11** to **Table 7.14**. These tables explain how the exposure value is relevant to the risk evaluation and provides context on how that exposure value is used to inform response planning (which is addressed further in the OPEP).

**Table 7.10: Hydrocarbon exposure values for the environment that may be affected**

Hydrocarbon phase	Exposure value		
	Low	Moderate	High
Floating (g/m <sup>2</sup> )	1	10	50
Shoreline accumulation (g/m <sup>2</sup> )	10	100	1,000
Dissolved aromatics (ppb)	10	50	400
Entrained (ppb)	10	100	-

The low exposure values, which approximate a range of potential socio-economic effects, are used as a predictive tool to set the outer boundaries of the EMBA from the worst-case LOWC scenario shown in **Figure 7-3**. A ‘best fit’ line is drawn around the outermost limits of the low exposure value contours for all three phases of hydrocarbons (floating, dissolved and entrained) in all seasons. This results in a highly conservative and comprehensive basis to plan and prepare for spill response.

These low exposure values are not considered to be representative of a biological impact, but they are adequate for identifying the full range of environmental receptors that might be contacted by surface and/or subsurface hydrocarbons (NOPSEMA, 2019) and a visible sheen may be apparent.

Determining exposure values that may be representative of biological impact is complex since the degree of impact will depend on the sensitivity of the receptors contacted, the duration of the exposure and the toxicity of the hydrocarbon type making the contact. The toxicity of a hydrocarbon will also change over time, due to weathering processes altering the composition of the hydrocarbon.

To inform the environmental assessment, exposure values that may be representative of biological impact have also been identified for the worst-case LOWC scenario. These are called ‘moderate exposure values’ (defined by the moderate exposure value areas, MEVA) and ‘high exposure values’ (defined by the high exposure value area, HEVA) and are shown in **Figure 7-5**. Moderate and high exposure values are modelled for each fate of hydrocarbon to identify what contact is predicted for surface (floating hydrocarbons), subsurface (entrained hydrocarbons and dissolved aromatic hydrocarbons), and shoreline accumulation of hydrocarbon at sensitivities.



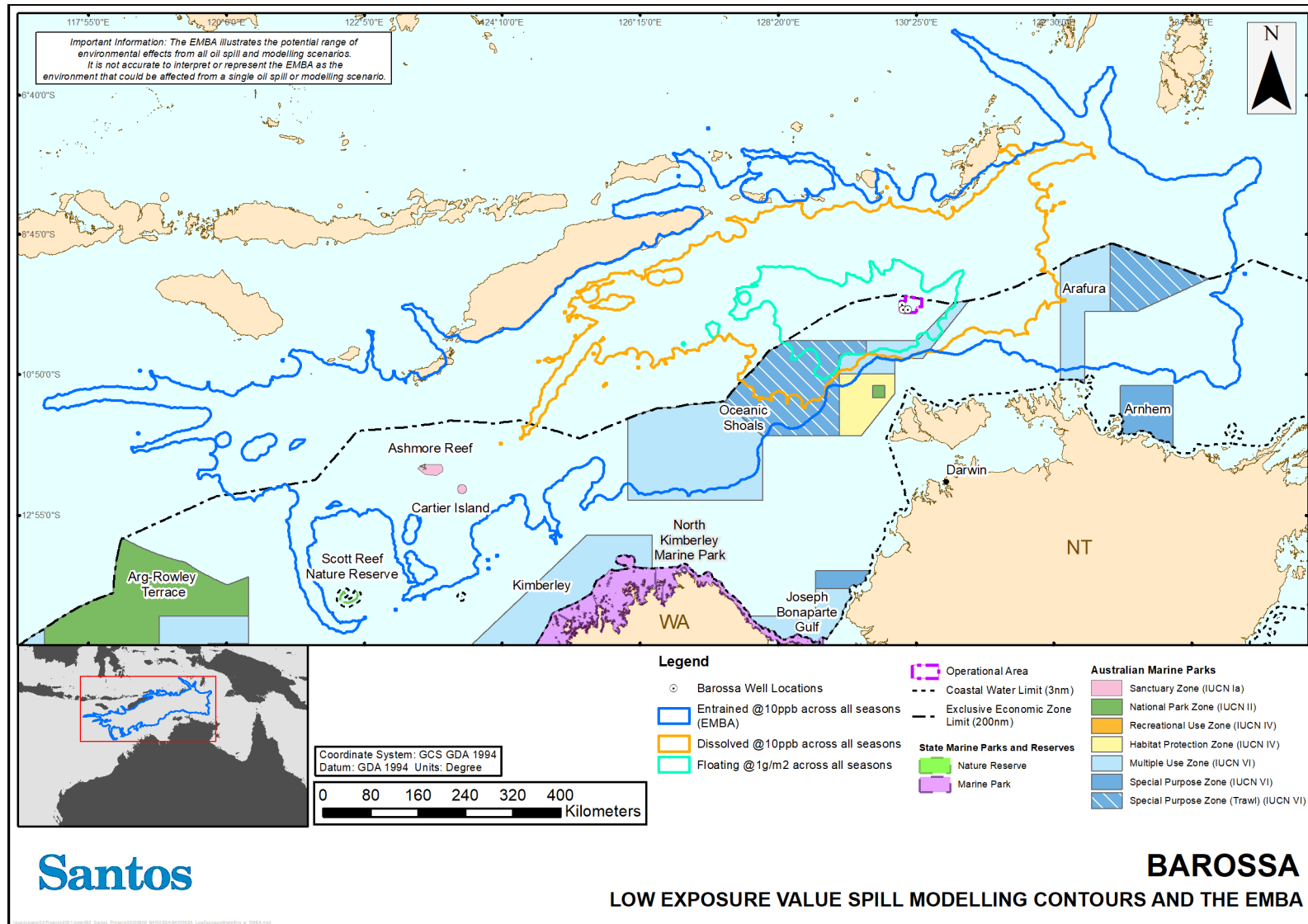


Figure 7-3: Low exposure value spill modelling contours and the EMBA

**Table 7.11: Floating hydrocarbons exposure values**

Surface hydrocarbons concentration (g/m <sup>2</sup> )	Exposure value	Description
1	Low	<p><b>Risk evaluation</b></p> <p>It is recognised that a lower floating hydrocarbons concentration of 1 g/m<sup>2</sup> (equivalent to a thickness of 0.001 mm or 1 ml of hydrocarbons per m<sup>2</sup>) is visible as a rainbow sheen on the sea surface. Although this is lower than the exposure value for ecological impacts, it may be relevant to socio-economic receptors and has been used as the exposure value to define the spatial extent of the environment that might be contacted (EMBA) from floating hydrocarbons.</p> <p><b>Response planning</b></p> <p>Contact at 1 g/m<sup>2</sup> (as predicted by spill trajectory modelling) is used as a conservative trigger for activating scientific monitoring plans as detailed in the OPEP.</p>
10	Moderate	<p><b>Risk evaluation</b></p> <p>There is a paucity of data on floating hydrocarbon concentrations with respect to impacts to marine organisms. Hydrocarbon concentrations for registering biological impacts resulting from contact of surface slicks have been estimated by different researchers at about 10 to 25 g/m<sup>2</sup> (French <i>et al.</i>, 1999; Koops <i>et al.</i>, 2004; NOAA, 2002). The impact of floating hydrocarbons on birds is better understood than on other receptors. A conservative exposure value of 10 g/m<sup>2</sup> has been applied to impacts from surface hydrocarbons in this EP. Although based on birds, this hydrocarbon exposure value is also considered appropriate for turtles, sea snakes and marine mammals (NRDAMCME, 1997). This value has been used to define the MEVA.</p> <p><b>Response planning</b></p> <p>Contact at 10 g/m<sup>2</sup> is not specifically used for spill response planning.</p>
50	High	<p><b>Risk evaluation</b></p> <p>At greater thicknesses the potential for impact of surface hydrocarbons to wildlife increases. All other things being equal, contact to wildlife by surface hydrocarbons at 50 g/m<sup>2</sup> is expected to result in a greater impact. This value has been used to define the HEVA.</p> <p><b>Response planning</b></p> <p>Containment and recovery effectiveness drops significantly with reduced hydrocarbon thickness (McKinney <i>et al.</i>, 2017; NOAA, 2014). McKinney <i>et al.</i> (2017) tested the effectiveness of various hydrocarbon skimmers at various hydrocarbon thicknesses. Their results showed that the hydrocarbons recovery rate of skimmers dropped significantly when hydrocarbon thickness was less than 50 g/m<sup>2</sup> (less than Bonn Agreement Code 4). Hence, 50 g/m<sup>2</sup> has been set as a guide for planning effective containment and recovery operations.</p> <p>Similarly, surface hydrocarbons greater than 50 g/m<sup>2</sup> (Bonn Agreement Code 4/5 and equivalent to hydrocarbons observed as discontinuous or continuous true colour) is considered to be a lower limit for effective dispersant operations and is therefore considered for planning.</p>

**Table 7.12: Shoreline hydrocarbon accumulation exposure values**

Shoreline Accumulation (g/m <sup>2</sup> )	Exposure Value	Description
10	Low	<p><b>Risk evaluation</b></p> <p>An accumulated concentration of hydrocarbons above 10 g/m<sup>2</sup> on shorelines is considered to represent a level of socio-economic effect (NOPSEMA, 2019). For example, reduction in visual amenity of shorelines. This value has been used in previous studies to represent a low contact value for interpreting shoreline accumulation modelling results (French-McCay, 2005a, 2005b) and is used to define the EMBA.</p> <p><b>Response planning</b></p> <p>Not specifically used for response planning because below the limit that can be effectively cleaned.</p>
100	Moderate	<p><b>Risk evaluation</b></p> <p>The impact exposure value for exposure to hydrocarbons stranded on shorelines is derived from levels likely to cause adverse impacts to marine or coastal fauna and habitats. These habitats and marine fauna known to use shorelines are most at risk of exposure to shoreline accumulations of hydrocarbons, due to smothering of intertidal habitats (such as mangroves and emergent coral reefs) and coating of marine fauna. Environmental risk assessment studies (French-McCay, 2009) report that a hydrocarbon thickness of 0.1 mm (100 g/m<sup>2</sup>) on shorelines is assumed as the lethal exposure value for invertebrates on hard substrates (rocky, artificial or human-made) and sediments (mud, silt, sand or gravel) in intertidal habitats. Therefore, a conservative exposure value for impacts of 100 g/m<sup>2</sup> has been applied to impacts from shoreline accumulation of hydrocarbons. This value has been used to define the MEVA.</p> <p><b>Response planning</b></p> <p>A shoreline concentration of 100 g/m<sup>2</sup>, or above, is likely to be representative of the minimum limit that the hydrocarbons can be effectively cleaned (AMSA, 2015; NOPSEMA, 2019) and is therefore used as a guide for shoreline clean-up planning. This exposure value equates to approximately ½ a cup of hydrocarbons per square metre of shoreline contacted.</p>
1,000	High	<p><b>Risk evaluation</b></p> <p>At greater thicknesses, the potential for impact of accumulated hydrocarbons to shoreline receptors increases. All other things being equal, accumulation of hydrocarbons above 1000 g/m<sup>2</sup> is expected to result in a greater impact. This value has been used to define the HEVA.</p> <p><b>Response planning</b></p> <p>As hydrocarbons increase in thickness the effectiveness of hydrocarbon recovery techniques increases. This value can therefore be used to prioritise hydrocarbon recovery efforts, assuming hydrocarbon recovery is deemed to have an environmental benefit.</p>

**Table 7.13: Dissolved aromatic hydrocarbon exposure values**

Dissolved hydrocarbons (ppb)	Exposure value	Description
10	Low	<p><b>Risk evaluation</b></p> <p>Dissolved aromatic hydrocarbons (DAH) include the monoaromatic hydrocarbons (compounds with a single benzene ring such as benzene, toluene, ethyl benzene, and xylenes) and polycyclic aromatic hydrocarbons [PAHs] (compounds with multiple benzene rings such as naphthalenes and phenanthrenes). These compounds have a greater bioavailability than other hydrocarbons and are the main contributors to hydrocarbon toxicity. The toxicity of DAHs is a function of the concentration and duration of exposure by sensitive receptors with greater concentration and exposure time causing more severe impacts. Typically tests of toxicity done under laboratory conditions measure toxicity as proportion of test organisms affected (e.g., 50% mortality or LC50) at the end of a set time, often 48 or 96 hours.</p> <p>French-McCay (2002) found LC50 for dissolved PAHs with a 96-hour exposure range between 30 ppb for sensitive species (2.5<sup>th</sup>-percentile species) and 2,260 ppb for insensitive species (97.5<sup>th</sup>-percentile species), with an average of about 250 ppb. The range of LC50s for PAHs obtained under turbulent conditions (this includes fine hydrocarbon droplets) was 6 ppb to 410 ppb with an average of 50 ppb (French-McCay, 2002).</p> <p>More recently, French-McKay (2018) described in-water thresholds as 10 TO 100 µg/L (equivalent to ppb). For the effect of UV on PAH toxicity, French-McKay <i>et al.</i> (2018) use the findings of DWH NRDA Trustees (2016) to adjust for this by reducing the water column exposure thresholds by 10 x in the top 20 m of the water column.</p> <p>The dissolved hydrocarbon 10 ppb exposure value has been used to inform the EMBA. An exposure value of 10 ppb is appropriate as it is concentration that could have some potential negative effect.</p> <p><b>Response planning</b></p> <p>Contact at 10 ppb (as predicted by spill trajectory modelling) is used as a trigger for activating scientific monitoring plans as detailed in the OPEP. Establishes planning area for scientific monitoring based on potential for exceedance of water quality triggers (NOPSEMA, 2019).</p>
50	Moderate	<p><b>Risk evaluation</b></p> <p>Approximates potential toxic effects, particularly sublethal effects to sensitive species (see the above text). Consistent with NOPSEMA (2019). This value has been used to define the MEVA.</p> <p>Ecotoxicology tests on a broad range of representative taxa of ecological relevance for mainly tropical Australia were conducted in order to inform the assessment of the potential for toxicity impacts from unweathered (i.e., fresh) and weathered Barossa condensate to sensitive marine biota. The ecotoxicity testing focused on the dissolved aromatic hydrocarbon concentration of the water accommodated fraction (WAF) as these hydrocarbons are more biologically available to organisms through absorption into their tissues when compared with entrained hydrocarbons (Jacobs, 2016b). Based on the ecotoxicology tests, the dissolved aromatic exposure values applied in this EP are considered highly conservative for the Barossa condensate. Specifically, the moderate exposure values of 50 ppb for 95% species protection for dissolved aromatic hydrocarbons is approximately 23 times more conservative than that</p>

		for the Barossa condensate (1,146 ppb for the 95% species protection threshold). <b>Response planning</b> Encompassed by response to 10 ppb. There is nothing different for higher exposure values.
400	High	<b>Risk evaluation</b> Approximates toxic effects including lethal effects to sensitive species (NOPSEMA, 2019). This value has been used to define the HEVA. <b>Response planning</b> Encompassed by response to 10 ppb. There is nothing different for higher exposure values.

**Table 7.14: Entrained hydrocarbon exposure values**

Entrained hydrocarbons (ppb)	Exposure value	Description
10	Low	<p><b>Risk evaluation</b></p> <p>Entrained hydrocarbons, as opposed to DAHs, are hydrocarbon droplets suspended in the water column and insoluble. Entrained hydrocarbons are not as bioavailable to marine organisms compared with DAHs and on that basis, are considered to be a less toxic, especially over shorter exposure time frames. Entrained hydrocarbons still have potential effects on marine organisms through direct contact with exposed tissues and ingestion (NRC, 2005). However, the level of exposure causing effects is considerably higher than for DAHs.</p> <p>Much of the published scientific literature does not provide sufficient information to determine if toxicity is caused by entrained hydrocarbons, but rather the toxicity of total hydrocarbons which includes both dissolved and entrained components. Variations in the methodology of the total water accommodated fraction (entrained and dissolved) may account for much of the observed wide variation in reported exposure values, which also depend on the test organism types, duration of exposure, hydrocarbon type and the initial hydrocarbon concentration. Total hydrocarbons toxicity acute effects of total hydrocarbons as LC50 for molluscs range from 500 to 2000 ppb (Clark <i>et al.</i>, 2001; Long &amp; Holdway, 2002). A wider range of LC50 values have been reported for species of crustacea and fish from 100 to 258,000,000 ppb (Gulec <i>et al.</i>, 1997; Gulec &amp; Holdway, 2000; Clark <i>et al.</i>, 2001) and 45 to 465,000,000 ppb (Gulec &amp; Holdway, 2000; Barron <i>et al.</i>, 2004), respectively.</p> <p>The 10 ppb exposure value has been used to inform the EMBA and represents the very lowest concentration and corresponds generally with the lowest trigger levels for chronic exposure for entrained hydrocarbons in the ANZECC &amp; ARM CANZ (2000) water quality guidelines. This is consistent with NOPSEMA (2019) guidance.</p> <p><b>Response planning</b></p> <p>Contact at 10 ppb (as predicted by spill trajectory modelling) is used as a trigger for activating scientific monitoring plans as detailed in the OPEP. Establishes planning area for scientific monitoring based on potential for exceedance of water quality triggers (NOPSEMA, 2019).</p>
100	Moderate	<p><b>Risk evaluation</b></p> <p>The 100 ppb exposure value is considered to be more representative of sub-lethal impacts to most species and lethal impacts to sensitive species based on toxicity testing as described above. This is considered conservative as toxicity to marine organisms from hydrocarbons is likely to be driven by the more bioavailable dissolved aromatic fraction, which is typically not differentiated from entrained hydrocarbons</p>

Entrained hydrocarbons (ppb)	Exposure value	Description
		<p>in toxicity tests using water accommodated fractions (WAFs). Given entrained hydrocarbons is expected to have lower toxicity than dissolved aromatics, especially over time periods where these soluble fractions have dissolved from entrained hydrocarbons, the higher Moderate exposure value for entrained hydrocarbons over DAH (100 versus 50 ppb) is considered appropriate. This value has been used to define the MEVA.</p> <p>Note that NOPSEMA does not define a moderate exposure value for entrained hydrocarbons, and 100 ppb is defined as the high exposure value. However, Santos has adopted 100 ppb as the moderate exposure level for impact assessment purposes in the absence of a NOPSEMA defined moderate value and based on existing literature (Bridges <i>et al.</i>, 2018; French-McCay, 2016; French-McCay, 2018).</p> <p><b>Response planning</b></p> <p>Encompassed by response to 10 ppb. There is nothing different for higher exposure values.</p>

### 7.5.5 Spill risk assessment approach

The approach to risk assessment for hydrocarbon spills involves several steps outlined below:

- + Identify the spatial extent of the EMBA. The EMBA is used to describe the existing environment and the values and sensitivities within it (**Section 3** and **Appendix C**).
- + Identify the MEVA where there is the potential for impact to biological receptors at moderate exposure levels or above.
- + Identify areas of high environmental value within the MEVA
- + Identify hotspots and evaluate the impacts and risks to them (as described in **Section 5**). Hot spots are high environmental value areas, and their determination is described in **Section 7.5.5.3**.
- + Identify priorities for monitoring (for consideration in the OPEP).

#### 7.5.5.1 Spill environment that may be affected

For activities where there is the potential for multiple spill scenarios (e.g. LOWC and vessel collision), the spill scenario, or combination of spill scenarios, resulting in the greatest spatial extent for potential contact with hydrocarbons is used to define the overall EMBA for the Activity. The MEVA is also defined as the area within the EMBA with greater concentrations of hydrocarbons which may result in impacts to receptors (**Section 7.5.4**).

#### 7.5.5.2 Areas of high environmental value

Within the MEVA areas that are considered to have high environmental value, include receptors with one or more of the following:

- + protected area status – this is used as an indicator of the biodiversity values contained within that area, such as a world heritage area, Ramsar wetland and marine protected area
- + BIA of listed threatened species – these are spatially defined areas where aggregations of individuals of a species are known to display biologically important behaviour, such as breeding, feeding, resting or migration

- + sensitivity of habitats to impact from hydrocarbons in accordance with the guidance document *Sensitivity mapping for oil spill response* produced by IPIECA (2012), the International Maritime Organisation and International Association of Oil and Gas Producers
- + sensitivities of receptors with respect to hydrocarbon-impact pathways
- + status of zones within protected areas (IUCN (1A) and sanctuary zones compared with IUCN (VI) and multiple use zones)
- + listed species status and predominant habitat (surface versus subsurface)
- + social values, socio-economic and heritage features (such as commercial fishing, recreational fishing, amenities, aquaculture) and cultural features.

### 7.5.5.3 Hot spots

While the entire modelled EMBA will be considered during risk assessment and spill response planning, it is best practice to concentrate greatest effort and level of detail on those parts of the EMBA that have the:

- + greatest intrinsic environmental value
- + highest probability of contact by hydrocarbons (either floating or entrained)
- + greatest potential concentration or volume of hydrocarbons arriving at the area.

These areas are termed ‘hot spots’ and are defined so that risk assessment and spill response planning efforts can be targeted. Hot spots are high environmental value areas that:

- + have the highest probability of contact (at least higher than 5%) at or above the moderate exposure value for surface hydrocarbons based on modelling results
- + have the greatest probability of contact and/or receive the greatest concentration or volume of hydrocarbons, either floating, accumulated or entrained hydrocarbons above contact exposure values described in **Section 7.5.4**.

**Table 7.15** provides a list of hot spots associated with Barossa drilling activities.

**Table 7.15: Hot spots in the EMBA**

Hot spots	Description
Offshore banks and shoals	<p>Areas of high environmental value and where spill modelling predicts floating hydrocarbons <math>\geq 10</math> g/m<sup>2</sup> (moderate floating exposure threshold) may pass over them are the benthic habitats present on some of the shallower offshore banks and shoals, including:</p> <ul style="list-style-type: none"> <li>+ Unnamed Shoal</li> <li>+ Tassie Shoal</li> </ul> <p>Areas of high environmental value and where spill modelling predicts entrained hydrocarbons <math>\geq 10</math> ppb (low entrained exposure threshold) include:</p> <ul style="list-style-type: none"> <li>+ Unnamed Shoal</li> <li>+ Evans Shoal</li> <li>+ Blackwood Shoal</li> <li>+ Tassie Shoal</li> <li>+ Lynedoch Shoal</li> </ul> <p>Surveys of the above shoals recorded coral and algae species, filter-feeder communities, sponges, demersal fish and pelagic fish. It is expected that most shoals would be characterised by similar communities.</p>

Hot spots	Description
Oceanic Shoals AMP Arafura AMP	Spill modelling predicts entrained hydrocarbons $\geq 10$ ppb (low entrained exposure threshold) at the Oceanic Shoals AMP and the Arafura AMP. The Oceanic Shoals AMP is significant because it contains habitats, species and ecological communities associated with the Northwest Shelf Transition. The Arafura Marine Park is significant because it contains habitats, species and ecological communities associated with the Northern Shelf Province and Timor Transition, it is near to important wetland systems including the Cobourg Peninsula Ramsar site, and provides important foraging habitat for seabirds' (Director of National Parks, 2018b).
KEFs	Spill modelling predicts entrained hydrocarbons $\geq 10$ ppb (low entrained exposure threshold) at 'Carbonate bank and terrace system of the Van Diemen Rise', the 'Shelf break and slope of the Arafura Shelf' and the 'Pinnacles of the Bonaparte Basin'.

#### 7.5.5.4 Priorities for protection

Priority protection areas are a subset of hot spots allocated for the purpose of prioritising where to send response teams to conduct certain spill response activities such as shoreline protection and shoreline clean-up, so that impacts to high environmental value areas are minimised. Priority protection areas typically have emergent features that receive the greatest concentration or volume of hydrocarbons, either floating or stranded hydrocarbons at response threshold concentrations (refer to **Table 7.11** and **Table 7.12**) and minimum contact time.

Modelling results for the LOWC (subsea) scenario (129,000 m<sup>3</sup> of Barossa Condensate) and vessel collision scenario (250 m<sup>3</sup> of MDO) predicts that no emergent hot spots will be contacted by either floating or stranded hydrocarbons at any threshold. Hence, there are no priority protection areas to conduct shoreline protection or clean-up activities.

The Barossa Development Drilling and Completions OPEP (BAA-200 0327) outlines the applicable spill response strategies for the modelled scenarios, including source control, monitor and evaluate, oiled wildlife response, and scientific monitoring. The OPEP identifies wildlife priority areas and scientific monitoring priority areas to provide guidance to the IMT on where to direct resources in the initial stages of the spill.

#### 7.5.5.5 Net environmental benefit analysis

NEBA is a structured approach used by the response community and stakeholders to select spill response strategies that will effectively remove hydrocarbons, are feasible to use safely in particular conditions, and will reduce the impact of a spill on the environment.

The NEBA process is used during pre-spill planning (strategic NEBA) and during an actual spill response (operational NEBA). A strategic NEBA is an integral part of the contingency planning process and is used to ensure that response strategies for scenarios are well informed. An operational NEBA is used throughout an actual spill to ensure that evolving conditions are understood, so that response strategies can be adjusted as necessary to manage individual response actions and end points.

Spill response may involve differing and conflicting priorities, values and perceptions of the importance of sensitive receptors and balancing these requires trade-offs. There is no universally accepted way to assign perceived value or importance, and it is not a quantitative process. Overall, the NEBA process provides an estimate of potential environmental effects that are sufficient to allow the parties to compare and select preferred combinations of response strategies to reduce environmental impacts to ALARP.



A strategic NEBA has been developed for all response strategies identified as applicable to credible spills identified in the OPEP related to an unplanned release of condensate, with the potential environmental benefit or potential impact to each protection priority area. This provides information that will help to select response strategies tailored to the key environmental values within the areas of highest priority. A summary of spill response strategies is available for each of the Priority for Protection sites and the potential impact that a response strategy has on the area's environmental values.

This information is to be considered in the NEBA process that takes place during a spill response (i.e., an operational NEBA). An operational NEBA will also consider real-time monitoring of the effectiveness and potential impacts of a response and will also consider accessibility, feasibility and safety of responders (refer to the *Barossa Development Drilling and Completions OPEP* (BAA-200-0327)).

## 7.5.6 Potential hydrocarbon impact pathways and nature and scale of impact

To help inform the hydrocarbon spill risk assessment receptors within the EMBA and potential impact pathways have been defined (**Table 7.16**). The potential impact pathways consider physical and chemical pathways. Physical pathways include contact from floating hydrocarbons, accumulated shoreline hydrocarbons, or entrained hydrocarbon droplets. Chemical pathways include ingestion, inhalation or contact from any hydrocarbon phase. These are summarised in **Table 7.16** and the information is drawn upon within the hydrocarbon risk assessment for the spill scenarios.

**Table 7.17** specifically describes the nature and scale of the hydrocarbon spills for this Activity on marine fauna and socio-economic receptors found within the MEVA. In the unlikely event of a loss of well control, stochastic modelling indicates that the MEVA may extend up to 162 km on the sea surface, 484 km for entrained hydrocarbons and up to 200 km for dissolved aromatic hydrocarbons from the release location.

There was no surface shoreline hydrocarbons accumulation predicted for any receptors in any season at any exposure value and therefore accumulated shoreline hydrocarbons and potential impact pathways are not discussed further.

**Table 7.16: Physical and chemical pathways for hydrocarbon exposure and potential impacts to receptors**

Receptor	Physical pathway	Potential impacts	Chemical pathway	Potential impacts
Seagrasses and macroalgae	Coating of leaves/thalli reducing light availability and gas exchange. Degree of coating depends upon the energy and tidal reach of the shoreline, the type of the receptor and continual weathering of the hydrocarbons.	Bleaching or blackening of leaves. Defoliation. Reduced growth.	External contact by hydrocarbons and adsorption across cellular membranes.	Mortality. Bleaching or blackening of leaves. Defoliation. Disease. Reduced growth. Reduced reproductive output. Reduced seed/propagule viability.
Hard corals (coral reefs)	Coating of polyps, shading resulting in reduction on light availability. Degree of coating is dependent upon the metocean conditions, dilution, if corals are emergent at all and continual weathering of the hydrocarbons.	Bleaching. Increased mucous production. Reduced growth.	External contact by hydrocarbons and adsorption across cellular membranes.	Mortality. Cell damage. Reduced metabolic capacity. Reduced immune response. Disease. Reduced growth. Reduced reproductive output. Reduced egg/larval success. Growth abnormalities.

Receptor	Physical pathway	Potential impacts	Chemical pathway	Potential impacts
Non-coral benthic invertebrates	Coating of adults, eggs and larvae. Degree of coating is dependent upon the energy and tidal reach of the shoreline, the type of the receptor and continual weathering of the hydrocarbons.	Mortality. Behavioural disruption. Impaired growth.	Ingestion and inhalation. External contact and adsorption across exposed skin and cellular membranes. Uptake of DAH across cellular membranes. Reduced mobility and capacity for oxygen exchange.	Mortality. Cell damage. Reduced metabolic capacity. Reduced immune response. Disease. Reduced growth. Reduced reproductive output. Reduced egg/larval success. Growth abnormalities. Behavioural disruption.
Sharks, rays and fish	Coating of adults but primarily eggs and larvae – reduced mobility and capacity for oxygen exchange.	Mortality. Oxygen debt. Starvation. Dehydration. Increased predation. Behavioural disruption.	Ingestion. External contact and adsorption across exposed skin and cellular membranes. Uptake of DAH across cellular membranes (for example, gills).	Mortality. Cell damage. Flesh taint. Reduced metabolic capacity. Reduced immune response. Disease. Reduced growth. Reduced reproductive output. Reduced egg/larval success. Growth abnormalities. Behavioural disruption.

Receptor	Physical pathway	Potential impacts	Chemical pathway	Potential impacts
Birds (seabirds and shorebirds)	Contact with the floating hydrocarbons resulting in coating. Degree of coating is dependent upon the energy and tidal reach of the shoreline, the type of the receptor and continual weathering of the hydrocarbons.	Feather and skin irritation and damage, with the potential to cause secondary impacts such as: <ul style="list-style-type: none"> <li>+ physical restriction of flight and swimming movement</li> <li>+ mortality</li> <li>+ hypothermia/impairing the waterproofing of feathers</li> <li>+ disruption to feeding/starvation</li> <li>+ disruption to breeding</li> <li>+ disruption to migration.</li> </ul>	Ingestion (during feeding or preening). External contact and adsorption across exposed skin and membranes. Inhalation.	Mortality. Cell damage, lesions. Secondary infections. Reduced metabolic capacity. Reduced immune response. Disease. Reduced growth. Reduced reproductive output. Growth abnormalities. Behavioural disruption.
Marine reptiles	Contact with the floating hydrocarbons resulting in coating. Degree of coating is dependent upon the energy and tidal reach of the shoreline, the type of the receptor and continual weathering of the hydrocarbons.	Irritation of eyes/mouth and potential illness, which may cause secondary impacts such as: <ul style="list-style-type: none"> <li>+ mortality</li> <li>+ disruption to feeding/starvation</li> <li>+ physical restriction</li> <li>+ behavioural disruption.</li> </ul>	Inhalation. Ingestion. External contact and adsorption across exposed skin and membranes.	Mortality. Cell damage, lesions. Secondary infections. Reduced metabolic capacity. Reduced immune response. Disease. Reduced growth. Reduced hatchling success. Reduced reproductive output. Growth abnormalities. Behavioural disruption.

Receptor	Physical pathway	Potential impacts	Chemical pathway	Potential impacts
Marine mammals	Coating of feeding apparatus in some species (baleen whales) from exposure to floating hydrocarbons.  Potential to coat the sensory hairs around the mouths of dugongs which can impact feeding.	Irritation of eyes/mouth, damage to fur and potential illness, which may cause secondary impacts such as:  + mortality + disruption to feeding/starvation + physical restriction + behavioural disruption.	Inhalation.  Ingestion.  External contact and adsorption across exposed skin and membranes.	Mortality.  Cell damage, lesions.  Secondary infections.  Reduced metabolic capacity.  Reduced immune response.  Disease.  Reduced growth.  Reduced reproductive output.  Growth abnormalities.  Behavioural disruption.
Plankton	Coating of feeding apparatus.  Reduced mobility and capacity for oxygen exchange.	Mortality.  Behavioural disruption (for example, reduced mobility).	Inhalation.  Ingestion.  External contact.	Mortality.  Impairment of biological activities (for example, feeding, respiration).  Reduced mobility.
Water quality and sediment quality	Presence of hydrocarbon residue in the water, which may filter down to sediments or continue to biodegrade on the surface.  Degree of loading in the water column is dependent upon the influence of wave energy and tidal range.	Impacts to flora and fauna, as discussed in rows above.	Adsorption via cellular membranes and soft tissue, ingestion, irritation/burning on contact and inhalation.  Impacts to flora and fauna, as discussed in rows above.	Impacts to flora and fauna, as discussed in rows above.

Receptor	Physical pathway	Potential impacts	Chemical pathway	Potential impacts
Protected areas	Coating of benthic habitats and marine fauna/flora within protected areas as discussed in rows above.	<p>Mortality, injury or behavioural disruption to marine fauna.</p> <p>Death or impairment of habitats within protected areas.</p> <p>Reduction in the quality of the marine environment within protected areas.</p> <p>Environmental value of protected areas is degraded.</p>	Impacts to flora and fauna, as discussed in rows above.	<p>Mortality, injury or behavioural disruption to marine fauna.</p> <p>Death or impairment of habitats within protected areas.</p> <p>Reduced growth of benthic habitats.</p> <p>Reduction in the quality of the marine environment within protected areas.</p> <p>Environmental value of protected areas is degraded.</p>
Socio-economic environment (commercial, subsistence and recreational fisheries, tourism, shipping, defence, shipwrecks, energy industry)	<p>Presence of hydrocarbon residue in the water, which may filter down to sediments or continue to biodegrade on the surface.</p> <p>There was no shoreline (surface) hydrocarbons accumulation predicted for any receptors in any season at any exposure value and therefore accumulated shoreline hydrocarbons and potential impact pathways are not discussed further.</p>	<p>Degradation of maritime heritage sites.</p> <p>Disruption to tourism, recreation, shipping, defence or energy industry activities.</p> <p>Displacement of commercial or recreational fishing; reduction in natural resources.</p>	Impacts to water quality, sediment quality, flora and fauna, as discussed in rows above.	<p>Mortality, injury or behavioural disruption to marine fauna relevant to commercial, subsistence and recreational fisheries or to tourism.</p> <p>Loss or degradation of habitats within protected areas.</p> <p>Reduced growth of benthic habitats.</p> <p>Reduction in the quality of the marine environment within protected areas.</p> <p>Environmental value of protected areas is degraded.</p>

Receptor	Physical pathway	Potential impacts	Chemical pathway	Potential impacts
<p>Cultural features including species of cultural significance e.g. totemic species, source of traditional food; that may traverse the EMBA</p>	<p>Presence of hydrocarbon residue in the water, which may filter down to sediments or continue to biodegrade on the surface.</p> <p>There was no surface shoreline hydrocarbons accumulation predicted for any receptors in any season at any exposure value and therefore accumulated shoreline hydrocarbons and potential impact pathways are not discussed further.</p>	<p>Hydrocarbons may be present in areas where species of cultural significance (e.g. turtles) may traverse.</p> <p>Displacement of traditional uses of the marine environment; reduction in natural resources with cultural significance e.g. food sources for traditional fishing and hunting.</p>	<p>Impacts to water quality, sediment quality, flora and fauna, as discussed in rows above</p>	<p>Mortality, injury or behavioural disruption to marine fauna that has cultural significance e.g. turtles.</p> <p>Loss of traditional food sources.</p>

**Table 7.17: Nature and scale of hydrocarbon spills on environment and socio-economic receptors within the moderate exposure value area (Figure 7-5)**

Receptor	Impacts of hydrocarbon spills	
	Entrained and dissolved aromatic hydrocarbons in the water column	Surface hydrocarbons
Plankton (including zooplankton, fish and coral larvae)	There is potential for localised mortality of plankton due to reduced water quality and toxicity. Also, through physical contact of small oil droplets, plankton mobility, feeding and/or respiration may be impaired. Plankton could include the eggs and larvae of marine invertebrates and fish and therefore entrained hydrocarbons could impact on recruitment of invertebrate/fish species. Effects will be greatest in the upper 10 m of the water column and areas close to the spill source where hydrocarbon concentrations are likely to be highest.	Plankton utilising the sea surface layer could be impacted by floating hydrocarbons.
	<p>Plankton could include the eggs and larvae of marine invertebrates and fish and therefore impact on recruitment of invertebrate/fish species. Plankton utilising the sea surface layer, as well as pelagic invertebrates, could be impacted from floating hydrocarbons. Exposure to entrained hydrocarbons and DAHs may result in lethal or sub-lethal impacts to plankton or pelagic invertebrates through a direct contact pathway. Such contact could impair the mobility, feeding and respiration of these fauna and exchange of chemicals could occur.</p> <p>The EMBA has the potential to overlap with spawning of some fish species given the year-round spawning of some species, including those of commercial fish species (refer socio-economic receptors below). In the unlikely event of a spill occurring, fish larvae may be impacted by hydrocarbons entrained in the water column.</p>	
Threatened/migratory fauna		
Marine mammals	Lethal or sub-lethal physical and toxic effects such as irritation of eyes/mouth and potential illness.	At risk of direct contact with surface hydrocarbons due to chance of surfacing within slick. Effects include irritation of eyes/mouth and potential illness. Surface respiration could lead to accidental ingestion of hydrocarbons or result in the coating of sensitive epidermal surfaces. Potential impact to feeding apparatus of some species (baleen whales).
	<p>Twelve migratory marine mammal species were identified by the PMST as occurring within the MEVA. Omura's whales are also known to occur in the vicinity. Of these, one is listed as endangered (blue whale) and two as vulnerable (fin whale and sei whale). There is the potential that entrained and dissolved aromatic hydrocarbons may intersect the BIA for the pygmy blue whale (<b>Table 3.7 &amp; Figure 3-8</b>). Pygmy blue whale migration extends over several months in May-August (Northern migration) and November-December (Southern migration) and encompasses a large geographical area. Impacts to pygmy blue whale may include behavioural impacts (e.g., avoidance of impacted areas), sub-lethal biological effects (e.g., skin irritation, eye damage, impacts from ingestion or inhalation) and, in rare circumstances, death. Other marine mammal species may also be transient in the MEVA.</p>	



Receptor	Impacts of hydrocarbon spills	
	Entrained and dissolved aromatic hydrocarbons in the water column	Surface hydrocarbons
Marine reptiles	<p>Lethal or sub-lethal physical and toxic effects such as irritation of eyes/mouth and potential illness.</p> <p>The <i>Recovery Plan for Marine Turtles in Australia 2017–2027</i> (CoA, 2017) highlights acute chemical discharge as one of several threats to marine turtles.</p> <p>Marine turtles are susceptible to the effects of hydrocarbon spills during all life stages (National Oceanic and Atmospheric Administration, 2010). Adult sea turtles exhibit no avoidance behaviour when they encounter hydrocarbon spills (National Oceanic and Atmospheric Administration, 2010).</p>	<p>At risk of direct contact with surface hydrocarbons due to chance of surfacing within slick. Effects include irritation of eyes/mouth and potential illness. Surface respiration could lead to accidental ingestion or inhalation of hydrocarbons or result in the coating of sensitive epidermal surfaces. Breathing and inhalation of toxic vapours may occur from exposure to hydrocarbons in surface waters.</p>
	<p>Seven species of threatened and / or migratory marine reptiles were identified within the MEVA (six species of sea turtles and the saltwater crocodile). Loggerhead, green, leatherback, hawksbill, flatback and Olive Ridley turtles are widely dispersed across northern Australia and, in the unlikely event of a hydrocarbon spill occurring, individuals traversing open water may come into contact with water column or surface hydrocarbons. The MEVA overlaps with the outer edge of olive ridley and flatback turtle BIAs for foraging and internesting respectively.</p> <p>A number of species of marine turtles may be transient in the MEVA mainly at location close to Ashmore Reef and Cartier Island.</p> <p>The <i>Recovery Plan for Marine Turtles in Australia 2017–2027</i> defines an internesting buffer around mainland NT islands as 60 km for flatback turtles and 20 km for the other species (DoEE, 2017) and therefore internesting flatback turtles may be encountered in the MEVA. It has, however, been demonstrated via a 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 &lt;44 m, favouring a mean depth of &lt;10 m (Whittock <i>et al.</i>, 2016). Whittock <i>et al.</i> (2016) defined suitable internesting habitat as water 0 to 16 m deep and within 5 to 10 km of the coastline. There is no evidence to date to indicate flatback turtles swim out into deep offshore waters during the internesting period (Pendoley, 2019). Water depths in the MEVA are generally deeper than this and are beyond 10 km from coastlines. Therefore, while the MEVA overlaps a small area of a flatback turtle internesting BIA, the number of individuals likely to be present in this area is expected to be limited.</p> <p>Any impacts from hydrocarbon spills are therefore expected to be limited to impacts on individuals and are unlikely to result in impacts to the overall population of any turtle species.</p> <p>Shoreline accumulation of hydrocarbons is not predicted to occur and therefore will not impact nesting beaches.</p>	

Receptor	Impacts of hydrocarbon spills	
	Entrained and dissolved aromatic hydrocarbons in the water column	Surface hydrocarbons
Birds (seabirds and shorebirds)	<p>Lethal or sub-lethal physical and toxic effects such as irritation of eyes/mouth and potential illness.</p> <p>May encounter entrained hydrocarbons while diving and foraging.</p>	<p>Particularly vulnerable to surface slicks. As most fish survive beneath floating slicks, they will continue to attract foraging seabirds, which typically do not exhibit avoidance behaviour. Smothering can lead to reduced water proofing of feathers and ingestion while preening. In addition, direct contact with hydrocarbons can erode feathers causing chemical damage to the feather structure that subsequently affects ability to thermoregulate and maintain buoyancy on water.</p>
	<p>Three threatened species of seabirds and shorebirds were identified within the MEVA by the PMST (<b>Appendix D</b>): curlew sandpiper, red knot and eastern curlew.</p> <p>Stochastic modelling predicts that the MEVA will not contact shorelines nor intersect any known BIAs or aggregation areas for seabirds or migratory shorebirds. However, seabirds may contact surface slicks at or above moderate exposure value whilst foraging in offshore, open water locations. While impacts on individual birds may occur in the event of a loss of well control, given that no hydrocarbon contact with shorelines or BIAs is predicted, it is expected that there will be no impacts to bird populations breeding, feeding and roosting in these areas. Therefore, impacts at a population level are considered unlikely.</p>	

Receptor	Impacts of hydrocarbon spills	
	Entrained and dissolved aromatic hydrocarbons in the water column	Surface hydrocarbons
Sharks, rays and fish	<p>Hydrocarbon droplets can physically affect fish, sharks and rays exposed for an extended duration (weeks to months). Smothering through coating of gills can lead to the lethal and sub-lethal effects of reduced oxygen exchange, and coating of body surfaces may lead to increased incidence of irritation and infection. Fish may also ingest hydrocarbon droplets or contaminated food leading to reduced growth.</p> <p>There is potential for localised mortality of fish eggs and larvae due to reduced water quality and toxicity. Effects will be greatest in the upper 10 m of the water column and areas close to the spill source where hydrocarbon concentrations are likely to be highest. For further information about environmental impacts to fish/sharks/rays from hydrocarbon exposure and toxicity effects, refer to <b>Table 7.16</b>.</p>	<p>While fish, sharks and rays do not generally break the sea surface, individuals may feed at the surface. For condensate/MDO spills where a slick is expected to quickly disperse and evaporate, prolonged exposure to surface hydrocarbons by fish, shark and ray species is unlikely. Due to the filter-feeding nature of whale sharks they may be susceptible to ingesting surface hydrocarbons, both fresh and weathered (tar balls) if feeding at the sea surface particularly from MDO spills.</p>
	<p>Northern Australian waters support a diverse assemblage of fish, particularly in shallower water near banks and shoals. Site attached fish associated with shoals and banks in the MEVA may be exposed to hydrocarbons at harmful levels. Six threatened species of fish and sharks were identified by the PMST including the white shark, whale shark, speartooth shark, sawfishes (freshwater and green) and northern river shark which may be present in the MEVA. Additionally, two conservation dependent species were also identified as occurring within the MEVA: the scalloped hammerhead and southern bluefin tuna. Threatened and migratory fish and sharks could be present at low densities all year round within the Operational Area and MEVA; however, the absence of any known feeding, resting or breeding areas means significant numbers are unlikely to be impacted if an unplanned release were to occur.</p> <p>No BIAs for fish, sharks and rays overlap the MEVA.</p>	
<b>Socio-economic</b>		
Commercial, recreational and traditional	<p>Hydrocarbons in the water column can have toxic effects on fish (as outlined above) potentially reducing catch rates and rendering fish unsafe for human consumption. Impacts on spawning fish can also result in impacts to commercial fisheries.</p>	<p>In addition to the effects of entrained and DAHs, exclusion zones surrounding a spill can directly impact fisheries by restricting access for fishermen. Weathered slicks may form tar balls which may result in oiling of nets and fishing infrastructure.</p>

Receptor	Impacts of hydrocarbon spills	
	Entrained and dissolved aromatic hydrocarbons in the water column	Surface hydrocarbons
Indonesian fisheries	<p>A number of commercial fisheries operate within the EMBA (<b>Section 3.2.7.1</b>). Impacts to these fisheries from a spill include, but are not limited to, a disruption/displacement of fishing activities caused by the physical presence of the slick, loss of catch, decline in commercially important fish stocks and/or suspension of fishing operations.</p> <p>Southern bluefin tuna are known to spawn within the EMBA, therefore a hydrocarbon spill occurring during spawning or movement from spawning grounds to the southern coast could have effects on the commercial fishery stock. It is likely that other commercial fish that are targeted in the region (refer to <b>Section 3.2.7.1</b>) could also be affected if spawning occurs during a hydrocarbon spill event.</p> <p>Exposure to entrained and DAHs could result in the accumulation of hydrocarbons in fish tissues to the extent that could result in hydrocarbon taint of fish flesh. Connell and Miller (1981) compiled a summary of studies listing the exposure value concentrations at which tainting occurred for hydrocarbons. The results contained in their review indicate that tainting of fish occurs when fish are exposed to ambient concentrations of 4 to 300 ppm (4,000 to 300,000 ppb) of hydrocarbons in the water, for durations of 24 hours or more, with response to phenols and naphthenic acids being the strongest. Given that entrained hydrocarbons are predicted to exceed the moderate exposure value at some locations in the MEVA, hydrocarbon taint is possible in fish flesh although it is difficult to assess how long fish might be exposed for, small, less mobile fishes would be more susceptible. It is possible that impacts could be detected to fisheries on a stock level although it is more likely that natural variation in fish abundance would be on a greater scale than any impacts attributable to a hydrocarbon spill. This would most likely be the case for fisheries species that utilise shallow waters around the banks and shoals and could occur through direct impacts to fish or to fish habitats (for example, seagrass, coral reef, mangrove habitats).</p> <p>Fish flesh tainting could also occur to important traditional Indonesian and recreational fish target species (particularly around the banks and shoals of the region, and Ashmore Reef) and fishers may be temporarily excluded from these areas.</p>	
Recreation and tourism	<p>There is limited tourism and recreation in remote, offshore waters, however some shoals and banks in the EMBA may be frequented. A hydrocarbon spill may temporarily displace these users from the EMBA, and impact upon natural resources (e.g. fish) targeted and seascapes valued by these users. It is considered highly unlikely that there will be long-term impacts to tourism and recreation activities.</p>	
Shipping	<p>Two shipping fairways intersect the EMBA. Hydrocarbons in the water column will have no effect on shipping.</p>	<p>Exclusion zones surrounding a spill will reduce access for shipping vessels for the duration of the response undertaken for spill clean-up (if applicable), ships may have to chart alternative routes leading to potential delays and increased costs.</p>

Receptor	Impacts of hydrocarbon spills	
	Entrained and dissolved aromatic hydrocarbons in the water column	Surface hydrocarbons
Defence	The level of defence activities performed near the Operational Area is low, though the MEVA does overlap some of the Northwest Exercise Area. Interference of defence activities due to a hydrocarbon spill is expected to be minimal as this would be communicated in the response to the DoD.	
Shipwrecks	<ul style="list-style-type: none"> <li>+ Surface hydrocarbons will have no impact on shipwrecks as all shipwrecks within the EMBA are submerged and therefore will not be contacted by surface hydrocarbons. The potential for in-water hydrocarbons to impact on shipwrecks is poorly documented. However, it has been proposed that exposure to hydrocarbons may alter bacterial community composition (biofilms) inhabiting shipwrecks possibly altering corrosion potential (Salerno <i>et al.</i>, 2016). The biofilms promote the recruitment of macro-organisms and can form protective surfaces which may decrease access for abiotic corrosion and may assist with the historic preservation of metal shipwrecks (dependent on the environmental conditions). Further studies have provided evidence that exposure of shipwreck surfaces to residual spill contaminants has the potential to alter biofilm taxonomy and functional potential, which may place the biodiversity and the preservation of historic metal structures in the deep sea at risk (Mugge <i>et al.</i>, 2019).</li> </ul>	
Cultural features	Marine resource use by Indigenous people is generally restricted to coastal waters. Fishing, hunting and the maintenance of maritime cultures and heritage through ritual, stories and traditional knowledge continue as important uses of the nearshore region and adjacent areas. While the MEVA is largely offshore, it may overlap with cultural features. Information provided to Santos by Tiwi island representatives during preparation of the EP identified concerns about the potential for a hydrocarbon spill to reach the Tiwi shoreline, and potential impacts from a hydrocarbon spill on marine species to which they have cultural connections or use as a traditional food source (e.g. marine turtles) that may travel in and out of the deeper sea area that may be affected by a spill.	
Existing energy industry activity	A number of energy industry operators have existing infrastructure within, and would transit through, the MEVA (e.g. Santos Bayu-Undan and Inpex Ichthys's gas export pipelines). An exclusion zone surrounding a spill has the potential to adversely affect such operators.	
Protected areas		
Marine parks and Commonwealth heritage areas	The EMBA overlaps four Australian Marine Parks: the Oceanic Shoals Marine Park, Arafura Marine Park, Ashmore Reef Marine Park and the Cartier Island Marine Park. Additionally, the Scott Reef Nature Reserve to the southwest of the modelled EMBA, has been included in the risk assessment for unplanned events given its proximity to the modelled EMBA.	
	Stochastic modelling results indicate that the open water environment within the Oceanic Shoals Marine Park may be affected by surface (probability 47%) and entrained (probability 33%) hydrocarbons at or above moderate exposure values in transitional seasons. There is also a low probability (12%) of the waters of the Arafura Marine Park being contacted by entrained hydrocarbons at or above moderate exposure values in transitional seasons. These protected areas support sensitive habitats and faunal groups described above.	

Receptor	Impacts of hydrocarbon spills	
	Entrained and dissolved aromatic hydrocarbons in the water column	Surface hydrocarbons
KEFs	<p>There are four KEFs that overlap the MEVA:</p> <ul style="list-style-type: none"> <li>+ Carbonate bank and terrace system of the Van Diemen Rise</li> <li>+ Pinnacles of the Bonaparte Basin</li> <li>+ Shelf break and slope of the Arafura Shelf</li> <li>+ Tributary canyons of the Arafura Depression.</li> </ul> <p>There are a number of KEFs in the North-west Marine Region and the North Marine Region that are within the EMBA. These include; Ancient coastline at 125 m depth contour, Ashmore Reef and Cartier Island and surrounding Commonwealth Waters, continental slope demersal fish communities, carbonate bank and terrace system of the Sahul Shelf, Seringapatam Reef and Commonwealth waters in the Scott Reef Complex in the North-west Marin region, and carbonate bank and terrace system of the Van Diemen Rise, pinnacles of the Bonaparte Basin, Shelf break and slope of the Arafura Shelf and tributary canyons of the Arafura Depression in the North Marine Region.</p>	
	<p>While some features associated with the KEFs are subtidal or submerged and would not be directly contacted by a surface slick, they all may support increased productivity or abundance of marine fauna that use surface waters above the features (including plankton, pelagic invertebrates and fish, marine mammals, marine reptiles and seabirds) which may be impacted by floating hydrocarbons. Impacts to marine fauna are described above.</p> <p>Stochastic modelling predicts that sea surface, entrained and dissolved hydrocarbons at high exposure values could occur in waters above the KEF of the 'Shelf break and slope of the Arafura Shelf'. Surface and/or entrained hydrocarbons at moderate exposure values may also occur in waters above the 'Carbonate bank and terrace system of the Van Diemen Rise' KEF and of the 'Pinnacles of the Bonaparte Basin' KEF. Hydrocarbons are expected to remain in the upper water column with probability of contact decreasing with water depth.</p>	
Offshore banks and shoals	<p>Shallow banks/shoals within the top 20 m of the water column may be impacted by entrained hydrocarbons. Modelling results show entrained hydrocarbons at or above moderate exposure values may contact Margaret Harris Bank, Lynedoch Bank, Evans Shoal, Franklin Shoal, Flinders Shoal, Blackwood Shoal, Troubador Shoals and Tassie Shoal, all of which rise to water depths shallower than 20 m.</p> <p>Whilst the modelling also showed surface hydrocarbons at or above moderate exposure values may contact Tassie Shoal and an Unnamed shoal, both these shoals are submerged (i.e., do not break the sea surface) therefore impact from surface exposure is improbable.</p>	

Receptor	Impacts of hydrocarbon spills	
	Entrained and dissolved aromatic hydrocarbons in the water column	Surface hydrocarbons
Benthic communities	<p>Banks and shoals support a diverse and varied range of benthic communities, reef-building soft corals, hard corals and filter-feeders (Heyward <i>et al.</i>, 2012, 1997b). Surveys of Tassie, Evans and Blackwood Shoals and Lynedoch Bank recorded coral and algae species, filter-feeder communities, sponges, demersal fish and pelagic fish. It is expected that Margaret Harris Bank, Franklin Shoal and Flinders Shoal would be characterised by similar communities.</p> <p>Benthic communities are vulnerable to hydrocarbons. Filter feeders are particularly susceptible as they are likely to directly ingest hydrocarbons while feeding. This may cause mortality or sublethal impacts such as alteration in respiration rates, decreases in filter feeding activity and reduced growth rates, biochemical effects.</p> <p>Entrained hydrocarbons may impact on subtidal macroalgae of banks and shoals in the top 20 m of the water column. Given the hydrocarbon characteristics (i.e., very low levels of aromatics in the three ring PAHs and above) and weathering/decay of the entrained and dissolved hydrocarbons of the released condensate, the potential impacts associated with these hydrocarbons are expected to be minimal. Studies have shown that impacts on algae and seagrasses are variable, and generally recover quickly (Runcie <i>et al.</i>, 2010; Taylor &amp; Rasheed, 2011).</p> <p>Impacts to shallow water corals from entrained hydrocarbons may include increased mortality and sub-lethal effects such as changes in feeding, bleaching (loss of zooxanthellae), increased mucous production resulting in reduced growth rates and impaired reproduction (Negri &amp; Heyward, 2000). Given the patchy distribution of shallow water corals, the potential impacts on coral reefs are expected to be restricted to sub-lethal impacts.</p>	
Wetlands	<p>Ramsar wetlands are present at Ashmore Reef and provide key habitats that support a high diversity and abundance of migratory birds and various wetland habitats. The MEVA does not contact Ashmore Reef Ramsar wetland, with low maximum entrained hydrocarbon exposure values predicted. Hence, potential impacts are expected to be minimal.</p>	
Threatened ecological communities	<p>There are no threatened ecological communities within the MEVA.</p>	

## 7.5.7 Spill response strategies

Numerous spill response strategies are available to be implemented in the event of a spill. These are generally strategies that have been implemented in the past or are considered good industry practice. Section 4 of the *Barossa Development Drilling and Completions OPEP (BAA-200-0327)* provides a detailed description of the applicable response strategies for this Activity, which include, depending on the type and size of the spill:

- + source control (BOP, subsea first response toolkit (SFRT), Subsea Dispersant Injection (SSDI), relief well, capping stack)
- + monitoring and evaluation
- + mechanical dispersion
- + oiled wildlife response
- + scientific monitoring
- + waste management.



## 7.6 Hydrocarbon spill – condensate

### 7.6.1 Description of event

<b>Event</b>	<p>A loss of well control (LOWC) during drilling may occur due to a number of reasons, including:</p> <ul style="list-style-type: none"> <li>+ shallow gas</li> <li>+ well kick</li> <li>+ tripping/swabbing</li> <li>+ loss of primary and secondary well control</li> <li>+ failure to keep the correct mud density.</li> </ul> <p>In the event of a LOWC, condensate and associated gas may be released to the marine environment. Worst-case credible spill scenarios were estimated to cover the possibility of a blowout from any well drilled under this EP. The worst-case credible spill scenarios were predicted by selecting the most likely hydrocarbon flow parameters from the wells to yield the credible maximum blowout volumes and rates (i.e., environmentally credible worst-case volume and rate) from both subsurface (seabed) and surface (MODU drill floor) releases. Key parameters for input to the worst-case scenarios were taken from well design documents, suitable analogues, latest reservoir models, or best estimates where information was unavailable. The worst-case scenario was the subsea LOWC.</p> <p>Quantitative hydrocarbon spill modelling was undertaken for the worst-case subsea LOWC scenario. Outputs from the modelling were used to inform the environmental assessment and to assist with emergency planning.</p> <p>The environmental consequences of a LOWC are highly variable, dependent on the characteristics of the hydrocarbon released, the dynamics of the receiving environment and the proximity of the release point to sensitive environmental receptors.</p>
<b>Extent</b>	<p>The EMBA for modelled LOWC scenarios are defined in <b>Section 7.5.4</b> and <b>Figure 7-5</b>.</p> <p>For information on the extent of potential impact associated with a LOWC, refer to <b>Section 7.6.2</b>.</p>
<b>Duration</b>	<p>The duration of a LOWC is predicted to be 90 days (refer to <b>Table 7.6</b>). This is the estimated time required to drill a relief well and gain control of the primary well. Hydrocarbons would persist within the environment for a longer period of time, although the condensate released is expected to weather quickly through evaporation and dispersion (<b>Section 7.5.3.2</b>).</p>

### 7.6.2 Nature and scale of environmental impacts

Potential receptors: physical environment (water and sediment quality, shoals and banks, benthic habitats), threatened or migratory fauna (marine mammals, marine reptiles, sharks, fish, rays and birds), protected and significant areas (marine parks, KEFs), socio-economic receptors (fisheries, tourism, recreation and other third-party operators) and cultural features.

Hydrocarbon spills will cause a decline in water quality and may cause chemical (e.g., toxic) and physical (e.g., coating of emergent habitats, oiling of wildlife at sea surface) impacts to marine species. The severity of the impact of a hydrocarbon spill depends on the magnitude of the spill (i.e., extent, duration) and sensitivity of the receptor.

The magnitude of potential environmental impact from a condensate release is dependent on multiple factors including release volume and rate, and ocean and weather conditions.

An assessment of the sensitive environmental receptors at risk from a condensate release has been determined based on a literature review and trajectory and fate modelling described below, noting that there is limited published data on the impacts of condensate on wildlife and in particular entrained condensate.

The potential impact pathways (physical and chemical) of hydrocarbon exposure to relevant habitat and marine fauna receptors are summarised in **Table 7.16** and an impact assessment is completed for receptors within the MEVA in **Table 7.17**.

## 7.6.2.1 Stochastic spill dispersion modelling – summary of results for moderate exposure values

The spill modelling results at or above moderate exposure values (as used to define the MEVA) are summarised below for a subsea LOWC, more detailed results are provided **Appendix H**.

Further parameters required to inform spill response strategies are described in the OPEP.

The currents in the region 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.

### *Accumulated shoreline hydrocarbons*

No shoreline accumulation of hydrocarbons was identified at any exposure value in any season.

### *Surface hydrocarbons greater than 10 g/m<sup>2</sup>*

Modelling results indicate that sea surface hydrocarbons at or above 10 g/m<sup>2</sup> may extend up to 162 km west during transitional seasons, up to 122 km west-south-west in summer months and up to 126 km west-south-west during winter. Locations potentially contacted at the moderate exposure value for surface hydrocarbons include:

- + A high contact probability of 100% was predicted at 'Shelf Break and slope of the Arafura Shelf' KEF, with a minimum arrival time of 0.04 days. Contact probability of 39% at the 'Carbonate bank and terrace system of the Van Diemen Rise' KEF was also predicted with a minimum arrival time of 10.2 days. Noting that these receptors are submerged; hence, less susceptible to surface hydrocarbon impacts.
- + The Oceanic Shoals was the only AMP predicted to be contacted, with a 12% probability of exposure in the transitional seasons.
- + Two shoals were predicted to be contacted at a low probability (17%) within 12.3 days (Unnamed shoal and Tassie shoal).
- + The probability for condensate to cross the Australian Exclusive Economic Zone at the moderate exposure value was 24% in summer and 10% in transitional seasons, with corresponding minimum times of arrival of 18 days and two days respectively.

### *Entrained hydrocarbons greater than 100 ppb*

Modelling results predict that entrained hydrocarbons at or above 100 ppb would occur within 0 to 10 m water depth, with a maximum distance from the release location of 484 km to the west (transitional and winter seasons). Sensitive locations potentially contacted at or above the moderate exposure value:

- + No entrained hydrocarbons was predicted below the 10 to 20 m water depth.
- + High probability of entrained hydrocarbons crossing the Australian Exclusive Economic Zone (98%).
- + The Arafura and Oceanic Shoals AMPs were the only AMPs predicted to be contacted, at 12% and 33% probability respectively, with maximum exposure values of 143 ppb and 215 ppb respectively.
- + The 'Shelf break and slope of the Arafura Shelf', 'Carbonate bank and terrace system of the Van Diemen Rise' and 'Pinnacles of the Bonaparte Basin' were the only KEFs predicted to be contacted, at 100%, 42% and 6% probability respectively, with maximum exposure values of 1,843 ppb, 289 ppb and 126 ppb respectively.

A number of shoals and banks were predicted to be contacted by entrained hydrocarbons at 9% to 46% probability, with maximum exposure values ranging from 113 to 246 ppb. And entrained hydrocarbons at or

above 100 ppb were predicted (57% probability) to contact the 'Tributary Canyons of the Arafura Depression' at any depth.

### *Dissolved hydrocarbons greater than 50 ppb*

Modelling results for dissolved aromatic hydrocarbons predict that hydrocarbons above 50 ppb may extend 39 km east-northeast in summer, 43 km east-northeast in transitional seasons and 39 km west south-west in winter.

The 'Shelf break and slope of the Arafura Shelf' KEF was the only receptor contacted at the moderate exposure value with a contact probability of 100%, a maximum exposure value of 575 ppb and a minimum arrival time of 0.1 days.

### 7.6.2.2 Deterministic spill dispersion modelling

The stochastic simulation output provides a probabilistic temporal and spatial representation of a spill incident. Individual stochastic realisations were selected to run in deterministic mode. The deterministic simulations were selected by identifying the stochastic realisations from each scenario that resulted in:

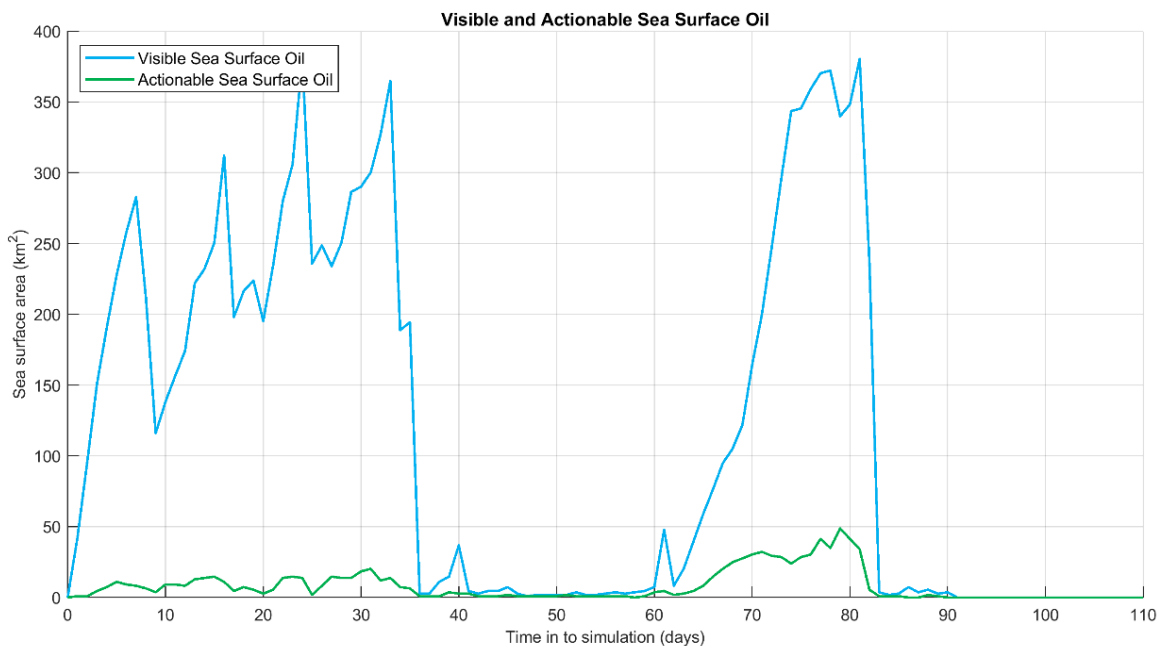
- + largest swept area of condensate on the sea surface above 10 g/m<sup>2</sup>
- + greatest dissolved hydrocarbon time-averaged exposure concentration at the Evans Shoal and Tassie Shoals (being the nearest known physical sensitive receptors).

#### Largest swept area of condensate on the sea surface above 10 g/m<sup>2</sup>

The deterministic trajectory that resulted in the largest swept area of condensate on the sea surface above 10 g/m<sup>2</sup> had begun at 6 am, 1<sup>st</sup> of December 2012, during summer conditions.

Zones of exposure on the sea surface (swept area) over the entire 110-day simulation occurred west-southwest from the release location.

**Figure 7-4** displays the time series for the zone of exposure at the low exposure value (1 g/m<sup>2</sup>) and moderate exposure value (10 g/m<sup>2</sup>) over the 110-day simulation. The maximum area of coverage at the low exposure value on the sea surface was approximately 380 km<sup>2</sup> at 80 days. Between day 32 and 60, the wind speeds increased to above 12 knots and peaked at 27 knots causing the condensate to entrain. This resulted in a reduction of condensate on the sea surface.



**Figure 7-4: Time series of the area of visible hydrocarbons (1 g/m<sup>2</sup>) and hydrocarbons at moderate exposure value (10 g/m<sup>2</sup>) on the sea surface for the trajectory with the largest sea surface swept area at 10 g/m<sup>2</sup>. Results are based on a 129,000 m<sup>3</sup> subsea release of Barossa condensate over 90 days, tracked for 110 days, 6 am 1<sup>st</sup> December 2012**

At the conclusion of the simulation, approximately 103,258 m<sup>3</sup> (80%) spilled hydrocarbons were lost to the atmosphere through evaporation. Approximately 20,707 m<sup>3</sup> (16%) of the condensate was predicted to have decayed by the end of the simulation, while approximately 5,024 m<sup>3</sup> (3.8%) was predicted to remain within the water.

#### Greatest dissolved hydrocarbon time-averaged exposure concentration at the Evans and Tassie Shoals

The simulations that resulted in the greatest exposure of dissolved hydrocarbons at the Evans Shoal and Tassie Shoal receptors were identified for runs commencing in winter (run 83) and transitional season (run 30) conditions.

Run 83, starting at 8 pm 25 June 2014 during winter conditions, produced a maximum dissolved hydrocarbon exposure of 19.2 ppb (over a 96-hour window) at Evans Shoals. While run 30, starting at 7 pm on 16 October 2011 during transitional season conditions, resulted in a maximum dissolved hydrocarbon exposure at Tassie Shoal of 12.3 ppb (over a 96-hour window).

### 7.6.2.3 Vapour dispersion modelling

A vapour dispersion modelling study was undertaken to assess levels of potential airborne concentrations of volatiles from a LOWC (RPS, 2019b).

#### Vapour dispersion modelling methodology

The gas and vapor modelling (RPS, 2019b) was performed using an advanced three-dimensional trajectory and fates blowout model OILMAPDeep, coupled with a three-dimensional gas and vapor plume atmospheric model AIRMAP. The OILMAPDeep model calculates the blowout dynamics at the seabed and the rise of the resultant gas, oil and water plume through the water column. Once on the water surface OILMAPDeep calculates the transport, spreading, entrainment and evaporation of spilled hydrocarbons over time, based on the prevailing wind and current conditions and the physical and chemical properties. The atmospheric plume model (AIRMAP) is coupled to the OILMAPDeep model and is used to calculate the atmospheric

concentrations of the blowout gas and the elevated hydrocarbons (benzene) from the spilled hydrocarbon liquids. **Table 7.18** provides the settings and thresholds used for the vapour dispersion modelling.

**Table 7.18: Settings and thresholds used for vapour dispersion modelling**

Input variable		Value	
Scenario		LOWC	
Water depth (m)		250	
Tubing diameter (inch)		10.71	
Condensate rate (stb/day)		9,190 (day 1)	
Gas rate (MMscf/day)		919 (day 1)	
Reservoir temperature (°C)		170	
Release pressure (bar)		5,982	
Release duration (hours)		24	
Simulation length (hours)		24	
Wind conditions			
Minimum		1 knot	
Average		10 knots	
Maximum		37 knots	
Atmospheric reporting thresholds			
Zone of concern (ZOC)	Criteria for ZOC (benzene)	Atmospheric concentration	
		mg/m <sup>3</sup>	ppm
ZOC 0	Trigger for immediate removal of personnel from workspace	1	0.25
ZOC 1	Exceeds trigger for long-term adverse health effects	2	0.5
ZOC 2	Danger of exceeding flammable range	19,168	6,000
ZOC 3	Exceeded flammable limit, explosion possible if ignition source present	38,336	12,000

#### Vapour dispersion modelling results

For all wind speeds assessed, the modelling indicated that vapour plume concentrations for all zones of concern (human health risk and safety risk; and also, a proxy for potential environmental harm to marine fauna at or above sea surface) (i.e., ZOC 0 to 3) occurred within approximately 2.5 km from the well (RPS, 2019b).

### 7.6.3 Environmental performance outcomes and control measures

The EPOs relating to this event include:

- + No loss of containment of hydrocarbon to the marine environment. [EPO-03]
- + No unplanned objects, emissions or discharges to sea or air. [EPO-04]
- + No injury or mortality to EPBC Act listed fauna. [EPO-05]
- + No significant impacts to cultural features from the Activity. [EPO-09]

An assessment of the environmental benefits and the potential costs or issues associated with control measures for this Activity are shown in **Table 7.19** to demonstrate that potential risks are ALARP. Control measures that are adopted have associated EPSs and measurement criteria which are presented in **Table 8.2**. Rejected control measures have an ALARP evaluation provided to justify their rejection.

The OPEP contains spill response strategies and associated performance outcomes, control measures and performance standards; and an ALARP evaluation.

**Table 7.19: Control measure evaluation for a loss of well control hydrocarbon spill**

CM reference	Control measure	Environmental benefit	Potential cost/issues	Evaluation
Standard control measures				
BAD-CM-013	Source control plan	Ensures source control arrangements are effectively and efficiently implemented in order to reduce the volume of hydrocarbons released to the environment.	Costs associated with preparing documents, assurance (audits) and maintaining response capability (spill response exercises, service provider contract administration).	<b>Adopted</b> – environmental benefits of ensuring source control arrangements in place outweighs the financial costs.
BAD-CM-017	Accepted OPEP	Implements response plans to deal with an unplanned hydrocarbon release quickly and efficiently to reduce impacts to the marine environment.	Administrative costs of preparing documents and large costs of preparing for and implementing response strategies.	<b>Adopted</b> – regulatory requirement, must be adopted.
BAD-CM-018	Drilling and completions management process	Includes control measures for well integrity and well control in an accepted WOMP, MODU Safety Case.  Defines critical acceptance criteria for well operations that reduce the risk of a LOWC.  Accounts for emergency situations such as cyclone response plans.	Costs associated with preparing and implementing the WOMP, Safety Case and D&C programs.	<b>Adopted</b> – regulatory requirement, must be adopted.
BAD-CM-034	Minimum lighting for safe work and navigation	Ensures the MODU is seen by other marine users, thereby reducing the potential for collision during drilling operations.	Standard maritime safety and navigational equipment; regulatory requirement and therefore the cost is not identified as an issue.	<b>Adopted</b> – regulatory requirement, must be adopted.

CM reference	Control measure	Environmental benefit	Potential cost/issues	Evaluation
BAD-CM-038	Petroleum Safety Zone (500 m) established	PSZ alerts other marine users to the presence of the MODU and wellheads, thereby reducing the likelihood of vessel collision and fishing gear snagging on the wellheads.	Negligible costs.	<b>Adopted</b> – regulatory requirement, must be adopted.
BAD-CM-040	MODU planned maintenance system	Requires that equipment is maintained and certified including BOP, reducing probability of a loss of well control.	High cost of maintaining MODU equipment and managing the maintenance system.	<b>Adopted</b> – benefits of ensuring MODU is maintained and equipment is operating as intended outweighs the potential high costs.
BAD-CM-042	Relief well MODU identification	Ensures relief well MODU availability is confirmed to be able to meet the timeframes defined in Table 9-4 of the OPEP prior to spud.	Potential delay to drilling schedule in the event that a suitable MODU for relief well drilling is not available within required timeframes.	<b>Adopted</b> – ensuring there is a suitable MODU for relief well drilling is considered best practice.
BAD-CM-047	Well suspension equipment and procedures	Integrity of hydrocarbon containment barriers to prevent a loss of well containment.	Implementation costs – field and office support.	<b>Adopted</b> – a regulatory requirement, must be adopted.
<b>Additional control measures</b>				
N/A	Manage the timing of the Activity to avoid sensitive biological periods (e.g., fish spawning, whale foraging)	Reduce potential environmental consequences by avoiding sensitive biological periods for conservation significant marine fauna in the MEVA.	Drilling campaign is longer than 12 months. High cost in suspending activities and demobilising / remobilising the MODU and vessels. Impracticable to avoid all biological sensitive periods in the MEVA due to the variability between species (e.g. spawning fish species) and extended length.	<b>Rejected</b> – high cost is grossly disproportionate to the environmental benefits given remote likelihood of a LOWC, and the nature and scale of potential impacts within the MEVA.
N/A	Manage the timing to avoid drilling during cyclone season	In the event of a LOWC, cyclonic conditions may spread hydrocarbons further than predicted and/or hindering spill response activities.	Drilling campaign is longer than 12 months. The official Northern Territory cyclone season runs from 1 November to 30 April; hence, drilling would be precluded for up to 6 months per year.	<b>Rejected</b> – the financial cost of mobilising a MODU and vessels either side of cyclone season adds significant costs to the development. Such costs are unwarranted given

CM reference	Control measure	Environmental benefit	Potential cost/issues	Evaluation
			<p>High cost in suspending activities and demobilising/remobilising the MODU and vessels.</p> <p>Cyclones are a known risk and drilling within cyclone season is appropriately managed under current industry standards and regulatory regime (e.g. Safety Case). Weather conditions are monitored, and drilling operations respond in accordingly.</p>	<p>the risks are well understood and standard industry practices will be used to manage the risk.</p>
N/A	Dedicated spill response resources/facilities in close proximity to the Operational Area	Would enable a faster spill response as resources will be in close proximity.	<p>Significant additional costs associated with securing dedicated resources.</p> <p>Modelling shows no shoreline loading of hydrocarbons.</p>	<p><b>Rejected</b> – significant costs grossly disproportionate to environmental benefits given remote likelihood of a LOWC, lack of shoreline hydrocarbons and low persistence of condensate in a tropical climate.</p>
N/A	A dedicated second MODU on standby for the purpose of relief well drilling	Could reduce the length of time taken to drill a relief well. Instead of a base timeframe for the drilling of a relief well of 90 days, the relief well could potentially be drilled in 54 days (90 days less the 36 days required for the MODU to be ready to spud/commence relief well operations).	<p>For the dedicated second MODU to be ready for relief well drilling, it would need to be contracted, crewed and hold a valid NOPSEMA Safety Case. This could cost approximately \$600,000 USD per day for a minimum negotiated contract term, plus a cost associated for MODU mobilisation and demobilisation (depending on MODU type).</p> <p>After reviewing availability, it is anticipated a MODU would need to be brought in from overseas to guarantee availability of this rig. It is conceivable that to cover the full duration of the drilling campaign (up to eight 90-day wells) with a relief MODU on standby, the additional cost would be in the order of \$380 million USD, depending on where the</p>	<p><b>Rejected</b> – significant costs considered grossly disproportionate to the environmental benefit considering the remote likelihood of a LOWC.</p> <p>In addition, it is envisaged that a MODU would be made available through the APPEA-administered MoU (MODU and Well Services). The MoU agreement documents the commitment to share rigs, equipment, and service personnel in the event of a major loss of containment incident, significantly increasing the resources available to</p>



CM reference	Control measure	Environmental benefit	Potential cost/issues	Evaluation
			<p>MODU was mobilised from/to and the market at the time.</p> <p>Introducing another MODU and support equipment/personnel on standby would result in additional environmental and safety risks.</p>	<p>a titleholder company.</p>

CM reference	Control measure	Environmental benefit	Potential cost/issues	Evaluation
N/A	Amend the well design to reduce the volume of hydrocarbons released in the event of a LOWC	By reducing the diameter of the wellbore through the reservoir and back to surface increases the backpressure on the well and hence the flowrates through well redesign. This would result in a reduction in overall volume of hydrocarbons released to the environment in the event of a LOWC.	The wellbore size for each of the wells is driven by the deliverability requirements of the wells. Reducing the size of the wellbore would require additional wells to be constructed. This would result in a significant increase in costs and longer Activity duration, as well as an increase in discharges to sea and air, greater area of seabed disturbance and a longer period of potential interaction with other marine users. Adding one additional well would cost in the order of \$50 million to \$60 million USD.	<b>Rejected</b> – modelling conducted for the Barossa OPP used a smaller wellbore (8.5-inch) compared to that used for spill modelling for this EP (10.5-inch). The EMBA for these two scenarios are similar in size due to the increased exit velocity from the smaller wellbore diameter (8.5-inch) reducing the droplet size and resulting in >80% of the condensate remaining in the water column. Whereas the larger droplets encountered from the larger wellbore design (10.5-inch) would rise to the surface where they may be subject to evaporation and re-entrainment. Therefore, reducing the wellbore size will not result in a significant reduction in the EMBA size, and the environmental and economic costs of increasing the number of wells and duration of the campaign are considered grossly disproportionate to the potential reduction in environmental impact.

## 7.6.4 Environmental impact assessment

The below environmental impact assessment follows the approach detailed in **Section 7.5.5**.

### 7.6.4.1 Identification of hot spots for consequence assessment

Hot spots that are predicted to be contacted by hydrocarbons in any phase within the MEVA and EMBA for a LOWC are listed in **Table 7.20**. The values and sensitivities associated with these areas are described in **Appendix C**. These hot spots meet the criteria (as described in **Section 7.5.5**) which includes a probability of contact greater than 5%, or high volumes of entrained and dissolved hydrocarbons.

Note that the worst-case values were taken from the modelling scenarios to identify the hot spots and therefore is taken from any season and any hydrocarbon phase at any water depth.

**Table 7.20: Identified high environmental value and hot spot receptors**

Receptor	Exposure values			Hot Spot
	Low (EMBA)	Moderate (MEVA)	High (HEVA)	
Arafura AMP	✓	✓		Y
Ashmore Reef AMP	✓			
Cartier Island AMP	✓			
Oceanic Shoals AMP	✓	✓		Y
Carbonate bank and terrace system of the Sahul Shelf KEF	✓			
Pinnacles of the Bonaparte Basin KEF	✓	✓		Y
Shelf break and slope of the Arafura Shelf KEF	✓	✓	✓	Y
Carbonate bank and terrace system of the Van Diemen Rise KEF	✓	✓		Y
Tributary canyons of the Arafura Depression KEF	✓	✓		
Continental slope demersal fish communities KEF	✓			
Ashmore Reef and Cartier Island and surrounding Commonwealth waters KEF	✓			
Barton Shoal	✓			
Dillon Shoal	✓			
Cootamundra Shoal	✓			
Calder Shoal	✓			
Margaret Harries Banks	✓	✓		
Money Shoal	✓			
Lynedoch Bank	✓	✓		Y
Evans Shoal	✓	✓		Y
Franklin Shoal	✓	✓		
Flinders Shoal	✓	✓		
Blackwood Shoal	✓	✓		Y

Receptor	Exposure values			Hot Spot
	Low (EMBA)	Moderate (MEVA)	High (HEVA)	
Martin Shoal	✓			
Loxton Shoal	✓			
Sunset Shoal	✓			
Troubadour Shoals	✓	✓		
Sunrise Bank	✓			
Bellona Bank	✓			
Echo Shoals	✓			
Big Bank Shoals	✓			
Karmt Shoal	✓			
Jabiru Shoals	✓			
Pee Shoal	✓			
Mangola Shoal	✓			
Vee Shoal	✓			
Fantome Shoal	✓			
Johnson Bank	✓			
Woodbine Bank	✓			
Barracouta Shoal	✓			
Tassie Shoal	✓	✓		Y
Unnamed shoal	✓	✓		Y

This process identified the following hot spots:

- + Arafura and Oceanic Shoals AMPs
- + Shelf break and slope of the Arafura Shelf KEF
- + Carbonate bank and terrace system of the Van Diemen Rise KEF
- + Pinnacles of the Bonaparte Basin KEF
- + Lynedoch Bank
- + Evans Shoal
- + Blackwood Shoal
- + Tassie Shoal
- + Unnamed Shoal<sup>28</sup>.

<sup>28</sup> 'Unnamed shoal' is assumed to have similar values to those at other banks and shoals in the region as described in **Appendix C**.

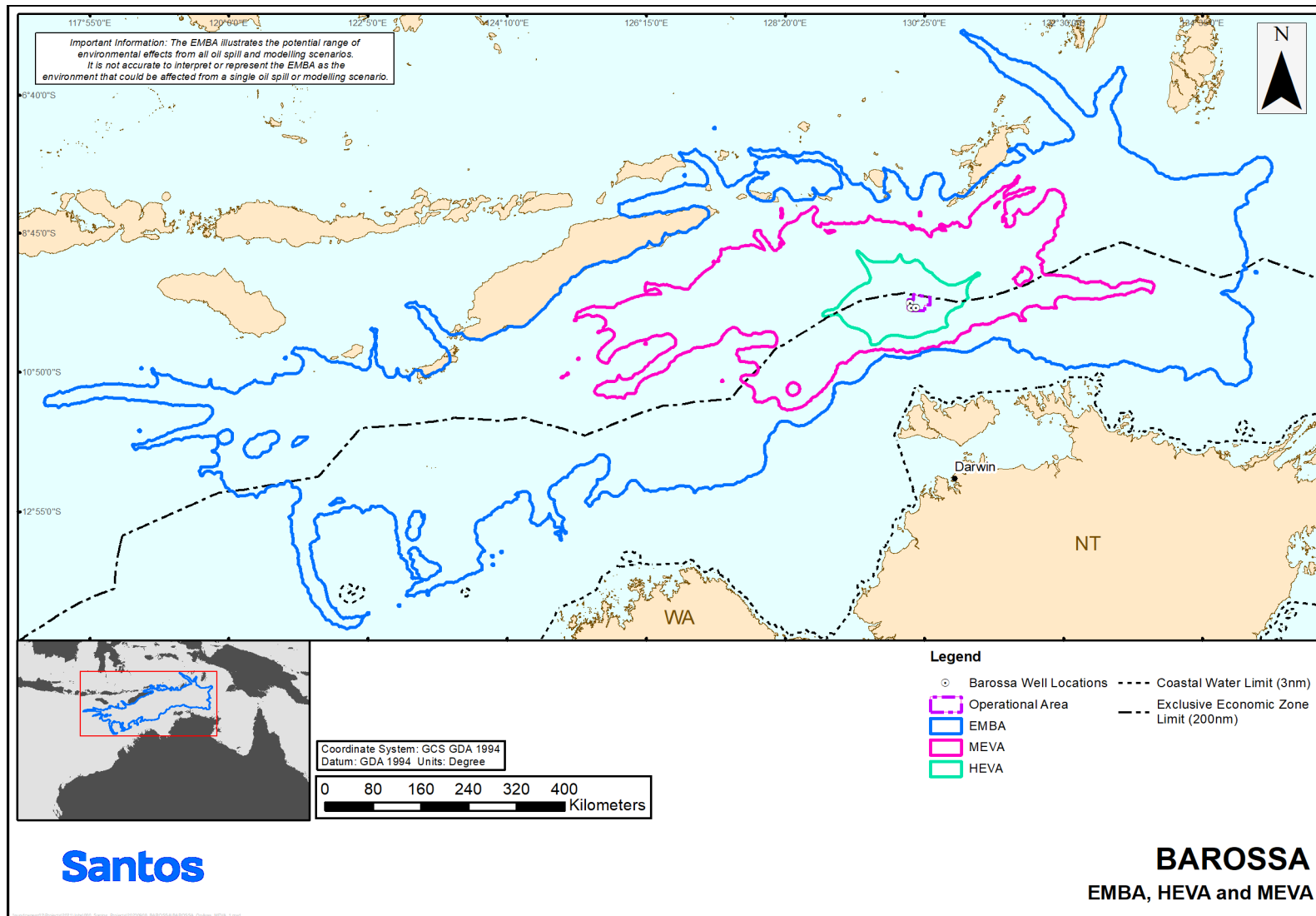


Figure 7-5: Modelled environment that may be affected, moderate exposure value area and high exposure value area from a loss of well control

**Table 7.21: Impact, likelihoods and consequence ranking – loss of well control**

<b>Receptors</b>	<p>Physical environment (water and sediment quality, benthic habitats, KEFs)</p> <p>Threatened, migratory or local fauna (marine mammals, marine reptiles, sharks, rays, fish, and birds)</p> <p>Protected and significant areas (marine parks)</p> <p>Socio-economic receptors (fisheries, tourism, recreation)</p> <p>Cultural features</p>
<b>Consequence</b>	IV – Major
<p>A summary of the consequence assessment for each receptor category is presented below. Potential impact pathways (physical and chemical) of hydrocarbon exposure for receptors are summarised in <b>Table 7.16</b>, and potential impacts to receptors that may be found within the area of moderate exposure are further described in <b>Table 7.17</b>.</p> <p><i>Physical environment or habitat</i></p> <p>There are no emergent or shoreline habitats within the MEVA.</p> <p>Stochastic modelling indicates surface, entrained and dissolved aromatic hydrocarbons at or above moderate exposure values may affect water quality in the Arafura and Oceanic Shoals AMPs, KEFs and at various banks and shoals.</p> <p>Banks and shoals support a diverse and varied range of benthic communities, reef-building soft corals, hard corals and filter-feeders (Heyward <i>et al.</i>, 2012, 1997b), and may support aggregations of foraging wildlife. Some of the shoals/banks close to the Operational Area have the potential to be contacted in this spill scenario by entrained hydrocarbons at the moderate exposure level at relatively low probabilities (9% to 46%), as predicted by stochastic modelling.</p> <p>Potential impacts that may occur as a result of hydrocarbon exposure could include sub-lethal stress and, in some cases, total or partial mortality of sensitive benthic organisms (e.g., corals) and the early life stages of resident fish and invertebrate species. Exposure to entrained hydrocarbons may also increase mortality in the early life stages of benthic species affected and could cause localised and long-term effects to the shallow hard coral communities at these shoals/banks.</p> <p>A hydrocarbon release during a loss of well control has the potential to result in a localised, temporary reduction in air quality near the release site. Based on the Barossa condensate assay, up to 57% of the hydrocarbons would evaporate within the first few hours, with almost 80% evaporated after two days when on the sea surface (RPS APASA, 2017). Additionally, as demonstrated by the vapour dispersion modelling, hydrocarbon vapor concentrations above human health risk and safety risk levels (also considered a proxy for environmental risk) would extend to approximately 2.5 km (RPS, 2019b).</p> <p>Hydrocarbon vapor in this open water offshore environment would rapidly disperse with the prevailing wind. Potential impacts to air quality are expected to be temporary however may be significant for short periods of time in relatively close proximity to the release location.</p> <p>Water quality and sediment quality will be affected by the release of hydrocarbons with the potential for Major (IV) consequences due to the long-term nature of hydrocarbon contamination.</p> <p><i>Threatened or migratory fauna</i></p> <p>In the event of a LOWC, a reduction in water quality has the potential to impact marine fauna. Marine fauna present in the area may be exposed to floating hydrocarbons, entrained hydrocarbons, or dissolved aromatic hydrocarbons. A description of impacts to marine fauna from exposure to condensate is provided in <b>Table 7.17</b>.</p> <p>Impacts would be greatest within several kilometres of the spill where the toxic aromatic components of the condensate will be at their highest concentration, and when hydrocarbons is at its thickest on the sea surface. Upon release to the marine environment, the condensate will rapidly lose toxicity with time and will spread thinner at the surface as evaporation continues or due to entrainment within the water column.</p> <p>Breeding/foraging BIAs for seabirds or migratory shorebirds are not predicted to be contacted by hydrocarbons at or above moderate exposure values. Seabirds may contact surface slicks at or above moderate exposure values</p>	

whilst foraging in offshore, open water locations and could cause impact on feather integrity, slight secondary effects through ingestion after preening or ingestion of oiled fish (as described in **Table 7.16** and **Table 7.17**).

The pygmy blue whale BIA may be contacted by hydrocarbons at or above moderate exposure values for surface and entrained hydrocarbons. Potential impacts are likely to be limited to individuals that may be transiting through the area with potential for coating of baleen (in whales) and ingestion of oiled prey (plankton/fish) as described in **Table 7.16** and **Table 7.17**.

Based on the stochastic modelling outputs, the spill may contact various BIAs for marine turtles, but given the distance from key areas for breeding and nesting, any potential impacts are likely to be limited to individuals that may be transiting through the area or feeding at nearby submerged shoals and banks.

The potential sensitive receptors in the surrounding areas of the spill will include fish, marine mammals, marine reptiles and seabirds, as discussed in **Table 7.17**. There is considered to be the potential for Major (IV) consequences to marine fauna, defined as ‘Major long-term effect on local population, industry or ecosystem factors’.

*Protected areas*

The MEVA intersects two AMPs (**Section 3.2.5.1**) at 12% and 33% probability of exposure. Although hydrocarbons are only predicted to occur within the 0 to 10-m layer of the water column, long-term effects on one or more of the protected area’s values could occur (e.g. sediment contamination). Hence, potential consequences are considered to be Major (IV).

*Socio-economic receptors*

There is potential for temporary disruption to fishing activities (traditional Indonesian, recreational and commercial) due to surface, dissolved or entrained hydrocarbons. Although only expected in the medium term, the consequence is considered to be Moderate (III) due to the potential significant loss of value to local fishing industries.

A LOWC and associated condensate spill could also disrupt other energy industry operations in the region (e.g. Santos Bayu Undan operations), military exercises and commercial shipping. Potential consequences are considered to be Moderate (III) for these socio-economic receptors.

*Cultural Features*

While there was no surface shoreline hydrocarbons accumulation predicted in the event of a significant spill, the EMBA may overlap cultural features in the marine environment. Potential impacts to cultural features from a hydrocarbon spill may include decline in traditional food sources and/or mortality of fauna with cultural significance. On the basis of the above assessment, a LOWC has the potential to impact an array of environmental and socio-economic receptors, with the highest consequence considered to be Major (IV).

<b>Likelihood</b>	A – Remote
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The likelihood of a LOWC event occurring during the Activity with the proposed control measures in place is extremely low when considering industry and Santos’ statistics. Wells are designed with essential engineering and safety control measures to prevent a loss of containment occurring. Blowout events during oil well development drilling has been reported at a frequency of  $3.4 \times 10^{-5}$  per drilled well (IOGP, 2019; development drilling operations at normal wells, North Sea Standard).

Control measures in place to control the flow of hydrocarbons include construction design, safety shutdown systems, regular inspection and maintenance, and competent personnel. Industry-standard and activity-specific control measures to reduce the chance of a loss of containment event resulting in a release have been implemented, including procedures such as the NOPSEMA-accepted WOMP and safety case, and a spill response plan (OPEP). These control measures are considered to reduce the risk of a loss of containment occurring to a level that is acceptable and ALARP.

Santos considers there to be less technical uncertainty and risk when drilling production wells compared to exploration wells.

The likelihood of a LOWC occurring with the control measures in place and then resulting in a Major (IV) consequence is considered to be Remote (a).

Residual Risk	The residual risk is considered <b>Low</b> .
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### 7.6.5 Demonstration of as low as reasonably practicable

The industry standard safe drilling methodologies, including the inherently safe well design and its operations with primary (i.e., maintaining the appropriate hydrostatic pressure) and secondary well control features (i.e., BOP) will be implemented to reduce the probability of a loss of containment. All safety options have been considered in well design and equipment choice for the Activity.

The combination of the standard prevention control measures (**Section 7.6.3**), and the spill response strategies, as presented in the OPEP, together reduce the hydrocarbon spill risk and impact.

Santos has determined applicable source control response measures to limit the spill volume from a LOWC event to ALARP.

#### Source control

A number of source control options have been evaluated for the Activity (refer to the OPEP). Of these source control options, the drilling of a relief well is considered the primary means of controlling the source in the event of an unplanned well release. Spill response and impact assessment for this Activity has been based on the relief well taking 90 days to execute. A breakdown of the key tasks and their timeframe to drill a relief well in 90 days have been included in the *Barossa Development Drilling and Completions OPEP* (BAA-200-0327).

#### Spill mitigation controls

Santos considers that through the selection of appropriate spill response strategies, development of spill response controls and maintenance of preparedness arrangements and resources to implement these controls, spill risk is mitigated to ALARP. Preparedness spill response controls are outlined in **Table 7.19** while those that would be implemented in the event of a spill are outlined within the OPEP.

All reasonably practicable control measures have been reviewed (refer OPEP for further evaluation) and those adopted are considered appropriate to reduce the residual risk to a 'Low' level. The proposed control measures are in accordance with the Santos risk management criteria and are considered appropriate to manage the risk to ALARP.

### 7.6.6 Acceptability evaluation

Is the risk ranked between Very Low and Medium?	Yes – maximum credible hydrocarbon spill (condensate from a LOWC) residual risk is ranked as Low.
Is further information required to validate the consequence assessment?	No – hydrocarbon spill modelling results were used to determine consequence and risk.
Are risks and impacts consistent with the principles of ESD?	Yes – Activity evaluated in accordance with Santos' <i>Offshore Division Environmental Hazard Identification and Assessment Guideline</i> , which considers principles of ESD.
Have the acceptable levels of impact and risks been informed by relevant species recovery plans, threat abatement plans and conservation advice and Australian marine park zoning objectives?	Yes – consistent with relevant species recovery plans, conservation management plans and management actions set out in <b>Table 3.8</b> , including: <ul style="list-style-type: none"> <li>+ Recovery Plan for Marine Turtles in Australia 2017–2027 (DoEE, 2017)</li> <li>+ Approved Conservation Advice for <i>Rhincodon typus</i> (whale shark) (TSSC, 2015d)</li> <li>+ Conservation management plan for the blue whale, 2015 to 2025 (CoA, 2015a)</li> </ul>



	<ul style="list-style-type: none"> <li>+ Approved Conservation Advice for <i>Balaenoptera borealis</i> (sei whale) (TSSC, 2015a)</li> <li>+ Approved Conservation Advice for <i>Balaenoptera physalus</i> (fin whale) (TSSC, 2015b)</li> <li>+ Recovery plan for the white shark (<i>Carcharodon carcharias</i>) (DSEWPaC, 2013)</li> <li>+ Approved Conservation Advice for <i>Pristis clavata</i> (Dwarf Sawfish) (DEWHA, 2009)</li> <li>+ Approved Conservation Advice for <i>Pristis pristis</i> (largetooth sawfish) (DoE, 2014b)</li> <li>+ Commonwealth Conservation Advice on <i>Pristis zijsron</i> (green sawfish) (DEWHA, 2008)</li> <li>+ Sawfish and River Sharks Multispecies Recovery Plan (DoE, 2015a)</li> <li>+ Recovery plan for the grey nurse shark (<i>Carcharias taurus</i>) (DoE, 2014a)</li> <li>+ Approved Conservation Advice for <i>Glyphis garricki</i> (northern river shark) (DoE, 2014c)</li> <li>+ National recovery plan for threatened albatrosses and giant petrels 2011 to 2016 (DSEWPaC, 2011b)</li> <li>+ Approved Conservation Advice for <i>Calidris ferruginea</i> (curlew sandpiper) (TSSC, 2015e)</li> <li>+ Approved Conservation Advice for <i>Numenius madagascariensis</i> (Eastern Curlew) (TSSC, 2015f)</li> <li>+ Approved conservation advice <i>Calidris canutus</i> (red knot) (TSSC, 2016b)</li> <li>+ Approved Conservation Advice for <i>Papasula abbotti</i> (Abbott’s booby) (TSSC, 2015h)</li> <li>+ Marine Bioregional Plan for the North-West Marine Region (CoA, 2012b).</li> </ul> <p>Management is also consistent with the zoning of the Australian marine parks, and their management plans (i.e., North Marine Parks Network Management Plan 2018 (Director of National Parks, 2018a) and North-West Marine Parks Network Management Plan 2018 (Director of National Parks, 2018b)) in that risks have been reduced to ALARP, such as implementation of spill response activities will limit impacts, thereby conserving the marine park values which includes habitats critical to the diversity and value of the protected areas.</p>
<p>Are performance outcomes, control measures and associated performance standards consistent with legal and regulatory requirements?</p>	<p>Yes – management consistent with OPGGS Act and Regulations, including Safety Case and WOMP.</p> <p>Through acceptance of this EP, legislative and regulatory requirements will be met as per <b>Section 1.6.2</b>.</p>
<p>Are performance outcomes, control measures and associated performance standards consistent with Santos’ Environment, Health and Safety Policy?</p>	<p>Yes – aligns with Santos’ Environment, Health and Safety Policy.</p>

<p>Are performance outcomes, control measures and associated performance standards consistent with industry standards?</p>	<p>Yes – the most recent and comparable Drilling and Completions Eps accepted by NOPSEMA have been reviewed for consistency with the performance outcomes, control measures and associated performance standards proposed in this EP.</p>
<p>Have performance outcomes, control measures and associated performance standards taken into consideration Relevant Person feedback?</p>	<p>Yes – requests made by Relevant Persons relating to managing spill response activities have been considered. Hydrocarbon spill matters raised by ECNT, Tiwi Island Clan groups and individuals and West Timor and Timor-Leste Relevant Persons are addressed in <b>Section 3.2.8.8</b>.</p>
<p>Are performance standards such that the impact or risk is considered to be ALARP?</p>	<p>Yes – ALARP assessment conducted, with no additional control measures adopted.</p>

The residual risk of an unplanned hydrocarbon spill (condensate) is assessed as Low. Based on an assessment of Santos’ acceptability criteria and with the control measures in place, potential risks are considered acceptable.

## 7.7 Hydrocarbon spill – marine diesel oil

### 7.7.1 Description of event

<p><b>Event</b></p>	<p><i>Worst-credible MDO spill</i></p> <p>It is considered credible that a release of MDO to the marine environment could occur as a result of a collision between the support vessels, between a support vessel and the MODU, or between a passing third party vessel and the MODU or a support vessel. Such a collision could rupture a fuel tank resulting in the release of MDO to sea. Vessel collision could occur due to factors such as human error, poor navigation, vessel equipment failure or poor weather.</p> <p>As described in Section 7.5.1.2, a spill scenario of 250 m<sup>3</sup> of MDO has been assumed for this EP.</p> <p><i>Refuelling incident</i></p> <p>The second most significant MDO spill scenario identified is a refuelling incident (fuel hose failure or rupture, coupling failure or tank overfilling) where fuel bunkering would need to be stopped manually. Fuel released before the cessation of pumping as well as fuel remaining in the transfer line may be released to the environment.</p> <p>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<sup>3</sup> considered to be the maximum volume that could be released from the hose before shutdown.</p>
<p><b>Extent</b></p>	<p>Spill trajectory modelling (RPS, 2016) indicated that there was some probability of a 250 m<sup>3</sup> MDO spill extending as follows (using the moderate exposure value):</p> <ul style="list-style-type: none"> <li>+ Shoreline loading was not predicted to occur.</li> <li>+ Surface hydrocarbons were predicted to occur within approximately 132 km.</li> <li>+ Entrained hydrocarbons were predicted to occur within approximately 240 km.</li> <li>+ Dissolved hydrocarbons were not predicted to occur.</li> </ul>
<p><b>Duration</b></p>	<p>A 250 m<sup>3</sup> release of MDO was modelled for a release over 6 hours, replicating the potential duration of a spill arising from a significant collision. Hydrocarbons would persist within the environment for a longer period of time, although MDO is expected to weather quickly through evaporation and dispersion.</p>

### 7.7.2 Nature and scale of environmental impacts

Potential receptors: physical environment (water and sediment quality, shoals and banks, benthic habitats), threatened or migratory fauna (marine mammals, marine reptiles, sharks, fish, rays and birds), protected and significant areas (marine parks, KEFs), socio-economic receptors (fisheries, tourism, recreation, third party operators) and cultural features.

Hydrocarbon spills will cause a decline in water quality and may cause chemical (e.g., toxic) and physical (e.g., coating of emergent habitats, oiling of wildlife at sea surface) impacts to marine species. The severity of the impact of a hydrocarbon spill depends on the magnitude of the spill (i.e., extent, duration) and sensitivity of the receptor. The nature and scale of a hydrocarbon spill is described throughout this chapter for a vessel collision scenario, given smaller hydrocarbon spills (from refuelling) will impact a smaller area than a vessel collision.

Potential impact pathways (physical and chemical) of hydrocarbon exposure for receptors are summarized in and potential impacts to receptors found within the EMBA are further described in **Table 7.21**.

**Table 7.19** summarises the potential impacts of hydrocarbon spills to sensitive receptors and values within the EMBA.

### 7.7.2.1 Stochastic spill dispersion modelling

The modelling results (RPS, 2016) are presented for the fate of hydrocarbon from a vessel collision at the exposure values defined in **Section 7.5.4**.

A surface release of MDO to the marine environment would result in a localised reduction in water quality in the upper surface waters of the water column near the location of the spill. Modelling was undertaken at a single location at the south-west corner of the permit area (Operational Area). This location is considered to provide a representative and conservative estimate of the potential environmental impacts and risks based on the geographical location of the nearest sensitive receptors to the east and west of the Operational Area (i.e., Lynedoch Bank, Evans Shoal and Tassie Shoal). The release location is broadly equidistant between these sensitive receptors.

The spill modelling results at or above moderate exposure values are summarised below for a surface vessel collision, more detailed results are provided **Appendix H** for the purposes of risk evaluation.

Further parameters required to inform spill response strategies are described in the OPEP. The currents in the region 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.

#### *Accumulated shoreline oil*

No shoreline accumulation of oil was identified at any exposure value in any season.

#### *Floating oil*

The maximum distance sea surface oil at the moderate exposure value ( $> 10 \text{ g/m}^2$ ) is predicted to travel from the release location varied greatly between seasons. Based on the stochastic modelling outputs, hydrocarbon was predicted to travel approximately 28.1 km (east-northeast), 132 km (west) and 71 km (west) during summer, transitional and winter conditions, respectively (RPS APASA, 2015).

The only receptors predicted to be contacted at a moderate exposure value are the surface waters of the 'Shelf break and slope of the Arafura Shelf' KEF with the highest probability (100%) in summer, and 'Carbonate bank and terrace system of Van Diemen Rise' KEF at 1% probability in transitional seasons.

#### *Entrained oil*

The stochastic modelling outputs show that the moderate exposure value for entrained hydrocarbons extended up to approximately 240 km from the release location, depending on the prevailing oceanic conditions (i.e., winds and currents) influencing the released hydrocarbon.

The sensitive receptors which have very low probability (1%-11%) of being contacted at the moderate entrained exposure value during various seasons include:

- + Shoals and banks.
- + 'Shelf break and slope of the Arafura Shelf', 'Carbonate bank and terrace system of the Van Diemen Rise' and 'Pinnacles of the Bonaparte Basin' KEFs.
- + Open waters of the Oceanic Shoals and Arafura AMPs.

#### *Dissolved oil*

No receptors were predicted to be exposed to moderate or high dissolved aromatic concentrations under any season assessed.

### 7.7.3 Environmental performance outcomes and control measures

The EPOs relating to this event include:

- + No loss of containment of hydrocarbon to the marine environment. [EPO-03]
- + No unplanned objects, emissions or discharges to sea or air. [EPO-04]
- + No injury or mortality to EPBC Act listed fauna during activities. [EPO-05]
- + No significant impacts to cultural features from the Activity. [EPO-09]

An assessment of the environmental benefits and the potential costs or issues associated with control measures for this Activity are shown in **Table 7.22** to demonstrate that potential risks are ALARP. Control measures that are adopted have associated EPSs and measurement criteria which are presented in **Table 8.2**. Rejected control measures have an ALARP evaluation provided to justify their rejection.

Selection of oil spill response strategies and associated performance outcomes, control measures and performance standards, including those required to maintain preparedness and for response, are detailed within the OPEP. The OPEP contains an evaluation of oil spill preparedness arrangements to demonstrate that oil spills will be mitigated to ALARP.

**Table 7.22: Control measure evaluation for the surface release of marine diesel oil (vessel collision/bunkering)**

CM reference	Control measure	Environmental benefit	Potential cost/issues	Evaluation
<b>Standard control measures</b>				
BAD-CM-012	MODU and vessel spill response plans	Implements response plans (SOPEP/SMPEP) on board vessels and MODU to deal with unplanned hydrocarbon releases and spills quickly and efficiently in order to reduce impacts to the marine environment.	Cost of implementing the procedures.	<b>Adopted</b> – environmental benefits of ensuring response plans in place, are followed and measures implemented outweighs the costs.
BAD-CM-015	Maritime Notices	Maritime notifications ensure marine users are informed of the proposed activities, reducing the likelihood of unplanned interactions.	Negligible costs.	<b>Adopted</b> – it is a regulatory requirement.
BAD-CM-016	Support vessel	Minimises the risk of a third-party vessel colliding with the MODU and vessels through visual identification and communication with approaching vessels.	Significant cost to charter support vessels; however, the MODU safety case requires a standby vessel during drilling for emergency response purposes.	<b>Adopted</b> – environmental and safety benefits considered to outweigh costs.

CM reference	Control measure	Environmental benefit	Potential cost/issues	Evaluation
BAD-CM-017	Accepted OPEP	Implements response plans to deal with an unplanned hydrocarbon release quickly and efficiently in order to reduce impacts to the marine environment.	High cost associated with preparing documents, ongoing management (spill response exercises) and implementation of OPEP.	<b>Adopted</b> – regulatory requirement, must be adopted.
BAD-CM-020	Fuel oil quality	Use of MDO rather than a 'heavier' fuel type reduces potential spill impacts as MDO is less persistent in the marine environment.	Potential fuel 'change over' costs prior to vessel commencement.	<b>Adopted</b> – environmental benefits of ensuring vessels use MDO are considered to outweigh the costs.
BAD-CM-010	Bulk liquid (hydrocarbon) transfer procedure	Bulk liquid transferred in accordance with bulk transfer procedures to reduce the risk of an unintentional release of MDO to the sea.	Cost of implementing procedure. Cost of purchasing and maintaining equipment (e.g., bulk hoses and connections).	<b>Adopted</b> – environmental benefits of ensuring procedures are followed outweighs the costs.
BAD-CM-022	Santos Relevant Persons consultation	Relevant Person consultation ensures marine users are aware of the proposed activities, reducing the likelihood of unplanned interactions.	Cost to prepare and distribute information, and to address any feedback provided.	<b>Adopted</b> – benefits considered to outweigh costs.
BAD-CM-034	Minimum lighting for safe work and navigation	Ensures the MODU and vessels are seen by other marine users, thereby reducing the potential for interaction and collision.	Standard maritime safety and navigational equipment; regulatory requirement.	<b>Adopted</b> – it is a regulatory requirement.
BAD-CM-036	Seafarer certification (MO 70 – Seafarer certification)	Demonstrates appropriately trained and competent personnel, to navigate vessels and reduce interaction with other marine users.	Costs associated with personnel time in obtaining qualifications; regulatory requirement.	<b>Adopted</b> – it is a regulatory requirement.

CM reference	Control measure	Environmental benefit	Potential cost/issues	Evaluation
BAD-CM-037	Marine assurance standard to ensure compliance with relevant Marine Orders for safe vessel operations (MO 21 – Safety and emergency arrangements; MO 27 – Safety of navigation and radio equipment; MO 30 – Prevention of collisions)	Ensures contracted vessels are operated, maintained and manned in accordance with industry standards and regulatory requirements.	Cost associated with implementing procedures.	<b>Adopted</b> – benefit of assuring vessels outweighs procedure compliance costs.
BAD-CM-038	Petroleum Safety Zone (500 m) established	PSZ alerts other marine users to the presence of the MODU, thereby reducing the likelihood of vessel collision.	Negligible costs; it is a regulatory requirement.	<b>Adopted</b> – it is a regulatory requirement.
BAD-CM-040	MODU planned maintenance system	Requires that equipment is maintained and certified, reducing probability of an unplanned MDO spill.	High cost of maintaining MODU equipment and managing the maintenance system.	<b>Adopted</b> – benefits of ensuring MODU is maintained outweighs the costs.
BAD-CM-041	Vessel planned maintenance system	Requires that equipment is maintained and certified, reducing the probability of an unplanned MDO spill.	High cost of maintaining vessel equipment and managing the maintenance system.	<b>Adopted</b> – benefits of ensuring vessels are maintained outweighs the costs.
<b>Additional control measures</b>				
BAD-CM-048	Maximum volume of MGO/MDO stored in a single tank of vessels used for the Activity will not exceed 250m <sup>3</sup>	Limits the volume of MGO/MDO that can be lost to the marine environment in the event of a vessel collision.  Ensures consistency with the Drilling and Completions OPEP, which assumes a vessel collision release volume of 250m <sup>3</sup> of MGO/MDO for spill modelling and response planning.	Limits the vessels that can be contracted to undertake the Activity, could result in additional bunkering during the Activity if largest volume stored in a single fuel tank is limited to 250 m <sup>3</sup> and the tanks are larger in volume.	<b>Adopted</b> – benefits of ensuring MGO/MDO single tank volumes do not exceed 250m <sup>3</sup> outweighs the potential to not be able to contract a vessel.

CM reference	Control measure	Environmental benefit	Potential cost/issues	Evaluation
N/A	Manage the timing of the Activity to avoid sensitive biological periods (e.g., fish spawning, whale foraging)	Reduce potential environmental consequences by avoiding sensitive biological periods for conservation significant marine fauna in the MEVA.	<p>Drilling campaign is longer than 12 months, requiring ongoing vessel support.</p> <p>High cost in suspending activities and demobilising/remobilising the MODU and vessels.</p> <p>Impracticable to avoid all biological sensitive periods in the MEVA due to the variability between species (e.g. spawning fish species) and extended length.</p>	<b>Rejected</b> – high cost is grossly disproportionate to the environmental benefits given remote likelihood of a vessel collision and fuel oil spill, and the nature and scale of potential impacts within the MEVA.
N/A	Zero fuel bunkering via hose	Removes spill risk from fuel bunkering activities via hose.	<p>Cost associated with transfer of MDO via drums or containers which then needs to be transferred to fuel storage tanks on board.</p> <p>Not possible to modify MODU to allow additional fuel storage to facilitate this.</p>	<b>Rejected</b> – not feasible to modify MODU fuel storage facilities. Would result in significant lifting operations. Does not eliminate the risk of an MDO refuelling spill to sea. MDO bunkering operations are standard industry practice.
N/A	Require all vessels involved in the Activity to be double hulled	Reduces the likelihood of a loss of hydrocarbon inventory in the highly unlikely event of a vessel collision, minimising potential environmental impact.	Vessels are subject to availability and are required to meet Santos’ standards during activities, requirement of a double hull on vessels would limit the number available to Santos. It is Santos’ preference that vessels are doubled hulled.	<b>Rejected</b> – potential high costs associated with only contracting double hulled support vessels is considered to be grossly disproportionate compared with the low risk of a vessel collision and MDO spill.



## 7.7.4 Environmental impact assessment

<b>Receptors</b>	Physical environment and habitats – water quality, KEFs Threatened, migratory or local fauna – plankton, invertebrates, marine mammals, marine reptiles, sharks, rays and fish, seabirds Protected areas – marine parks Socio-economic – commercial, recreational and traditional fisheries; recreation and tourism, energy industry
<b>Consequence</b>	II – Minor

A summary of the consequence assessment for each receptor category is presented below. Potential impact pathways (physical and chemical) of hydrocarbon exposure for receptors are summarised in **Table 7.16**, and potential impacts to receptors that may be found within the area of moderate exposure are further described in **Table 7.17**, as they fall within the MEVA for a LOWC.

### *Physical environment and habitats*

It is likely that water quality will be reduced due to hydrocarbon contamination (both at the sea surface and in the upper water column as a result of entrained and dissolved hydrocarbons) at the location of the spill, as well as within surrounding marine waters over shoals and banks, open waters of the Oceanic Shoals and Arafura AMPs and the KEFs of the ‘Shelf break and slope of the Arafura Shelf’, ‘Carbonate bank and terrace system of the Van Diemen Rise’ and ‘Pinnacles of the Bonaparte Basin’. However, water quality changes are expected to be temporary in nature due to rapid evaporation, natural degradation and dispersion of MDO in the open ocean (Neff *et al.*, 2000b) and restricted to within 240 km from the release location.

The open waters above the seabed KEFs of the ‘Shelf break and slope of the Arafura Shelf’, ‘Carbonate bank and terrace system of the Van Diemen Rise’ and ‘Pinnacles of the Bonaparte Basin’ may be contacted by hydrocarbons at or above moderate exposure values. The maximum depth that hydrocarbons associated with a surface release of 250 m<sup>3</sup> of MDO may entrain is 20 to 30 m, being a water depth above the KEFs.

Some of the shoals/banks close to the Operational Area have the potential to be contacted in this spill scenario by entrained hydrocarbons at a moderate exposure level at relatively low probabilities (1% to 11%), as predicted by stochastic modelling. Given the surface nature of the release the maximum depth that hydrocarbons associated with a 250 m<sup>3</sup> spill of MDO may entrain is 20 to 30 m. Considering this, and the broad depth range of the shoals/banks, any potential impacts will be limited to the upper water column layers which these features extend into. Potential impacts that may occur as a result of hydrocarbon exposure could include sub-lethal stress and, in some cases, total or partial mortality of sensitive benthic organisms (e.g., corals) and the early life stages of resident fish and invertebrate species.

The stochastic modelling outputs show that the moderate exposure value did not contact any receptors in any season.

Potential impacts to shoals and banks are expected to be Minor (II) – Detectable but insignificant change to local population, industry or ecosystem factors.

### *Threatened/migratory fauna*

A surface release of MDO to the marine environment would result in a localised reduction in water quality in the upper surface waters of the water column. As a light hydrocarbon, MDO undergoes rapid spreading and evaporative loss in warm waters, indicating that a surface slick will be temporary. The high rate of evaporation means that little MDO will become entrained and few aromatic hydrocarbons are predicted to become dissolved reducing impact to marine fauna. Surface oil, and entrained hydrocarbon in the sea surface layer, could have the physical effect of coating fauna interacting within and under the surface, including plankton, pelagic invertebrates and fishes, marine reptiles, marine mammals and seabirds, and may also affect some species through ingestion of oiled fish (as described in **Table 7.16**).

Seabirds may contact surface slicks at or above the moderate exposure value whilst foraging in offshore, open water locations and could cause slight secondary effects through ingestion after preening or ingestion of oiled fish (as described in **Table 7.16** and **Table 7.17**). Breeding/foraging BIAs for seabirds or migratory shorebirds are not predicted to be contacted by hydrocarbons above the moderate exposure value.

The pygmy blue whale BIA may be contacted by hydrocarbons at or above moderate exposure values for surface and entrained hydrocarbons and therefore impacts to their migratory behaviour could be expected. Potential impacts are likely to be limited to individuals that may be transiting through the area with potential for coating of baleen (in whales) and ingestion of oiled prey (plankton/fish) as described in **Table 7.16** and **Table 7.17**.

There is the potential for turtles to be foraging at submerged shoals and banks or transiting through open waters within the region, therefore turtle behaviour could be disrupted (as described in **Table 7.17**). Based on the stochastic modelling outputs, the spill may contact various BIAs for marine turtles, but given the rapid dispersion of MDO, any potential impacts are likely to be limited to individuals that may be transiting through the area.

Potential impacts to marine fauna are expected to be Minor (II) – Detectable but insignificant change to local population, industry or ecosystem factors.

*Protected areas*

The stochastic modelling results predict that the open water environment within the Oceanic Shoals and Arafura AMP may be affected by a 250 m<sup>3</sup> release of MDO at or above moderate exposure values.

Impacts to the values of these marine parks are anticipated to be temporary and localised due to the rapid evaporation rates of the volatile components of MDO and its rapid natural degradation and dispersion in the open ocean.

Potential impacts to protected areas are expected to be Minor (II) – Detectable but insignificant change to local population, industry or ecosystem factors.

*Socio-economic receptors*

There is the potential for hydrocarbons to temporarily disrupt fishing activities (traditional, subsistence, recreational and commercial) if the surface or entrained hydrocarbon moves through fishing areas. However, the high rate of evaporation means that little MDO will become entrained and few aromatic hydrocarbons are predicted to become dissolved.

Given the volume of oil that could potentially be released, it is unlikely that impacts could be detected to fisheries on a stock level although it is more likely that natural variation in fish abundance would be on a greater scale than any impacts attributable to a hydrocarbon spill.

A MDO spill could also disrupt other energy industry operations in the region (e.g. support vessels transiting to/from Darwin), military exercises and commercial shipping. Potential consequences are considered to be Minor (II) for these socio-economic receptors.

*Cultural Features*

While there was no surface shoreline hydrocarbons accumulation predicted in the event of a significant spill, the EMBA may overlap cultural features in the marine environment. Potential impacts to cultural features from a hydrocarbon spill may include decline in traditional food sources and/or mortality of fauna with cultural significance.

On the basis of the above assessment, a MDO spill has the potential to impact an array of environmental and socio-economic receptors, with the highest consequence considered to be Minor (II).

<b>Likelihood</b>	C – Possible
<p>The likelihood of a hydrocarbon release occurring due to a vessel collision/bunkering is limited given the set of mitigation and management controls in place. Subsequently the likelihood of a vessel collision releasing hydrocarbons to the environment resulting in a minor consequence is considered to be possible.</p> <p>While the event is possible, the likelihood of risks and potential Impacts to cultural features (refer to <b>Section 3.2.8</b>) will be less, or of a similar magnitude, to that which has occurred from other offshore marine activities including commercial shipping activities (<b>Section 3.2.7.6</b>), defence exercises (<b>Section 3.2.7.5</b>), and commercial fishing including (<b>Section 3.2.7.1</b>).</p>	
<b>Residual Risk</b>	The residual risk is considered <b>Low</b> .

**7.7.5 Demonstration of as low as reasonably practicable**

The use of vessels is integral to the Activity and therefore vessels and associated risks of unplanned hydrocarbon releases, cannot be completely eliminated.

All reasonably practicable control measures have been reviewed and those adopted are considered appropriate to manage the residual risk to a Low level. The proposed management controls are in accordance with the Santos risk management criteria and are considered appropriate to manage the risk to ALARP.

In terms of spill response activities, Santos will implement oil spill response as specified within the OPEP. A detailed ALARP assessment on the adequacy of arrangements available to support spill response strategies and control measures is presented in the *Barossa Development Drilling and Completions OPEP* (BAA-200-0327).

### 7.7.6 Acceptability evaluation

Is the risk ranked between Very Low to Medium?	Yes – residual risk is ranked as Low.
Is further information required to validate the consequence assessment?	No – potential impacts and risks are well understood through the information available.
Are risks and impacts consistent with the principles of ESD?	Yes – Activity evaluated in accordance with Santos’ <i>Offshore Division Environmental Hazard Identification and Assessment Guideline</i> , which considers principles of ESD.
Have the acceptable levels of impact and risks been informed by relevant species recovery plans, threat abatement plans and conservation advice and Australian marine park zoning objectives?	<p>Yes – consistent with relevant species recovery plans, conservation management plans and management actions set out in <b>Table 3.8</b>, including:</p> <ul style="list-style-type: none"> <li>+ Recovery Plan for Marine Turtles in Australia 2017–2027 (DoEE, 2017)</li> <li>+ Approved Conservation Advice for <i>Rhincodon typus</i> (whale shark) (TSSC, 2015d)</li> <li>+ Conservation management plan for the blue whale, 2015 to 2025 (CoA, 2015a)</li> <li>+ Approved Conservation Advice for <i>Balaenoptera borealis</i> (sei whale) (TSSC, 2015a)</li> <li>+ Approved Conservation Advice for <i>Balaenoptera physalus</i> (fin whale) (TSSC, 2015b)</li> <li>+ Recovery plan for the grey nurse shark (<i>Carcharias taurus</i>) (DoE, 2014a)</li> <li>+ Recovery plan for the white shark (<i>Carcharodon carcharias</i>) (DSEWPaC, 2013)</li> <li>+ Sawfish and River Sharks Multispecies Recovery Plan (DoE, 2015a)</li> <li>+ Marine Bioregional Plan for the North-West Marine Region (CoA, 2012b).</li> </ul>
Are performance outcomes, control measures and associated performance standards consistent with legal and regulatory requirements?	<p>Yes – management consistent with <i>Marine Safety (Domestic Commercial Vessel) National Law Act 2012</i> (Cth), Marine Order Part 30: Prevention of Collisions, Marine Order Part 21: Safety of Navigation and Emergency Procedures, and <i>Navigation Act 2012</i>. Through acceptance of this EP, legislative and regulatory requirements will be met as per <b>Section 1.6.2</b>.</p>
Are performance outcomes, control measures and associated performance standards consistent with Santos’ Environment, Health and Safety Policy?	Yes – aligns with Santos’ Environment, Health and Safety Policy.
Are performance outcomes, control measures and associated performance standards consistent with industry standards?	Yes – the most recent and comparable Drilling and Completions Eps accepted by NOPSEMA have been reviewed for consistency with the performance outcomes, control measures and associated performance standards proposed in this EP.
Have performance outcomes, control measures and associated performance standards taken into consideration Relevant Person feedback?	Yes – requests from Relevant Persons relating to managing spill response activities have been considered.

<b>Are performance standards such that the impact or risk is considered to be ALARP?</b>	Yes – see ALARP above.
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The residual risk of an unplanned hydrocarbon spill (MDO) is assessed as Low. Based on an assessment of Santos' acceptability criteria and with the control measures in place, potential risks are considered acceptable.

## 7.8 Minor hydrocarbon release (surface and subsea)

### 7.8.1 Description of event

<p><b>Event</b></p>	<p>Causes for accidental hydrocarbon releases (other than MDO release from a vessel collision or bunkering, and LOWC) include:</p> <ul style="list-style-type: none"> <li>+ ROV failure (including oil seal, hydraulic system hose and quick disconnect system failures)</li> <li>+ loss of primary containment (drums, tanks, intermediate bulk containers [IBCs], etc) due to handling, storage and dropped objects (e.g., swinging load during lifting activities)</li> <li>+ vessel or MODU pipework failure or rupture, hydraulic hose failure, inadequate bunding</li> <li>+ dropped objects damaging MDO infrastructure (hoses, pipes, tanks, etc)</li> <li>+ helicopter refuelling loss of containment of aviation fuel</li> <li>+ drop-out of formation fluids from flaring during well flowback.</li> </ul> <p>Hydrocarbons could include formation fluids, hydraulic fluids, lubricant oils and waste oils.</p> <p>The MODU/vessels main engines and equipment such as pumps, cranes, winches, power packs and generators require MDO for fuel and a variety of hydraulic fluids and lubricating oils for efficient operation and maintenance of moving parts. These products are present within the equipment and also held in storage containers and tanks on the MODU and vessels. Small hydrocarbon leaks could occur from loss of primary containment due to handling, storage and dropped objects (during lifting activities or in-board refuelling such as for equipment or helicopters on deck). Volumes are likely to be small and limited to the volume of individual containers (e.g., IBC, 44-gallon drums) stored on the deck of vessels or the MODU. The credible spill for this scenario is considered to be the loss of an IBC (1 m<sup>3</sup>) during transfer from a vessel to the MODU.</p> <p>Equipment deployed overboard during drilling (e.g., ROV operations) can result in unplanned discharges (of hydraulic fluids) directly to the marine environment due to equipment failure, equipment interactions with the vessel thrusters and/or accidental contact with subsea infrastructure. The largest credible hydrocarbon spill from ROV operations would be an accidental release of approximately 0.05 m<sup>3</sup> (50 L) of hydraulic fluid from the deployed ROV.</p> <p>Well flowback is a planned activity as part of the well completion program. Hydrocarbon flaring may be interrupted by pressure drops, incomplete combustion, or higher than anticipated drilling fluid content in the flaring system during well flowback. As a result of flaring drop out, formation fluids may subsequently be discharged into the marine environment. Similarly, some flowback cushioning fluids (i.e. base oil) may accidentally be released during well flowback. Hydrocarbon spilt volumes due to drop out from flaring and well flowback are difficult to estimate. Given the automatic and manual systems in place during flaring, the accidental release of hydrocarbon is expected to be low (less than 1.6 m<sup>3</sup>).</p> <p>Minor accidental loss of other hydrocarbon-based liquids (e.g., used lubricating oils, cooking oil, and hydraulic oil) to the marine environment could also occur via tank pipework failure or rupture, hydraulic hose failure, inadequate bunding and/or storage, insufficient fastening or inadequate handling.</p>
<p><b>Extent</b></p>	<p>The relative low volumes of spilt hydrocarbons are expected to rapidly disperse into the marine environment. Below harmful concentrations are expected to occur at short distances from the hydrocarbon release point. Potential impacts beyond the Operational Area are not expected.</p>
<p><b>Duration</b></p>	<p>Potentially harmful concentrations limited to a very short period (hours to days) immediately following release.</p>

## 7.8.2 Nature and scale of environmental impacts

Potential receptors: physical environment (water quality); threatened, migratory or local fauna (marine mammals, marine reptiles, sharks and rays, fish and birds).

Hydraulic fluids and lubricating fluids behave similarly to MDO when spilt in the marine environment (for information on MDO behaviour in the marine environment refer to **Section 7.7**). Hydraulic fluids are medium oils of light to moderate viscosity and have a relatively rapid spreading rate and, like MDO, will dissipate quickly, particularly in high sea states, although lubricating oils are more viscous and so the spreading rate of a spill of these oils would be slightly slower.

### 7.8.2.1 Physical environment

Minor volumes of hydrocarbons released to the marine environment would lead to contamination of the water column near the MODU and vessels. The potential impacts would most likely be highly localised and restricted to the immediate area surrounding the spill, with rapid dispersal to concentrations below impact thresholds likely to occur in the open ocean.

Due to the small volumes and expected rapid dispersal to concentrations below impact thresholds, detectable impacts to sediment quality or benthic habitats are not expected.

There is no emergent or intertidal habitat that could be impacted by a surface spill.

### 7.8.2.2 Threatened migratory or local fauna

The minor and short-term changes to water quality that may result are not predicted to impact on marine fauna (e.g., pelagic fish and sharks, marine mammals, marine reptiles and seabirds). No BIAs overlap the Operational Area and it is unlikely these types of spills will extend beyond the Operational Area.

Small hydrocarbon spills are unlikely to have an ecological effect on threatened or migratory fauna, given the volumes that could be released, and the dispersive nature of the open ocean environment. Physical coating of marine fauna or lethal/sub-lethal toxicity effects from any accidentally released hydrocarbons is considered unlikely, given the expected low volumes/concentrations and short exposure times.

### 7.8.3 Environmental performance outcomes and control measures

The EPOs relating to this event include:

- + No loss of containment of hydrocarbon to the marine environment. [EPO-03]
- + No unplanned objects, emissions or discharges to sea or air. [EPO-04]

An assessment of the environmental benefits and the potential costs or issues associated with control measures for this Activity are shown in **Table 7.23** to demonstrate that potential risks are ALARP. Control measures that are adopted have associated EPSs and measurement criteria which are presented in **Table 8.2**. Rejected control measures have an ALARP evaluation provided to justify their rejection.

**Table 7.23: Control measure evaluation for minor release of hydrocarbons**

CM reference	Control measure	Environmental benefit	Potential cost/issues	Evaluation
Standard control measures				
BAD-CM-002	Dropped object prevention procedures	Impacts to environment are reduced by preventing dropped objects and by retrieving dropped objects unless the environmental consequences are negligible or there are risks to safety. Procedure minimises drop risk during lifting operations.	Cost of procedure implementation.	<b>Adopted</b> – environmental benefits of preventing dropped objects and resultant hydrocarbon spill outweighs the costs.
BAD-CM-005	Hazardous chemical management procedures	Reduces the risk of spills and leaks to sea by controlling the storage, handling and clean-up of hydrocarbons.	Cost of procedure implementation.	<b>Adopted</b> – environmental benefits of implementing the procedures outweighs the costs.
BAD-CM-007	Chemical selection procedure	Only environmentally acceptable drilling chemicals (including base oils) are used reducing potential impacts in the event of an accidental release.	Cost of procedure implementation. Range of chemicals reduced with potentially higher costs for alternative products.	<b>Adopted</b> – benefit of only using environmentally acceptable chemicals outweighs the costs.



CM reference	Control measure	Environmental benefit	Potential cost/issues	Evaluation
BAD-CM-008	General chemical management procedures	Reduces the risk of accidental discharge to sea by controlling the storage, handling and clean-up of hydrocarbons.	Cost of procedure implementation.	<b>Adopted</b> – environmental benefits of ensuring procedures are followed outweighs the costs.
BAD-CM-010	Bulk liquid transfer procedure	Bulk liquid transferred in accordance with bulk transfer procedures to reduce the risk of an unintentional release to the sea.	Cost of implementing procedure.	<b>Adopted</b> – environmental benefits of ensuring procedures are followed outweighs procedural compliance costs
BAD-CM-011	Bulk solid transfer procedure	Reduces likelihood of an unplanned release occurring during bulk transfer through correct equipment maintenance and integrity to prevent accidental loss of solids.	Cost of implementing procedures.	<b>Adopted</b> – environmental benefits of ensuring procedures are followed outweighs procedural compliance costs
BAD-CM-009	International Maritime Dangerous Goods Code	Reduces the risk of an environmental incident, such as an accidental release to sea or unintended chemical reaction.	Cost of procedure implementation.	<b>Adopted</b> – it is a legislated requirement.
BAD-CM-012	MODU and vessel spill response plans	Implements response plans (SOPEP/SMPEP) on board vessels and MODU to deal with unplanned hydrocarbon releases and spills quickly and efficiently in order to reduce impacts to the marine environment.	Cost of plan development and implementation.	<b>Adopted</b> – environmental benefits of ensuring response plans are in place in the event of a spill outweighs the costs.

CM reference	Control measure	Environmental benefit	Potential cost/issues	Evaluation
BAD-CM-014	ROV inspection and maintenance procedures	Maintenance and pre-deployment inspection on ROV completed as scheduled to reduce the risk of unplanned hydraulic fluid releases to the marine environment.	Cost of procedure implementation.	<b>Adopted</b> – environmental benefits of ensuring procedures are followed outweigh costs.
BAD-CM-033	Well flowback procedures	Includes control measures that reduce the risk of hydrocarbons from entering the marine environment during well flowback.	Cost of procedure implementation.	<b>Adopted</b> – environmental benefits of ensuring procedures are followed outweighs costs.
BAD-CM-040	MODU planned maintenance system	Requires that equipment is maintained and certified, reducing probability of leaks of hydrocarbons from the equipment.	Cost of managing the system.	<b>Adopted</b> – environmental benefits of ensuring MODU is maintained outweighs the costs.
BAD-CM-041	Vessel planned maintenance system	Requires that equipment is maintained and certified, reducing probability of leaks of hydrocarbons from the equipment.	Cost of managing the system.	<b>Adopted</b> – environmental benefits of ensuring vessels are maintained outweigh the costs.
<b>Additional control measures</b>				
N/A	Do not undertake flaring during well flowback	Reduces risk of accidental hydrocarbon discharge due to flare dropout.	Flaring is a requirement for safe well flowback. Eliminating flaring may lead to flammable gases building up to unsafe levels onboard the MODU.	<b>Rejected</b> – safety issues outweigh the environmental benefit for short-term well flowback.
N/A	Eliminate vessel to vessel lifting in field	Reduces the risk release of hydrocarbon to the marine environment from hydrocarbon containers or secondary impact with hydrocarbon containing equipment due to dropped objects.	Eliminating lifting would require MODU/vessels storing more equipment and supplies on-board, and/or additional trips to shore. MODU/vessels will not have enough deck space to store all required equipment, materials, supplies needed for the duration of the Activity.	<b>Rejected</b> – not feasible to eliminate lifting in the field.

## 7.8.4 Environmental impact assessment

<b>Receptors</b>	Physical environment (water quality) Threatened, migratory or local fauna (marine mammals, marine reptiles, sharks, fish, rays and birds)
<b>Consequence</b>	I – Negligible
<p>In the event of a minor hydrocarbon spill, the quantities would be limited to approximately 1 m<sup>3</sup> for the loss of the contents of an IBC, 1.6 m<sup>3</sup> during flaring drop out or 50 L for ROV hydraulic fluid. The small volumes, dilution and dispersion from natural weathering processes such as ocean currents are such that spills will be limited in area and duration.</p> <p>The susceptibility of marine fauna to hydrocarbons is dependent on hydrocarbon type and exposure duration; however, given that exposures would be limited in extent and duration, exposure to marine fauna from this hazard is considered to be low. The small volumes of worst-case discharges are such that, the impacts to receptors will decline rapidly with time and distance at the sea surface.</p> <p>Harmful effects are not expected to the benthic community due to the water depths.</p> <p>Near the sea surface, fish are able to detect and avoid contact with surface slicks and as a result, fish mortalities rarely occur in open waters from surface spills (Kennish, 1997; Scholz <i>et al.</i>, 1992). Pelagic fish species are therefore generally not highly susceptible to impacts from hydrocarbon spills. In offshore waters near to the release point, pelagic fish are at risk of exposure to the more toxic aromatic components of the hydrocarbons. Pelagic fish in offshore waters are highly mobile and comprise species such as tunas, sharks and mackerel. Due to their mobility, it is unlikely that pelagic fish would be exposed to toxic components for long periods in this spill scenario. The more toxic components would also rapidly evaporate and concentrations would significantly diminish with distance from the spill site, limiting the potential area of impact.</p> <p>Given that a small hydrocarbon spill would not result in a decreased population size at a local or regional scale or long-term reduction to water and sediment quality, but would be detectable, it is expected that a spill of this nature would result in a I – Negligible consequence.</p>	
<b>Likelihood</b>	C – Possible
<p>The likelihood of releasing minor volumes of hydrocarbons to the environment during routine operations is considered Possible I. The likelihood is considered less for well flowback operations given the very short duration of these activities (days) and given the Activity is intensely managed and monitored.</p>	
<b>Residual Risk</b>	The residual risk is considered <b>Low</b> .

## 7.8.5 Demonstration of as low as reasonably practicable

Storage and use of hydraulic and lubricating oils/fluids for equipment and machinery, including for ROV operations, are required to undertake the Activity, so their removal from the Activity is not viable. Well flowback is also required to complete the wells, and flaring is a safety critical Activity.

All reasonably practicable control measures have been reviewed and those adopted are considered appropriate to manage the residual risk to a Low level. The proposed management controls are in accordance with the Santos risk management criteria and are considered appropriate to manage the risk to ALARP.

## 7.8.6 Acceptability evaluation

Is the risk ranked between Very Low and Medium?	Yes – maximum minor hydrocarbon spill residual risk is ranked as Low.
Is further information required to validate the consequence assessment?	No – potential impacts and risks are well understood through the information available.
Are risks and impacts consistent with the principles of ESD?	Yes – Activity evaluated in accordance with Santos’ <i>Offshore Division Environmental Hazard Identification and Assessment Guideline</i> which considers principles of ESD.
Have the acceptable levels of impact and risks been informed by relevant species recovery plans, threat abatement plans and conservation advice and Australian marine park zoning objectives?	<p>Yes – consistent with relevant species recovery plans, conservation management plans and management actions set out in <b>Table 3.8</b>, including:</p> <ul style="list-style-type: none"> <li>+ Recovery Plan for Marine Turtles in Australia 2017–2027 (DoEE, 2017)</li> <li>+ Approved Conservation Advice for <i>Rhincodon typus</i> (whale shark) (TSSC, 2015d)</li> <li>+ Conservation Management Plan for the Blue Whale 2015–2025 (CoA, 2015a)</li> <li>+ Approved Conservation Advice for <i>Balaenoptera borealis</i> (sei whale) (TSSC, 2015a)</li> <li>+ Approved Conservation Advice for <i>Balaenoptera physalus</i> (fin whale) (TSSC, 2015b)</li> <li>+ Recovery plan for the grey nurse shark (<i>Carcharias taurus</i>) (DoE, 2014a)</li> <li>+ Recovery plan for the white shark (<i>Carcharodon carcharias</i>) (DSEWPaC, 2013)</li> <li>+ Sawfish and River Sharks Multispecies Recovery Plan (DoE, 2015a)</li> <li>+ Marine Bioregional Plan for the North-West Marine Region (CoA, 2012b).</li> </ul>
Are performance outcomes, control measures and associated performance standards consistent with legal and regulatory requirements?	<p>Yes – management consistent with Marine Order 91 (Marine pollution prevention – oil).</p> <p>Through acceptance of this EP, legislative and regulatory requirements will be met as per <b>Section 1.6.2</b>.</p>
Are performance outcomes, control measures and associated performance standards consistent with Santos’ Environment, Health and Safety Policy?	Yes – aligns with Santos’ Environment, Health and Safety Policy.
Are performance outcomes, control measures and associated performance standards consistent with industry standards?	Yes – the most recent and comparable Drilling and Completions Eps accepted by NOPSEMA have been reviewed for consistency with the performance outcomes, control measures and associated performance standards proposed in this EP.
Have performance outcomes, control measures and associated performance standards taken into consideration Relevant Persons feedback?	Yes – requests from Relevant Persons relating to managing spill response activities have been considered.
Are performance standards such that the impact or risk is considered to be ALARP?	Yes – ALARP assessment conducted, with no additional control measures adopted.

The residual risk of an unplanned minor hydrocarbon release (surface and subsea) is assessed as Low. Based on an assessment of Santos' acceptability criteria and with the control measures in place, potential risks are considered acceptable.

## 7.9 Spill response operations

The spill response strategies that may be adopted in the event of a hydrocarbon spill from this Activity have been identified in the Barossa Development Drilling and Completions OPEP (BAA-200-0327). An environmental assessment of these spill response strategies has been conducted as presented below.

An overview of the hydrocarbon spill scenarios considered for this Activity and relevant to spill response operations is provided in **Section 7.5**, with environmental assessments in **Section 7.6** and **Section 7.7**.

### 7.9.1 Description of event

<p><b>Event</b></p>	<p>In the event of a hydrocarbon spill, response strategies will be implemented to reduce environmental impacts to ALARP. The selection of strategies will be undertaken through a net environmental benefits analysis (NEBA). Spill response will be under the direction of the relevant control agency, as defined in the OPEP, which may be Santos, another agency or both. In all instances, Santos will undertake a ‘first-strike’ spill response and will act as the Control Agency until the designated Control Agency assumes control. The response strategies considered to be appropriate for the worst-case oil spill scenarios identified for the Activity are provided in the <i>Barossa Development Drilling and Completions OPEP</i> (BAA-200-0327) and comprise:</p> <ul style="list-style-type: none"> <li>+ source control (BOP, subsea first response toolkit (SFRT), relief well, capping stack)</li> <li>+ monitor and evaluate</li> <li>+ mechanical dispersion</li> <li>+ oiled wildlife response</li> <li>+ scientific monitoring</li> <li>+ waste management.</li> </ul> <p>Although a relief well is the primary method to stop a loss of well control (LOWC), secondary source control measures may be employed if the conditions are appropriate. These include a capping stack and/or subsea dispersant injection (SSDI). Deployment of a capping stack would be limited to appropriate conditions (e.g., blowout rates within safe operating limits, safe vertical access) and when operating conditions permit (wind speed, wave height, current and plume radius). SSDI would likely only be used if it could be demonstrated through an operational NEBA that it would provide a net benefit by enabling source control personnel safer access to the site to bring the release under control (e.g., by reducing volatile organic compounds).</p> <p>While response strategies are intended to reduce the environmental consequences of a hydrocarbon spill, poorly planned and coordinated response activities can result in a lack of or inadequate information being available upon which poor decisions can be made, exacerbating or causing further environmental harm. An inadequate level of training and guidance during the implementation of spill response strategies can also result in environmental harm over and above that already caused by the spill.</p>
<p><b>Extent</b></p>	<p>Extent of spill. Spill response could occur anywhere within the EMBA for the worst-case spill scenarios.</p>
<p><b>Duration</b></p>	<p>The spill response effort as a whole will exceed the duration of the worst-case spill, due to persistence of the oil in the environment and the requirement to remove this oil and/or monitor impacts and recovery to sensitive receptors. The OPEP provides further detail on the likely duration of specific response strategies.</p>

## 7.9.2 Nature and scale of environmental impacts

**Potential receptors:** physical environment (water and sediment quality, shoals and banks, benthic habitats); threatened or migratory fauna (marine mammals, marine reptiles, sharks, fish, rays and birds); protected and significant areas (marine parks, KEFs); and socio-economic receptors (fisheries, tourism, recreation, and other third-party operators) and cultural features. In each case, for a full assessment of the impacts and risks associated, see **Section 6** above.

Light emissions	
<p>Spill response activities will involve the use of vessels (and potentially a MODU; herein this section referred to as a 'vessel'), which are required, at a minimum, to display navigational lighting. Vessels may operate near shoreline areas during spill response activities.</p> <p>Spill response activities will also involve onshore operations, including the use of vehicles and temporary camps, which may require lighting.</p>	
<b>Potential receptors</b>	<p>Threatened, migratory or local fauna</p> <p>Protected areas</p> <p>Socio-economic receptors</p>
<p>Lighting may cause behavioural changes to fish, mammals, birds and marine turtles that can have a heightened consequence during key lifecycle activities, such as turtle nesting and hatching. Turtles and birds, which includes threatened and migratory fauna (<b>Table 3.6</b>), have been identified as key fauna susceptible to lighting impacts. <b>Section 6.2</b> provides further detail on the nature and scale of light emission impacts.</p> <p>Spill response activities that require lighting may occur anywhere within the moderate exposure value area (MEVA; refer to <b>Section 7.5.4</b>), including in protected areas and close to shoals.</p>	
Noise emissions	
<p>Spill response activities will involve the use of aircraft and vessels, which will generate noise both offshore and in nearshore locations within the EMBA.</p>	
<b>Potential receptors</b>	<p>Threatened, migratory or local fauna</p> <p>Protected areas</p> <p>Socio-economic receptors</p>
<p>Underwater noise from the use of vessels may impact marine fauna, such as fish (including commercial species), marine reptiles and marine mammals. <b>Section 6.1</b> provides details on potential noise emission impacts.</p> <p>Cetaceans have been identified as the key concern for vessel noise within the MEVA, with the pygmy blue whale distribution range intersecting the MEVA.</p> <p>Vessels may also need to enter marine parks and other areas utilised for tourism, commercial and recreational fishing, and subsistence fishing.</p>	
Atmospheric emissions	
<p>The use of fuels to power vessel engines, generators and mobile equipment used during spill response activities will result in emissions of greenhouse gases, such as carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>) and nitrous oxide (N<sub>2</sub>O), along with non-GHGs such as sulphur oxides (SO<sub>x</sub>) and nitrogen oxides (NO<sub>x</sub>). Emissions will result in a localised decrease in air quality.</p>	
<b>Potential receptors</b>	<p>Threatened, migratory or local fauna</p> <p>Physical environment or habitat (air quality)</p> <p>Socio-economic receptors</p>
<p>Atmospheric emissions from spill response equipment will be localised, and the use of mobile equipment, vessels and vehicles is not considered to create emissions on a scale where noticeable impacts would be predicted. <b>Section 6.3</b> provides further details on the nature and scale of air emission impacts.</p>	

Operational discharges and waste	
<p>Operational discharges include those routine discharges from vessels used during spill response, which may include:</p> <ul style="list-style-type: none"> <li>+ deck drainage</li> <li>+ putrescible waste and sewage</li> <li>+ cooling water from operation of engines</li> <li>+ bilge water</li> <li>+ ballast water</li> <li>+ brine discharge.</li> </ul> <p>In addition, there are specific spill response discharges and waste creation that may occur, including:</p> <ul style="list-style-type: none"> <li>+ cleaning of oily equipment, vessels and vehicles</li> <li>+ sewage and putrescible and municipal waste at offshore staging sites</li> <li>+ creation, storage, transport and disposal of oily waste and contaminated organics.</li> </ul>	
<b>Potential receptors</b>	Threatened, migratory or local fauna Physical environment or habitat Protected areas Socio-economic receptors
<p>Operational discharges from vessels may create a localised and temporary reduction in marine water quality. Effects include nutrient enrichment, toxicity, turbidity, and temperature and salinity increases, as detailed in <b>Section 6.6</b>. Discharge could potentially occur adjacent to marine habitats, such as corals, seagrass and macroalgae, and in protected areas, which support a more diverse faunal community; however, discharges are still expected to be localised and temporary.</p> <p>Cleaning of oil-contaminated equipment, vehicles and vessels has the potential to spread oil from contaminated areas to areas not impacted by a spill, potentially spreading the impact area and moving oil into a more sensitive environment.</p> <p>Sewage and putrescible and municipal waste will be generated from offshore activities at temporary staging/mooring areas, which may include toilet and washing facilities. These wastes have the potential to impact water quality, impact habitats, and reduce the aesthetic value of the environment, which may be within protected areas.</p>	
Seabed and habitat disturbance, marine fauna interaction	
<p>The movement and operation of vessels during spill response activities have the potential to disturb the physical environment and marine habitats and fauna, which may occur within protected areas. Disturbance may also impact socio-economic values of an area.</p> <p>Spill response operations can impact on wildlife via vessel strikes and behavioural changes due to physical presence of personnel and equipment. Oiled wildlife response activities may also involve deliberate disturbance (hazing), capture, handling, cleaning, rehabilitation, transportation and release of wildlife, which could lead to additional impacts to wildlife.</p>	
<b>Potential receptors</b>	Threatened, migratory and local fauna Physical environment or habitat Protected areas Socio-economic receptors
<p>The use of vessels may disturb benthic habitats, including corals, seagrass and macroalgae. Impacts to habitats from vessels include damage through the deployment of anchors, mooring lines and from grounding.</p> <p>Oiled wildlife response may include the hazing, capture, handling, cleaning, rehabilitation, transportation, cleaning and release of wildlife susceptible to oiling, such as birds and marine turtles. While oiled wildlife response is aimed</p>	



at having a net benefit, poor responses can potentially create additional stress and exacerbate impacts from oiling, interfere with lifecycle processes, hamper recovery and, in the worst instance, increase levels of mortality. The disturbance to marine habitat, as well as the potential for disruption to culturally sensitive areas, may occur in specially protected areas (e.g., AMP).

## Interactions with other marine users

Spill response activities may involve the use of vessels and equipment in areas used by the general public or industry in Australia and potentially Indonesia. The mobilisation of spill response personnel into Forward Operating Bases may also place increased demands on local accommodation and other businesses.

<b>Potential receptors</b>	Socio-economic receptors
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The use of vessels in the offshore environment and the undertaking of spill response activities may exclude the general public and industry use of the affected environment. As well as impacting recreational activities (e.g., recreational fishing) of the general public, this may impact on revenue with respect to industries such as commercial fishing. The mobilisation of personnel to regional communities has the potential to affect the local community through demands on local accommodation and business, reducing the availability of services to members of the public.

## Chemical dispersant application

Subsea dispersant injection (SSDI) is known to reduce volatile organic compound levels at the sea surface and is shown to be effective at dispersing condensates when applied subsea (RPS, 2019), making conditions safer for responders and source control personnel. **Section 7.6.2.3** outlines the vapour dispersion modelling undertaken to assess the levels of potential airborne concentration of volatiles in the event of a LOWC and for all wind speeds assessed, the modelling indicated that vapour plume concentrations for all zones of concern (human health risk and safety risk) (i.e., ZOC 0 to 3) occurred within approximately 2.5 km from the well (RPS, 2019b), hence the inclusion of SSDI as a potential response strategy.

SSDI is shown to reduce surface concentrations of hydrocarbons, thereby reducing the exposure of seabirds and surfacing marine fauna to hydrocarbons. It also disperses hydrocarbons into a larger volume of water, reducing concentrations and enhances biodegradation (French-McCay *et al.*, 2018). SSDI is likely to be a secondary response tactic for a well blow out if surface concentrations of hydrocarbons are resulting in an unsafe environment for response personnel. Application of subsea dispersants is likely to result in a safer and more reliable delivery of other source control tactics.

<b>Potential receptors</b>	Threatened, migratory or local fauna Physical environment and habitat Protected areas Socio-economic receptors
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While the aim of chemical dispersants is to provide a net benefit to the environment, the use of dispersants has the potential to increase impact to habitats under the sea surface, including coral, seagrass and macroalgae, and to marine fauna (particularly fish and invertebrates) by increasing entrained oil and dissolved aromatic hydrocarbon concentration and exposure. These sensitive receptors are generally located in shallow coastal areas of the offshore islands and shoals and banks of the region.

Increased entrained and dissolved aromatic hydrocarbon concentration may also impact on marine fauna either directly or through impacts to subsea habitats. Direct impacts are most likely to be encountered by plankton, benthic filter feeding invertebrates, fish and sharks. Fish and sharks include threatened/migratory species, which may ingest oil or uptake toxic compounds across gill structures. As a result of increased impact to marine fauna and subtidal habitats, including those that represent values of Protected Areas, socio-economic impacts may be felt through industries such as tourism and commercial fishing.

A description of the impacts from entrained oil and aromatic hydrocarbons from a worst-case loss of well control, without a specific consideration of dispersant addition, is provided in **Section 7.5.6**.

### 7.9.3 Environmental performance outcomes and control measures

An assessment of the environmental benefits and the potential costs or issues associated with control measures relevant to response vessels and helicopters for this Activity are shown in **Table 7.24** to demonstrate the potential impacts from this aspect are ALARP. Additional control measures that are more specific to spill response are presented in the OPEP.

Control measures that are adopted have associated EPSs and measurement criteria which are presented in within the relevant strategy sections of the OPEP. Rejected control measures have an ALARP evaluation provided to justify their rejection.

**Table 7.24: Control measure evaluation for spill response operations**

CM reference	Control measure	Environmental benefit	Potential cost/issues	Evaluation
BAD-CM-001	Procedure for interacting with marine fauna (complied with by response vessels)	Refer to <b>Table 7.4</b>	Refer to <b>Table 7.4</b>	<b>Adopted</b> – Refer to <b>Table 7.4</b>
BAD-CM-034	Minimum lighting for safe work and navigation (on response vessels)	Refer to <b>Table 6.7</b>	Refer to <b>Table 6.7</b>	<b>Adopted</b> – Refer to <b>Table 6.7</b>
BAD-CM-021	Air pollution prevention certification (for response vessels)	Refer to <b>Table 6.9</b>	Refer to <b>Table 6.9</b>	<b>Adopted</b> – Refer to <b>Table 6.9</b>
BAD-CM-026	Sewage treatment system (on response vessels)	Refer to <b>Table 6.12</b>	Refer to <b>Table 6.12</b>	<b>Adopted</b> – Refer to <b>Table 6.12</b>
BAD-CM-027	Oily water treatment system (on response vessels)	Refer to <b>Table 6.12</b>	Refer to <b>Table 6.12</b>	<b>Adopted</b> – Refer to <b>Table 6.12</b>
BAD-CM-022	Santos Relevant Persons consultation (after an accidental spill event)	Promotes awareness and reduces potential impacts from response to socio-economic activities.	Minimal cost in relation to overall effort/costs in managing incident.	<b>Adopted</b> – considered a standard control for incident management.
NA	Chemical dispersant application – Refer to OPEP for specific controls	Refer to OPEP	Refer to OPEP	Refer to OPEP

### 7.9.4 Environmental impact assessment

Receptor	Consequence level
Spill response operations – light emissions	
Threatened, migratory or local fauna	The receptors considered most sensitive to lighting from vessel operations are seabirds, shorebirds and marine turtles. Following restrictions on night-time operations by spill response vessels, which will demobilise to mooring areas offshore with safety lighting only, impacts from vessels are considered to be I – Negligible.
Physical environment or habitat	

Receptor	Consequence level
Threatened ecological communities	
Protected areas	
Socio-economic receptors <sup>29</sup>	
Overall worst-case consequence level	I – Negligible
<b>Spill response operations – noise emissions</b>	
Threatened, migratory or local fauna	The receptors considered most sensitive to vessel noise are cetaceans. However, following the adoption of control measures to limit close interaction with protected fauna (i.e., <i>Protected Marine Fauna Interaction and Sighting Procedure</i> (EA-91-II-00003)), a temporary behavioural disturbance is expected only with a consequence of I – Negligible.
Physical environment or habitat	
Threatened ecological communities	
Protected areas	
Socio-economic receptors	
Overall worst-case consequence level	I – Negligible
<b>Spill response operations – atmospheric emissions</b>	
Threatened, migratory or local fauna	Atmospheric emissions from spill response equipment will be localised, and impacts to even the most sensitive fauna, such as birds, are expected to be Negligible (I).
Physical environment or habitat	
Threatened ecological communities	
Protected areas	
Socio-economic receptors	
Overall worst-case consequence level	I – Negligible
<b>Spill response operations – operational discharges and waste</b>	
Threatened, migratory or local fauna	Operational discharges from vessels may create a localised and temporary reduction in marine water quality, which has the potential to impact shallow marine habitats in particular. However, following the adoption of regulatory requirements for vessel discharges, which prevent discharges close to shorelines, discharges will have a negligible impact to habitats, fauna or protected area values.
Physical environment or habitat	
Threatened ecological communities	

<sup>29</sup> The spill response activities could be within an area that may overlap with cultural values. These cultural values (refer to Section 3.2.6.8) will be considered through the NEBA process described in the OPEP.

Receptor	Consequence level
Protected areas	Washing of vessels and equipment will take place only in defined offshore hot zones preventing impacts to shallow habitats.
Socio-economic receptors	<p>Sewage, putrescible waste and municipal waste generated onshore will be stored and disposed of at approved locations.</p> <p>The storage, transport and disposal of hydrocarbon-contaminated waste arising from spill response operation actions, will be managed by Santos' appointed waste management contractor, and dedicated waste containment areas will prevent the spreading or leaching of hydrocarbon contamination.</p> <p>Operational discharges from spill response operations are expected to be Minor (II).</p>
Overall worst-case consequence level	II – Minor
<b>Spill response operations – seabed and benthic habitat disturbance; marine fauna interactions</b>	
Threatened, migratory or local fauna	The use of vessels has the potential to disturb benthic habitats, including sensitive shoal habitats such as corals and macroalgae. A review of shallow water habitats and of bathymetry and the establishment of demarcated areas for access and anchoring will reduce the level of impact to I – Negligible.
Physical environment or habitat	
Threatened ecological communities	These habitats or environments are likely to be values of the protected area they occur in, and the impact to the protected areas from physical disturbance is therefore also considered II – Minor.
Protected areas	The main direct disturbance to fauna would be the hazing, capture, handling, transportation, cleaning and release of wildlife susceptible to oiling impacts, such as birds and marine turtles. This would only be done if this intervention were to deliver a net benefit to the species, but it may result in a II – Minor consequence following compliance with the Santos' <i>Oiled Wildlife Response Framework</i> and <i>Northern Territory Oiled Wildlife Response Plan</i> .
Socio-economic receptors	
Overall worst-case consequence level	II – Minor
<b>Spill response operations – disruption to other users of marine and coastal areas and townships</b>	
Socio-economic receptors	The use of vessels in the offshore environment and spill response activities may exclude general public, cultural uses and commercial industries (e.g. fishing). Note that this is distinct from the socio-economic impact of a spill itself, as described in <b>Section 7.6</b> . With the application of control measures, it is considered that the additional impact of spill response activities on affected industries would be II – Minor.
Overall worst-case consequence level	II – Minor

Receptor	Consequence level
Spill response operations – chemical dispersant application	
Threatened, migratory or local fauna	<p>The use of chemical dispersants has the potential to increase the distribution and concentration of entrained hydrocarbon and dissolved aromatic hydrocarbons within the water column. Entrained hydrocarbon and dissolved aromatic hydrocarbons concentrations are expected to be elevated adjacent to the release site with the potential for increased impacts to nearby benthic and pelagic fishes, sharks and invertebrates.</p> <p>The generic impacts to receptors from entrained hydrocarbon and dissolved aromatic hydrocarbons described in <b>Section 7.5.6</b> are considered to apply.</p> <p>The primary controls for reducing impacts to these receptors from dispersant use is in the selection of approved or environmentally risk assessed chemical dispersants and through the careful assessment of application areas such that sensitive receptor impacts are reduced to ALARP. It is important to note that dispersants will only be applied if the response is seen as having a net environmental benefit as per the overarching NEBA analysis of spill response strategies. In the event dispersants are used there is the potential for a Minor (II) additional impact.</p>
Physical environment or habitat	
Threatened ecological communities	
Protected areas	
Socio-economic receptors	
Overall worst-case consequence level	II – Minor

### 7.9.5 Demonstration of as low as reasonably practicable

A NEBA is the primary tool used during spill response to evaluate response strategies and has the goal of selecting strategies that result in the least net impact to key environmental sensitivities. The NEBA process will identify and compare net environmental benefits of alternative spill response options. The NEBA will effectively determine whether an environmental benefit will be achieved through implementing a response strategy or by undertaking no response. The NEBA will be undertaken by the relevant Controlling Agency for the Activity. For those activities under the control of Santos, the Incident Management Team (IMT) Environmental Team Leader will be responsible for reviewing the priority receptors and selected response strategies identified in this EP and coordinating the NEBA for each operational period. This will demonstrate that, at the strategy level, the response operations reduce additional environmental impacts to ALARP.

Spill response activities will be conducted in offshore waters using vessels and aircraft, and potentially a MODU should a relief well be required. The greatest potential for additional impacts from implementing spill response is considered to be on wildlife in offshore waters from oiled wildlife response activities.

Santos, together with the Controlling Agency for spill response, will apply appropriate processes and standards to ensure spill response impacts are reduced to a level that is ALARP.

All reasonably practicable control measures have been reviewed and those adopted are considered appropriate to manage the impacts such that the residual consequence is assessed to be II – Minor. The proposed control measures are in accordance with the Santos risk management criteria and are considered appropriate to manage impacts to ALARP.

### 7.9.6 Acceptability evaluation

Is the consequence ranked as I or II?	Yes – maximum consequence is II – Minor from planned events.
Is further information required to validate the consequence assessment?	No – potential impacts and risks are well understood through the information available.
Are the risks and impacts consistent with the principles of ESD?	Yes – Activity evaluated in accordance with Santos’ <i>Offshore Division Environmental Hazard Identification and Assessment Guideline</i> which considers principles of ecologically sustainable development.
Have the acceptable levels of impact and risks been informed by relevant species recovery plans, threat abatement plans and conservation advice and Australian marine park zoning objectives?	<p>Yes – Consistent with relevant species recovery plans, conservation management plans and management actions set out in <b>Table 3.8</b>, including conservation values of the identified protection priorities (<b>Section 3</b>) and relevant species recovery plans, conservation management plans and management actions, including:</p> <ul style="list-style-type: none"> <li>+ Recovery Plan for Marine Turtles in Australia 2017–2027 (DoEE, 2017)</li> <li>+ Approved Conservation Advice for <i>Rhincodon typus</i> (whale shark) (TSSC, 2015d)</li> <li>+ Conservation Management Plan for the Blue Whale, 2015 to 2025 (CoA, 2015a)</li> <li>+ Approved Conservation Advice for <i>Balaenoptera borealis</i> (sei whale) (TSSC, 2015a)</li> <li>+ Approved Conservation Advice for <i>Balaenoptera physalus</i> (fin whale) (TSSC, 2015b)</li> <li>+ Recovery Plan for the White Shark (<i>Carcharodon carcharias</i>) (DSEWPaC, 2013)</li> <li>+ Approved Conservation Advice for <i>Pristis clavata</i> (dwarf sawfish) (DEWHA, 2009)</li> <li>+ Approved Conservation Advice for <i>Pristis pristis</i> (largetooth sawfish) (DoE, 2014b)</li> <li>+ Commonwealth conservation advice on <i>Pristis zijsron</i> (green sawfish) (DEWHA, 2008)</li> <li>+ Sawfish and River Sharks Multispecies Recovery Plan (DoE, 2015a)</li> <li>+ Approved Conservation Advice for <i>Glyphis garricki</i> (northern river shark) (DoE, 2014a)</li> <li>+ Conservation management plan for the southern right whale 2011 to 2021 (DSEWPaC, 2012)</li> <li>+ Approved Conservation Advice for <i>Aipysurus apraefrontalis</i> (short-nosed sea snake) (DSEWPaC, 2011)</li> <li>+ Approved Conservation Advice for <i>Calidris ferruginea</i> (curlew sandpiper) (TSSC, 2015e)</li> <li>+ Approved Conservation Advice for <i>Numenius madagascariensis</i> (eastern curlew) (TSSC, 2015f)</li> </ul>

	<ul style="list-style-type: none"> <li>+ Approved Conservation Advice for <i>Calidris canutus</i> (Red Knot) (TSSC, 2016b)</li> <li>+ Approved Conservation Advice for <i>Anous tenuirostris melanops</i> (Australian lesser noddy) (TSSC, 2015g)</li> <li>+ Approved conservation advice <i>Limosa lapponica menzbieri</i> (bar-tailed godwit (northern Siberian)) (TSSC, 2016a)</li> <li>+ Approved Conservation Advice for <i>Papasula abbotti</i> (Abbott’s booby) (TSSC, 2015h)</li> </ul> <p>Management is also consistent with the zoning of the Australian marine parks, in that risks have been reduced to ALARP, such as implementation of spill response activities will limit impacts, thereby conserving the marine park values as required by the North Marine Parks Network Management Plan (Director of National Parks, 2018a) and North-West Marine Parks Network Management Plan (Director of National Parks, 2018b).</p>
<p>Are performance outcomes, control measures and associated performance standards consistent with legal and regulatory requirements?</p>	<p>Yes – Management consistent with <i>National Plan for Maritime Environmental Emergencies</i> (AMSA, 2019), amongst other legislation identified in Section 6 and 7.</p> <p>Through acceptance of this EP, legislative and regulatory requirements will be met as per <b>Section 1.6.2</b>.</p>
<p>Are performance outcomes, control measures and associated performance standards consistent with Santos’ Environment, Health and Safety Policy?</p>	<p>Yes – aligns with Santos’ Environment, Health and Safety Policy.</p>
<p>Are performance outcomes, control measures and associated performance standards consistent with industry standards?</p>	<p>Yes – the most recent and comparable Drilling and Completions Eps accepted by NOPSEMA have been reviewed for consistency with the performance outcomes, control measures and associated performance standards proposed in this EP.</p>
<p>Have performance outcomes, control measures and associated performance standards taken into Relevant Persons feedback?</p>	<p>Yes – requests relating to managing spill response activities have been considered.</p> <p>During any spill response, a close working relationship with relevant regulatory bodies (e.g., AMSA, DEPWS) will occur to ensure there is ongoing, coordinated consultation with Relevant Persons on the acceptability of response operations. Relevant persons listed in <b>Table 4.1</b>, whose functions, interests or activities are considered at risk as a result of the event, will be included in the list of Relevant Persons who will be notified under Santos’ Incident Management Process during the response operations.</p> <p>Wildlife response will be conducted in accordance with the Northern Territory Oiled Wildlife Response Plan (NTOWRP) and any other NT OWR plans that are published for territory waters (the NT government is currently developing one).</p> <p>Subject to the availability and the participation of the Tiwi Islands Ranger Groups, Santos undertakes to train the Tiwi Islands Ranger Groups prior to the Activity and provide additional on the job training post-spill to additional personnel (if required).</p>
<p>Are performance standards such that the impact or risk is considered to be ALARP?</p>	<p>Yes – see ALARP above.</p>

The consequence of spill response operations on receptors is assessed as II – Minor. Based on an assessment of Santos' acceptability criteria and with the control measures in place, potential impacts are considered acceptable.



## 8 Implementation strategy

<b>OPGGs(E)R 2009 Requirements</b>
<b>Regulation 14(1)</b>
The environment plan must contain an implementation strategy for the activity in accordance with this regulation.
<b>Regulation 14(10)</b>
The implementation strategy must comply with the Act, the regulations and any other environmental legislation applying to the activity.

This section describes the implementation strategy for this EP as required by the regulations.

The specific arrangements that will be implemented in the event of an oil pollution emergency are detailed within the OPEP.

Post-acceptance consultation implementation is discussed in **Section 8.10**.

### 8.1 Environmental management system

<b>OPGGs(E)R 2009 Requirements</b>
<b>Regulation 14(3)</b>
The implementation strategy must contain a description of the environmental management system for the activity, including specific measures to be used to ensure that, for the duration of the activity: <ol style="list-style-type: none"> <li>a) the environmental impacts and risks of the activity continue to be identified and reduced to a level that is as low as reasonably practicable; and</li> <li>b) control measures detailed in the environment plan are effective in reducing the environmental impacts and risks of the activity to as low as reasonably practicable and an acceptable level; and</li> <li>c) environmental performance outcomes and standards set out in the environment plan are being met.</li> </ol>

The Santos Management System exists to support Santos' values and legal obligations to undertake work in a manner that is safe and sustainable. The management system is a framework of policies, standards, processes, procedures, tools and control measures that are designed to ensure:

- + compliance with legal obligations (including compliance with an approved EP)
- + a common approach is followed across the organisation
- + proactive management
- + mandatory requirements are implemented and are auditable
- + management performance is measured and corrective actions are taken
- + opportunities for improvement are recognised and implemented
- + workforce commitments are understood and demonstrated.

The implementation strategy for this EP is designed, among other things, so that:

- + environmental impacts and risks of the Activity continue to be identified for the duration of the Activity and reduced to a level that is ALARP
- + control measures detailed in this EP are effective in reducing environmental impacts and risks to ALARP and an acceptable level
- + environmental performance outcomes and standards set out in this EP are being met

- + Relevant Persons consultation continues as appropriate for the duration of the Activity.

### 8.1.1 Environment, Health and Safety Policy

Santos’ Environment, Health and Safety (EHS) Policy (**Appendix A**) clearly sets out Santos’ strategic environmental objectives and the commitment of the management team to continuously improve our management systems and reduce the risk of harm to people and the environment. This EP has been prepared in accordance with the fundamentals of this policy. All Santos employees are required to complete an EHS Induction on commencing with Santos that includes information on their EHS obligations.

### 8.1.2 Hazard identification, risk and impact assessment and controls

Hazards and associated environmental risks and impacts for the proposed activities have been systematically identified and assessed in this EP in accordance with Santos’ *Offshore Division Environmental Hazard Identification and Assessment Guideline* (EA-91-IG-00004\_5). The control measures and environmental performance standards that will be implemented to manage the identified risks and impacts, and the environmental performance outcomes that will be achieved, are detailed below.

To ensure that environmental risks and impacts remain acceptable and ALARP during the Activity and for the duration of this EP, hazards will continue to be identified, assessed and controlled as described in **Section 8.8** and **Section 8.9**.

Any new, or proposed amendment to a control measure, EPS or EPO will be managed in accordance with the *Offshore Division Environment Management of Change Procedure* (EA-91-IQ-10001) (**Section 8.8.2**). This Procedure also applies to new information about the impacts or risks of the Activity received during the post acceptance consultation implementation process.

Oil spill response control measures and environmental performance standards and outcomes are listed in the OPEP.

## 8.2 Environmental performance outcomes

To ensure environmental risks and impacts will be of an acceptable level, environmental performance outcomes have been defined and are listed in **Table 8.1**, with the exception of those relating to oil spill response, which are listed in the OPEP. These outcomes will be achieved by implementing the identified control measures to the defined environmental performance standards.

**Table 8.1: Environmental performance outcomes**

Reference	Environmental performance outcomes
EPO-01	No significant impacts to other marine users
EPO-02	No introduction of marine pest species
EPO-03	No loss of containment of hydrocarbon to the marine environment
EPO-04	No unplanned objects, emissions or discharges to sea or air
EPO-05	No injury or mortality to EPBC Act listed marine fauna
EPO-06	No significant changes to air, sediment and water quality
EPO-07	Seabed disturbance limited to planned activities and defined locations within the Operational Area
EPO-08	No significant impacts to marine fauna from lighting emissions
EPO-09	No significant impacts to cultural features from the Activity

## 8.2.1 Control measures and performance standards

OPGGs(E)R 2009 Requirements
Regulation 13 Environmental assessment
<p>Evaluation of environmental impacts and risks</p> <p>13(7) The environment plan must:</p> <ul style="list-style-type: none"> <li>(a) set environmental performance standards for the control measures identified under paragraph (5)(c); and</li> <li>(b) set out the environmental performance outcomes against which the performance of the titleholder in protecting the environment is to be measured; and</li> <li>(c) include measurement criteria that the titleholder will use to determine whether each environmental performance outcome and environmental performance standard is being met.</li> </ul>

The control measures that will be used to manage identified environmental impacts and risks and the associated statements of performance required of the control measure (i.e., EPSs) are listed in **Table 8.2**. Measurement criteria outlining how compliance with the control measure and the expected environmental performance could be evidenced are also listed.

All control measures and EPS and associated measurement criteria relating to oil spill preparedness and response operations are contained within the OPEP.

**Table 8.2: Control measures and environmental performance standards for the proposed Activity (EP)**

Control Measure	Control measure reference no.	Environmental Performance Standard	EPS reference no.	Measurement Criteria	EPO reference no. (Table 8.1)	
Procedure for interacting with marine fauna	BAD-CM-001	Vessel(s) comply with Santos' <i>Protected Marine Fauna Interaction and Sighting Procedure</i> (EA-91-II-00003) which ensures compliance with Part 8 of <i>Environment Protection and Biodiversity Regulations 2000</i> which includes controls for minimising the risk of collision with marine fauna.	BAD-CM-001-EPS-01	Conformance checked on receipt of marine fauna sighting datasheets. Completed vessel statement of conformance.	EPO-05 EPO-09	
		Any vessel strikes with cetaceans will be reported in the National Ship Strike Database.	BAD-CM-001-EPS-02	Conformance checked on Santos' receipt of incident report.		
		Helicopter contractor procedures comply with Santos' <i>Protected Marine Fauna Interaction and Sighting Procedure</i> (EA-91-11-00003), which ensures compliance with Part 8 of the Environment Protection and Biodiversity Conservation Regulations 2000, which includes controls for minimising interaction with marine fauna.	BAD-CM-001-EPS-03	Helicopter contractor procedures align with Santos' <i>Protected Marine Fauna Interaction and Sighting Procedure</i> (EA-91-11-00003).		
Dropped object prevention procedures	BAD-CM-002	Safety Case includes the following control measures for dropped objects that reduce the risk of objects entering the marine environment: <ul style="list-style-type: none"> <li>+ lifting equipment certification and inspection</li> <li>+ lifting crew competencies</li> <li>+ heavy-lift procedures</li> <li>+ preventative maintenance on cranes.</li> </ul>	BAD-CM-002-EPS-01	NOPSEMA-accepted Safety Case. Completed inspection checklist. Details contained in incident documents.	EPO-04	
		Lifting operations managed in accordance with work instructions or procedures.		BAD-CM-002-EPS-02		MODU work instructions or procedures.
		Objects dropped overboard are recovered to mitigate the environmental consequences from objects remaining in the marine environment, unless the environmental consequences of the dropped object are negligible, or safety risks are disproportionate to the environmental consequences.		BAD-CM-002-EPS-03		Fate of dropped objects detailed in incident documents.
		MODU station keeping system	BAD-CM-003	MODU station keeping system maintains the MODU at the desired location.		BAD-CM-003-EPS-01
Anchors positioned and maintained at locations defined in the rig mooring analysis to reduce risks to seabed habitat and petroleum infrastructure.	BAD-CM-003-EPS-02	Completed Mooring Report demonstrates that intended positions were maintained.				
All parts of the MODU mooring system deployed to sea are recovered within three months of MODU departure to mitigate consequences from objects remaining in the marine environment.	BAD-CM-003-EPS-03	Mooring recovery recorded in daily vessel report.				
Positioning of the MODU will be undertaken in accordance with the mooring design and analysis and the drilling contractors' rig move procedure, which includes procedures for the deployment and retrieval of anchors using support vessels to minimise seabed disturbance.	BAD-CM-003-EPS-04	Procedures for the deployment and retrieval of anchors are implemented				
Waste (garbage) management procedure	BAD-CM-004	Waste management procedure implemented to reduce the risk of unplanned release of waste to sea. The procedure includes standards for: <ul style="list-style-type: none"> <li>+ bin types</li> <li>+ lids and covers</li> <li>+ waste segregation</li> <li>+ bin storage.</li> </ul>	BAD-CM-004-EPS-01	Completed inspection checklist.	EPO-04	

Control Measure	Control measure reference no.	Environmental Performance Standard	EPS reference no.	Measurement Criteria	EPO reference no. (Table 8.1)
		No waste (garbage <sup>30</sup> ) discharged to sea, unless the waste is food waste disposed in accordance with MARPOL Annex V.	BAD-CM-004-EPS-02	Completed garbage disposal record book or recording system.	
		Pursuant to MARPOL Annex V, placards displayed to notify personnel of waste disposal restrictions.	BAD-CM-004-EPS-03	Completed inspection checklist.	
Hazardous chemical <sup>31</sup> management procedures	BAD-CM-005	For hazardous chemicals including hydrocarbons, the following standards apply to reduce the risk of an accidental release to sea: <ul style="list-style-type: none"> <li>+ Storage containers closed when the product is not being used.</li> <li>+ Storage containers managed in a manner that provides for secondary containment in the event of a spill or leak.</li> <li>+ Storage containers labelled with the technical product name as per the SDS.</li> <li>+ Spills and leaks to deck, excluding storage bunds and drip trays, immediately cleaned up.</li> <li>+ Storage bunds and drip trays do not contain free flowing volumes of liquid.</li> <li>+ Spill response equipment readily available.</li> </ul>	BAD-CM-005-EPS-01	Completed inspection checklist.	EPO-04
Deck cleaning product selection	BAD-CM-006	Deck cleaning products planned to be released to sea meet the criteria for not being harmful to the marine environment according to MARPOL Annex V.	BAD-CM-006-EPS-01	SDS and product supplier supplementary data as required. Completed inspection checklist.	EPO-06
Chemical selection procedure	BAD-CM-007	Firefighting foam on board the MODU and vessels will not be discharged to sea during testing of the firefighting system.	BAD-CM-007-EPS-01	Completed ISPP certificate.	EPO-04
		Drilling, completions and cement chemicals potentially discharged to sea are Gold/Silver/D or E rated through OCNS, or PLONOR substances listed by OSPAR, or have a complete risk assessment as per Santos' Santos Offshore Division Drilling Chemical Selection and Approval Process (EA-91-II-00007) so that only environmentally acceptable products are used.	BAD-CM-007-EPS-02	Completed Santos risk assessment. Completed operational reports demonstrating that only approved drilling chemicals have been used.	EPO-05 EPO-06
General chemical management procedures	BAD-CM-008	SDS <sup>32</sup> available for all chemicals to aid in the process of hazard identification and chemical management.	BAD-CM-008-EPS-01	Completed operational reports.	EPO-04
		Chemicals managed in accordance with SDS in relation to safe handling and storage, spill response and emergency procedures, and disposal considerations.	BAD-CM-008-EPS-02	Completed inspection checklist.	
International Maritime Dangerous Goods Code	BAD-CM-009	Dangerous goods managed in accordance with International Maritime Dangerous Goods Code to reduce the risk of an environmental incident, such as an accidental release to sea or unintended chemical reaction.	BAD-CM-009-EPS-01	Completed Multimodal Dangerous Goods Form for OSV transfers demonstrates compliance. Completed inspection checklist.	EPO-04
Bulk liquid transfer procedure	BAD-CM-010	Bulk liquids transferred in accordance with bulk transfer procedure to reduce the risk of a release to sea. The procedures will require:	BAD-CM-010-EPS-01	Completed procedural documents, for example work permits, job safety analysis forms, checklists, etc.	EPO-04

<sup>30</sup> Garbage as defined by MARPOL Annex V and excludes waste generated as part of the 'drilling' process as described in these standards.

<sup>31</sup> Chemical in both liquid and solid form

<sup>32</sup> Safety data sheet or material safety data sheet.

Control Measure	Control measure reference no.	Environmental Performance Standard	EPS reference no.	Measurement Criteria	EPO reference no. (Table 8.1)
		<ul style="list-style-type: none"> <li>+ hose integrity: certified hoses will be used</li> <li>+ hose flotation: bulk hoses in the water fitted with floatation collars</li> <li>+ hose connections: hoses used for hydrocarbons fitted with hammer union connections at the MODU's manifold, self-sealing (dry-break) connections at the vessel end and self-sealing break-away connections when two or more hoses are joined together</li> <li>+ valve alignment: a MODU supervisor checks that all valves are lined up correctly</li> <li>+ tank venting: air vents for hydrocarbon storage tanks banded if there is a risk of spill to deck</li> <li>+ supervision: dedicated hose watch person while pumping bulk product</li> <li>+ communications: constant radio communications between MODU control room and vessel</li> <li>+ inventory control: MODU control room monitors tank fill levels</li> <li>+ emergency shutdown available and tested before each transfer operation.</li> </ul>		Spill details contained in incident documentation.	EPO-06
Bulk solid transfer procedure	BAD-CM-011	<p>Bulk solids transferred in accordance with bulk transfer procedures to reduce the risk of an unintentional<sup>33</sup> release to sea. The procedures include standards for:</p> <ul style="list-style-type: none"> <li>+ hose integrity: certified hoses will be used</li> <li>+ hose flotation: bulk hoses in the water fitted with floatation collars</li> <li>+ valve alignment: a MODU supervisor checks that all valves are lined up correctly</li> <li>+ communications: constant radio communications between MODU control room and vessel</li> <li>+ inventory control: MODU control room monitors tank fill levels or air vents watched to detect tank overfill</li> <li>+ emergency shutdown available and tested before each transfer operation.</li> </ul>	BAD-CM-011- EPS-01	<p>Completed procedural documents, for example work permits, job safety analysis forms, checklists, etc.</p> <p>Spill details contained in incident documentation.</p>	EPO-04 EPO-06
MODU and vessel spill response plans	BAD-CM-012	MODU and vessels have and implement a SOPEP, or SMPEP, pursuant to MARPOL Annex I.	BAD-CM-012- EPS-01	Approved SOPEP or SMPEP.	EPO-03 EPO-04
		SOPEP or SMPEP spill response exercises conducted at least every three months to ensure personnel are prepared.	BAD-CM-012- EPS-02	Spill exercise records or evidence of a spill exercise in an operational report.	EPO-06 EPO-09
Source control plan	BAD-CM-013	Prior to drilling there will be a source control plan in place.	BAD-CM-013- EPS-01	Source control plan.	EPO-03 EPO-04 EPO-06 EPO-09
ROV inspection and maintenance procedures	BAD-CM-014	Preventative maintenance on ROV completed as scheduled to reduce the risk of hydraulic fluid releases to sea.	BAD-CM-014- EPS-01	Maintenance records or evidence of maintenance in operational reports.	EPO-04
		ROV pre-deployment inspection completed to reduce the risk of hydraulic fluid releases to sea.	BAD-CM-014- EPS-02	Completed pre-deployment inspection checklist.	
Maritime Notices	BAD-CM-015	Information provided to either AMSA, Department of Defence (DoD), AHO and/or nearest port authority on MODU arrival and departure so that the maritime industry is aware of petroleum activities.	BAD-CM-015- EPS-01	Transmittal records demonstrate notification of Activity before the Activity commencing.	EPO-01
Support vessel	BAD-CM-016	At least one support vessel available at all times to monitor the MODU 500 m PSZ to identify and communicate with any approaching third-party vessels.	BAD-CM-016- EPS-01	Daily Vessel Report.	EPO-01

<sup>33</sup> Tank venting and associated product loss is an intentional release to sea for safety reasons.

Control Measure	Control measure reference no.	Environmental Performance Standard	EPS reference no.	Measurement Criteria	EPO reference no. (Table 8.1)
		Support vessels will be equipped with an AIS and radar.	BAD-CM-016-EPS-02	Completed inspection report or statement of conformance from vessel contractor.	EPO-03
		Monitoring of surrounding marine environment is undertaken from vessel bridge.	BAD-CM-016-EPS-03	Bridge log (or equivalent).	
Accepted OPEP	BAD-CM-017	In the event of an oil spill to sea, the Santos OPEP requirements are implemented to mitigate environmental impacts.	BAD-CM-017-EPS-01	Completed incident documentation.	EPO-03 EPO-04 EPO-05 EPO-06 EPO-09
Drilling and completions management process (DCMP)	BAD-CM-018	NOPSEMA-accepted WOMP provides control measures for well integrity including: <ul style="list-style-type: none"> <li>+ measures for suspension in the event of a cyclone that reduce the risk of an unplanned release of hydrocarbons</li> <li>+ completion and ongoing management of wells will be in accordance with the requirements of the accepted WOMP.</li> </ul>	BAD-CM-018-EPS-01	NOPSEMA-accepted WOMP.	EPO-03 EPO-04 EPO-05 EPO-06
		NOPSEMA accepted Safety Case includes control measures for well control that reduce the risk of an unplanned release of hydrocarbons.	BAD-CM-018-EPS-02	NOPSEMA-accepted Safety Case.	
		Santos Critical Acceptance Criteria (CAC) for critical well operations and integrity aspects are achieved. CAC will be selected based on the well objectives and Santos' Drilling and Completions Management Process technical standards, being: <ul style="list-style-type: none"> <li>+ location, rig moves and support</li> <li>+ well control equipment</li> <li>+ well barriers</li> <li>+ drilling and completions fluids</li> <li>+ surveying and trajectory control</li> <li>+ casing, liner and tubing</li> <li>+ cement</li> <li>+ wellhead and production trees</li> <li>+ completion components.</li> </ul>	BAD-CM-018-EPS-03	Completed CAC in well program.	
Waste incineration procedures	BAD-CM-019	Waste incineration managed in accordance with MARPOL Annex VI, except incineration on vessels within the 500 m PSZ shall not occur.	BAD-CM-019-EPS-01	Completed waste record book or recording system.	EPO-04 EPO-06
Fuel oil quality	BAD-CM-020	MARPOL-compliant (Marine Order 97) fuel oil (MDO) will be used during the Activity.	BAD-CM-020-EPS-01	Fuel bunkering records and/or relevant purchase records.	EPO-04 EPO-06
		Intermediate fuel oil or heavy fuel oil will not be used during the Activity.	BAD-CM-020-EPS-02		
Air pollution prevention certification	BAD-CM-021	Pursuant to MARPOL Annex VI, MODU and vessels will maintain a current International Air Pollution Prevention Certificate, as relevant to vessel class, which certifies that measures to prevent ODS emissions, and reduce Nox, Sox, and incineration emissions during the Activity are in place.	BAD-CM-021-EPS-01	Current international air pollution prevention certificate.	EPO-04 EPO-06
Santos Relevant Persons consultation	BAD-CM-022	Santos will complete activity pre-commencement stakeholder notifications as per <b>Table 8.4</b> .	BAD-CM-022-EPS-01	Santos correspondence to Relevant Persons.	EPO-01
		If the MODU departs and returns from the Operational Area, relevant maritime notices will be updated.	BAD-CM-022-EPS-02	Santos correspondence to Relevant Persons.	

Control Measure	Control measure reference no.	Environmental Performance Standard	EPS reference no.	Measurement Criteria	EPO reference no. (Table 8.1)
		All correspondence with external persons is recorded.	BAD-CM-022-EPS-03	Saved records.	
		Santos' Relevant Persons Consultation Coordinator is contactable before, during and after completion of the planned Activity to ensure consultation feedback is evaluated and considered during the operational Activity phases.	BAD-CM-022-EPS-04	Consultation Coordinator contact details provided to Relevant Persons in all correspondence.	
Compliance with the <i>Biosecurity Act 2015</i> (Cth)	BAD-CM-023	Vessels and MODU on contract to Santos are managed to low risk in accordance with the Santos IMSMP (EA-00-RI-10172) before movement or transit into or within the invasive marine species management zone, which requires: <ul style="list-style-type: none"> <li>+ assessment of applicable vessels using the IMSMP risk assessment</li> <li>+ the management of immersible equipment to low risk.</li> </ul>	BAD-CM-023-EPS-01	Completed risk assessment demonstrating MODU, equipment and vessels are 'low risk'.	EPO-02
		Pursuant to the <i>Biosecurity Act 2015</i> (Cth) and Australian Ballast Water Management Requirements 2017, vessels carrying ballast water and engaged in international voyages shall manage ballast water so that marine pest species are not introduced.	BAD-CM-023-EPS-02	Records show Ballast Water Management is implemented. Completed ballast water record book or log is maintained.	
		Vessels receive entry clearance from DAFF as necessary (or as applicable to their location and movements).	BAD-CM-023-EPS-03	Records show a complete Questionnaire for Biosecurity Exemptions for Biosecurity Control Determination issued to Seaports at least one month in advance where practicable.	
MODU identification system	BAD-CM-024	MODU has an AIS to aid in its detection at sea.	BAD-CM-024-EPS-01	Noted in inspection report or statement of conformance supplied by MODU/vessel contractor.	EPO-01 EPO-03
Anti-foulant system	BAD-CM-025	Vessel anti-foulant system maintained in compliance with International Convention on the Control of Harmful Anti-fouling Systems on Ships where applicable.	BAD-CM-025-EPS-01	Current International Anti-Fouling System Certificate.	EPO-02 EPO-06
Sewage treatment system	BAD-CM-026	Pursuant to MARPOL Annex VI, MODU and vessel(s) have a current International Sewage Pollution Prevention Certificate which certifies that required measures to reduce impacts from sewage disposal are in place (as applicable to vessel class).	BAD-CM-026-EPS-01	Current International Sewage Pollution Prevention Certificate.	EPO-04 EPO-06
		Sewage discharged in accordance with MARPOL Annex IV.	BAD-CM-026-EPS-02	Completed inspection checklist.	EPO-04 EPO-06
		Preventive maintenance on sewage treatment equipment is completed as scheduled.	BAD-CM-026-EPS-03	Maintenance records.	EPO-04 EPO-06
Oily water treatment system	BAD-CM-027	Oily mixtures (bilge water) only discharged to sea in accordance with MARPOL Annex I.	BAD-CM-027-EPS-01	Completed inspection checklist. Oil record book or log.	EPO-04 EPO-06
		Preventative maintenance on oil filtering equipment completed as scheduled.	BAD-CM-027-EPS-02	Maintenance records or evidence of maintenance in operational reports.	EPO-04 EPO-06
		Pursuant to MARPOL Annex I, a MODU and vessel(s) will have an International Oil Pollution Prevention Certificate which certifies that required measures to reduce impacts of planned oil discharges are in place (as applicable to vessel class).	BAD-CM-027-EPS-03	Current International Oil Pollution Prevention Certificate.	EPO-04 EPO-06
Cuttings management system	BAD-CM-028	All well returns to the MODU are diverted to shale shakers, except if drilling with seawater. The recovered drilling fluid is recycled to the mud pits and separated drilled cuttings/solids diverted overboard. If drilling with seawater, cuttings/solids returned to the MODU are diverted overboard.	BAD-CM-028-EPS-01	Daily Mud Report.	EPO-04 EPO-05 EPO-06
		The shale shakers are fitted with screens that meet API standards for solids removal particle size cut points.	BAD-CM-028-EPS-02	Inspection records.	



Control Measure	Control measure reference no.	Environmental Performance Standard	EPS reference no.	Measurement Criteria	EPO reference no. (Table 8.1)
		Centrifuges are used as required to remove additional finer drilled cuttings/solids that are too small for the shale shakers to remove.	BAD-CM-028-EPS-03	Daily Mud Report.	
		Shale shakers are inspected by a dedicated shale shaker hand whilst drilling to ensure: <ul style="list-style-type: none"> <li>+ shakers are running and screens vibrating</li> <li>+ shaker screens are not damaged or blinding.</li> </ul>	BAD-CM-028-EPS-04	Daily Mud Report.	
		If NAF is used, a compliance engineer tracks oil on cuttings daily to ensure the average oil-on-cuttings does not exceed 10% w/w dry average per well.	BAD-CM-028-EPS-05	Daily mud compliance report	
		Amount of residual NAF on discharged cuttings is less than 10% (w/w) dry per well.	BAD-CM-028-EPS-06	Completed operational reports.	
		If the average oil-on-cuttings for a well cannot be achieved, cuttings will be retained in enclosed containers and shipped ashore in accordance with jurisdictional requirements.	BAD-CM-028-EPS-07	Completed operational reports.	
Inventory control procedure	BAD-CM-029	Only residual water-based fluid systems, brine, completion chemicals, cement and cement spacer within MODU mud pits and surface tanks that is no longer required will be diverted overboard.	BAD-CM-029-EPS-01	End of Well Report.	EPO-04 EPO-05 EPO-06
		Non-aqueous fluid (NAF) and base oil operational readiness checklist completed before taking product onto the MODU, or before mixing or circulating if the product is already on the MODU. The aspects that will be checked are: <ul style="list-style-type: none"> <li>+ systems of work</li> <li>+ equipment</li> <li>+ maintenance</li> <li>+ deck drainage</li> <li>+ spill containment</li> <li>+ valves and lines</li> <li>+ hoses.</li> </ul>	BAD-CM-029-EPS-02	Completed operational checklist.	
		Non-aqueous fluid (NAF) within MODU mud pits that is no longer required will not be released to sea <sup>34</sup> .	BAD-CM-029-EPS-03	Completed operational reports.	
		If non-aqueous fluid (NAF) has been displaced out of the well bore, only interface fluids with residual synthetic base oil content of <1% will be discharged overboard if no longer required.	BAD-CM-029-EPS-04	Completed operational reports.	
		Unusable inventories of bulk cement, drilling fluid solid additives, brine and drill water on-board the MODU managed according to the decision list in <b>Table 6.13</b> .	BAD-CM-029-EPS-05	End of Well Report. Completed decision log.	
Oil content measurement procedure	BAD-CM-030	All drilling-related synthetic base oil content measurements and calculations will be made in accordance with the methods detailed in <i>Operational Guidelines for the use of Non-Aqueous Drilling Fluids (DR-91-ID-016)</i> .	BAD-CM-030-EPS-01	Completed operational reports.	EPO-05 EPO-06
Quality control limits for Barite	BAD-CM-031	The contaminant limit concentrations in barite used for the drilling meets the standards of: <ul style="list-style-type: none"> <li>+ mercury (Hg) – 1 mg/kg dry weight in stock barite</li> <li>+ cadmium (Cd) – 3 mg/kg dry weight in stock barite.</li> </ul>	BAD-CM-031-EPS-01	Records show barite used for the drilling meets the required standards.	EPO-05 EPO-06
		All barite is selected in accordance with API specifications which has limitations on all contaminant concentrations.	BAD-CM-031-EPS-02	Mud reports show all mud is API standard.	EPO-05 EPO-06

<sup>34</sup> Note that the product will be back loaded to a support vessel and/or left on the MODU for future use.

Control Measure	Control measure reference no.	Environmental Performance Standard	EPS reference no.	Measurement Criteria	EPO reference no. (Table 8.1)
Ozone-depleting substance handling procedures	BAD-CM-032	ODSs managed in accordance with MARPOL Annex VI to reduce the risk of an accidental release of ODS to air.	BAD-CM-032-EPS-01	Completed ODS record book or recording system.	EPO-04 EPO-06
Well flowback procedures	BAD-CM-033	NOPSEMA-accepted MODU Safety Case Revision for well flowback includes control measures that reduce the risk of hydrocarbons from entering the marine environment (where applicable).	BAD-CM-033-EPS-01	NOPSEMA-accepted safety case revision for well flowback.	EPO-03 EPO-04
		Santos Well Flowback Program checklists completed to ensure safety and environmental control measures are implemented.	BAD-CM-033-EPS-02	Completed well flowback program checklist.	EPO-05 EPO-06
		High efficiency burner heads and a specialist noise silenced flare will be utilised during well flowback to ensure effective flaring of hydrocarbons.	BAD-CM-033-EPS-03	Well test design report.	
		Oil burner pilots to remain ignited during a well flowback to reduce the risk of hydrocarbons being released to sea and air.	BAD-CM-033-EPS-04	Incident report of flare drop-out.	
		Gas line pilots will be used and will remain ignited during a well flowback to reduce the risk of hydrocarbons being released to air.	BAD-CM-033-EPS-05	Completed well flowback program checklist.	
		Burner monitored by a dedicated flare watcher during a well flowback to identify and communicate an unplanned flare drop-out.	BAD-CM-033-EPS-06	Incident report of flare drop-out.	
		In the event of a flare drop-out or hydrocarbon being observed on the sea surface then liquid flaring, and if applicable the well flowback, shall cease and the event investigated and corrected before proceeding.	BAD-CM-033-EPS-07	Incident report of flare drop-out or unplanned hydrocarbon release.	
		Two burner booms provided on the MODU to allow for redundancy and operation in all weather conditions.	BAD-CM-033-EPS-08	Well test design report	
		During a well flowback, formation water and completion fluids containing hydrocarbons must be: <ul style="list-style-type: none"> <li>+ flared with hydrocarbons, or</li> <li>+ treated through an oil-water filtration system before discharge to sea at an oil in water concentration of &lt;30 ppm, or</li> <li>+ stored in tanks on-board and shipped ashore for disposal.</li> </ul>	BAD-CM-033-EPS-09	Completed operational reports.	
		Oil-water filtration equipment will be: <ul style="list-style-type: none"> <li>+ designed to reduce oil-in-water to less than 30 ppm</li> <li>+ calibrated before use</li> <li>+ monitored for oil-in-water content to assess the performance of the filtration equipment.</li> </ul>	BAD-CM-033-EPS-10	Completed operational reports.	
No extended production tests for assessing reservoir depletion, and maximum rate will only be used to remove solids from the well.	BAD-CM-033-EPS-11	Completed operational reports.			
Minimum lighting for safe work and navigation	BAD-CM-034	Vessel/MODU navigation lighting and equipment is compliant with International Rules for Preventing Collisions at Sea/Marine Order 30: Prevention of Collisions, and with Marine Order 21: Safety of Navigation and Emergency Procedures.	BAD-CM-034-EPS-01	Vessel certification confirms compliance with applicable regulations.	EPO-01 EPO-03 EPO-08 EPO-09
No fishing from MODU or vessels	BAD-CM-035	Personnel are prohibited from recreational fishing activities on MODU or vessels.	BAD-CM-035-EPS-01	Induction records confirm no fishing prohibition is communicated to all personnel.	EPO-01
Seafarer certification	BAD-CM-036	Vessel crew are trained and competent, in accordance with Flag State regulations, to navigate vessels.	BAD-CM-036-EPS-01	Training records.	EPO-01 EPO-03

Control Measure	Control measure reference no.	Environmental Performance Standard	EPS reference no.	Measurement Criteria	EPO reference no. (Table 8.1)
Marine Assurance Standard to ensure compliance with relevant Marine Orders for safe vessel operations (MO 21 – Safety and emergency arrangements; MO 27 – Safety of navigation and radio equipment; MO 30 – Prevention of collisions)	BAD-CM-037	Vessels selected and on-boarded to ensure contracted vessels are operated, maintained and manned in accordance with industry standards (for example, Marine Orders) and regulatory requirements (this EP) and the relevant Santos procedures mentioned in this EP.	BAD-CM-037-EPS-01	Completed documentation demonstrates procedure requirements.	EPO-01 EPO-02 EPO-03 EPO-04 EPO-05 EPO-06 EPO-08
Petroleum Safety Zone (500 m) established	BAD-CM-038	A 500 m PSZ is defined around the MODU during the Activity.	BAD-CM-038-EPS-01	Notice to Mariners placed with AHO outlining PSZ and time frames of the Activity.	EPO-01 EPO-03
		A 500 m PSZ is defined around each wellhead once installed and well completed.	BAD-CM-038-EPS-02		
Recovery of deployed equipment	BAD-CM-039	All equipment deployed during any Activity will be recovered at the end of each drilling campaign.	BAD-CM-039-EPS-01	Survey records.	EPO-04 EPO-07
MODU planned maintenance system	BAD-CM-040	Documented maintenance program is in place for equipment on MODU that provides a status on the maintenance of equipment.	BAD-CM-040-EPS-01	Vessel daily/weekly records.	EPO-04 EPO-05 EPO-06
				CMMS records.	
				Vessel contractor written verification demonstrates compliance with Planned Maintenance System.	
Vessel planned maintenance system	BAD-CM-041	Documented maintenance program is in place for equipment on vessels that provides a status on the maintenance of equipment.	BAD-CM-041-EPS-01	Vessel daily/weekly records.	EPO-04 EPO-05 EPO-06
				International Maritime Contractors Association Common Marine Inspection Document.	
				Vessel contractor written verification demonstrates compliance with Planned Maintenance System.	
				CMMS records.	
Relief well MODU identification	BAD-CM-042	Prior to drilling commencement, as detailed in Assurance Review 4 of the DCMP, a suitable relief well MODU will be confirmed to be available. Drilling will not proceed if there is not at least one relief well MODU option that could execute a relief well within the time frames committed to in Table 9-4 of the OPEP. If the preferred MODU becomes unavailable during the Activity, Santos will update the Source Control Plan to identify a suitable alternative MODU.	BAD-CM-042-EPS-01	Relief well capability register confirms MODU availability for the duration of each campaign. Source Control Plan updated if MODU availability changes	EPO-03
MODU Move Procedure	BAD-CM-043	MODU move procedure contains a passage plan. No accidental contact with the seabed and subsea infrastructure during the MODU move.	BAD-CM-043-EPS-01	MODU move procedure.	EPO-04 EPO-07
				Details contained in incident documents.	

Control Measure	Control measure reference no.	Environmental Performance Standard	EPS reference no.	Measurement Criteria	EPO reference no. (Table 8.1)
Post Activity ROV survey	BAD-CM-044	During anchor recovery, a survey of the seabed in the vicinity of the MODU will be completed by an ROV. The survey will document the seabed condition at departure and any equipment identified would either be recovered by an ROV (if small / light enough) or marked for recovery during the SAR campaign.	BAD-CM-044- EPS-01	Survey records	EPO-04 EPO-07
Mud pit wash residue discharge controls	BAD-CM-045	"Less than 1% oil by volume content achieved before discharge of fluids from mud pit wash. If discharge specification not met (<1% oil by volume), the fluid will be returned to shore."	BAD-CM-045- EPS-01	Records demonstrate that discharge criteria were met before discharge or fluids were contained.	EPO-04 EPO-05 EPO-06
Decision list for managing bulk powders and brines remaining on the MODU at the end of the drilling campaign	BAD-CM-046	Decision criteria for remaining bulk products, in order of priority: - retain - sell - minimise - transfer to alternative MODU	BAD-CM-046- EPS-01	Decision record for management of residual bulk powders and brines.	EPO-04 EPO-05 EPO-06
Well suspension equipment and procedures	BAD-CM-047	Completion of verification steps to test and confirm integrity of barriers, including secondary verification by Perth office.	BAD-CM-047- EPS-01	Barrier integrity verification and testing records.	EPO-03 EPO-04 EPO-06
Maximum volume of MGO/MDO stored in a single tank of vessels used for the Activity will not exceed 250 m <sup>3</sup>	BAD-CM-048	The maximum volume of MGO/MDO stored in a single tank shall not exceed 250m <sup>3</sup>	BAD-CM-048- EPS-01	Written directive to vessel contractor	EPO-03
Cultural Heritage training and cultural ceremony.	BAD-CM-049	+ Cultural training completed by all site-based workforce (Santos employees and contractors) by end of their first rotation offshore or first rotation on the MODU; and every 12 months thereafter. + Cultural heritage monitors to provide an introduction to the Activity to the seas and any First Nations spiritual beings at commencement of drilling operations.	BAD-CM-049 EPS-01	Progress reporting as part of the EP Annual Environmental Performance Report	EPO-09
Monitoring of support vessel fuel consumption	BAD-CM-050	Monitoring of support vessel fuel consumption and identification of fuel use efficiency opportunities	BAD-CM-050- EPS-01	Support vessel fuel consumption monitoring records in Daily Vessel Reports	EPO-04

### 8.3 Leadership, accountability and responsibility

<b>OPGGs(E)R 2009 Requirements</b>
<b>Regulation 14(4)</b>
The implementation strategy must establish a clear chain of command, setting out the roles and responsibilities of personnel in relation to the implementation, management and review of the environment plan, including during emergencies or potential emergencies.

Santos’ Offshore Manager – Drilling and Completions, is accountable for the implementation, management and review of this EP.

The effective implementation of this EP requires collaboration and cooperation among Santos and its contractors. The chain of command and accountabilities of personnel in relation to the implementation, management and review of the EP is outlined in **Table 8.3**. It is also outlined in the OPEP for oil spill response.

**Table 8.3: Chain of command, key leadership roles and responsibilities**

Role	Responsibilities
Santos Offshore Manager – Drilling and Completions	<ul style="list-style-type: none"> <li>+ Accountable for implementation of this EP</li> <li>+ Responsible for communication of Santos’ policies and standards to all employees and contractors for their adherence to the same</li> <li>+ Promotes HSE as a core value integral with how Santos does its business</li> <li>+ Empowers personnel to ‘stop-the-job’ due to HSE concerns</li> <li>+ Provides resources for HSE management</li> <li>+ Promotes a high level of HSE performance and drives improvement opportunities</li> <li>+ Responsible for development and implementation of emergency response plans</li> <li>+ Maintains communication with Santos personnel, government agencies and the media</li> <li>+ Approves MoC documents, if acceptable and ALARP</li> <li>+ Responsible for completion of annual HSE improvement plan</li> </ul>
Santos Drilling Superintendent	<ul style="list-style-type: none"> <li>+ Responsible for conformance with environmental performance outcomes and standards in the EP</li> <li>+ Delegates HSE responsibility and informs these personnel of their responsibilities under the EP</li> <li>+ Empowers personnel to ‘stop-the-job’ due to HSE concerns</li> <li>+ Responsible for compliance with processes for HSE incident reporting, investigation, correction and communication</li> <li>+ Responsible for MODU compliance with quarantine requirements to operate in Australian waters</li> <li>+ Responsible for compliance with processes for HSE inspections and audits and implementation of corrective actions</li> <li>+ Reviews MoC documents</li> <li>+ Responsible for compliance with requirements for personnel on the MODU to have the necessary qualifications, training and/or supervision</li> </ul>

Role	Responsibilities
Santos Marine Superintendent	<ul style="list-style-type: none"> <li>+ Responsible for conformance with environmental performance outcomes and standards in the EP</li> <li>+ Delegates HSE responsibility and informs these personnel of their responsibilities under the EP</li> <li>+ Empowers personnel to 'stop-the-job' due to HSE concerns</li> <li>+ Responsible for compliance with processes for HSE incident reporting, investigation, correction and communication</li> <li>+ Responsible for vessel compliance with quarantine requirements to operate in Australian waters</li> <li>+ Responsible for compliance with processes for HSE inspections and audits and implementation of and corrective actions Reviews MoC documents</li> <li>+ Responsible for compliance with requirements for personnel on the vessels to have the necessary qualifications, training and/or supervision</li> </ul>
Santos Offshore Supervisors/ MODU Offshore Installation Manager/Vessel Masters	<ul style="list-style-type: none"> <li>+ Responsible for compliance with all HSE laws, conventions and approvals (e.g., safety case)</li> <li>+ Responsible for conformance with delegated environmental performance outcomes and standards in the EP</li> <li>+ Reports any new, or increase in, HSE risk or impact</li> <li>+ Responsible for compliance with MoC procedures</li> <li>+ Responsible for adherence by crew to operational work systems and procedures</li> <li>+ Responsible for implementation of requirements that plant and equipment is being operated as intended and is maintained</li> <li>+ Empowers personnel to 'stop-the-job' due to HSE concerns</li> <li>+ Responsible for compliance with reporting requirements for all HSE incidents, hazards and non-conformances</li> <li>+ Facilitates HSE investigations and ensures corrective actions are implemented</li> <li>+ Responsible for compliance with requirements for crew to be competent and prepared to respond to HSE incidents</li> </ul>

Role	Responsibilities
Santos Drilling HSE Advisor	<ul style="list-style-type: none"> <li>+ Monitoring conformance with EPOs and environmental performance standards, and the implementation strategy in the EP</li> <li>+ Prepares, maintains and distributes the environmental compliance register</li> <li>+ Completes regular HSE reports, inspections and audits</li> <li>+ Completes HSE inductions and promotes general awareness</li> <li>+ Collates HSE data and records</li> <li>+ Contributes to HSE incident management and investigations</li> <li>+ Provides operational HSE oversight and advice</li> <li>+ Facilitates the development and implementation of MoC documents</li> <li>+ Provides incident reports, compliance reports and notifications to NOPSEMA</li> <li>+ Responsible for fulfilment of Relevant Persons consultation and communication requirements</li> <li>+ Responsible for communication of EP requirements to subcontractors</li> </ul>
Santos Relevant Persons Coordinator	<ul style="list-style-type: none"> <li>+ Responsible for implementation of steps described in <b>Section 8.10</b> relating to post acceptance consultation throughout the duration of the Activity</li> <li>+ Maintains a Relevant Persons contact and information database</li> <li>+ Maintains a Relevant Persons Notification Log specific to the EP</li> <li>+ Maintains records of all Relevant Persons correspondence specific to the EP</li> <li>+ Before the Activity begins and on advice of Santos Drilling HSE Adviser, notifies all Relevant Persons listed in <b>Table 8.4</b>. The notification will include information on Activity timing, vessel/MODU movements and vessel/MODU details</li> <li>+ On advice of Santos Drilling HSE Adviser, provide cessation notifications to Relevant Persons identified in <b>Table 8.4</b>.</li> <li>+ Is available before, during and after the Activity to promote opportunities for Relevant Persons to provide feedback</li> <li>+ Internally communicates new risks and (or) controls that are raised during post acceptance consultation</li> <li>+ Prepares quarterly updates</li> </ul>
Santos Emergency Response Advisor	<ul style="list-style-type: none"> <li>+ Is responsible for overarching incident and crisis management responsibility</li> <li>+ Manages the Crisis Management Team and IMT personnel training program</li> <li>+ Reviews and assesses competencies for Crisis Management Team, IMT, and field-based Incident Response Team members</li> <li>+ Manages the Duty roster system for Crisis Management Team and IMT personnel</li> <li>+ Manages the maintenance and readiness of incident response resources and equipment</li> </ul>

Role	Responsibilities
Santos Oil Spill Response Advisor	<ul style="list-style-type: none"> <li>+ Provides upfront and ongoing guidance, framework, and direction on preparation of the OPEP relevant to this Activity</li> <li>+ Develops and maintains arrangements and contracts for incident response support from third parties</li> <li>+ Develops and defines objectives, strategies and tactical plans for response preparedness defined in the OPEP</li> <li>+ Undertakes assurance activities on arrangements outlined within the OPEP</li> </ul>

## 8.4 Workforce training and competency

OPGGs(E)R 2009 Requirements
Regulation 14(5)
<p>The implementation strategy must include measures to ensure that each employee or contractor working on, or in connection with, the activity is aware of his or her responsibilities in relation to the environment plan, including during emergencies or potential emergencies, and has the appropriate competencies and training.</p>

This section describes the mechanisms that will be in place so that each employee and contractor is aware of his or her responsibilities in relation to this EP and has appropriate training and competencies.

### 8.4.1 Activity inductions

Inductions addressing environmental management requirements are to be implemented and to include information about:

- + Santos’ Environment, Health and Safety Policy and Management System
- + the applicable regulatory regime/s
- + environmental sensitivities (e.g., nearby protected marine areas, sensitive environmental periods)
- + communications to avoid vessel interaction
- + activities with highest risk (e.g., invasive marine species and hydrocarbon releases)
- + relevant EP commitments (e.g., **Table 8.1** and **Table 8.2**)
- + incident reporting and notifications
- + regulatory compliance reporting
- + management of change process
- + oil pollution emergency response (e.g., OPEP requirements)
- + maritime and First Nations cultural heritage awareness.

### 8.4.2 Training and competency

All members of the workforce on the MODU and vessels will complete relevant training and hold qualifications and certificates for their role. Santos and its contractors are individually responsible for ensuring that their personnel are qualified and trained. The systems, procedures and responsible persons will vary and will be managed through the use of online databases, staff onboarding process and training departments, etc.

Personnel qualification and training records will be sampled before and/or during an Activity. Such checks will be performed during the procurement process, facility acceptance testing, inductions, crew change, and operational inspections and audits.



Additional training and competency requirements for relevant personnel specific to spill response are provided in the OPEP.

### 8.4.3 Workforce involvement and communication

Daily operational meetings will be held at which HSE will be a standing agenda item. It is a requirement that supervisors attend daily operational meetings and that all personnel attend daily toolbox or pre-shift meetings. Toolbox or pre-shift meetings will be held to plan jobs and discuss work tasks, including HSE risks and their controls.

HSE performance will be monitored and reported during the Activity, and performance metrics (such as the number of environmental incidents) will be regularly communicated to the workforce. Workforce involvement and environmental awareness will also be promoted by encouraging offshore personnel to report marine fauna sightings and marine pollution (for example, oil on water, dropped objects).

## 8.5 Emergency preparedness and response

<b>OPGG(E)R 2009 Requirements</b>
<b>Regulation 14(8)</b>
The implementation strategy must contain an oil pollution emergency plan and provide for updating the plan.
<b>Regulation 14(8AA)</b>
The oil pollution emergency plan must include adequate arrangements for responding to and monitoring oil pollution, including the following: <ul style="list-style-type: none"> <li>(a) the control measures necessary for timely response to an emergency that results or may result in oil pollution;</li> <li>(b) the arrangements and capability that will be in place, for the duration of the activity, to ensure timely implementation of the control measures, including arrangements for ongoing maintenance of response capability;</li> <li>(c) the arrangements and capability that will be in place for monitoring the effectiveness of the control measures and ensuring that the environmental performance standards for the control measures are met;</li> <li>(d) the arrangements and capability in place for monitoring oil pollution to inform response activities.</li> </ul>
<b>Regulation 14(8A)</b>
The implementation strategy must include arrangements for testing the response arrangements in the oil pollution emergency plan that are appropriate to the response arrangements and to the nature and scale of the risk of oil pollution for the activity.
<b>Regulation 14(8B)</b>
The arrangements for testing the response arrangements must include: <ul style="list-style-type: none"> <li>(a) a statement of the objectives of testing; and</li> <li>(b) a proposed schedule of tests; and</li> <li>(c) mechanisms to examine the effectiveness of response arrangements against the objectives of testing; and</li> <li>(d) mechanisms to address recommendations arising from tests.</li> </ul>

<b>Regulation 14(8C)</b>
<p>The proposed schedule of tests must provide for the following:</p> <ul style="list-style-type: none"> <li>(a) testing the response arrangements when they are introduced;</li> <li>(b) testing the response arrangements when they are significantly amended;</li> <li>(c) testing the response arrangements not later than 12 months after the most recent test;</li> <li>(d) if a new location for the activity is added to the environment plan after the response arrangements have been tested, and before the next test is conducted—testing the response arrangements in relation to the new location as soon as practicable after it is added to the plan;</li> <li>(e) if a facility becomes operational after the response arrangements have been tested and before the next test is conducted—testing the response arrangements in relation to the facility when it becomes operational.</li> </ul>
<b>Regulation 14(8D)</b>
<p>The implementation strategy must provide for monitoring of impacts to the environment from oil pollution and response activities that:</p> <ul style="list-style-type: none"> <li>(a) is appropriate to the nature and scale of the risk of environmental impacts for the activity; and</li> <li>(b) is sufficient to inform any remediation activities.</li> </ul>
<b>Regulation 14(8E)</b>
<p>The implementation strategy must include information demonstrating that the response arrangements in the oil pollution emergency plan are consistent with the national system for oil pollution preparedness and response.</p>

MODU and vessels are required to have and implement incident response plans, such as an emergency response plan and SMPEP or SOPEP. Regular incident response drills and exercises (for example, as defined in an emergency response plan, SMPEP or SOPEP) are performed to refresh the crew in using equipment and implementing incident response procedures.

The *Barossa Development Drilling and Completions Oil Pollution Emergency Plan* (OPEP) (BAA-200-0327) is a stand-alone document that details spill management arrangements, including the Santos incident management structure.

The OPEP provides Activity information comprising:

- + a description of the spill profile
- + applicable response strategies and control measures
- + net environmental benefit analysis (NEBA)
- + spill response ALARP assessment
- + arrangements for testing the response arrangements
- + arrangements for impact monitoring.

Santos will implement the OPEP in the event of a hydrocarbon spill. The OPEP details how Santos will prepare and respond to a spill event and meets the requirement of the OPGGS(E)R 2009, including to addresses the requirements of regulations 14(8)-(8E) inclusive.

## 8.6 Incident reporting, investigation and follow-up

OPGGSR 2009 Requirements
<b>Regulation 14(2)</b>
<p>The implementation strategy must:</p> <ul style="list-style-type: none"> <li>(a) state when the titleholder will report to the Regulator in relation to the titleholder’s environmental performance for the activity; and</li> <li>(b) provide that the interval between reports will not be more than 1 year.</li> </ul> <p>Note: Regulation 26C requires a titleholder to report on environmental performance in accordance with the timetable set out in the environment plan.</p>
<b>Regulation 14(7)</b>
<p>The implementation strategy must provide for sufficient monitoring of, and maintaining a quantitative record of, emissions and discharges (whether occurring during normal operations or otherwise), such that the record can be used to assess whether the environmental performance outcomes and standards in the environment plan are being met.</p>

All personnel will be informed through inductions and daily operational meetings of their duty to report HSE incidents and hazards. Reported HSE incidents and hazards will be shared during daily operational meetings and will be documented in the incident management systems as appropriate. HSE incidents will be investigated using root cause analysis.

Environmental recordable and reportable incidents will be reported to NOPSEMA as required, in accordance with **Table 8.4**. The incident reporting requirements will be provided to all crew on board the facilities and vessels with special attention to the reporting time frames to provide for accurate and timely reporting.

For the purposes of this Activity, in accordance with regulation 4 of the OPGGS(E) Regulations:

- + a recordable incident, for an Activity, means a breach of an EPO or EPS, in this EP that applies to the Activity, that is not a reportable incident
- + a reportable incident, for an Activity, means an incident relating to the Activity that has caused, or has the potential to cause, moderate to significant environmental damage.

For the purposes of this EP, a reportable incident is an incident that is assessed to have an environmental consequence of moderate or higher in accordance with the Santos environmental impact and risk assessment process outlined in **Section 5**.

## 8.7 Reporting and notifications

OPGGSR 2009 Requirements
<b>Regulation 14(2)</b>
<p>The implementation strategy must:</p> <ul style="list-style-type: none"> <li>(a) state when the titleholder will report to the Regulator in relation to the titleholder’s environmental performance for the activity; and</li> <li>(b) provide that the interval between reports will not be more than 1 year.</li> </ul> <p>Note: Regulation 26C requires a titleholder to report on environmental performance in accordance with the timetable set out in the environment plan.</p>
<b>Regulation 14(7)</b>
<p>The implementation strategy must provide for sufficient monitoring of, and maintaining a quantitative record of, emissions and discharges (whether occurring during normal operations or otherwise), such that the record can be used to assess whether the environmental performance outcomes and standards in the environment plan are being met.</p>

### 8.7.1 Notifications and compliance reporting

Regulatory, other notification and compliance reporting requirements are summarised in **Table 8.4**.

**Table 8.4: Activity notification and reporting requirements**

Initiation	Required Information	Timing	Type	Recipient
<b>Before the Activity</b>				
AMSA/AHO (refer <b>Table 4.13</b> )	Notification of proposed start and end dates and any other relevant information for the Notice to Mariners to be issued.  AMSA's JRCC requires the: <ul style="list-style-type: none"> <li>+ vessel and MODU details (including name, callsign and Maritime Mobile Service Identity)</li> <li>+ satellite communications details (including INMARSAT-C and satellite telephone numbers)</li> <li>+ area of operation</li> <li>+ requested clearance from other vessels</li> <li>+ any other information that may contribute to safety at sea</li> <li>+ when operations start and end.</li> </ul>	At least 48 hours before operations begin.	Written	AMSA's JRCC <a href="mailto:rccaus@amsa.gov.au">rccaus@amsa.gov.au</a>
		No less than four weeks before operations.	Written	AHO <a href="mailto:datacentre@hydro.gov.au">datacentre@hydro.gov.au</a>
Quarterly Updates	The Activity will be included in the Quarterly Update until the Activity has ended.	Quarterly	Online on Santos' website and automated notifications to registered/ subscribed interested parties	Relevant Persons and any other interested party who has registered or subscribed for Quarterly Updates.

Initiation	Required Information	Timing	Type	Recipient
Department of Agriculture, Fisheries and Forestry (refer <b>Table 4.13</b> )	In accordance with control measure BAD-CM-023, Santos will: <ul style="list-style-type: none"> <li>+ pursuant to the <i>Biosecurity Act 2015</i> and the <i>Biosecurity (Exposed Conveyances – Exceptions from Biosecurity Control) Determination 2016</i>, undertake a vessel biosecurity risk and be assessed as ‘low’ by the Commonwealth Department of Agriculture before interacting with domestic vessels and aircraft</li> <li>+ undertake pre-arrival approval for the vessels (where applicable) using the Maritime Arrivals Reporting System (MARS) to meet the DAFF biosecurity reporting obligations.</li> </ul>	Where applicable, apply for biosecurity risk assessment at least one month before Activity begins. MARS reporting at least 12 hours before arrival.	Written	DAFF Biosecurity
DAFF (Fisheries)	Prior notification of planned Activity commencement for the purpose of awareness of potential impacts to Commonwealth fishery licence holders.	No less than four weeks prior to the start of activities.	Written	
Department of Defence	Prior notification of planned Activity commencement, for the purposes of: <ul style="list-style-type: none"> <li>+ consideration of Defence activities</li> <li>+ consideration of restricted airspace</li> </ul>	No less than five weeks prior to the start of activities.	Written	Department of Defence
Department of Primary Industries and Regional Development (DPIRD)	Prior notification of planned Activity commencement for the purpose of awareness of potential impacts to WA State fishery licence holders.	No less than four weeks prior to the start of activities.	Written	DPIRD
Western Australian Fishing Industry Council (WAFIC)	Prior notification of planned Activity commencement for the purpose of awareness of potential impacts to WA State fishery licence holders.	No less than four weeks prior to the start of activities.	Written	WAFIC
Marine user notifications to Relevant Persons identified in <b>Table 8.5</b> (as may be updated from time to time).	Prior notification to Operational Area marine users of planned Activity commencement.	At least ten days before the Activity begins	Written	As indicated in <b>Table 8.5</b> by email.

Initiation	Required Information	Timing	Type	Recipient
Tiwi Islands clan groups	Prior notification of planned Activity commencement.	At least ten days before the Activity begins	Written	Tiwi Resources (on behalf of Tiwi Islands clan groups). Tiwi Resources will notify clan group representatives.
Other First Nations Groups, as agreed through the post acceptance consultation implementation process. And through the NLC	Prior notification of planned Activity commencement.	At least ten days before the Activity begins	Written	As determined through the post acceptance consultation implementation process.
<u>OPGGS(E) Regulation 29 – Notification</u> NOPSEMA must be notified that the Activity is to begin	Complete NOPSEMA’s Regulation 29 Start or End of Activity Notification form before the Activity.	At least ten days before the Activity begins.	Written	NOPSEMA
<u>OPGGS(E) Regulation 30 – Notification</u> NT Department of Industry, Tourism and Trade (DITT) must be notified that the Activity is to begin	Provide DITT a notification of Activity commencement under Regulation 30.	At least 10 days before the Activity begins.	Written	NTDITT – Energy Division
<b>During the Activity</b>				
<u>OPGGS(E) Regulation 26C – Environmental Performance</u> NOPSEMA must be notified of the environmental performance at the intervals provided for in the EP	Report must contain sufficient information to determine whether or not EPO and EPS in the EP have been met. Report will also address progress of Santos’ identification and/or implementation of sea country initiatives.	An environmental performance report will be submitted to NOPSEMA annually from the date of acceptance of this EP.	Written	NOPSEMA

Initiation	Required Information	Timing	Type	Recipient
<p><u>OPGGS(E) Regulations 26 &amp; 26A – Reportable Incident</u></p> <p>NOPSEMA must be notified of any reportable incidents</p> <ul style="list-style-type: none"> <li>+ A reportable incident is defined as per Section 8.6.</li> </ul>	<p>The oral notification must contain:</p> <ul style="list-style-type: none"> <li>+ all material facts and circumstances concerning the reportable incident known or able to be found out by reasonable search or enquiry</li> <li>+ any action taken to avoid or mitigate any adverse environmental impacts of the reportable incident</li> <li>+ the corrective action that has been taken, or is proposed to be taken, to stop, control or remedy the reportable incident.</li> </ul>	<p>As soon as practicable, and in any case not later than two hours after the first occurrence of a reportable incident, <u>or</u> if the incident was not detected at the time of the first occurrence, at the time of becoming aware of the reportable incident.</p>	Oral	NOPSEMA
	<p>A written record of the oral notification must be submitted. The written record is not required to include anything that was not included in the oral notification.</p>	<p>As soon as practicable after the oral notification.</p>	Written	NOPSEMA NOPTA
	<p>A written report must contain:</p> <ul style="list-style-type: none"> <li>+ all material facts and circumstances concerning the reportable incident known or by reasonable search or enquiry could be found out</li> <li>+ any action taken to avoid or mitigate any adverse environmental impacts of the reportable incident</li> <li>+ the corrective action that has been taken, or is proposed to be taken, to stop, control or remedy the reportable incident</li> <li>+ the action that has been taken, or is proposed to be taken, to prevent a similar incident occurring in the future</li> <li>+ reporting using NOPSEMA’s Report of an Accident, Dangerous Occurrence or Environmental Incident form.</li> </ul>	<p>Must be submitted as soon as practicable, and in any case not later than three days after the first occurrence of the reportable incident unless NOPSEMA specifies otherwise.</p> <p>Same report to be submitted to National Offshore Petroleum Titles Administrator (NOPTA) within seven days after giving the written report to NOPSEMA.</p>	Written	NOPSEMA NOPTA



Initiation	Required Information	Timing	Type	Recipient
<u>AMSA Reporting</u>	Titleholder agrees to notify AMSA of any marine pollution incident <sup>35</sup> .	Notification within two hours of incident.	Oral	AMSA JRCC
	Harmful Substances Report and SITREP available online (refer OPEP).	Harmful Substances Report as requested by AMSA following verbal notification. Report must be given to AMSA within 24 hours of request.	Written	AMSA JRCC
<u>DBCA-WA Reporting</u> Notification in the event of a hydrocarbon release	Verbal notification of any hydrocarbon release.	Verbal notification as soon as reasonably practicable.	Oral	DBCA-WA Kimberly regional office
<u>Director of National Parks Reporting</u> Notification of the event of oil pollution within a marine park or where an oil spill response action must be taken within a marine park (requested through consultation)	<p>The DNP should be made aware of oil/gas pollution events which occur within a marine park or are likely to impact on a marine park as soon as possible. Notification should be provided to the 24-hour Marine Compliance Duty Officer on 0419 293 465. The notification should include:</p> <ul style="list-style-type: none"> <li>+ titleholder details</li> <li>+ time and location of the incident (including name of marine park likely to be affected)</li> <li>+ proposed response arrangements as per the OPEP (such as dispersant, containment, etc.)</li> <li>+ confirmation of providing access to relevant monitoring and evaluation reports when available</li> <li>+ contact details for the response coordinator.</li> </ul> <p>Note that the DNP may request daily or weekly Situation Reports, depending on the scale and severity of the pollution incident.</p>	Verbal notification as soon as reasonably practicable.	Oral	Director of National Parks

<sup>35</sup> For clarity and consistency across Santos regulatory reporting requirements Santos will meet the requirement of reporting marine oil pollution by reporting oil spills assessed to have an environmental consequence of moderate or higher in accordance with Santos' environmental impact and risk assessment process outlined in **Section 5**.

Initiation	Required Information	Timing	Type	Recipient
<u>DCCEEW Reporting</u> Any harm or mortality to EPBC Act- listed threatened marine fauna Discovery of underwater cultural heritage	Notification of any harm or mortality to an EPBC listed species of marine fauna whether attributable to the Activity or not.	Within seven days to <a href="mailto:EPBC.permits@environment.gov.au">EPBC.permits@environment.gov.au</a> .	Written	DCCEEW
	If MNES are considered at risk from a spill or response strategy, or where there is death or injury to a protected species.	Email notification as soon as practicable.	Written	DCCEEW (Director of monitoring and audit section)
	Underwater cultural heritage details recorded in online database if discovered during Activity and notified to DCCEEW.	As soon as practicable, in any case no later than 21 days after discovery.	Written	DCCEEW
<u>Australian Marine Mammal Centre Reporting (DCCEEW)</u> Any ship strike incident with cetaceans will be reported to the National Ship Strike database	Ship strike report provided to the Australian Marine Mammal Centre: <a href="https://data.marinemammals.gov.au/report/shipstrike">https://data.marinemammals.gov.au/report/shipstrike</a> .	As soon as practicable.	Written	DCCEEW
<u>NT Department of Environment, Parks and Water Security (DEPWS)</u> <u>NT Environmental Protection Authority (EPA)</u> All actual or impending spills in NT waters	Verbal reporting will consist of transfer of information to conduct a coordinated emergency response. All reporting will be performed by the vessel master as per the vessel -specific SOPEP.	As soon as practicable.	Oral	DEPWS; NT EPA (Pollution Response Hotline; Environmental Operations)
	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.	Written report as soon as practicable.	Written	DEPWS; NT EPA (Pollution Response Hotline; Environmental Operations)
AFMA	Verbal notification if any spill may affect Commonwealth fisheries within the EMBA.	Verbal notification within eight hours.	Verbal	AFMA
DFAT	Any oil spill that has entered or is likely to enter international waters.	Verbal phone call notification within 8 hours, if the spill is likely to extend into international waters.	Verbal	DFAT (24-hour consular emergency centre)
		Follow up with email outlining details of incident.	Written	DFAT (24-hour consular emergency centre)

Initiation	Required Information	Timing	Type	Recipient
Consultation with AMSA (refer <b>Table 4.13</b> )	Notification of updates to both AHO and JRCC on progress and, importantly, any changes to the intended operations.	As soon as possible.	Written	AMSA's JRCC AHO
Tiwi Resources (Ranger Coordinator), Tiwi Land Council and Munupi Clan members	Notification of all spills heading towards the Tiwi Islands.	Within eight hours of incident being identified	Oral – by phone call	Tiwi Resources (Ranger Coordinator), Tiwi Land Council and Munupi Clan members
	Follow up email notification outlining details of incident.	After oral notification.	Written	Tiwi Resources (Ranger Coordinator), Tiwi Land Council and nominated Munupi Clan members (per OPEP, Table 7-1), subject to obtaining relevant email addresses.
Other First Nations Groups, as agreed through the post acceptance consultation implementation process and through the NLC	Notification of all spills heading towards the relevant parties' interests.	Within eight hours of incident being identified.	Oral – by phone call	As determined through the post acceptance consultation implementation process.
	Follow up email notification outlining details of incident.	After oral notification.	Written	As determined through the post acceptance consultation implementation process.
<b>End of the Activity</b>				
<u>OPGGs(E) Regulation 29 – Notifications</u> NOPSEMA must be notified that the Activity is completed	Complete NOPSEMA's Regulation 29 Start or End of Activity Notification form.	Within ten days after finishing the Activity.	Phone call and written	NOPSEMA

Initiation	Required Information	Timing	Type	Recipient
<p><u>OPGGs(E) Regulation 25A</u>            EP ends when titleholder notifies completion and the Regulator accepts the notification            NOPSEMA must be notified that the Activity has ended and all EP obligations have been completed</p>	Notification advising NOPSEMA of end of all activities to which the EP relates and that all obligations have been completed.	At the completion of the Activity and all EP obligations.	Written	NOPSEMA
AMSA (JRCC) Consultation	Notification that Activity has completed.	Within ten days of completion.	Written	JRCC
AHO	Notification that Activity has completed.	Within ten days of completion.	Written	AHO
DAFF	Notification that Activity has completed.	Within ten days of completion.	Written	DAFF
DoD	Notification that Activity has completed.	Within ten days of completion.	Written	DoD
DPIRD	Notification that Activity has completed.	Within ten days of completion.	Written	DPIRD
WAFIC	Notification that Activity has completed.	Within ten days of completion.	Written	WAFIC
Marine user notifications to Relevant Persons identified as in <b>Table 8.5</b> (as may be updated from time to time).	Notification to Operational Area marine users that Activity has completed.	Within ten days of completion.	Written	As indicated in <b>Table 8.5</b> by email
Tiwi Islands clan groups	Notification that Activity has completed.	Within ten days of completion.	Written	Tiwi Resources (on behalf of Tiwi Islands clan groups). Tiwi Resources will notify clan group representatives.
Other First Nations Groups, as agreed through the post acceptance consultation implementation process and through the NLC	Notification that Activity has completed.	Within ten days of completion.	Written	As determined through the post acceptance consultation implementation process.

**Table 8.5: Marine user notification recipients**

Relevant Person to be issued marine user notifications	Notification Recipient
Australian Border Force (ABF)	ABF
Australian Fisheries Management Authority (AFMA)	AFMA
Australian Institute of Marine Science (AIMS)	AIMS
Department of Defence – Navy (DoD – Navy)	DoD - Navy
NT Department of Industry, Tourism & Trade - Fisheries (NTDITT – Fisheries Division)	NTDITT - Fisheries
NT Seafood Council (NTSC)	NTSC
NT Guided Fishing Industry Association	NT Guided Fishing Industry Association
Tourism NT	Tourism NT
Top End Tourism	Top End Tourism
Northern Prawn Fishing Industry Pty Ltd (NRFI)	NRFI
Northern Prawn Fishery commercial licence-holders	NRFI
Northern Territory Seafood Council (NTSC)	NTSC
NT Timor Reef Fishery commercial licence holders	NTSC
Australian Southern Bluefin Tuna Industry Association (ASBTIA)	ASBTIA
Southern Bluefin Tuna Fishery licence-holders	ASBTIA and AFMA
Western Skipjack Tuna Fishery licence-holders	ASBTIA and AFMA
Western Tuna and Billfish Fishery licence-holders	ASBTIA and AFMA
Aquarium Fishery licence-holders	NTSC and NTDITT – Fisheries Division
Spanish Mackerel Fishery licence-holders	NTSC and NTDITT – Fisheries Division
Demersal Fishery licence-holders	NTSC and NTDITT – Fisheries Division
Offshore Net and Line Fishery licence-holders	NTSC and NTDITT – Fisheries Division
Small Pelagic (Development) Fishery licence-holders	NTSC and NTDITT – Fisheries Division
Pearl Oyster Fishery licence-holders	NTSC and NTDITT – Fisheries Division

Eni Australia Ltd	Eni Australia Ltd
Woodside Energy Ltd	Woodside Energy Ltd
Inpex Ichthys Pty Ltd	Inpex Ichthys Pty Ltd

## 8.7.2 Monitoring and recording emissions and discharges

OPGGs(E)R 2009 Requirements
<b>Regulation 10A(e)</b>
Includes an appropriate implementation strategy and monitoring, recording and reporting arrangements.
<b>Regulation 14 (7)</b>
The implementation strategy must provide for sufficient monitoring of, and maintaining a quantitative record of, emissions and discharges (whether occurring during normal operations or otherwise), such that the record can be used to assess whether the environmental performance outcomes and standards in the environment plan are being met.

Discharges to the marine environment associated with this Activity will be recorded and controlled in accordance with requirements under relevant marine orders and/or MARPOL requirements.

Santos and MODU/vessel contractors will maintain records so that emissions and discharges can be determined or estimated. Such records will be maintained for a period of five years. Contractors are required to make these records available upon request.

In addition, Santos will maintain records of discharges or emissions (where practicable), to the environment as described in **Table 8.6**.

**Table 8.6: Monitoring of emissions and discharges**

Discharge/emission	Parameter	Quantitative Record
Drilling chemicals (discharged to marine environment as per <b>Section 6.7</b> )	Volumes consumed Average oil on cuttings (NAF)	Volumes used will be estimated based on known inventories
Air emissions	Fuel volume Flared hydrocarbons	GHG calculations based on measured fuel use and flared hydrocarbons in accordance with NGERs reporting requirements
Oily water during well flowback	Volume and location	Measured volume included in a well flowback report
Oily water	Volume and location	Oil Record Book* or equivalent report
Garbage (including food scraps)	Volume and location	Volumes recorded in Garbage Record Book*
Sewage	Volume and location	Estimated based on POB and days on location
Unplanned discharge of solid objects	Volume	NOPSEMA recordable or reportable incident reports as per <b>Table 8.4</b>
Unplanned discharge of hazardous liquids	Volume	NOPSEMA recordable or reportable incident reports as per <b>Table 8.4</b>
Unplanned hydrocarbon release	Volume	NOPSEMA recordable or reportable incident reports as per <b>Table 8.4</b>

\*Maintained as per vessel class in accordance with relevant Marine Orders.

## 8.8 Document management

### 8.8.1 Information management and document control

This EP and OPEP, as well as approved management of change documents, are controlled documents and current versions will be available on Santos' intranet. Santos contractors are also required to maintain current versions of these documents.

Environmental performance outcomes and standards will be measured based on the measurement criteria listed in **Table 8.2**. Such records will be maintained for a period of five years. Contractors are required to make these records available upon request.

### 8.8.2 Management of change

The Management of Change (MoC) process provides a systematic approach to initiate, assess, approve, implement and close out actions associated with the change in Activity. Implementation of the MoC process is designed so that all activities undertaken by Santos are in full compliance with regulatory approvals and conditions and that changes have been properly considered, risk assessed, approved and communicated to all appropriate stakeholders accompanied by a detailed record of the change in Activity.

The MoC process considers Regulations 7, 8 and 17 of the OPGGS(E)R 2009 and determines if a proposed change can proceed and the manner in which it can proceed. The MoC procedure will determine whether a revision of the EP is required and whether that revision is to be submitted to NOPSEMA. For a change to proceed, the associated environmental impacts and risks must be demonstrated to be acceptable and ALARP. Additional consultation with Relevant Persons may be appropriate, depending on the nature and scale of the change.

The MoC procedure also allows for the assessment of new information that may become available after EP acceptance. When feedback is received from external stakeholders, consideration will be given as to whether it includes information concerning the environmental impacts or risks of Santos' activities, and if so, whether these impacts or risks were provided for in the relevant approval documentation (eg in this EP). If not provided for, the MoC process will be initiated in a timely manner in order for the significance of the new or increased impacts or risks to be assessed.

Accepted MoCs become part of the in-force EP or OPEP, are tracked on a register and are made available on Santos' intranet. Where appropriate, the EP compliance register will be updated so that CM or EPS changes are communicated to the workforce and implemented. Any MoC will be distributed to the relevant roles identified in **Table 8.3**, and the most relevant management position is responsible for communication and implementation of the MoC. This may include crew meetings, briefings or communications as appropriate for the change.

### 8.8.3 Reviews

This EP has assessed impacts and risk across the entire Operational Area, during any time of the year, for planned and unplanned events given the nature of the 24/7 operations and the length of time for which the Activity will continue.

It is recognised that during the period for which this EP is in force, the following may change:

- + legislation
- + businesses conditions, activities, systems, processes and people
- + industry practices
- + science and technology
- + societal and Relevant Persons expectations.



The following tasks are undertaken so that Santos maintains up-to-date knowledge of the industry, legislation and conservation advice:

- + Maintain membership of APPEA (Australian Petroleum Production & Exploration Association), which provides a mechanism for communicating potential changes in legislation, industry practice and other issues that may affect EP implementation to relevant personnel in Santos.
- + Undertake annual spill response exercises to check spill response arrangements and capability are adequate.
- + Identify and consult Relevant Persons under regulation 11A of the OPGGS(E)R (refer to **Section 3.2.8.8**) and undertake post acceptance implementation consultation as outlined in **Section 8.10**.
- + Subscribe to various regulator updates.
- + Have regular liaison meetings with NOPSEMA.

If identified changes have an impact on the Activity or risks described and assessed in this EP, the EP will be reviewed and any changes required are to be assessed and documented in accordance with Santos' MoC procedure (**Section 8.8.2**).

## 8.9 Audits and inspections

<b>OPGGS(E)R 2009 Requirements</b>
<b>Regulation 14(6)</b>
The implementation strategy must provide for sufficient monitoring, recording, audit, management of nonconformance and review of the titleholder's environmental performance and the implementation strategy to ensure that the environmental performance outcomes and standards in the environment plan are being met.

### 8.9.1 Assurance and audits

Santos maintains a risk based activity assurance and audit schedule which is reviewed and updated from time to time.

Assurance activities and audits will be undertaken in a manner consistent with Santos' Assurance Operating Standard SMS-LRG-OS03.

During the Activity, an assurance review against the EP and/or OPEP will be performed at least annually, and may be desktop only or include a field-based component.

Assurance and audit findings may include opportunities for improvement and non-conformances. Audit non-conformances are managed as described in **Section 8.9.3**.

### 8.9.2 Inspections

HSE inspections will be conducted at least monthly during the Activity to identify hazards, incidents and EP non-conformances. These inspections will also check compliance against a selection of the EPOs and EPSs of this EP (**Table 8.2**) and inform end of Activity reporting (**Table 8.4**).

### 8.9.3 Non-compliance management

EP non-compliances will be addressed and resolved by a systematic corrective action process as outlined in Santos' Compliance Operating Standard (SMS-LRG-OS04). Non-compliances arising from audits and inspections will be entered into Santos' incident and action tracking management system (i.e., HSE Toolbox). Once entered, corrective actions, time frames and responsible persons (including action owners and event validators) will be assigned. Corrective action 'close out' will be monitored using a management escalation process.

### 8.9.4 Continuous improvement

For this EP, continuous improvement will be driven by:

- + improvements identified from the review of business-level HSE key performance indicators
- + actions arising from Santos and departmental HSE improvement plans
- + corrective actions and feedback from HSE audits and inspections, incident investigations and after-action reviews
- + opportunities for improvement and changes identified during pre-activity reviews and MoC documents
- + actions taken to address objections or claims, and issues raised during the post acceptance consultation implementation process (**Section 8.10**).

This may result in a review of the EP, with changes applied in accordance with **Section 8.8.2**.

Identified continuous improvement opportunities will be assessed in accordance with the MoC process so that any potential changes to this EP, or OPEP, are managed in accordance with the OPGGS(E)R 2009 and in a controlled manner.

## 8.10 Post Acceptance consultation implementation strategy

OPGGS(E)R 2009 Requirements
Regulation 14(9)
<p>The implementation strategy must provide for appropriate consultation with:</p> <ul style="list-style-type: none"> <li>(a) relevant authorities of the Commonwealth, a State or Territory; and</li> <li>(b) other relevant interested persons or organisations.</li> </ul>

Santos is committed to appropriate post acceptance consultation implementation for this Activity with relevant government authorities and other relevant interested persons and organisations. Having regard to the nature of relevant interested persons and organisations, Santos' post acceptance consultation implementation strategy has been tailored to provide for effective consultation with different groups, based on Santos' experience consulting with these groups previously.

### 8.10.1 Post-acceptance consultation implementation strategy with First Nations Groups

Santos will undertake consultation over the life of the activity primarily through representative organisations. Having regard to Santos' experience consulting with First Nations groups, and feedback from First Nations relevant persons, Santos considers that consultation through representative bodies provides an appropriate mechanism for ongoing consultation with First Nations relevant interested persons, in that representative bodies provide for regular, culturally appropriate engagement with First Nations persons in order to ensure information can be disseminated to communities regularly and in a manner which is readily accessible to First Nations group. Consultation will be undertaken on a regular basis, particularly through activity planning and execution, with nominated representatives (as nominated by each of the representative organisations) of the:

- + Northern Land Council, Tiwi Land Council and Kimberley Land Council.
- + Tiwi Islands people.
- + Mulurryud Consultative Committee (Croker Island people)
- + Other First Nations people who wish to be consulted going forward.

More broadly, Santos is seeking to establish a network of consultative committees to support consultation activities for other proposed regional activities, building on the consultation model developed by the representatives of the Mulurryud Consultative Committee in response to Santos' engagement activities.

Santos recognises the Mulurryud Consultative Committee as a representative forum for the purpose of Reg 11A consultation. Santos has been provided a copy of the Committee's charter, which includes details the committee's purpose of enabling culturally appropriate consultation with the First Nations peoples of Croker Island through committee membership representing and comprising traditional owners and custodians of Croker Island and surrounding sea country.

To this end Santos will continue to work with its external First Nations cultural advisers to help identify where consultative committees should be established for other Santos activities based on activity-specific impacts and risks. Santos recognises that the connectedness of these cultural advisers have to regional communities and the role they play in interpreting technical industry information for communities where English may be a fifth language.

Post-implementation consultation will include consideration of culturally appropriate management measures where First Nations people believe that there may be impacts or risks, or have concerns with regards to:

- + Traditional lands and waters
- + Sea country interests
- + Totemic species
- + Other cultural values or sensitivities of importance

As per the Croker Island model, it is envisaged that other regional committees will self-determine committee membership to be representative of those who have authority to speak for country in accordance with traditional lore and custom.

Santos acknowledges that these committees will provide appropriate fora for consultation, complementary to those activities undertaken through Land Councils and Aboriginal Corporations which typically have more legally defined representative functions.

The activities of these committees are proposed to be supplemented with broader community information sessions, as well as regular updates to Land Councils and Aboriginal Corporations on activity milestones and achievements.

## 8.10.2 Post-acceptance consultation implementation strategy - approach

Formal acceptance of the EP will be communicated via the NOPSEMA website. Santos will also provide access to the EP via the NOPSEMA website and will provide details on the Santos website on how to provide ongoing feedback in relation to the Drilling and Completions Activity.

Activity notifications and reports will be made in accordance with **Table 8.4**. The notifications and reports are based on legislative requirements, standing arrangements with particular Relevant Persons, Relevant Persons' requests for notification made during Regulation 11A consultation or as otherwise deemed appropriate by Santos.

Following Activity commencement, Santos will provide quarterly updates on the Activity. The updates will be posted on Santos' website, with notifications to registered / subscribed interested parties.

Santos will continue to accept, assess and respond to post acceptance consultation feedback during the life of the Activity. Records of any post acceptance consultation will be maintained in an appropriate Santos consultation database.

If, during the course of post acceptance consultation, Santos receives information demonstrating a new or increased environmental impact or risk that is not provided for in this EP, as in force at the time, Santos will apply its Management of Change process outlined in **Section 8.8.2**.

Santos will maintain a database of relevant authorities, and other relevant interested persons and organisations for this Activity. This includes updating its database in light of post acceptance consultation, including identification of new Relevant Persons, and information obtained during Regulation 11A consultation in the preparation of subsequent EPs for the Barossa Gas Project. This database will be used to inform the Activity notifications as detailed in **Table 8.4**.

Santos is developing a community engagement package with senior representatives of the communities on the Tiwi and Croker Islands that will include the above suggestions and other initiatives to ensure that the First Nations people and communities will share in the benefits of Barossa Gas Project proceeding.

## 8.11 Other Measures

During the preparation of this EP, including as a result of consultation with Relevant Persons, Santos has identified additional measures which it considers are appropriate to implement. These measures are not control measures, as defined in the OPGGS(E)R, because they are not intended to be used by Santos as a basis for managing environmental impacts and risks. Some measures are not properly characterized as 'control measures' in respect of the Activity because they relate to operations outside of the operational area, which are not regulated under this EP. Notwithstanding this, Santos considers it appropriate to adopt the following measures as part of its implementation strategy:

- + In response to concerns raised by some Tiwi Island Clan members, Santos will commit to no planned crew change flights over the Tiwi Islands (including Seagull Island), unless required for safe operations or emergency response.
- + Santos will also, through relevant Land Councils (who are relevant persons) and other relevant persons, consult to identify and implement worthwhile First Nations initiatives that could include, but are not necessarily be limited to:
  - employment of cultural awareness community observers (CACOs), who will conduct cultural awareness inductions for field based staff across each of the major work packages.
  - support of ranger programs and studies to help First Nations people preserve environmental and cultural features and values on their country.
  - seeking to facilitate employment opportunities for First Nations people as trainee HSE advisors for drilling and completions activities, subject to the availability and participation of First Nations trainees, with a view to them obtaining HSE qualifications and competencies to enable future ongoing employment in HSE. Further, Santos plans to discuss the way in which it might be able to facilitate presentations by the trainee advisers to their communities about HSE management of the drilling and completions activities.
  - periodic community townhalls across regional locations relevant to the Barossa Project, to provide Project updates and to provide an opportunity for feedback from CACOs to assist in the development of any potential improvement programs.
  - Santos to facilitate trips to the drilling site, at intervals (as necessary), taking into account cultural advice as to the most appropriate clan members to attend such trips.

Santos also acknowledges that some First Nations clans and individuals consider that they have cultural and spiritual beliefs and connections to the seas. The intangible spiritual and cultural connections and beliefs

identified as part of the preparation of this EP (see **Section 3.2.8**) did not identify or link to any specific place (which is capable of some certainty). Santos is committed to working with relevant land councils, other First Nations organisations, and cultural liaisons to ensure that relevant senior and authoritative First Nations community members are engaged with Santos on the identification and implementation of any other appropriate cultural practices by Santos in relation to intangible spiritual and/or cultural heritage connections and beliefs that they commonly use when travelling through country where they believe spiritual beings may exist. For example, a common practice is the use of ceremonies to introduce activities or the presence of strangers to spiritual beings.

## 9 References

- [ABARES] Australian Bureau of Agricultural and Resource Economics and Sciences (2020). Fisheries Status Reports. Australian Government Department of Agriculture, Water, and the Environment.
- Air Services Australia (2020). Short Term Noise Monitoring Program, Strathmore Heights, Essendon Airport, Melbourne. Version 1.0. Available online: <https://www.airservicesaustralia.com/wp-content/uploads/Short-Term-Monitoring-Program-Strathmore-Heights-VIC-September-2020.pdf>.
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## APPENDIX A – SANTOS' ENVIRONMENT, HEALTH AND SAFETY POLICY

### Environment, Health & Safety



#### Policy

##### Our Commitment

Santos is committed to being the safest gas company wherever we have a presence and preventing harm to people and the environment

##### Our Actions

We will:

1. Integrate environment, health and safety management requirements into the way we work
2. Comply with all relevant environmental, health and safety laws and continuously improve our management systems
3. Include environmental, health and safety considerations in business planning, decision making and asset management processes
4. Identify, control and monitor risks that have the potential for harm to people and the environment, so far as is reasonably practicable
5. Report, investigate and learn from our incidents
6. Consult and communicate with, and promote the participation of all workers to maintain a strong environment, health and safety culture
7. Empower our people, regardless of position, to "Stop the Job" when they feel it necessary to prevent harm to themselves, others or the environment
8. Work proactively and collaboratively with our stakeholders and the communities in which we operate
9. Set, measure, review and monitor objectives and targets to demonstrate proactive processes are in place to reduce the risk of harm to people and the environment
10. Report publicly on our environmental, health and safety performance

##### Governance

The Environment Health Safety and Sustainability Committee is responsible for reviewing the effectiveness of this policy.

This policy will be reviewed at appropriate intervals and revised when necessary to keep it current.

Kevin Gallagher

Managing Director & CEO

Status: APPROVED

Document Owner:	David Banks, Chief Operating Officer		
Approved by:	The Board	Version:	3

15 August 2022

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**APPENDIX B - REQUIREMENTS (INCLUDING LEGISLATIVE  
REQUIREMENTS) APPLICABLE TO THE ACTIVITY**

**Table B-1: Applicable Commonwealth Legislation**

Requirement / Legislation	Summary	Applicable to Activity and relevant to environmental management?	Administering authority	How Santos will meet requirements
<p><i>Aboriginal and Torres Strait Islander Heritage Protection Act 1984</i> (Cth) (ATSIHP Act)</p>	<p>This Act provides for the preservation and protection from injury or desecration areas and objects in Australia and Australian waters that are of significance to Aboriginal people in accordance with Aboriginal tradition. The Minister may make a declaration to protect such areas and objects. The Act also requires the discovery of Aboriginal remains to be reported to the Minister.</p>	<p>No – the ATSIHP Act is not directly relevant to the environmental management of the Activity as there are no areas within the operational area or the EMBA that have been the subject of a 'significant Aboriginal areas' declaration under the ATSIHP Act. However, in the event such areas are declared in the future, this Act could potentially become relevant to the activities. Accordingly, this Act has been identified in Table B-1 for completeness.</p>	<p>Commonwealth – Attorney-General's Department Commonwealth – Department Climate Change, Energy, the Environment and Water</p>	<p>There are no requirements arising under the ATSIHP Act that apply to the environmental management of the Activity. Refer to <b>Section 3.2.7.8</b> – Heritage and <b>Section 3.2.8</b> – Cultural Features in relation to cultural features more broadly.</p>
<p><i>Aboriginal Land Rights (Northern Territory) Act 1976</i> (Cth) (ALR Act)</p>	<p>An Act providing for the granting of Traditional Aboriginal Land in the Northern Territory for the benefit of Aboriginals, and for other purposes. Establishes Land Councils and enables them to operate.</p>	<p>No – the ALR Act is not directly relevant to environmental management of the Activity. There are no predicted impacts to land or nearshore locations (including the Tiwi Islands) associated with the Activity. However, the TLC which is established under the ALR Act, represents Tiwi people in the protection of land, sea and environment. Accordingly, this Act has been identified in Table B-1 for completeness (and to provide context for the consultation undertaken by Santos with the TLC and Tiwi people in the course of preparing</p>	<p>Commonwealth – Attorney-General's Department Commonwealth – Department of the Prime Minister and Cabinet Tiwi Land Council (TLC)</p>	<p>There are no requirements arising under the ALR Act that apply to the environmental management of the Activity. Refer to <b>Section 3.2.7.8</b>– Heritage and <b>Section 3.2.8</b> – Cultural Features in relation to cultural features more broadly. Refer also to <b>Section 3.2.8.8</b> in relation to consultation with the TLC and Tiwi people.</p>

Requirement / Legislation	Summary	Applicable to Activity and relevant to environmental management?	Administering authority	How Santos will meet requirements
<p><i>Native Title Act 1993</i> (Cth) (NTA)</p>	<p>The <i>Native Title Act 1993</i> (Cth) recognises the rights and interests of Aboriginal and Torres Strait Islander people in land and waters according to their traditional laws and customs, and creates processes through which native title can be recognised and protected.</p> <p>Under s 280(2) of the OPGGS Act, petroleum activities must be carried out in a manner that does not interfere with the enjoyment of native title rights and interests under the NTA to a greater extent than necessary.</p>	<p>No – the NTA is not directly relevant to environmental management of the Activity. There are no native title claims or determinations within the operational area or the EMBA.</p> <p>However, the NLC is a Representative Aboriginal/Torres Strait Islander Body under the NTA for parts of the operational area and EMBA.</p> <p>Accordingly, this Act has been identified in Table B-1 for completeness (and to provide context for the consultation undertaken by Santos with the NLC in the course of preparing this environment plan).</p>	<p>Commonwealth – Attorney-General's Department</p> <p>Commonwealth – Department of the Prime Minister and Cabinet</p> <p>National Native Title Tribunal</p> <p>Federal Court of Australia</p>	<p>There are no requirements arising under the NTA that apply to the environmental management of the Activity.</p> <p>Refer to <b>Section 3.2.7.8</b>– Heritage and <b>Section 3.2.8</b> – Cultural Features in relation to cultural features more broadly.</p> <p>Refer also to <b>Section 3.2.8.8</b> - Consultation in relation to consultation with NLC.</p>
<p><i>Australian Heritage Council Act 2003</i> (Cth) (AHC Act)</p>	<p>This Act identifies areas of heritage value listed on the Register of the National Estate and establishes the Australian Heritage Council and its functions.</p>	<p>No – the AHC Act is not directly relevant to environmental management of the Activity.</p> <p>While there are no world heritage properties, national heritage places or Commonwealth heritage places within the operational area, the modelled EMBA intersects the Ashmore Reef Nature Reserve and is in close proximity to the Scott Reef Nature Reserve. Both Scott Reef Nature Reserve and Ashmore Reef Nature Reserve are listed on the Register of the National Estate.</p> <p>The AHC Act has been identified in Table</p>	<p>Australian Heritage Council through Commonwealth – Department of Climate Change, Energy, the Environment and Water</p>	<p>There are no requirements arising under the AHC Act that apply to the environmental management of the Activity.</p> <p>Refer to <b>Section 3.2.7.8</b> – Heritage and to <b>Section 7.7</b> – hydrocarbon spill – marine diesel oil in respect of potential impacts on heritage places.</p>

Requirement / Legislation	Summary	Applicable to Activity and relevant to environmental management?	Administering authority	How Santos will meet requirements
		B-1 for completeness and context as to consideration of the AHC as a potential Relevant Person.		
<p><i>Australian Maritime Safety Authority Act 1990 (Cth) (AMSA Act)</i></p>	<p>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 Marine Orders in Commonwealth waters.</p> <p>The Act also aims to promote maritime safety, protect the marine environment from pollution and environmental damage from ships, provide for a national search and rescue service and promote the efficient provision of service by AMSA.</p> <p>AMSA is the lead agency for responding to oil spills in the marine environment and is responsible for the Australian National Plan for Maritime Environmental Emergencies.</p>	<p>Yes – while the Act does not contain any explicit requirements relevant to the environmental management of the Activity, it establishes and sets out the functions of AMSA, which functions relate to environmental management including in respect of response to spill events and administration of marine orders.</p>	<p>AMSA Commonwealth – Department of Infrastructure, Transport, Regional Development, Communications and the Arts</p>	<p>AMSA has been consulted as a Relevant Person – refer to <b>Section 3.2.8.8</b> -Consultation in preparing the environment plan, and will be notified throughout activities in accordance with Table 8-4. See also the following sections relevant to AMSA's functions:</p> <p><b>Section 7.4</b> – Non-hydrocarbon and chemicals release (surface) – liquids</p> <p><b>Section 7.7</b>– Hydrocarbon spill – marine diesel oil</p> <p><b>Section 7.8</b> – Minor hydrocarbon release (surface and subsea)</p>
<p>Marine Orders</p>	<p>Marine Orders are subordinate rules made pursuant to the <i>Navigation Act 2012 (Cth)</i>, <i>Protection of the Sea (Prevention of Pollution from Ships) Act 1983 (Cth)</i>, <i>Protection of the Sea (Harmful Anti-Fouling Systems) Act 2006 (Cth)</i> and the <i>Marine Safety (Domestic Commercial Vessel) National Law Act 2012 (Cth)</i> affecting the maritime industry. They are a means of</p>	<p>Yes - various Marine Orders apply to activities under this EP, including in relation to vessel movements, safety, discharges and emissions. The Marine Orders (MO) relevant to this EP include:</p> <ul style="list-style-type: none"> <li>+ MO 21 - Safety and emergency arrangements</li> <li>+ MO 27 – Safety of navigation and radio equipment</li> <li>+ MO 30 – Prevention of collisions</li> </ul>	<p>AMSA</p>	<p>Discharges to the marine environment will be recorded and controlled in accordance with relevant marine orders – refer <b>Section 8.7.2</b> (Monitoring and recording emissions and discharges). Santos has implemented control measures directed to ensuring compliance with Marine Orders – refer to <b>Section 8.2.1</b>.</p>

Requirement / Legislation	Summary	Applicable to Activity and relevant to environmental management?	Administering authority	How Santos will meet requirements
	<p>implementing Australia's international maritime obligations by giving effect to international conventions in Australian law.</p>	<ul style="list-style-type: none"> <li>+ MO 70 – Seafarer certification</li> <li>+ MO 91 – Marine pollution prevention - oil</li> <li>+ MO 93 – Marine pollution prevention – noxious liquid substances</li> <li>+ MO 94 – Marine pollution prevention – packaged harmful substances</li> <li>+ MO 95 – Marine pollution prevention - garbage</li> <li>+ MO 96 – Marine pollution prevention - sewage</li> <li>+ MO 97 – Marine pollution prevention – air pollution</li> <li>+ MO 98 – Marine pollution – anti-fouling systems</li> </ul>		<p>Refer also to the following sections relevant to the implementation of Marine Orders:</p> <p><b>Section 6.3</b> – Atmospheric Emissions</p> <p><b>Section 6.6</b> – Operational discharges</p> <p><b>Section 7.1</b> – Release of solid objects</p> <p><b>Section 7.2</b> – Introduction of invasive marine species</p> <p><b>Section 7.4</b> – Non-hydrocarbon and chemicals release</p> <p><b>Section 7.7</b> – Hydrocarbon spill – marine diesel oil</p> <p><b>Section 7.8</b> – Minor hydrocarbon release</p> <p><b>Section 7.9</b> – spill response operations</p>
<p><i>Biosecurity Act 2015</i> (Cth)</p> <p>Biosecurity Regulation 2016 (Cth)</p> <p>Australian Ballast Water Management Requirements, Version 8</p>	<p>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.</p> <p>This Act includes mandatory controls on the use of seawater as ballast in ships and the declaration of sea vessels voyaging out of and into Commonwealth waters. The Regulations stipulate that all information regarding the voyage of the vessel and the ballast water is declared</p>	<p>Yes - this Act and Regulations apply to all foreign vessels operating in Australian waters and must comply with the Australian Ballast Water Management Requirements.</p>	<p>Commonwealth – Department of Agriculture, Fisheries and Forestry</p>	<p>Refer to <b>Section 7.2</b> – Introduction of invasive marine species, and to <b>Section 8.2.1</b> – Control measures and performance standards which contains control measures in respect of the implementation of the Australian Ballast Water Management Requirements 2017</p>

Requirement / Legislation	Summary	Applicable to Activity and relevant to environmental management?	Administering authority	How Santos will meet requirements
	<p>correctly to the quarantine officers.</p> <p>Australian Ballast Water Management Requirements outline the mandatory ballast water management requirements to reduce the risk of introducing invasive marine species (IMS) into Australia's marine environment through ballast water from international vessels. These requirements are enforceable under the <i>Biosecurity Act 2015</i> (Cth) and include obligations under the International Convention for the Control and Management of Ships' Ballast Water and Sediments.</p>			
<p><i>Environment Protection and Biodiversity Conservation Act 1999</i> (Cth) (EPBC Act)</p> <p>Environment Protection and Biodiversity Conservation Regulations 2000 (Cth)</p>	<p>While the OPGGS (E) Regulations under the OPGGS Act (see below) regulate day to day petroleum activities and apply to any activity that may have an impact on the environment, the EPBC Act regulates the assessment and approval of proposed actions that are likely to have a significant impact on a matter of National Environmental Significance (MNES).</p> <p>Actions that are likely to have a significant impact on a MNES referral under the EPBC Act; the assessment process is administered by the Department of Climate Change, Energy, the Environment and Water. Schedule 8 of the EPBC Regulations outlines the Australian IUCN Reserve Management</p>	<p>Yes – the EPBC Act applies to all aspects of the Activity that have the potential to impact MNES, and the Regulations contain requirements regarding interactions with cetaceans.</p> <p>The Barossa Gas Project, including the drilling and completions activities, will be undertaken in accordance with the 'class approval' granted by the Commonwealth Environment Minister under the EPBC Act on 27 February 2014. This approval applies to petroleum activities that are taken in Commonwealth waters in accordance with an endorsed program (being the environmental management authorisation process administered by NOPSEMA under the OPGGS Act and the</p>	<p>Commonwealth – Department of Climate Change, Energy, the Environment and Water</p> <p>NOPSEMA</p>	<p>The Barossa Development is approved under the EPBC Act.</p> <p>Refer to <b>Section 3.2</b>– Environmental Values and Sensitivities as well as <b>Sections 6 and 7</b> – Planned impacts and unplanned events for treatment of MNES.</p> <p>Consideration has also been afforded to Section 527E of the EPBC Act. See the note below this table (<b>Appendix B2</b>) containing Santos' approach to addressing the requirements of Section 527E.</p>

Requirement / Legislation	Summary	Applicable to Activity and relevant to environmental management?	Administering authority	How Santos will meet requirements
	<p>Principles.</p> <p>Further, the Regulations provide for the protection and conservation of cetaceans, and create various offences for actions that may endanger them.</p>	OPPGS (E) Regulations).		
<p><i>Fisheries Management Act 1991 (Cth) (FM Act)</i></p>	<p>Management plans for fisheries are established under the FM Act, and this Act also sets out the legislative basis for Statutory Fishing Rights (SFRs), licences and permits.</p> <p>The Act defines the Australian Fishing Zone (AFZ) and provides for the majority of Commonwealth fisheries offences. The Act also establishes the functions of the Australian Fisheries Management Authority, including in relation to the pursuit of ecologically sustainable development.</p>	<p>No – the FM Act is not directly relevant to the environmental management of the Activity. However, in the event of a spill, the Act provides the regulatory framework for any necessary fisheries management decisions in Commonwealth waters.</p> <p>Further, the AFMA is responsible for managing Commonwealth fisheries and is a relevant agency where the Activity has the potential to impact on fisheries resources in AFMA managed fisheries.</p> <p>The operational area overlaps four Commonwealth commercial fisheries managed by the AFMA, with the EMBA overlapping one additional Commonwealth fishery.</p> <p>Accordingly, this Act has been identified in Table B-1 for completeness (and to provide context for the consultation undertaken by Santos with the AFMA in the course of preparing this environment plan).</p>	<p>AFMA Commonwealth – Department of Agriculture, Fisheries and Forestry</p>	<p>There are no requirements arising under the FM Act that apply to the environmental management of the Activity, however as to aspects of this EP relevant to AFMA's functions, see:</p> <p><b>Section 3.2.7.1</b> – Commercial Fisheries</p> <p><b>Section 3.2.8.8</b></p> <p><b>Sections 6 and 7</b> – Planned impacts and unplanned events</p>
<p><i>Underwater Cultural Heritage</i></p>	<p>The UCH Act replaced the <i>Historic Shipwrecks Act 1976 (Cth)</i> and extends</p>	<p>Yes. Santos has identified that no known listed historic shipwrecks or plane</p>	<p>Commonwealth – Department of Climate</p>	<p>Reporting obligations under the UCH Act are addressed at</p>



Requirement / Legislation	Summary	Applicable to Activity and relevant to environmental management?	Administering authority	How Santos will meet requirements
<p>Act 2018 (Cth) (UCH Act)</p>	<p>protection to other wrecks such as submerged aircraft and to human remains.</p> <p>The UCH Act protects the heritage values of vessels and aircrafts and the remains of vessels and aircrafts that have been in Australian waters. Heritage that has been in Australian waters for at least 75 years is automatically protected, while other heritage can be declared to be protected by the Minister. It is an offence to interfere with heritage covered by this Act.</p> <p>Key obligations include:</p> <ul style="list-style-type: none"> <li>+ not disturbing protected underwater heritage during the course of a proposed action without a permit;</li> <li>+ observing the requirements of protected zones and obtaining a permit to enter one if required; and</li> <li>+ notifying of the discovery of any suspected underwater heritage identified during the course of proposed action within 21 days of discovery.</li> </ul>	<p>wrecks occur within the operational area, and one listed historic shipwreck occurs within the EMBA. Despite one historic shipwreck occurring in the EMBA, there is no predicted impact to cultural heritage values in relation to this shipwreck resulting from activities under the EP, including from unplanned risks.</p> <p>Although there are no presently predicted impacts, the UCH Act imposes obligations in the event of an article of heritage being discovered. The UCH Act requires that that anyone who finds an article of underwater cultural heritage which appears to be of an archaeological character needs to notify the relevant authorities, via online form.</p>	<p>Change, Energy, the Environment and Water</p>	<p>Table 8.4 - Notification requirements. As to Santos's assessment of existing heritage under the UCH Act, see <b>Section 3.2.7.8</b> - Heritage</p>
<p>National Biofouling Management Guidelines for the Petroleum Production and Exploration</p>	<p>The guidance document provides recommendations for the management of biofouling hazards by the petroleum industry.</p>	<p>Yes - applying the recommendations within this document and implementing effective biofouling controls can reduce the risk of the introduction of IMS.</p>	<p>Commonwealth – Department of Agriculture, Fisheries and Forestry</p>	<p>Refer to <b>Section 7.2</b> – Introduction of invasive marine species and especially to <b>Section 7.2.6</b> which confirms that management is consistent with this Guideline.</p>

Requirement / Legislation	Summary	Applicable to Activity and relevant to environmental management?	Administering authority	How Santos will meet requirements
Industry 2009				
<p><i>National Greenhouse and Energy Reporting Act 2007</i> (Cth) (NGER Act)</p> <p>National Greenhouse and Energy Reporting (Safeguard Mechanism) Rule 2015</p>	<p>The NGER Act applies to the atmospheric emissions through combustion engine use to operate the vessels associated with the Activity.</p> <p>The NGER Act provides for a single national reporting framework for the reporting and dissemination of information about greenhouse gas emissions, greenhouse gas projects and energy use and production of corporations.</p> <p>The Safeguard Mechanism is also administered under the NGER Act.</p>	<p>Yes - the Barossa Gas Project will be a designated large facility under the NGER Act and as such will be subject to the Safeguard Mechanism. This means that Santos, among other things, will have an obligation to ensure that the net covered emissions of GHGs from the operation of the Barossa Gas Project do not exceed the applicable baseline.</p>	<p>Commonwealth – Department of Climate Change, Energy, the Environment and Water Clean Energy Regulator Climate Change Authority</p>	<p>Refer to <b>Section 6.3</b> – Atmospheric emissions</p>
<p><i>Marine Safety (Domestic Commercial Vessel) National Law Act 2012</i> (Cth)</p> <p>Marine Safety (Domestic Commercial Vessel) National Law Regulation 2013 (Cth)</p>	<p>This Act is a single regulatory framework for the certification, construction, equipment, design and operation of domestic commercial vessels inside Australia’s exclusive economic zone. The Act names AMSA as the National Marine Safety Regulator and confers functions on AMSA in relation to marine safety, including that AMSA may make and maintain Marine Orders.</p> <p>The Regulations under the Act set out the definition of a vessel and details and requirements of the accredited marine surveyor scheme.</p>	<p>Yes – all vessel movements associated with the Activity will be governed by AMSA marine safety regulations under the Act.</p> <p>The Act also imposes duties on owners, masters and crew of domestic commercial vessels in relation to the safety of the vessel, relevant to the owners, masters and crew of any Australian Activity vessels under this EP. The Act also sets requirements in relation to the survey of marine vessels which any Australian Activity vessels must comply with.</p>	<p>AMSA</p>	<p>Santos, when engaging vessel contractors, shall assure the vessel contractors compliance with applicable maritime law and regulations via implementation of Santos’ Marine Assurance Standard.</p> <p>Refer to EP Control Measure BAD-CM-037 – Marine Assurance Standard</p> <p>Refer also to the controls in relation to vessel movements at:</p> <ul style="list-style-type: none"> <li>+ <b>Section 6.5</b> – Interactions with other marine users</li> <li>+ <b>Section 7.9</b> – Spill response operations</li> <li>+ <b>Section 7.7</b> – Hydrocarbon spill – marine diesel oil</li> </ul>

Requirement / Legislation	Summary	Applicable to Activity and relevant to environmental management?	Administering authority	How Santos will meet requirements
<p><i>Navigation Act 2012 (Cth)</i></p>	<p>The Act aims to promote the safety of life at sea (SOLAS) and safe navigation, prevent pollution of the marine environment and ensure AMSA has the power to carry out inspection of vessels and enforce national and international standards. Specifically, this Act empowers AMSA to make Marine Orders, which are legislative instruments, with respect to any matter for which provision must or may be made by the regulations.</p> <p>A number of Marine Orders enacted under this Act apply directly to offshore petroleum activities:</p> <ul style="list-style-type: none"> <li>+ Marine Order 21: Safety and emergency arrangements</li> <li>+ Marine Order 27: Safety of navigation and radio equipment</li> <li>+ Marine Order 30: Prevention of collisions</li> <li>+ Marine Order 58: Safe management of vessels</li> <li>+ Marine Order 70: Seafarer certification.</li> </ul> <p>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.</p>	<p>Yes - all vessel movements associated with the Activity will be governed by marine safety regulations and Marine Orders under the Act. See Marine Orders, above.</p>	<p>AMSA Commonwealth - Department of Infrastructure, Transport, Regional Development, Communications and the Arts</p>	<p>Santos, when engaging vessel contractors, shall assure the vessel contractors compliance with applicable maritime law and regulations via implementation of Santos' Marine Assurance Standard.</p> <p>Refer to EP Control Measure BAD-CM-037 – Marine Assurance Standard</p> <p>Refer to the controls in relation to vessel movements at:</p> <ul style="list-style-type: none"> <li>+ <b>Section 6.5</b> – Interactions with other marine users</li> <li>+ <b>Section 7.9</b> – Spill response operations</li> <li>+ <b>Section 7.7</b> – Hydrocarbon spill – marine diesel oil</li> </ul>
<p><i>Offshore Petroleum</i></p>	<p>Petroleum exploration and development</p>	<p>Yes – activities under the EP are to be</p>	<p>NOPSEMA</p>	<p>Requirements under the OPGGS Act</p>

Requirement / Legislation	Summary	Applicable to Activity and relevant to environmental management?	Administering authority	How Santos will meet requirements
<p><i>and Greenhouse Gas Storage Act 2006</i> (Cth) Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009 (Cth)</p>	<p>activities in Australia's offshore areas are subject to the environmental requirements specified in the OPGGS Act and associated Regulations. The OPGGS Act contains a broad requirement for titleholders to operate in accordance with 'good oil-field practice'. Specific environmental provisions relating to work practices essentially require operators to control and prevent the escape of wastes and petroleum.</p> <p>The Act also requires that activities are carried out in a manner that does not unduly interfere with other rights or interests, including the conservation of the resources of the sea and seabed, such as fishing or shipping. In some cases, where there are particular environmental sensitivities or multiple use issues it may be necessary to apply special conditions to an exploration permit area. The holder of a petroleum title must maintain adequate insurance against expenses or liabilities arising from activities in the title, including expenses relating to clean-up or other remedying of the effects of the escape of petroleum.</p> <p>The OPGGS(E)R provide an objective based regime for the management of environmental performance for Australian offshore petroleum exploration and production activities in</p>	<p>performed:</p> <ul style="list-style-type: none"> <li>+ consistent with the principles of ecologically sustainable development as set out in section 3A of the EPBC Act; and</li> <li>+ so environmental impacts and risks of the Activity are reduced to ALARP and are of an acceptable level.</li> </ul> <p>This EP must demonstrate that the Activity will be undertaken in line with the principles of ecologically sustainable development, and that impacts and risks resulting from these activities are ALARP and acceptable.</p>	<p>Commonwealth – Department of Industry, Science and Resources</p>	<p>and associated Regulations are addressed throughout this EP.</p>

Requirement / Legislation	Summary	Applicable to Activity and relevant to environmental management?	Administering authority	How Santos will meet requirements
	<p>areas of Commonwealth jurisdiction. Key objectives of the OPGGS(E)R include to:</p> <ul style="list-style-type: none"> <li>+ ensure operations are performed in a way that is consistent with the principles of ecologically sustainable development</li> <li>+ adopt best practice to achieve agreed environment protection standards in industry operations</li> <li>+ encourage industry to continuously improve its environmental performance.</li> </ul>			
<p><i>Ozone Protection and Synthetic Greenhouse Gas Management Act 1989</i> (Cth) Ozone Protection and Synthetic Greenhouse Gas Management Regulations 1995 (Cth)</p>	<p>Regulates the manufacture, importation and use of ODSs (typically used in fire-fighting equipment and refrigerants). Applicable to the handling of any ODS. The Act provides a licensing system for import, export and manufacture of ODSs and equipment containing ODSs, while the Regulations control the end-use of ODSs, which are licensed by DCCEW.</p>	<p>Yes – this Act applies where ODS is found on vessel refrigeration systems. The MODU and vessels may use ODSs and therefore are regulated under this Act.</p>	<p>Commonwealth – Department of Climate Change, Energy, the Environment and Water</p>	<p>Santos, when engaging vessel contractors, shall assure the vessel contractors compliance with applicable maritime law and regulations via implementation of Santos’ Marine Assurance Standard.</p> <p>Refer to EP Control Measure BAD-CM-037 – Marine Assurance Standard</p> <p>Refer also to <b>Section 6.3</b> – Atmospheric emissions and in particular confirmation at <b>Section 6.3.6</b> that management of emissions is consistent with this Act.</p> <p>Relevant Activity vessels will follow ODS handling procedures.</p>
<p><i>Protection of the Sea (Powers of Intervention) Act 1981</i> (Cth) Protection of the</p>	<p>This Act authorises the Commonwealth (through AMSA) to take measures for the purpose of protecting the sea from pollution by oil and other noxious substances discharged from ships and</p>	<p>Yes - this Act applies to vessel discharges and movements associated with the Activity.</p> <p>The Act is relevant in that Santos must comply with Marine Orders made under</p>	<p>AMSA Commonwealth – Department of Infrastructure, Transport, Regional</p>	<p>See above at Marine Orders.</p>

Requirement / Legislation	Summary	Applicable to Activity and relevant to environmental management?	Administering authority	How Santos will meet requirements
Sea (Powers of Intervention) Regulations 1983 (Cth)	provides legal immunity for persons acting under an AMSA direction.	the Act. See Marine Orders, above. Further, the Act confers powers on AMSA to take action in the event of a spill or likely spill of oil or noxious subjects from a ship, which functions are relevant in the event of an MDO spill arising from activities under this EP.	Development, Communications and the Arts	
<p><i>Protection of the Sea (Prevention of Pollution from Ships) Act 1983</i> (Cth)</p> <p>Protection of the Sea (Prevention of Pollution from Ships) (Orders) Regulations 1994 (Cth)</p>	<p>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 shipboard management plans, shipboard oil pollution emergency plans, shipboard marine pollution emergency plans, and ship-to-ship operations plans. 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:</p> <ul style="list-style-type: none"> <li>+ Marine Order 91: Marine pollution prevention – oil</li> <li>+ Marine Order 93: Marine pollution prevention – noxious liquid substances</li> <li>+ Marine Order 94: Marine pollution prevention – packaged harmful substances</li> <li>+ Marine Order 95: Marine pollution</li> </ul>	<p>Yes - Santos and its contractors must comply with relevant requirements under this Act and Regulations in respect of Activity vessels, including requirements to have a shipboard oil pollution emergency plan and a marine pollution emergency plan.</p> <p>The requirement to maintain a ship energy efficiency management plan is not applicable to Activity vessels as the vessels will not be engaged on an overseas voyage when undertaking activities under this EP.</p>	<p>AMSA</p> <p>Commonwealth – Department of Infrastructure, Transport, Regional Development, Communications and the Arts</p>	<p>Santos, when engaging vessel owners/contractor, shall assure the vessel contractors compliance with applicable marine orders via implementation of Santos’ Marine Assurance Standard.</p> <p>Refer to EP Control Measure BAD-CM-037 – Marine Assurance Standard.</p> <p>Vessel owners/contractors 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 activities under this EP.</p> <p>See, in particular:</p> <ul style="list-style-type: none"> <li>+ <b>Section 6.6</b> – Operational discharges</li> <li>+ <b>Section 7.9</b> – Spill response operations</li> <li>+ <b>Sections 7.4 to 7.8</b> – unplanned hydrocarbon and non-hydrocarbon / chemical spills</li> <li>+ <b>Section 7.2</b> - Introduction of</li> </ul>

Requirement / Legislation	Summary	Applicable to Activity and relevant to environmental management?	Administering authority	How Santos will meet requirements
	prevention – garbage + Marine Order 96: Marine pollution prevention – sewage + Marine Order 97: Marine pollution prevention – air pollution.			IMS The requirement for Santos to maintain an oil pollution emergency plan is addressed within the OPEP (see <b>Section 8</b> of this EP for further information). In relation to shipboard marine pollution emergency plans, see <b>Section 8.5</b> – Emergency preparedness and response of this EP, as well as BAD-CM-012.
<i>Protection of the Sea (Civil Liability of Bunker Oil Pollution Damage) Act 2008 (Cth)</i>	This Act implements the requirements for the International Convention on Civil Liability for Bunker Oil Pollution Damage, by imposing insurance certification requirements in respect of regulated Australian vessels carrying more than 2,000 tonnes of oil in bulk as cargo.	No – [activities under this EP do not involve the use of any vessels carrying over 2,000 tonnes of oil, as regulated under the Act.]	AMSA Commonwealth – Department of Infrastructure, Transport, Regional Development, Communications and the Arts	Refer to <b>Section 7.7</b> – Hydrocarbon spill – marine diesel oil
<i>Protection of the Sea (Harmful Anti-fouling Systems) Act 2006 (Cth)</i>	This Act relates to the protection of the sea from the effects of harmful anti-fouling systems. It prohibits the use of harmful organotins in anti-fouling paints used on ships. This is enacted by Marine Order 98 (Marine pollution – anti-fouling systems) 2013.	Yes - this Act applies to vessel movements in Australian Waters associated with the Activity. Vessels are required to have biofouling systems in place to prevent introduction of IMS/harmful impact on Australian biodiversity. Australian ships, or foreign ships in Australian shipping facilities, must not be applied with harmful anti-fouling compounds (organotins). Activity vessels will comply with the relevant requirements of this Act.	AMSA Commonwealth, Department of Infrastructure, Transport, Regional Development, Communications and the Arts	See <b>Section 7.2</b> – Introduction of invasive marine species, and BAD-CM-025. See also Marine Orders, above.

**Table B2: Northern Territory Legislation**

Requirement / Legislation	Summary	Applicable to Activity and relevant to environmental management?	Administering Authority	How Santos will meet requirements
<p><i>Heritage Act 2011</i> (NT)</p>	<p>This Act establishes the NT Heritage Council and governs protection of both natural and cultural heritage places and objects within the NT jurisdiction by establishing heritage offences and regulating activities that may impact heritage places and objects, including through a process for obtaining work approvals.</p>	<p>Yes – this Act is applicable to the extent that unplanned events may impact natural and cultural heritage places or objects in the NT, constituting a heritage offence under the Act.</p>	<p>NT Department of Territory Families, Housing and Communities</p>	<p>There are no requirements arising under this Act that apply to activities under this EP, however for aspects of this EP addressing unplanned events, which are relevant to avoiding impacts to natural and cultural heritage places or objects, see: <b>Section 7</b> – Unplanned events risk and impact assessment</p>
<p><i>Fisheries Act 1988</i> (NT) Fisheries Regulations 1992 (NT)</p>	<p>The <i>Fisheries Act 1988</i> (NT) provides for the regulation, conservation and management of fisheries and fishery resources so as to maintain their sustainable utilisation, to regulate the sale and processing of fish and aquatic life, and for related purposes.</p>	<p>No – the Act is not directly relevant to the environmental management of the Activity. However, for a Joint Authority Fishery (such as the Timor Reef Fishery), in the event of an emergency, the Act provides the regulatory framework for the Joint Authority to make any necessary fisheries management decisions.</p> <p>The operational area overlaps the Timor Reef Fishery which is jointly managed by the NT and Commonwealth. The EMBA intersects with numerous NT-managed fisheries regulated under this Act.</p> <p>Accordingly, this Act has been identified in Table B-1 for completeness (and to provide context for the consultation undertaken by Santos with the NT Department of Industry, Tourism and Trade in the course of preparing this environment plan).</p>	<p>NT Department of Industry, Tourism and Trade – Fisheries Division</p>	<p>There are no requirements arising under the Act that apply to the environmental management of the Activity, however as to aspects of this EP relevant to the NT Department of Industry, Tourism and Trade's functions, see:</p> <p><b>Section 3.2.7.1</b> – Commercial Fisheries</p> <p><b>Section 3.2.8.8</b></p> <p><b>Sections 6 and 7</b> – Planned impacts and unplanned events</p>



**Table B3: Western Australia Legislation**

Requirement / Legislation	Summary	Applicable to Activity and relevant to environmental management?	Administering Authority	How Santos will meet requirements
<p><i>Biodiversity Conservation Act 2016</i> (WA)</p> <p>Biodiversity Conservation Regulations 2018 (WA)</p>	<p>The <i>Biodiversity Conservation Act 2016</i> (WA) came into effect on 3 December 2016 and replaced the <i>Wildlife Conservation Act 1950</i> (WA). This Act provides for the conservation and protection of Western Australian wildlife.</p>	<p>Yes – although spill modelling does not predict impacts in WA waters, with consideration for NOPSEMA Environment Bulletin: Oil Spill Modelling, Santos has considered the environmental values and sensitivities of the Scott Reef Nature Reserve in this EP (see <b>Section 3.1.1</b>). As the Scott Reef Nature Reserve is in WA waters, Santos has included this Act for completeness, to the extent that planned impacts and unplanned events may impact listed species, having regard to the requirements of this Act in relation to Scott Reef.</p> <p>The Act and Regulations contain various requirements and offence provisions in relation to WA fauna and flora.</p>	<p>WA Department of Biodiversity, Conservation and Attractions</p>	<p>For controls for minimising potential impacts to WA fauna and flora in the Scott Reef Nature Reserve, see:</p> <p><b>Section 7.6</b> – Hydrocarbon Spill – condensate</p> <p><b>Section 7.7</b> – Hydrocarbon Spill – Marine Diesel Oil</p> <p><b>Section 7.9</b> – Spill Response Operations</p>
<p><i>Environmental Protection Act 1986</i> (WA)</p>	<p>Provides for the prevention, control and abatement of pollution and environmental harm to the Western Australian environment.</p>	<p>Yes – although there is no predicted impact on WA waters, following NOPSEMA guidance, Santos has considered the environmental values and sensitivities of the Scott Reef Nature Reserve in this EP (see <b>Section 3.1.1</b>). As the Scott Reef Reserve is in WA waters, Santos has included this Act for completeness, to the extent that spill response operations may be undertaken in the event of an unplanned hydrocarbon/chemical release, having regard to the requirements of this Act in relation to Scott Reef.</p> <p>The Act contains various requirements and offence provisions in relation to pollution and environmental harm.</p>	<p>WA Department of Water and Environment Regulation (DWER)</p>	<p>For controls in the EP related to unplanned discharges, see:</p> <p><b>Section 7.9</b> – Spill Response Operations</p>

Requirement / Legislation	Summary	Applicable to Activity and relevant to environmental management?	Administering Authority	How Santos will meet requirements
<p>Environmental Protection (Unauthorised Discharges) Regulations 2004 (WA)</p>	<p>The purpose of the Regulations is to cover discharges into the environment from business or commercial activity which are not serious enough to cause pollution or environmental harm and breach the provisions of the <i>Environmental Protection Act 1986</i> (WA).</p>	<p>Yes – although there is no predicted impact on WA waters, following NOPSEMA guidance, Santos has considered the environmental values and sensitivities of the Scott Reef Nature Reserve in this EP (see <b>Section 3.1.1</b>). As the Scott Reef Reserve is in WA waters, Santos has included this Act for completeness, to the extent that spill response operations may be undertaken in the event of an unplanned hydrocarbon/chemical release, having regard to the requirements of this Act in relation to Scott Reef.</p> <p>The Regulations contain offence provisions in relation to unauthorised discharges.</p>	<p>WA Department of Water and Environment Regulation (DWER)</p>	<p>For controls in the EP related to unplanned discharges, see:</p> <p><b>Section 7.6</b> – Hydrocarbon Spill – condensate</p> <p><b>Section 7.7</b> – Hydrocarbon Spill – Marine Diesel Oil</p> <p><b>Section 7.9</b> – Spill Response Operations</p>
<p><i>Fish Resources Management Act 1994</i> (WA)</p> <p>Fish Resources Management Regulations 1995 (WA)</p>	<p>This Act establishes a framework for management of fishery resources and is the nominated lead agency responsible for implementing Western Australian marine biosecurity management requirements through implementation of the <i>Fish Resources Management Act 1994</i> (WA) (FRMA 1994) and associated regulations.</p>	<p>Yes – to the extent that vessel movements during spill response actions have the potential to introduce IMS.</p>	<p>WA Department of Primary Industries and Regional Development</p>	<p>For controls in the EP related to unplanned discharges, see:</p> <p><b>Section 7.6</b> – Hydrocarbon Spill – condensate</p> <p><b>Section 7.7</b> – Hydrocarbon Spill – Marine Diesel Oil</p> <p><b>Section 7.9</b> – Spill Response Operations</p>

Requirement / Legislation	Summary	Applicable to Activity and relevant to environmental management?	Administering Authority	How Santos will meet requirements
<i>Aquatic Resources Management Act 2016 (WA)</i>	This Act is the primary legislation used to manage fishing, aquaculture, pearling and aquatic resources in Western Australia.	Yes – to the extent that vessel movements during spill response actions have the potential to introduce IMS, having regard to the requirements of this Act in relation to Scott Reef.	WA Department of Primary Industries and Regional Development	<p><b>Section 7.6</b> – Hydrocarbon Spill – condensate</p> <p><b>Section 7.7</b> – Hydrocarbon Spill – Marine Diesel Oil</p> <p><b>Section 7.9</b> – Spill Response Operations</p>
<i>Pollution of Waters by Noxious Substances Act 1987 (WA)</i>	This Act protects WA waters from pollution by oil and noxious substances and gives effect to MARPOL in WA waters.	<p>Yes – although there is no predicted impact on WA waters, following NOPSEMA guidance, Santos has considered the environmental values and sensitivities of the Scott Reef Nature Reserve in this EP (see <b>Section 3.1.1</b>). As the Scott Reef Reserve is in WA waters, Santos has included this Act for completeness, to the extent that spill response operations may be undertaken in the event of an unplanned hydrocarbon/chemical release, having regard to the requirements of this Act in relation to Scott Reef.</p> <p>The Act contains various requirements and offence provisions in relation to pollution by oil and other noxious substances in WA waters.</p>	WA Department of Transport	<p>For controls in the EP related to unplanned discharges, see:</p> <p><b>Section 7.9</b> – Spill Response Operations</p>

**Table B4: International Agreements and Conventions**

International agreements and conventions	Summary	Applicable to Activity and relevant to environmental management?	How Santos will meet requirement
Agreement Between the Government of Australia and the Government of Japan for the Protection of Migratory Birds in Danger of Extinction and Their Environment 1974 (JAMBA)	This agreement recognises the special international concern for the protection of migratory birds and birds in danger of extinction that migrate between Australia and Japan. Implemented in EPBC Act. Birds listed on the annex to this agreement must be placed on the migratory species list under the EPBC Act.	Yes – only to the extent that a credible spill scenario may result in impact to migratory seabirds foraging in the EMBA.	In the event of a spill scenario that impacts migratory birds, Santos will implement its spill response operations. <b>Section 3.2.6</b> – Threatened and migratory fauna <b>Sections 7.6 and 7.7</b> – unplanned hydrocarbon releases <b>Section 7.9</b> – Spill Response Operations
Agreement Between the Government of Australia and the Government of the People’s Republic of China for the Protection of Migratory Birds and Their Environment 1986 (CAMBA)	This agreement recognises the special international concern for the protection of migratory birds and birds in danger of extinction that migrate between Australia and China. Implemented in EPBC Act. Birds listed on the annex to this agreement must be placed on the migratory species list under the EPBC Act.	Yes – only to the extent that a credible spill scenario may result in impact to migratory seabirds foraging in the EMBA.	In the event of a spill scenario that impacts migratory birds, Santos will implement its spill response operations. <b>Section 3.2.6</b> – Threatened and migratory fauna <b>Sections 7.6 and 7.7</b> – unplanned hydrocarbon releases <b>Section 7.9</b> – Spill Response Operations
Agreement Between the Government of Australia and the Government of the Republic of Korea for the Protection of Migratory Birds 2006 (ROKAMBA)	This agreement recognises the special international concern for the protection of migratory birds and birds in danger of extinction that migrate between Australia and Korea. Implemented in EPBC Act. Birds listed on the annex to this agreement must be placed on the migratory species list under the EPBC Act.	Yes – only to the extent that a credible spill scenario may result in impact to migratory seabirds foraging in the EMBA.	In the event of a spill scenario that impacts migratory birds, Santos will implement its spill response operations. <b>Section 3.2.6</b> – Threatened and migratory fauna <b>Sections 7.6 and 7.7</b> – unplanned hydrocarbon releases <b>Section 7.9</b> – Spill Response Operations

International agreements and conventions	Summary	Applicable to Activity and relevant to environmental management?	How Santos will meet requirement
Convention for the Control of Transboundary Movements of Hazardous Wastes and Their Disposal 1989 (Basel Convention)	This convention deals with the transboundary movement of hazardous wastes, particularly by sea. Implemented in <i>Hazardous Waste (Regulation of Exports and Imports) Act 1989</i> .	No - Activity does not involve transboundary movement of hazardous wastes. Administered by Australian Government Department of Foreign Affairs and Trade (DFAT)	N/A
Convention on Biological Diversity 1992	This convention has three main objectives: the conservation of biodiversity; the sustainable use of its components; and the fair and equitable sharing of the benefits arising from the use of genetic resources.	Yes – relevant only insofar as the Activity may interact with MNES (threatened and migratory species) protected under the EPBC Act.	<p><b>Section 3.2</b> – Environmental Values and Sensitivities</p> <p><b>Section 6</b> – Planned activities risk and impact assessment</p> <p><b>Section 7</b> – Unplanned events risk and impact assessment</p>
International Convention on Oil Pollution Preparedness, Response and Co-operation 1990 (OPRC 90)	This convention comprises national arrangements for responding to oil pollution incidents from ships, offshore oil facilities, sea ports and oil handling. The convention recognises that in the event of pollution incident, prompt and effective action is essential. Parts of this convention are implemented by the <i>Protection of the Sea (Prevention of Pollution from Ships) Act 1983</i> (Cth).	Yes – in the event of a worst-case credible spill scenario, this may enact a national arrangement for response. Refer to <i>Protection of the Sea (Prevention of Pollution from Ships) Act 1983</i> (Cth) at table B-1.	<p>In the event of a spill scenario, Santos will implement its spill response operations.</p> <p><b>Section 7.9</b> – Spill Response Operations</p> <p><b>Sections 7.6 and 7.7</b> – unplanned hydrocarbon releases</p>
Convention on the Conservation of Migratory Species of Wild Animals 1979 (Bonn Convention)	The Bonn Convention aims to improve the status of all threatened migratory species through national action and international agreements between range states of particular groups of species.	Yes - only relevant in so far as the credible spill scenario may result in impact to MNES protected migratory species.	<p><b>Section 3.2</b> – Environmental Values and Sensitivities</p> <p><b>Section 7.9</b> – Spill Response Operations</p> <p><b>Sections 7.6 and 7.7</b> – unplanned hydrocarbon releases</p>

International agreements and conventions	Summary	Applicable to Activity and relevant to environmental management?	How Santos will meet requirement
International Convention for the Establishment of an International Fund for Compensation for Oil Pollution Damage (FUND92)	This convention ensures compensation is provided for damage caused by oil pollution.	No – relevant to oil tankers, not supply or vessels.	N/A
International Convention for the Prevention of Pollution from Ships 1973/1978 (MARPOL 73/78)	This convention and protocol (together known as MARPOL 73/78) build on earlier conventions in the same area. MARPOL is concerned with operational discharges of pollutants from ships. It contains six Annexes, dealing respectively with oil, noxious liquid substances, harmful packaged substances, sewage, garbage and air pollution. Detailed rules are laid out as to the extent to which (if at all) such substances can be released in different sea areas. The legislation giving effect to MARPOL in Australia is the <i>Protection of the Sea (Prevention of Pollution from Ships) Act 1983</i> (Cth), the <i>Navigation Act 2012</i> (Cth) and several Parts of Marine Orders made under this legislation.	Yes – refer to <i>Protection of the Sea (Prevention of Pollution from Ships) Act 1983</i> (Cth), <i>Navigation Act 2012</i> (Cth) and Marine Orders at table B-1 above.	<b>Sections 6 and 7</b> – Planned and unplanned events
International Convention for the Safety of Life at Sea 1974	This convention is generally regarded as the most important of all international treaties concerning the safety of merchant ships. Implemented by the <i>Navigation Act 2012</i> (Cth) and Marine Orders under that Act.	Yes – refer to <i>Navigation Act 2012</i> (Cth) and Marine Orders at table B-1 above.	<b>Section 6.5</b> – Interactions with other marine users <b>Section 8</b> – Implementation strategy

International agreements and conventions	Summary	Applicable to Activity and relevant to environmental management?	How Santos will meet requirement
<p>International Convention for the Control and Management of Ships' Ballast Water and Sediments (Ballast Water Convention) 2004</p>	<p>The Ballast Water Convention entered into force on 8th September 2017. It aims to prevent the spread of harmful aquatic organisms from one region to another, by establishing standards and procedures for the management and control of ships' ballast water and sediments. Implemented in Australia by the Australian Ballast Water Management Requirements.</p>	<p>Yes – refer to Australian Ballast Water Management Requirements at table B-1 above.</p>	<p><b>Section 6.6</b> – Operational discharges <b>Section 7.2</b> – Introduction of invasive marine species</p>
<p>Minamata Convention on Mercury 2021</p>	<p>This convention seeks to protect human health and the environment from anthropogenic emissions and releases of mercury and mercury compounds.</p> <p>The convention covers all aspects of the life cycle of mercury, controlling and reducing mercury across a range of products, processes and industries.</p>	<p>Yes – Relevant to the contaminant limit concentrations in barite.</p> <p>Santos has committed to BAD-CM-031 Quality Control limits for Barite (relevant to mercury):</p> <p>Mercury (Hg) – 1 mg/kg dry weight in stock barite</p>	<p><b>Section 6.7</b> – Drilling and completions discharges</p>

International agreements and conventions	Summary	Applicable to Activity and relevant to environmental management?	How Santos will meet requirement
<p>United Nations Convention on the Law of the Sea (UNCLOS) 1982</p>	<p>Part XII of the Convention sets up a general legal framework for marine environment protection. The convention imposes obligations on State Parties to prevent, reduce and control marine pollution from the various major pollution sources, including pollution from land, from the atmosphere, from vessels and from dumping (Articles 207 to 212). Subsequent articles provide a regime for the enforcement of national marine pollution laws in the many different situations that can arise. Australia signed the agreement relating to the implementation of Part XI of the Convention in 1982, and UNCLOS in 1994.</p>	<p>Yes – only relevant to the extent that Santos will comply with MARPOL through the following relevant 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:</p> <ul style="list-style-type: none"> <li>+ Marine Order 91: Marine pollution prevention – oil</li> <li>+ Marine Order 93: Marine pollution prevention – noxious liquid substances</li> <li>+ Marine Order 94: Marine pollution prevention – packaged harmful substances</li> <li>+ Marine Order 95: Marine pollution prevention – garbage</li> <li>+ Marine Order 96: Marine pollution prevention – sewage</li> <li>+ Marine Order 97: Marine pollution prevention – air pollution.</li> </ul>	<p>Santos will comply with the relevant Marine Orders.</p> <p><b>Section 6.6</b> – Operational discharges</p> <p><b>Sections 7.4 to 7.8</b> – unplanned hydrocarbon and non-hydrocarbon / chemical spills</p> <p><b>Section 7.2</b> - Introduction of IMS</p> <p><b>Section 7.9</b> – Spill response operations</p>
<p>United Nations Framework Convention on Climate Change 1992</p>	<p>The objective of the convention is to stabilise greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous interference with the climate system. Australia ratified the convention in December 1992 and it came into force on 21 March 1994.</p>	<p>Yes – only relevant to the extent that to reduce impact of GHG emissions associated with vessel use, Santos will comply with MARPOL Annex VI (Marine Order 97: Marine pollution prevention – air pollution) and require the use of low sulphur fuel. The MODU and vessels will use MDO, which is a low sulphur fuel.</p>	<p>Santos will comply with Marine Order 97.</p> <p><b>Section 6.3</b> – Atmospheric emissions</p>



International agreements and conventions	Summary	Applicable to Activity and relevant to environmental management?	How Santos will meet requirement
<p>1997 Treaty between Australia and Indonesia establishing an Exclusive Economic Zone Boundary and Certain Seabed Boundaries (Perth Treaty)</p>	<p>This treaty has been signed but not yet ratified. When ratified, the treaty will finalise the EEZ boundary between Australia and Indonesia. Under the Perth Treaty, there are areas of overlapping jurisdiction where Australia exercises seabed jurisdiction including exploration for petroleum, and Indonesia exercises water column jurisdiction including fishing rights.</p>	<p>Yes - the southern boundary of the Perth Treaty is outside the operational area but within the EMBA. Although the Treaty has not been ratified and imposes no obligations on Santos, it is relevant to Santos's assessment of potential Relevant Persons and has therefore been identified in Table B-1 for completeness. Administered by DFAT.</p>	<p>There are no requirements arising under the Treaty that apply to the environmental management of the Activity.</p> <p>See <b>Section 3.2.8.8</b> – Consultation, and <b>Section 3.2.7.2</b> – Indonesian and Timorese commercial and subsistence fishing.</p>
<p>Memorandum of Understanding between Australia and Indonesia on the Operations of Indonesian Traditional Fishermen in Areas of the Australian Fishing Zone and Continental Shelf – 1974</p>	<p>Enables traditional fishing by Indonesian traditional fishers within the sections of the Australian EEZ.</p>	<p>There are no requirements arising under the Treaty that apply to the environmental management of the Activity.</p>	<p>See <b>Section 3.2.8.8</b> – Consultation, and <b>Section 3.2.7.2</b> – Indonesian and Timorese commercial and subsistence fishing.</p>

## **Appendix B2: Consideration of the Indirect Consequences under Section 527E of the EPBC Act**

Sub-section 75(2) of the EPBC Act requires that the Minister responsible for administering the EPBC Act, or their delegate when deciding whether an action is a controlled action, consider 'all adverse impacts (if any)' the action has, will have, or is likely to have, on protected matters.

For the purposes of the Act, under section 527E(1) an event or circumstance is an 'impact' of an action taken by a person if: (a) the event or circumstance is a direct consequence of the action; or (b) for an event or circumstance that is an indirect consequence of the action—subject to subsection 527E(2), the action is a substantial cause of that event or circumstance.

In respect to section 527E(1)(b), events/circumstances that are a result of actions taken by a third party (called a 'secondary action'), such as those arising in the context of scope 3 greenhouse gas emissions, will only be an indirect consequence of the action (called the 'primary action') where:

- + The action is a substantial cause of the event or circumstance; and
- + The primary action facilitates the secondary action to a major extent; and
- + Both the secondary action and event/circumstance is either within the contemplation of the proponent of the primary action or is a reasonably foreseeable consequence of the primary action.

Santos has considered the potential for 'indirect consequences' to arise in relation to the Barossa development and specifically the petroleum activity that is the subject of this EP. In this context, for the purposes of applying section 527E(1)(b) and (2) of the EPBC Act to the OPGGS(E)R regulatory regime:

- + The 'event or circumstances' is consumption or combustion of gas by a third party.
- + The 'impact' is emission of greenhouse gases.
- + The 'action' is:
  - The whole Barossa development in the context of an OPP assessment.
  - The particular petroleum activity (or activities) in the context of an EP assessment.

The OPP for the Barossa development was submitted by Santos in October 2016 and accepted by NOPSEMA in March 2018. A comprehensive environmental impact assessment was completed in accordance with established practice and policies at that time.

In the context of an EP, the nature of the 'petroleum activity' will determine the scope of relevant 'indirect consequences'. This may be a subset of the consequences that are relevant when undertaking an OPP assessment, as the activities are a component of the project as a whole.

For an event or circumstance to be an indirect consequence of a petroleum activity, the petroleum activity must be demonstrated as:

- + A substantial cause of that event or circumstance (s. 527E(1)(b)); and
- + Facilitating, to a major extent, the action taken by the third party (as further explained in s. 527E(2)).

Neither the term 'substantial' or 'major' is defined in the EPBC Act. In accordance with typically usage and dictionary definitions:

- + 'Substantial' means weighty or big, in a relative sense to be considerable and with reference to degrees of relevance, something more than significant.
- + 'Major' means greater in size, amount, importance etc and constituting the majority or larger part.

In the context of this EP, the scope of relevant petroleum activity is limited to the drilling and completion of Barossa development wells. The EP does not permit the construction and operation of other facilities required to produce and transport the reservoir hydrocarbons (i.e. natural gas). Notably in relation to s.527E(1)(b) and (2):

- + No natural gas is recovered as a result of the drilling and completions activities. There are a number of subsequent, interposed petroleum activities that must be authorised under the OPGGS(E)R and then undertaken before any gas is capable of being recovered.
- + Gas consumption/combustion cannot reasonably be said to have been facilitated by a petroleum activity which has no resource extraction component. Even if some kind of facilitation could be observed, drilling and completions activities cannot reasonably be characterised as an important or majority facilitator of that action. These activities are multiple steps removed from such a characterisation. Drilling and completions activities are therefore not a primary action to a secondary action involving gas consumption/combustion.
- + There are a chain of events prior to resource (i.e. natural gas) recovery, and then a chain of events afterwards and ahead of any resource being consumed by a third party. From a causal perspective, the link between drilling and completions activities and a third party greenhouse gas emission is weak. This petroleum activity cannot reasonably be characterised as having a weighty/big, considerable or significant causal relationship to third party gas consumption/combustion.
- + In this context, Santos has concluded that drilling and completions activities do not facilitate to a major extent natural gas consumption/combustion and this petroleum activity is not a substantial cause of any associated scope 3 greenhouse gas emissions.

At a later stage, Santos will be submitting Barossa Development EPs to extract, produce and transport the natural gas. Santos will have no ability to extract the natural gas from the development wells until such time as these petroleum activities have been assessed, meet the criteria in regulation 10A of the OPGGS(E)R and the EPs have been accepted by NOPSEMA.

The causal relationship between production operations petroleum activities and consumption or combustion of gas by a third party is different in those circumstances. Santos will consider such indirect consequences in its future production operations EP.

APPENDIX C – BAROSSA DRILLING AND  
COMPLETIONS VALUES AND SENSITIVITIES OF THE  
MARINE ENVIRONMENT

## Barossa Development Drilling and Completions Values and Sensitivities of the Marine Environment

<b>PROJECT / FACILITY</b>	Barossa
<b>REVIEW INTERVAL (MONTHS)</b>	12 Months
<b>SAFETY CRITICAL DOCUMENT</b>	NO

<b>R e v</b>	<b>Owner</b>	<b>Reviewer/s Managerial/Technical/Site</b>	<b>Approver</b>
	<b>Barossa Environmental Adviser</b>	<b>Barossa Environmental Adviser</b>	<b>General Manager Approvals</b>
1			

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Rev	Rev Date	Author / Editor	Amendment
0	05/10/21	Santos	Submission to NOPSEMA with Revision 0 of Barossa Development Drilling and Completions Environment Plan (BAD-200-0003)
1	18/07/23	Santos	Update to align with geographical extent of Drilling and Completions modelled EMBA, PMST updates and inclusion of additional environmental values and sensitivities for international waters.

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## 1 Introduction

This document describes the existing environment that may be affected (EMBA) by the Barossa Development drilling and completions campaign and includes details of the relevant values and sensitivities of that environment, as required by the Commonwealth Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009 (OPGGS (E) Regulations).

### 1.1 Geographical extent

Santos Ltd (Santos) proposes to conduct the Barossa Development drilling and completions campaign (herein referred to as the Barossa Development Drilling Campaign) within Commonwealth petroleum production license NT/L1. The permit area is in Australian Commonwealth waters, approximately 300 km north of Darwin, Northern Territory (NT), and approximately 100 km north of the Tiwi Islands (**Figure 1-1**).

A portion of the permit area and EMBA is located between the Perth Treaty boundary and the 1972 continental shelf (**Figure 1-1**). Under the Perth Treaty, there are areas of overlapping jurisdiction where Australia exercises seabed jurisdiction including for petroleum exploration, and Indonesia exercises water column jurisdiction including fishing rights (the Perth Treaty area).

The modelled EMBA does not overlap with NT coastal waters. Values and sensitivities outside but proximal to the modelled EMBA, such as Scott Reef Nature Reserve to the southwest of the modelled EMBA, have been included in the risk assessment for unplanned events.

The region includes coastal waters and shoreline habitats in Western Australia (WA), the NT, Indonesia and Timor-Leste. The portion of the EMBA located within Australian waters largely approximates the North Marine Region (NMR) and the North-west Marine Region (NWMR) (**Figure 1-2**).

Four provincial bioregions occur within the Australian waters of the EMBA (**Figure 1-2**), based on the Integrated Marine and Coastal Regionalisation of Australia (IMCRA) version 4.0. Provincial bioregions are largely classified based on biological and physical information, including the distribution of demersal fishes, marine plants and invertebrates, sea floor geomorphology and sediments, and oceanographic data (IMCRA v. 4.0). Bioregions within international waters of the EMBA have not been formally classified, however habitats within these waters are described by published scientific literature and studies.

See below for the NWMR and NMR provincial bioregions relevant to the EMBA.

#### **North-west Marine Region:**

- + North-west Shelf Transition
- + Timor Province.

#### **North Marine Region:**

- + North-west Shelf Transition
- + Timor Transition
- + Northern Shelf Province.

To classify broadscale habitat or species distributions within the EMBA, the provincial bioregions of the NMR and NWMR and the international waters of south-west Indonesia and Timor-Leste have been referred to, where relevant, throughout this document.

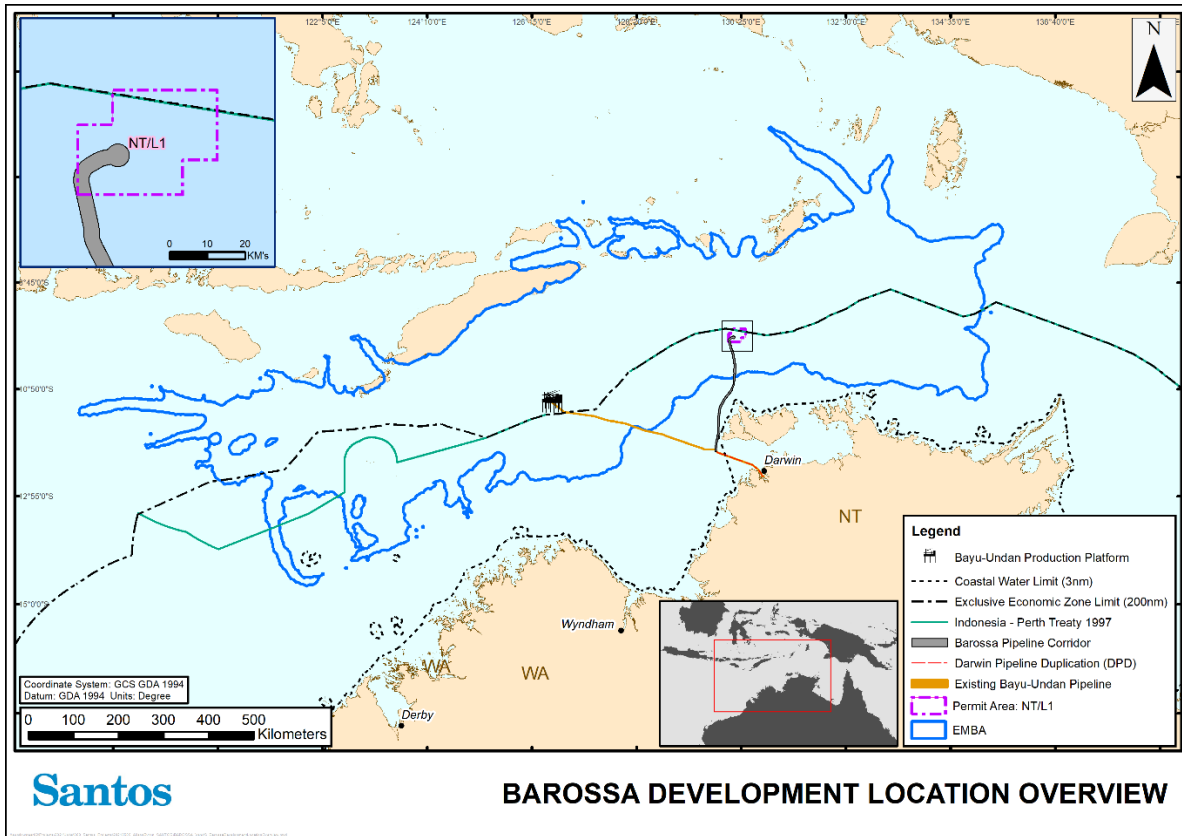


Figure 1-1: Barossa Development Location Overview

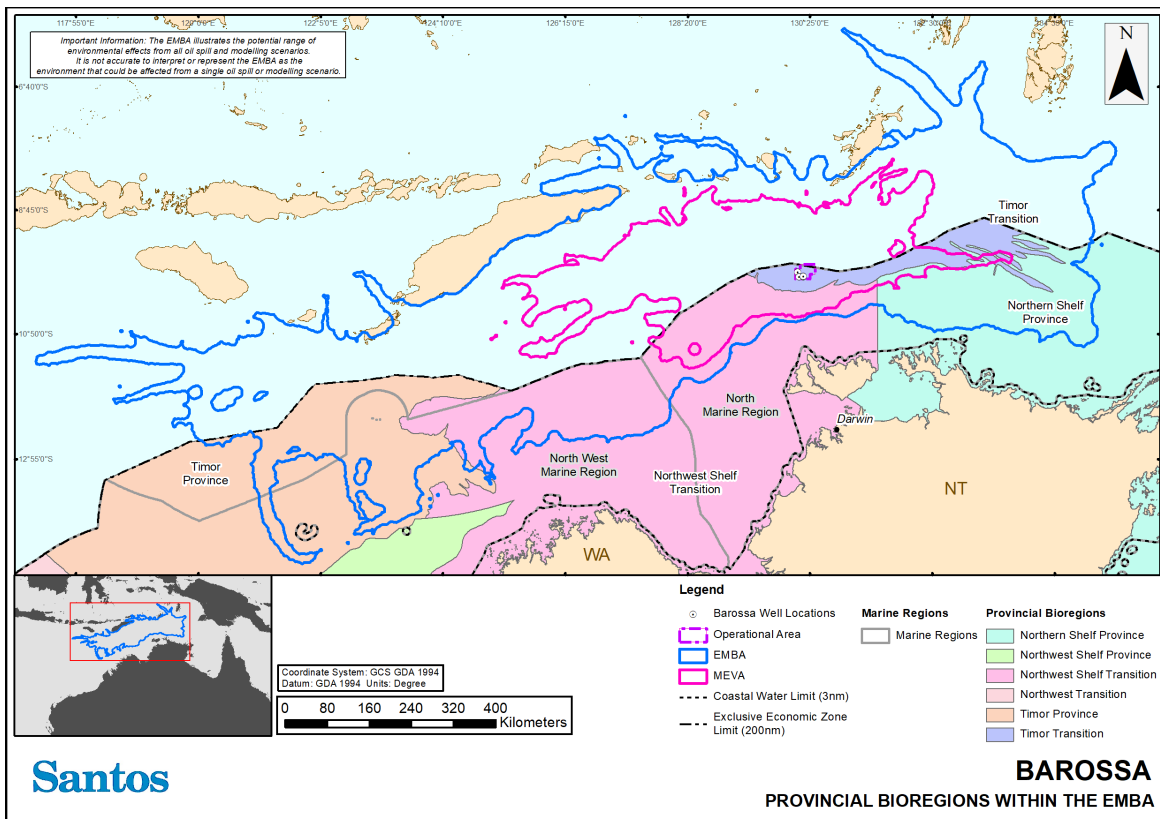


Figure 1-2: IMCRA 4.0 provincial bioregions within the EMBA

## 1.2 Barossa marine studies program

An extensive environmental baseline studies program has been undertaken to characterise the existing marine environment within and surrounding the Barossa Development. The studies involved the collection of detailed baseline data over 12 months (July 2014 to July 2015) to capture seasonal variability in the area, as well as desktop modelling studies to contribute to the understanding of the baseline environment. These studies informed the *Barossa development area offshore project proposal* (ConocoPhillips, 2019), which was prepared in accordance with the requirements of the OPGGS (E) Regulations.

See **Table 1-1** for a summary of the Barossa environmental baseline studies.

**Table 1-1: Summary of Barossa environmental baseline studies**

Study type	Description of study	Reference
<b>Field-based studies</b>		
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, 2016a, 2016b, 2014
Sediment quality and infauna survey	Collection of baseline data on sediment quality and infauna communities near the Barossa development.	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 by using a specialised remotely operated vehicle (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 near the Barossa development and surrounding areas.	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 pipeline route corridor. The Australian Institute of Marine Science (AIMS) did the survey in September/October 2015, which involved characterisation of the seabed habitats, associated biota and fish communities (shoals only).	Heyward et al., 2017
Geophysical survey	This was a preliminary geophysical survey of potential pipeline routes within the pipeline route corridor presented in the accepted offshore project proposal (OPP) (Conocco Phillips, 2019).	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 corridor in water depths from ~80 m to 25 m.	Jacobs, 2017

Study type	Description of study	Reference
<b>Field-based studies</b>		
Oceanic shoals marine park benthic habitat and fish diversity assessment	An AIMS seabed and fish biodiversity survey conducted between September and October 2017. 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 use this new data to update the predictive habitat model and do a 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 pipeline route corridor and a comprehensive assessment of the seafloor and shallow geological features along the pipeline route corridor.	DOF Subsea, 2018
<b>Desktop/modelling studies</b>		
Environmental literature review and gap analysis	Collection and collation of publicly available information about the marine environment near the Barossa field and gap analysis to determine is the availability of sufficient information to inform an environmental impact assessment and any future regulatory approvals for a potential full field development.	Jacobs SKM, 2014
Hydrodynamic model validation study	Data from the metocean study and obtained by 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



## 2 Physical environment

### 2.1 Geomorphology

#### 2.1.1 Formation history

About 550 to 160 million years ago, the northern and western parts of Australia formed part of the northern margin of Gondwana. About 300 million years ago, crustal stretching, rifting and breakup-initiated development of an extensive basin where sediments were deposited (Baker et al., 2008 in DEWHA, 2008a). About 135 million years ago the continent broke up, resulting in the separation of greater India and Australia.

#### 2.1.2 Bathymetry and seabed

##### Seabed at the permit area

The water depths in the permit area are between approximately 130 m and 350 m, with the southern portion being shallower (**Figure 2-3**). The seabed within the permit area is generally flat and located on a plain feature devoid of any significant bathymetric features with sediments comprising predominantly fine clayey sand (Fugro, 2016). See **Figure 2-1** for an example of the typical seabed terrain within the permit area.

This description is based on the available information, which includes:

- + bathymetry and seabed topography data derived from previous seismic surveys acquired in 2007 and 2016
- + geophysical surveys in 2015 and 2017
- + ROV footage collected during pre- and post-spud surveys during exploration and appraisal drilling campaigns
- + baseline studies undertaken across the area (see **Section 1.2**).

In general, the benthic habitats observed in the permit area were typical of those expected in offshore environments and were consistent with studies conducted both in areas with similar features and comparable geographic location (Jacobs, 2016c). See **Section 3.1** for further details on the benthic habitats observed in the permit area.



**Figure 2-1: Typical seabed terrain in the permit area (Jacobs, 2016a)**

The permit area occurs within the bounds of the Shelf Break and Slope of the Arafura Shelf KEF (**Section 10.8**). The ecological values associated with this unique seafloor feature (i.e. patch reefs and hard substrate pinnacles) were not observed during the surveys (Jacobs, 2016a).

### Seabed along the pipeline route corridor

Two geophysical surveys have been undertaken over the pipeline route corridor (Fugro, 2016 and DOF, 2018).

Results are reported in kilometres relative to the distance from the northern to the southern end of the pipeline route corridor (referred to as KPs or Kilometre Points) and summarised below (**Table 2-1**), the pipeline route corridor KP are presented in **Figure 2-2**. The pipeline route corridor passes through the Van Diemen Rise KEF and the Oceanic Shoals Marine Park. Approximately 30 km of the pipeline route corridor lies within the Oceanic Shoals Marine Park Multiple Use Zone, and approximately 31.5 km lies within the Habitat Protection Zone (refer **Section 12.2.1**). Water depth range from about 240 m in the permit area, to approximately 50 m towards the southern end of the pipeline and about 5 m within the shallow water area of the pipeline route corridor.

**Table 2-1: Summary of seabed features along the pipeline route corridor**

KP	Seabed feature observations
KP0 to KP60	The pipeline route starts in 254 m of water and is essentially flat for the first 5 km. 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.
KP60 to KP110	The route shallows from 101 m depth at KP70.7 to 73.5 m at KP87.7 before rising again to 78.6 m at KP109. Isolated and clustered pockmarks occur throughout the area. Habitat between KP70 and KP108, within the Van Diemen Rise KEF and Oceanic Shoals Marine Park, consists of burrowers and crinoids with a small outcrop of filter feeders at KP80. Between KP100 and KP110, the pipeline passes adjacent to Goodrich Bank. Goodrich Bank typically consists of coarse sandy substrate and sparse filter feeders (further described in <b>Table 2-2</b> ).
KP110 to KP165	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 KP1110 and KP122.5. At KP135, the pipeline passes about 2.3 km to the east of Marie Shoal. Between KP145 and KP175 it passes through the Habitat Protection Zone of the Oceanic Shoals Marine Park.
KP165 to KP210	The seabed is typically smooth and featureless with large sandwaves and megaripples.
KP210 to KP262.5	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. The AIMS habitat model (further described in <b>Section 12.2.1</b> ) predicts outcrops of hard corals and filter feeders adjacent to the pipeline route between KP210 and KP235. AIMS (2017) reports macroscopic biota was generally sparse but low- to 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. Between KP247 and KP252 the pipeline re-enters the Van Diemen Rise KEF (see <b>Section 10.9</b> ).

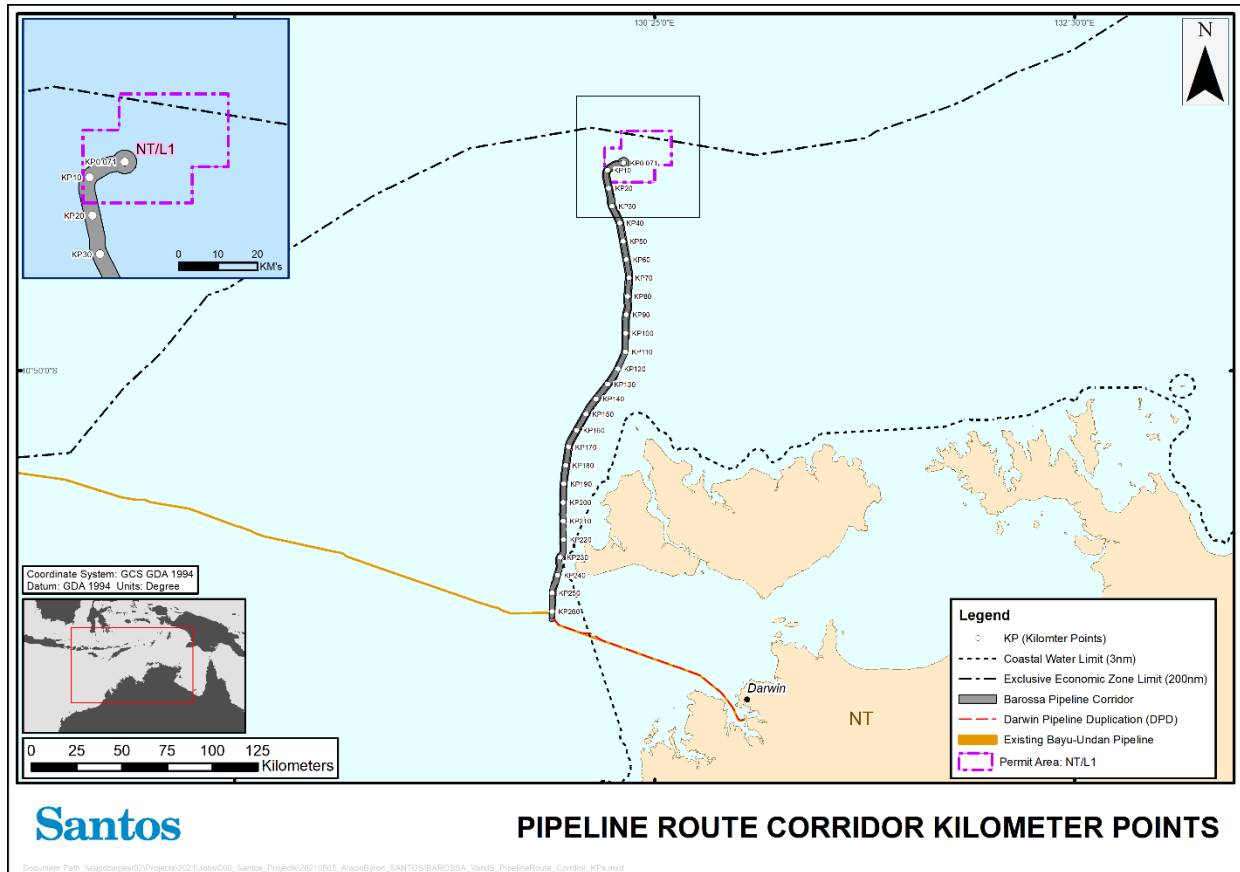


Figure 2-2: Pipeline route corridor kilometer points

**Seabed within the EMBA**

Bioregional plans for the components of the EMBA that are in Australian waters describe a diverse range of geological features. These include shelves, canyons, terraces, plateaus, valleys, pinnacles, reefs, banks and shoals (DEWHA, 2008a) – see **Figure 2-4**. However, most of the EMBA consists of flat, featureless seabed. Bathymetry of the EMBA is shown in **Figure 2-3**. Notable features within the EMBA include the Bonaparte Depression, a 45,000 km<sup>2</sup> geomorphic basin that is the only one of its kind in the NWMR, and the Arafura Shelf, which is characterised by continental shelf, canyons, terraces, the Arafura Sill and the Arafura Depression (DEWHA, 2008a) (**Figure 2-3**).

Several major landform features have been identified within the EMBA, including nine KEFs (DEWHA, 2008a) described in **Section 10**. Notable reef and shoal habitats within the EMBA include those around Evans Shoal, Tassie Shoal, Blackwood Shoal, Lynedoch Bank, Ashmore Reef, Cartier Island, and Hibernia Reef, Seringapatam Reef and Scott Reef – see **Sections 2.4** and **2.5**. Values and sensitivities outside but proximal to the modelled EMBA, such as Scott Reef Nature Reserve to the southwest of the modelled EMBA, have been included in the risk assessment for unplanned events. Evans Shoal, Tassie Shoal and Lynedoch Bank, nearest the permit area, have been the subject of field-based surveys as part of the Barossa development baseline studies (**Section 1.2**). These surveys have recorded sediment, infauna and benthic habitat (Jacobs, 2016a, 2016b) – see a summary of the results in **Section 2.4.1**. **Section 3.1** further details the benthic habitats in the EMBA.

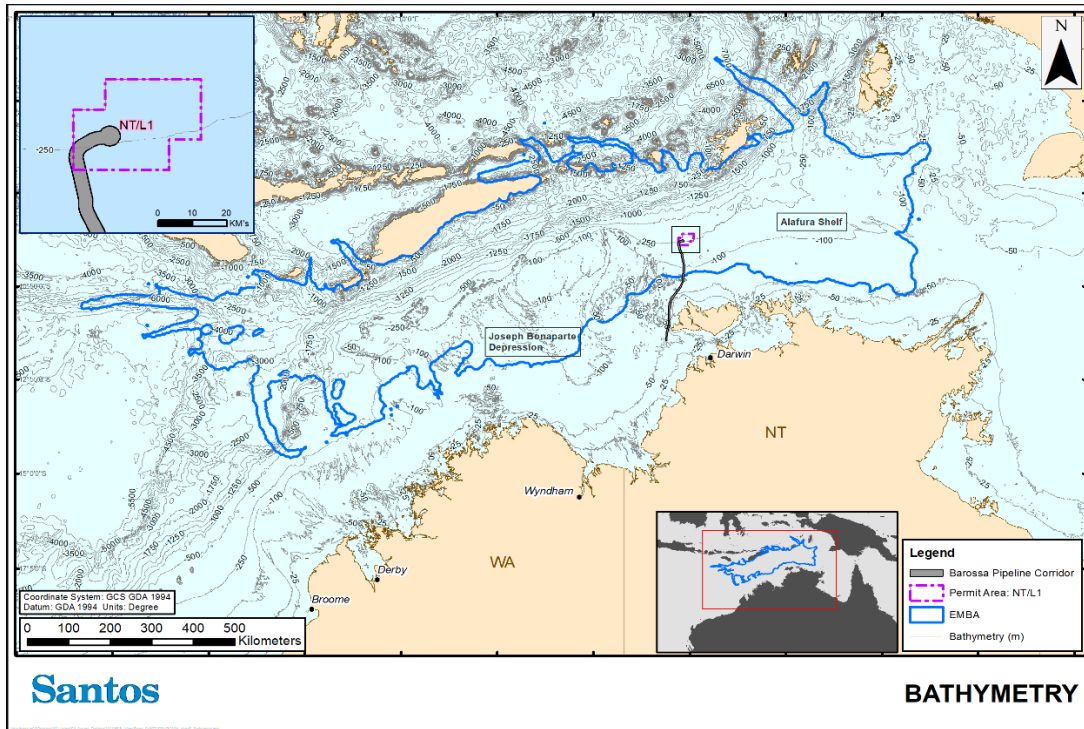


Figure 2-3: Bathymetry of the EMBA

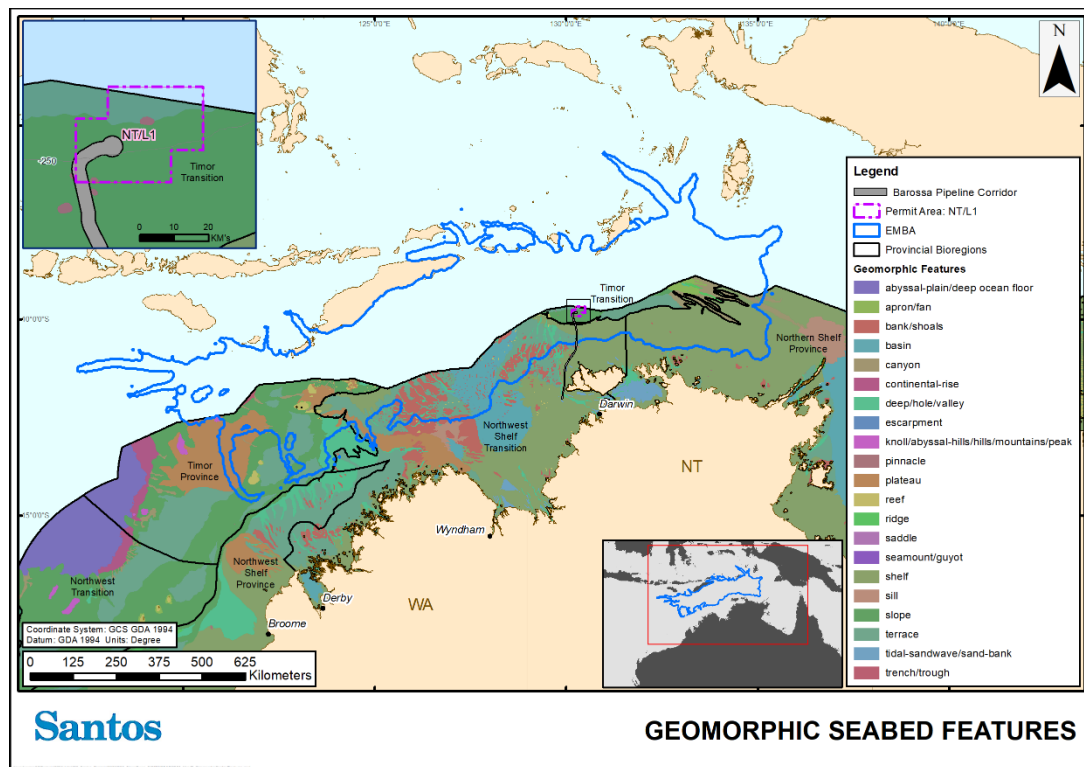


Figure 2-4: Geomorphologic features of the EMBA

## 2.2 Climate

Waters in the northern extent of the EMBA predominantly lie in the arid tropics. Monsoonal conditions usually occur from October to March (wet season), with cooler and drier conditions prevailing from April to September (dry season).

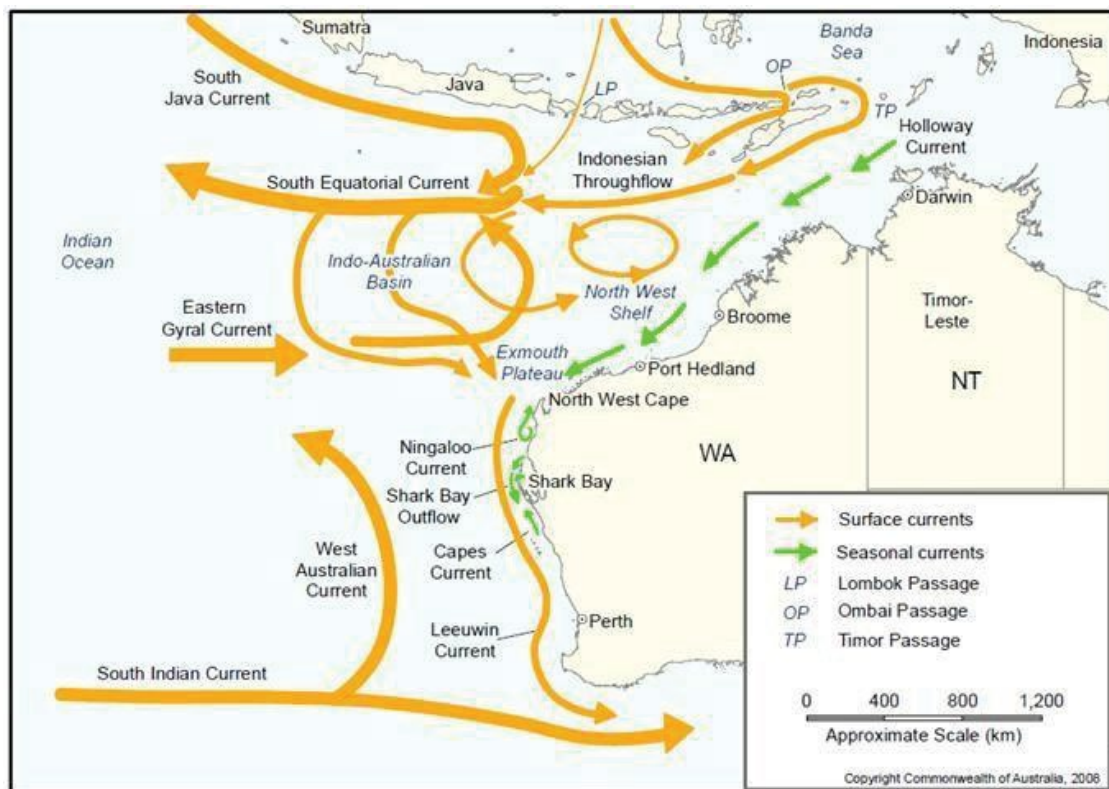
Meteorological data for the region, recorded at the Bureau of Meteorology (BoM) weather station at Melville Island (the closest metrological station to the permit area), shows a small seasonal variation in air temperatures. The mean maximum summer and winter air temperatures range between 33.6 °C in October/November and 31.2 °C in July (BoM, 2017). The annual maximum temperature is 32.4 °C and the minimum temperature is 22.3 °C (BoM, 2017). The average tropical cyclone frequency for the Timor and Arafura seas region is one cyclone per year, which occur mostly between November and April (BoM, 2017).

## 2.3 Oceanography

### 2.3.1 Regional current system

Large-scale currents of the Timor and Arafura seas are dominated by the Indonesian Throughflow (ITF) current system – see **Figure 2-5**. The ITF brings warm, low-salinity oligotrophic waters through a complex system of currents, linking the Pacific and Indian oceans via the Indonesian Archipelago (DSD, 2010). The strength of the ITF fluctuates seasonally, reaching maximum strength during the south-east monsoon, and weakening during the north-west monsoon.

The Holloway Current (**Figure 2-5**), a relatively narrow boundary current that flows along the north-west shelf of Australia between 100 and 200 m depth, also influences the seas in the EMBA. The direction of the current changes seasonally with the monsoon, flowing towards the north-east in summer and the south-west in winter (Fugro, 2015).



**Figure 2-5: Surface currents in the Northern Territory and Western Australia**

Source: DEWHA (2008b)

### 2.3.2 Current and tides

Water movement in the EMBA is influenced by wind and tidal activity and less by ocean currents. Smaller-scale surface currents reflect seasonal wind activity, flowing easterly to north easterly during the wet season and west to south-west during the dry season (Heyward et al., 1997). Local wind-driven surface currents can reach speeds of 0.6 metres per second (m/s) during monsoonal wind surges, although more typical speeds are in the range of 0.2 to 0.3 m/s (Heyward et al., 1997). Average current speed in the permit area

ranged from 0.22 m/s at the near surface to 0.14 m/s at 210 below mean sea level (MSL) during the metocean data collection for the Barossa development (Fugro, 2015).

Tidal activity is typically dominated by semi-diurnal tides, with two daily high tides and two daily low tides. The highest astronomical tide recorded at Tassie Shoal (about 75 km west of the permit area) is 1.4 m above MSL and the lowest astronomical tide is 1.8 m below MSL (Consulting Environmental Engineers, 2002). The mean tidal range is 2.2 m at spring tides and 0.3 m at neaps (Consulting Environmental Engineers, 2002). Measurements of ocean currents at Tassie Shoal show water movement is strongly tidal, with typical speeds in the range of 0.1 to 0.4 m/s and peak speeds up to 0.8 m/s (Consulting Environmental Engineers, 2002).

### 2.3.3 Waves

Waves in the EMBA are expected to be composed of locally generated sea waves in response to local wind activity and swell waves created by distant wind activity. Wave height is generally between 0.6 and 0.8 m, coming from the west in the wet season and from the east in the dry season. Waves at Tassie Shoal typically approach from west to south-west throughout the year (Consulting Environmental Engineers, 2002). Cyclones and tropical storms can greatly increase wave heights by up to 8 m in the outer Timor Sea during the cyclone season (Przeslawski et al., 2011).

The wave climate offshore of the north-west shelf of Australia is normally dominated by the passage of storms over the southern Indian Ocean (Fugro, 2015). However, between October and March, the wave climate is controlled by the south-westerly monsoon winds. This combination of wind directions may lead to concurrent swells approaching from different directions. The sea wave climate also reflects the seasonal wind regime, with waves predominantly from the south-west in summer and from the east in winter.

### 2.3.4 Temperature

Surface water temperatures in the permit area generally range between 27 and 30 °C while temperatures above the seabed range between 11 and 13 °C (Jacobs, 2016a). Sea temperatures in the upper water column near the permit area were recorded as reaching a maximum of 30.9 °C in summer and a minimum of 24.7 °C in spring (Fugro, 2015). The minimum sea temperature of 10.6 °C was recorded near the seabed (within the permit area) at 253 m below MSL in spring. Mean temperatures ranged from 28.1 °C at 34 m below MSL (summer) to 12.6 °C at 253 m below MSL (summer) (Fugro, 2015). Water temperatures within the EMBA are expected to be broadly within the ranges of those observed in the permit area.

## 2.4 Shoals and banks

A number of shoals and banks occur within the EMBA (**Table 2-2** and **Figure 2-6**). Few historic studies of these features exist, with most 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., 2010; Heyward et al., 2011).

Evans Shoal, Tassie Shoal and Lynedoch Bank are the nearest shoals and banks to the permit area (**Table 2-2**). The nearest shoals and banks to the pipeline route corridor include Mesquite Shoal, Goodrich Bank, Marie Shoal and Shepparton Shoal. Goodrich bank is 0.3 km from the pipeline route corridor. Mesquite Shoal, Marie Shoal and Shepparton Shoal are all located between 1 and 3 km from the boundary of the pipeline route corridor (**Figure 2-6**).

Table 2-2: Shoals and banks within the EMBA

Geomorphic feature	In EMBA	In MEVA	Water depth range (m)*	Approximate distance/direction from operational area
Lynedoch Bank	✓	✓	From 60m to 100m	38km South East
Evans Shoal	✓	✓	From 20m to 110m	62km West
Tassie Shoal	✓	✓	From 20m to 90m	71km South West
Blackwood Shoal	✓	✓	From 30m to 80m	82km West
Franklin Shoal	✓	✓	From 20m to 90m	93km West
Flinders Shoal	✓	✓	From 20m to 80m	95km West
Margaret Harries Bank	✓	✓	From 40m to 120m	158km West
Troubadour Shoals	✓	✓	From 20m to 110m	164km West
Money Shoal	✓	✗	From 10m to 60m	246km East
Eugene McDermott Shoal	✓	✗	From 30m to 100m	701km South West
Fantome Shoal	✓	✗	From 30m to 300m	707km West
Vee Shoal	✓	✗	From 30m to 220m	723km West
Barracouta Shoal	✓	✗	From 60m to 170m	729km South West
Woodbine Bank	✓	✗	From 20m to 140m	771km West
Johnson Bank	✓	✗	From 10m to 210m	782km West

The shoals and banks within the EMBA share a tropical marine biota similar to that of emergent reef such as Ashmore Reef, Cartier Island, Seringapatam Reef and Scott Reef (Heyward et al., 2017). AIMS' analysis of benthic communities showed that neighbouring shoals and banks (i.e. within hundreds of kilometres of the permit area) frequently share about >80% of benthic community composition (Heyward et al., 2017). 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. 2017). The distribution of more than 150 shoal/bank features across the Sahul Shelf KEF (Figure 2-6), with individual shoals/banks often separated by 5 to 20 km, suggests an extensive series of 'stepping stone' habitats are available to recruit larvae and connect these ecosystems at ecological time scales (Heyward et al. 2017).

The shoals and banks within the EMBA (Table 2-2) are expected to support comparable levels of biodiversity, but the dominant benthic species may vary in abundance and diversity, with subsets of species being prominent on some more than others (Heyward et al., 2017).

Section 2.4.1 below presents a summary of the results from the Barossa environmental baseline studies (Section 1.2), which included a benthic habitat survey of Evans Shoal, Tassie Shoal and Lynedoch Bank.

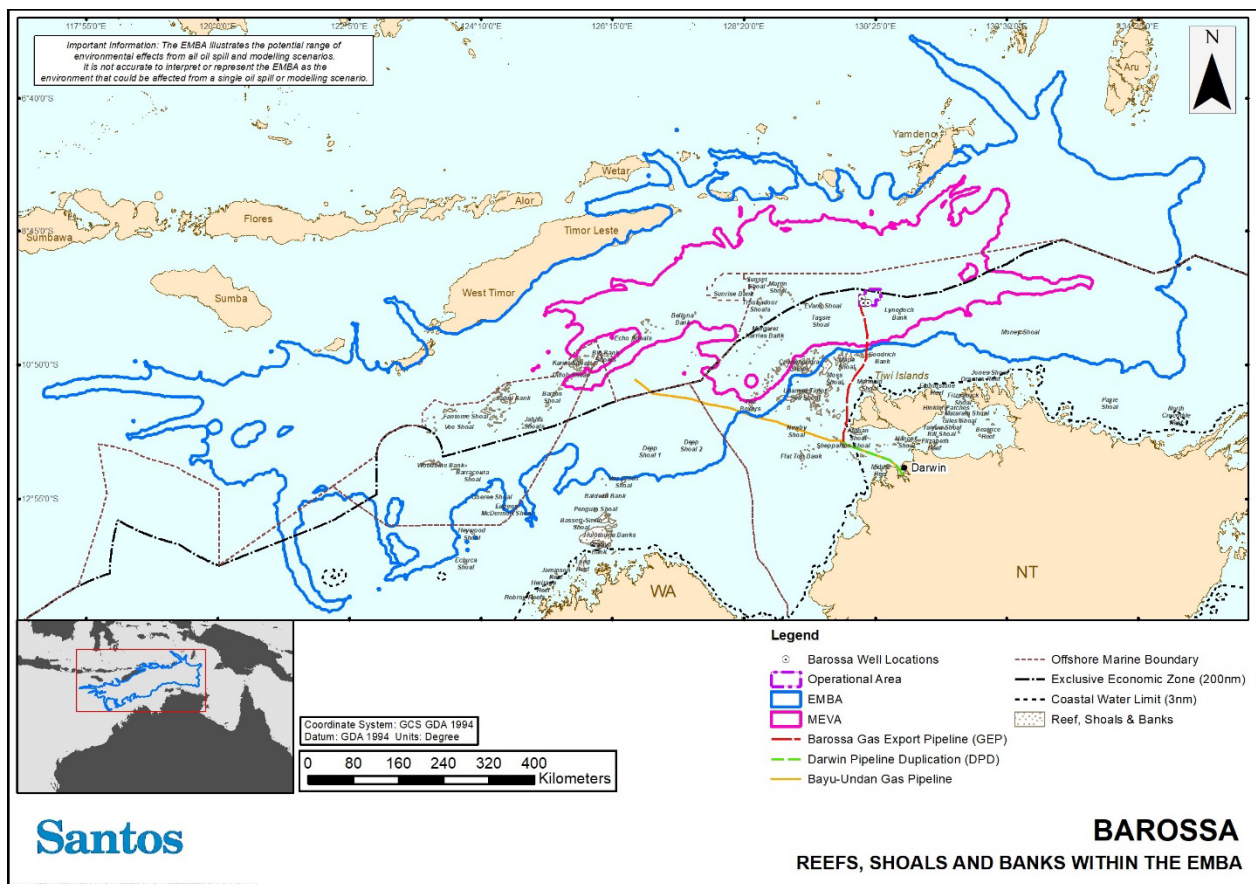


Figure 2-6: Reefs, Shoals and Banks within the EMBA

### 2.4.1 Summary of the results from the Barossa marine studies program

Evans Shoal, Tassie Shoal and Lynedoch Bank were surveyed as part of the environmental baseline studies program (Jacobs, 2016c). There was a high degree of similarity between the surveyed sites, based on the consistent diversity observed in habitat features and biota present. One exception to this was the eastern slope of Evans Shoal, which showed a higher degree of similarity to a scarp feature (Jacobs, 2016c). This may be due to depth or greater exposure to predominant currents and weather.

In general, the reef flat at Evans Shoal was characterised by sand and algae-covered rubble with



communities dominated by hard corals, soft corals, various algae and sponges which were present in varying degrees of diversity and abundance (Jacobs, 2016c; Heyward et al., 2017). The plateaus of Evans Shoal and Tassie Shoal also had extensive areas of sand and rubble (Heyward et al., 2017). Gorgonians and sea whips often dominated the reef crest, whereas the hard substrate of the slope predominantly supported sponges and filter feeders (such as gorgonians, feather stars and sea whips). Filter feeders became more prevalent on rocky outcrops beyond about 60 m (Heyward et al., 2017). Of particular note were the northern and southern slopes of Evans Shoal as these supported large areas of dense plate coral (at 40 to 50 m water depth) and dense sub-massive coral (northern slope at about 47 m water depth) (Jacobs, 2016c).



Heyward et al. (2017) also recorded areas of medium- to high-density foliaceous coral at Evans Shoal and Tassie Shoal and noted that this habitat was very similar to that observed further west in the Sahul Shoals and within the deeper lagoon at Scott Reef. Overall coral cover of about 9% was observed at both Evans and Tassie Shoals (Heyward et al., 2017).




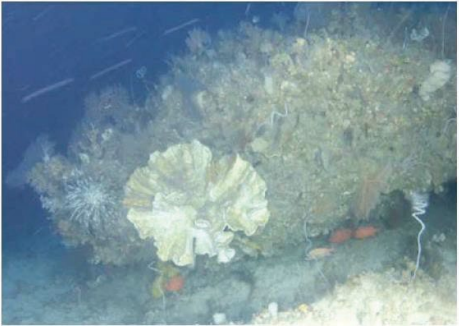
Heyward et al. (2017) noted the seabed habitats at the shoals were broadly consistent with those observed from studies across the region. They also noted that while there were many similarities between the shoals in the region, there were differences – likely influenced by the broader physical environment. For example, the status of the benthic communities on each shoal may reflect different disturbance events (e.g. cyclone/storm damage and coral bleaching) and recruitment histories due to variations in biological connectivity (Heyward et al., 2017).

The shoal slopes supported a diverse range of fish species typical of reef-fish assemblages as well as pelagic species. Species richness in the fish community was influenced most by the calcareous reef composition of the substrata, and the percentage cover of hard coral on this substratum type (Heyward et al., 2017). Therefore, species richness decreased with depth as seabeds exhibited bare substrata. AIMS has conducted a detailed characterisation of the fish communities at Evans Shoal and Tassie Shoal – see **Section 5.1.1** for a summary of the findings.

See **Table 2-3** for a summary of the results from the marine studies program (Heyward et al., 2017) for Evans Shoal, Tassie Shoal, Lynedoch Bank, Goodrich Bank, Marie Shoal and Shepparton Shoal.





**Table 2-3: Summary of the results from the marine studies program**

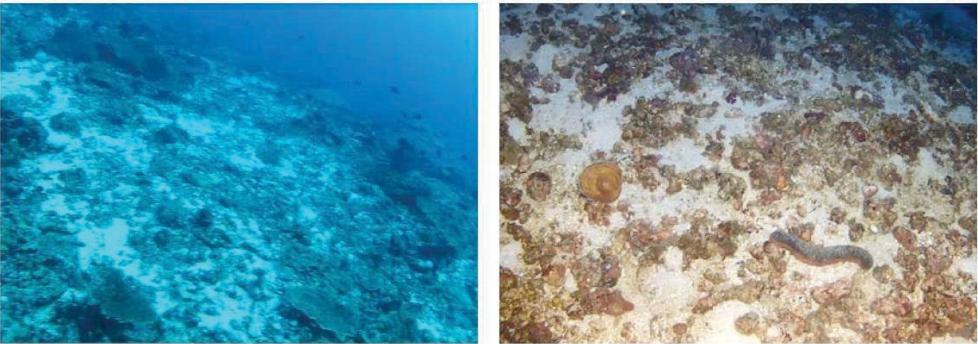
Shoal/bank	Description
Evans Shoal	<p>Evans Shoal, located about 65 km to the west of the permit area, is a flat-topped shoal that reaches a plateau at about 18 to 28 m below the sea surface. The infauna communities were reasonably diverse and abundant (3 to 63 individuals representing 3 to 42 taxa in the coarser sediments), with the species present being dominated by molluscs (e.g. Laevidentaliidae), crustaceans (e.g. tanaids, amphipods, isopods, callianassids) and annelid worms (e.g. syllids, <i>Nematonereis</i> species, lumbrinerids) (Jacobs, 2016b). The coarser sediments at Evans Shoal supported higher species diversity and abundance. The relationship between coarse sediments, high infaunal abundances and species richness has been previously identified in the north- west shelf with Huang et al. (2013) noting that greater species richness and total abundance were associated with coarse-grained, heterogeneous sediments (Jacobs, 2016b).</p> <p>The key benthic habitats and dominant fish species observed are discussed below (Jacobs, 2016c).</p> <p><b>Reef flat (centre of the shoal)</b></p> <p>The transect was located at a water depth of about 28 m. The substrate was predominantly sand with patchy mixed beds of filter feeders (e.g. sponges and soft corals) and macroalgae. Hard corals were observed at a small bommie (Jacobs, 2016c). Heyward et al. (2017) noted that hard corals were generally sparse or absent across large areas of the plateau, but their density increased towards the outer edges of the plateau. Several taxa of fish including species from families Labridae, (wrasse), Pomacanthidae (damselfish and clownfish), Acanthuridae (surgeonfishes, tangs and unicornfishes), Zanclidae (Moorish idols), Balistidae (triggerfishes) and Monacanthidae (leatherjacket).</p> <div style="display: flex; justify-content: space-around;">   </div> <p><b>Southern slope</b></p> <p>Transects on this slope began on the reef flat in 18 m water depth. While the substrate of the reef flat was dominated by sand and rubble, some areas supported high-density coral cover (mostly plate and branching forms but also soft corals) and <i>Halimeda</i> species (calcareous algae). A diverse assemblage of reef-fish occurred in these areas and whitetip reef sharks were also observed. The reef crest of the shoal (about 32 m deep) was dominated by plate coral, whereas the upper slope was dominated by sand. As water depth increased the substrate changed from being dominated by plate corals (about 42 m depth) to macroalgae with scattered sponges and sea cucumbers (about 55 m depth).</p>

Shoal/bank	Description
	<div style="display: flex; justify-content: space-around;">   </div> <p><b>Eastern slope</b></p> <p>Transects on this slope began at about 83 m water depth. The reef flat was characterised by sandy substrate with occasional small macroalgae. Silvertip sharks were observed in this habitat. The crest of the shoal (about 88 m deep) supported a rocky overhang with various types of filter feeders. The slope was dominated by steep rock faces and rocky overhangs with small sandy ledges that supported filter feeders (such as gorgonians, feather stars, sea whips and sponges) and reef-fish.</p> <div style="display: flex; justify-content: space-around;">   </div> <p><b>Northern slope</b></p> <p>Transects on the northern slope began at about 45 m water depth. The reef flat on this slope alternated between areas dominated by plate coral, sub-massive coral and macroalgae (including <i>Halimeda</i> species) with sponges. Whitetip reef sharks and one tawny nurse shark were observed on the reef flat, as were individuals from the fish families Labridae, Pomacentridae and Pomacanthidae. Small discrete piles of rubble were also observed and were likely to be triggerfish nests. The crest of the shoal (about 80 m deep) was colonised by sponges, filter feeders and algae. The reef slope was characterised by rocky substrate with small sand-covered ledges and supported communities dominated by sponges and filter feeders (such as gorgonians, feather stars, sea whips and sponges). One moray eel (<i>Muraenidae</i>) and various species of fish (families Chaetodontidae (butterflyfish), Carangidae (queenfishes, runners, scads and trevallies), Caesionidae (fusilliers), Serranidae (groupers and reef cod) and Holocentridae (squirrelfish) were observed in the rocky overhangs of the reef slope.</p>

Shoal/bank	Description
Tassie Shoal	<div> </div> <p>Tassie Shoal, located about 75 km to the west of the permit area, is a flat-topped shoal that reaches a plateau at about 14 to 15 m below the sea surface. The infauna communities were reasonably diverse and abundant (12 to 33 individuals representing 12 to 24 taxa), with species present being dominated by syllid polychaetes, tanaid crustaceans, foraminifera, brittlestars and fibularid echinoderms (urchins) (Jacobs, 2016b). The key benthic habitats and dominant fish species associated with the shoal are discussed below (Jacobs, 2016c).</p> <p><b>Reef flat</b></p> <p>The reef flat was sampled at two sites at a water depth of about 15 m. The substrate consisted of sand, rubble and patchy reef structure. The reef structure was dominated by massive, sub- massive, plate and branching coral forms, and the hard substrate supported a range of sea whips, soft corals, <i>Halimeda</i> species, turf algae and sponges. Feather stars, large clams and a decapod crustacean were also recorded. A diverse range of tropical fish species were sighted including representatives from the families Labridae, Pomacentridae, Zanclidae, Pomacanthidae and Acanthuridae. Two whitetip reef sharks were also observed.</p> <div> </div>

Shoal/bank	Description
	<p><b>Eastern slope</b></p> <p>The transect began in about 28 m water depth. The reef crest was dominated by hard coral, soft coral and sponges, but also supported <i>Halimeda</i> species. Schools of fish (<i>Acanthurids</i> and <i>Carangids</i>) and sea snakes were observed on both the reef flat and upper slope. The top of the reef slope (30 to 50 m) was dominated by sponges and soft corals, such as gorgonians and sea whips. The substrate became dominated by sand and rock at about 50 m and began to flatten out and become dominated by sand around 70 m. A sea snake and a whitetip reef shark were observed at the bottom of the reef slope (about 48 m).</p> <div> </div>
Lynedoch Bank	<p>Lynedoch Bank, located about 54 km to the south-east of the permit area, is a flat-topped bank which reaches a plateau at about 14 to 16 m below the sea surface. The infauna communities were reasonably diverse and abundant (56 individuals representing 39 taxa) with species present being dominated by nematodes, tanaid crustaceans, and polychaetes (tube-dwelling <i>onuphids</i> and <i>chaetopterids</i>, and <i>lumbrinerids</i>), brittlestars (<i>ophiuroids</i>) and mud shrimp (<i>callianassids</i>) (Jacobs, 2016b). The key benthic habitats and fish communities of the shoal are discussed below (Jacobs 2016c).</p> <p><b>Reef flat (centre of the shoal)</b></p> <p>The reef flat was sampled at two sites at a water depth of about 16 m. The reef flat was dominated by sand and rubble with hard corals (mostly branching, massive and sub-massive), sponges, soft coral and <i>Halimeda</i> species present. Small reef-fish were common (including individuals from the families <i>Chaetodontidae</i>, <i>Labridae</i> and <i>Zanclidae</i>) with whitetip reef sharks, a sea snake and a moray eel also observed.</p>

Shoal/bank	Description
	<div style="display: flex; justify-content: space-around;">   </div> <p><b>Eastern slope</b></p> <p>The transect began on the reef flat in about 26 m water depth, which was observed to be similar to that described above. The reef sloped gently to a depth of about 85 m and was characterised by a sand and rubble substrate. There was a noticeable low abundance of fish, sharks and other motile biota.</p> <div style="display: flex; justify-content: space-around;">   </div> <p><b>Western slope</b></p> <p>The reef flat was characterised by sand and rubble with hard corals (mostly branching, encrusting and massive forms), sponges and <i>Halimeda</i> species present. Small triggerfish (Balistidae) were common, with sharks (most likely silvertip and whitetip reef sharks) and a sea snake also observed. The reef crest (about 40 m water depth) and the slope were dominated by sand and rubble, with occasional sponges, sea stars, sea cucumbers, and reef-fish (Pomacanthidae). The slope flattened out at about 70 m deep and became dominated by sand.</p>

Shoal/bank	Description
	
<p>Goodrich Bank, Marie Shoal and Shepparton Shoal</p>	<p>Goodrich Bank, Marie Shoal and Shepparton Shoal are located directly adjacent to the pipeline route corridor.</p> <p>AIMS undertook a seabed biodiversity survey in 2015 at two mid-shelf seabed locations adjacent to Goodrich Bank and Cape Helvetius (Heyward et al., 2017). 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 waters surrounding Goodrich Bank and were only encountered at depths less than 30 m.</p> <p>The AIMS extended benthic habitat map shows that burrowers/crinoids and filter-feeder communities are expected at Marie and Shepparton shoals.</p> <p>Connectivity between shoal features is expected given the strong surface currents in the region (Heyward et al., 2017). Therefore, it is anticipated that the ecological characteristics of the Goodrich Bank, Marie Shoal and Shepparton Shoal are broadly consistent with the above description of the shoals and banks located within the EMBA, as well as the characteristics described for Evans Shoal, Tassie Shoal and Lynedoch Bank.</p>

## 2.5 Offshore reefs and islands

**Table 2-4** summarises the regionally important offshore reefs and islands within the EMBA. These reefs include diverse coral and seagrass habitats, and benthic and fish communities. A number of these reefs and islands also have designated biological important areas (BIAs), where aggregations of individuals of a species are known to display biologically important behaviour such as breeding, foraging, resting or migration.

**Table 2-4: Summary of the regionally important offshore reefs and islands within the EMBA**

Offshore reef/island	Description
Ashmore Reef	<p>Ashmore Reef lies about 800 km to the south-west of the permit area and is protected by the Commonwealth-managed Ashmore Reef Marine Park (<b>Section 12.1.1</b>). Ashmore Reef is also a designated Ramsar wetland of international significance (<b>Section 9.1.1</b>).</p> <p>The reef is a large platform reef of 227 km<sup>2</sup>, consisting of an atoll-like structure with three low, vegetated islands, numerous banks of shifting sand and two large lagoon areas. The surrounding reef consists of a well-developed reef crest – most prominent on the south and east sides – and a broad reef flat that can be up to 3 km across. Along the edge of this reef flat area are large areas of drying sand that become exposed at low tide, particularly along the southern side. Water depth within the lagoon is highly variable, ranging from extremely shallow around the sand banks and up to 45 m in the deeper areas. The three islands located within the lagoon – West Island, East Island and Middle Island – are mostly flat, being composed of coarse sand with a few areas of exposed beach rock and limestone outcrops (Clarke, 2010; Shell, 2009).</p> <p>Five species of seagrass have been reported at Ashmore Reef, with <i>Thalassia hemprichii</i> being the dominant species (Pike &amp; Leach, 1997; Skewes et al., 1999b; Brown &amp; Skewes, 2005). The total area of seagrass at Ashmore Reef in 1999 was estimated to be 470 ha (Skewes et al., 1999b). However, much of this was very sparse cover and there were only 220 ha of seagrass with a greater than 10% cover (Brown &amp; Skewes, 2005). Seagrass grew in a sparse, patchy distribution across the sand flats, but had a higher coverage on the reef flat area, where it extended to within 100 m of the reef crest. The area of greatest cover and diversity was in the west and south-west areas of the reef on the inner reef flat (Brown &amp; Skewes, 2005). These seagrass meadows support a small but significant population of dugongs estimated at around 100 individuals in all age classes from calves to adults (Hale &amp; Butcher, 2013).</p> <p>The diversity of fish at Ashmore Reef is higher than other comparable reefs in the NMR bioregion with more than 760 species recorded (Russell et al., 2005; Kospartov et al., 2006). The majority of fish species are shallow water, benthic taxa that typically inhabit depths down to 100 m and are widely distributed throughout the Indo-West Pacific (Russell et al., 2005). The most species rich groups are gobies (Gobiidae), damselfishes (Pomacentridae), wrasses (Labridae), cardinal fishes (Apogonidae), moray eels (Muraenidae), butterflyfishes (Chaetodontidae), and rockcods and groupers (Serranidae) (Allen, 1989; Russell et al., 2005). Macroalgae at Ashmore Reef are estimated to cover more than 2,000 ha, mostly on the reef slope and crest areas (Hale &amp; Butcher, 2013). The algal community is dominated by turf and coralline algae, with fleshy macroalgae comprising typically less than 10% of total algal cover (Skewes et al., 1999b).</p>
Cartier Island	<p>Cartier Island lies about 780 km to the south-west of the permit area. The island and surrounding reefs are protected by the Cartier Island Marine Park (<b>Section 12.1.2</b>). Cartier Island is an unvegetated sand cay surrounded by mature reef flats; it sits at the centre of a reef platform that rises steeply from the seabed. The island is composed of coarse sand and is stabilised by patches of beach rock around its perimeter. The island supports large populations of nesting marine turtles and is a designated nesting BIA for the green turtle (<b>Section 6.1.2</b>).</p>
Hibernia Reef	<p>Hibernia Reef is about 740 km to the south-west of the permit area and is situated about 40 km north-east of Ashmore Reef and 60 km north-west of Cartier Island. Hibernia Reef consists of an approximately oval-shaped reef that tapers to a point on the western side. The reef covers an area of about 11.5 km<sup>2</sup> and has no permanent land, but large areas of the reef can become exposed at low tide. Hibernia Reef is also characterised by a deep central lagoon and drying sand flats.</p>



Offshore reef/island	Description
Seringapatam Reef <sup>1</sup>	<p>Seringapatam Reef (about 1,000 km to the south-west of the permit area) is a remote atoll. It covers an area of about 55 km<sup>2</sup> and encloses a lagoon which has a relatively consistent depth of about 20 m (maximum depth of 30 m) (Heyward et al., 2013). The lagoon is connected to the ocean by a narrow passage in the north-east part of the reef. Seringapatam Reef is recognised as a KEF (<b>Section 10.3</b>).</p> <p>Seringapatam Reef is a regionally important scleractinian coral reef as it has a high biodiversity comparable to Ningaloo Reef. Results from a Western Australian Museum (WAM) survey in 2006 noted 159 species of scleractinian corals with a hard coral cover of about 16% (WAM, 2009). The dominant benthic habitats of the reef were observed to include hard and soft corals (Heyward et al., 2013 cited in ConocoPhillips, 2018).</p> <p>Several baseline studies were conducted at Seringapatam Reef in 2013, as part of interests in the Greater Poseidon Field in the Browse Basin. The dominant benthic habitats of the reef were observed to include turf algae, macroalgae, hard and soft corals, algae and filter feeders (e.g. sponges, gorgonians, hydroids and seapens) (Heyward et al., 2013).</p> <p>Seringapatam Reef was found to have a seagrass cover of 2 ha out of 5,519 ha (0.04%) composed of <i>Thalassia hemprichii</i> and <i>Halophila ovalis</i> in approximately equal quantities (Skewes et al., 1999a). This finding contrasts with a more recent survey where only one species of seagrass (<i>Halophila decipiens</i>) was recorded at Seringapatam (Huisman et al., 2009).</p>
Scott Reef <sup>1</sup>	<p>Scott Reef (about 1,000 km to the south-west of the permit area) includes North Scott Reef and South Scott Reef. North Scott Reef is an annular reef, about 17 km long and 16 km wide, enclosing a shallow lagoon (up to 20 m deep) that is connected to the ocean by passages in the north-east and south-west (Gilmour et al., 2013; Woodside, 2014). South Scott Reef is a crescent-shaped reef that is about 20 km wide. The lagoon at South Scott Reef ranges in depth (20 to 70 m) and supports significant benthic communities such as hard and soft corals. Sandy Islet, to the north of South Scott Reef, represents the only sandy shoreline habitat at Scott Reef and is a significant nesting site for green turtles, predominantly during the summer months (Gilmour et al., 2013). Light penetration at Scott Reef is high due to low turbidity. Light penetration depths to the deeper part of South Reef Lagoon are in excess of 50 m with corals able to survive at depths of up to 70 m (Woodside Energy Limited et al., 2010). Scott Reef is recognised as a KEF (<b>Section 10.3</b>) and Commonwealth Heritage Place (<b>Section 9.2.2</b>).</p> <p>Scott Reef supports five species of seagrass (URS, 2006), with <i>Thalassia hemprichii</i> most abundant (Skewes et al., 1999a; URS, 2006). The highly energetic environment and significant tidal exposure of Scott Reef restricts the area of habitats potentially suitable for seagrass establishment to a small proportion of the total area, resulting in low abundance (Skewes et al., 1999a; URS, 2006).</p> <p>Surveys at Scott and Seringapatam reefs (described above) recorded more than 100 species of marine algae (Huisman et al., 2009). The marine algal community was similar between reefs and also similar to the Rowley Shoals. Algae found at these offshore atolls forms a small subset of the Indo-Pacific algal flora, with virtually all of the species identified thus far having been previously collected from north-western Australia or from localities further north. Although further research is necessary, at present there is nothing to suggest that the macroalgal communities of these offshore atolls are unique within the Indo-Pacific (Huisman et al., 2009).</p> <p>Scott Reef has enormous habitat diversity and is considered a hot spot for fish, with five endemic species (DEWHA, 2008a). The reef has biogeographic significance due to the presence of species which are at or close to the limits of their geographic ranges, including fish known previously only from Indonesian waters such as cardinalfish, azure damselfish (<i>Chrysoptera hemicyanea</i>), comb-tooth blenny (<i>Escnius schroederi</i>) and several Gobiids (DEWHA, 2008a).</p> <p>Coral communities at Scott Reef occur across shallow (&lt; 30 m) and deep (&gt; 30 m) habitats, with 306 species from 60 genera and 14 families having been identified (Gilmour et al., 2009). Coral communities varied from shallow to deep water with 295 species recorded from shallow water environments and 51 species from deep water. Eleven species were only found in deep water environments. Of the corals recorded, none were endemic to Scott Reef (Gilmour et al., 2009) and all were predominantly widespread Indo-Pacific species.</p>

<sup>1</sup> Values and sensitivities outside but proximal to the modelled EMBA, such as Scott Reef Nature Reserve (including Scott Reef and Seringapatam Reef) to the southwest of the modelled EMBA, have been included in the risk assessment for unplanned events.

## 2.6 Other seabed features of interest

### 2.6.1 Seamounts

The Barossa environmental baseline studies program (Jacobs, 2016c) included sampling sites at several seamounts in the broader vicinity of the Barossa development (within 9 to 18 km to the west of the permit area). The seamounts are generally raised up from the seabed to water depths between 50 and 80 m and are characterised by predominantly sand and rubble (Jacobs, 2016c). The hard substrate of the seamount slopes support epibenthic communities dominated by sponges and filter feeders such as gorgonians (e.g. sea whips, sea fans and soft corals) and feather stars. Other epibenthic species observed included holothurians (sea cucumbers), sea fans and algae (Jacobs, 2016c).

Triggerfish nesting areas were apparent at the seamounts. The triggerfish (family Balistidae) appeared to make depressions in the sand and rubble at the top of the southernmost seamount surveyed, as they were observed in and around these depressions (Jacobs, 2016c). At a seamount directly west of the permit area (about 18 km), small discrete piles of rubble had accumulated that also may have been fish nests or as the result of tidal/current movement. These piles were also observed on the northern slope of Evans Shoal. The seamounts also appeared to support schools of fish (predominantly from the families Lutjanidae, Carangidae and Caesionidae, and including larvae or juveniles) both near the top of the seamount and at depth.

Four grey nurse sharks were observed at one of the seamounts in about 130 to 160 m water depth. This was considered unusual as neither the east nor west coast populations are known to extend that far north and are generally associated with shallower, more coastal waters (DoEE, 2017e).

Seamounts are likely to be observed sporadically across the wider EMBA and support epibenthic communities, such as sponges and filter feeders and schools of fish.

### 2.6.2 Scarps

The Barossa environmental baseline studies program (Jacobs, 2016c) included sampling sites at two scarps, 10 km to the south of the permit area, which were in water depths ranging between 160 and 190 m. The substrate of the scarps was similar and characterised by a hard bedrock pavement at the top, with a rocky profile along the ridge and sand habitats at the base (Jacobs, 2016c). The scarps provided habitat for gorgonians (e.g. sea whips), feather stars and other filter feeders, sponges, and hydroid/bryozoan turf. A deep-water snapper species (possibly goldband snapper) was also observed in a rocky overhang at the base of the slope and small silver fish and one ray were observed on the sand flat at one of the scarps (Jacobs, 2016c).

Scarps are likely to be observed sporadically across the wider EMBA and support epibenthic communities, such as sponges and filter feeders and schools of fish.

### 3 Benthic habitats and communities

Benthic habitats predominantly refer to communities consisting of marine plants, such as seagrass and macroalgae, or invertebrates such as reef-building corals.

Previous surveys in the Timor Sea indicate that between 50 and 200 m depth, the benthos consists mostly of soft, easily re-suspended sediments (Heyward et al., 1997; URS, 2005, 2007). The diversity and coverage of epibenthos is low and organisms present are predominantly sponges, gorgonians and soft corals (Heyward et al., 1997; URS, 2005, 2007).

The seabed features of regional interest nearest to the permit area (Evans Shoal, Tassie Shoal and Lynedoch Bank) and pipeline route corridor (Goodrich Bank, Marie Shoal and Shepparton Shoal) became the subject of the environmental baseline monitoring program for the Barossa development (**Section 1.2**). See **Section 2.3** for a discussion about the observed benthic habitats and communities.

**Section 2.5** summarises the regionally important offshore reefs and islands within the EMBA and the benthic habitats and communities they support.

AIMS has developed a spatial predictive benthic habitat model of the Oceanic Shoals Marine Park and the pipeline route corridor. This was part of the Australian National Environmental Science Program to determine the spatial heterogeneity of the benthic environment and key classes of organisms within the reserve. The outputs of this model are detailed in **Section 12.2.1**.

See the sections below for a broad description of the benthic communities within the EMBA, with reference to the observations made during the environmental baseline program (**Section 2.4**).

#### 3.1 Benthic communities

Benthic macrofauna groups observed near the permit area include octocorals (particularly sea pens) and motile decapod crustaceans (mostly prawns and squat lobsters), which were recorded in relatively low numbers. Other biota observed included anemones, starfish, brittle star and soft corals (Jacobs, 2016c).

The frequent bioturbations (burrows, mounds and tracks) observed suggest several burrow-living decapods (such as prawns) may be present (Jacobs, 2016c). These species are more active at dawn, dusk or at night in habitats lacking cover and hence, are less likely to be recorded during daylight surveys (Jacobs, 2016c).

Infaunal communities near the permit area were characterised by burrowing taxa and demersal fish, namely foraminifera (an amoeboid protist), nematodes, *Bregmaceros* sp. (codlets), tube-forming Onuphid polychaetes and the superb nut shell, *Ennucula superba*. The communities were characterised by low abundance (five to 15 individuals) and species diversity (five to nine taxa). The most common phyla within the infaunal communities were Annelida (total of eight individuals across the sampling sites), Mollusca and Foraminifera (total of seven individuals) and Crustacea (total of six individuals). Due to the lack of hard substrate, the associated epibenthos was expected to be sparse (Jacobs, 2016c).

The deep-water benthic characteristics of the permit area are broadly consistent with the results of similar surveys in offshore areas of the region (Jacobs, 2016c).

The permit area occurs within the bounds of the Shelf Break and Slope of the Arafura Shelf (KEF) (**Section 10.8**). The ecological values associated with this unique seafloor feature (i.e. patch reefs and hard substrate pinnacles) were not observed during the surveys (Jacobs, 2016a).

See **Figure 3-1** for some images that represent the benthic habitats and macrofauna near the permit area.

Two geophysical surveys have been undertaken over the pipeline route corridor (Fugro, 2016 and DOF, 2018). A summary of the benthic communities observed have been included in **Table 2-1**.



a) Silty sandy substrate with a burrowing anemone and widespread bioturbation (southern area)



b) Silty sandy substrate with a teleost fish and widespread bioturbation (southern area)



c) Silty sandy substrate with a sea pen (middle area)



d) Silty sandy substrate with gravelly silty sand substrate, a squat lobster and soft coral (middle area)



e) Silty sandy substrate with a teleost (gurnard) (northern area)



f) Silty sandy substrate with a prawn (northern area)

**Figure 3-1: Representative images of benthic habitats and macrofauna near the permit area (Jacobs, 2016c)**

### 3.2 Coral reefs

Extensive coral communities are not present within the permit area or pipeline route corridor (Jacobs, 2016c, 2017). Within the EMBA the following receptors contain extensive coral reefs:

- + Evan Shoal
- + Tassie Shoal
- + Blackwood Shoal
- + Lynedoch Bank
- + Ashmore Reef
- + Hibernia Reef
- + Seringapatam Reef<sup>2</sup>
- + Scott Reef<sup>2</sup>
- + shallower waters adjacent to the Indonesia and Timor-Leste coastlines.

See **Sections 2.4** and **2.5** for descriptions of the above receptors. In addition, more than 150 shoal/bank features occur across the Carbonate Banks and Terrace System of the Sahul Shelf KEF (**Section 10.5**). The hard substrate of these banks is thought to support diverse organisms including sessile benthic invertebrates, such as sponges, soft and hard corals, gorgonians, bryozoans, ascidians and associated reef fish and elasmobranchs (Brewer et al., 2007).

Coral reef communities within the EMBA are also expected to be widespread in shallower waters adjacent to the coastlines of Indonesia and Timor-Leste. The EMBA overlaps a small portion of the southern boundary of the Coral Triangle, on the south coast of Timor-Leste and West Timor. The Coral Triangle (CT) is located in South-east Asia and the Pacific, and encompasses the tropical marine waters of Indonesia, Malaysia, Papua New Guinea, Philippines, Solomon Islands and Timor-Leste. It is considered to be the planet's richest centre of marine life and coral diversity (Cross et al., 2014).

Corals are both primary producers and filter feeders and thus play a role in the provision of food to marine fauna and in nutrient recycling to support ecosystem functioning (CALM & MPRA, 2005a). The distribution of corals in the area is governed by the availability of hard substrate for attachment and light availability. Corals create settlement substrate and shelter for marine flora and fauna. Studies have shown that declines in the abundance, or even marked changes in species composition of corals, has a marked impact on the biodiversity and productivity of coral reef habitats (Pratchett et al., 2008). As part of the reef-building process, scleractinian corals are also important for the protection of coastlines through accumulation and cementation of sediments and dissipation of wave energy (CALM & MPRA, 2005a).

### 3.3 Seagrasses

Seagrass communities are not present within the permit area or pipeline route corridor (Jacobs, 2016c, 2017). Within the EMBA the following receptors contain seagrass communities:

- + Ashmore Reef
- + South Scott Reef<sup>2</sup>
- + Lesser Sunda Ecoregion within Indonesian and Timor-Leste coastlines.

The receptors located in Australian waters have been described in **Sections 2.4** and **2.5**.

Seagrasses are biologically important for four reasons:

1. as sources of primary production.
2. as habitat for juvenile and adult fauna such as invertebrates and fish.
3. as a food resource.
4. for their ability to attenuate water movement and trap sediment (Masini et al. 2009).

More than 30 species of seagrasses have been recorded within Australian waters. Seagrasses inhabit a variety of substrates from mud to rock, but occur most extensively on soft substrates (AIMS, n.d). Seagrass habitats are widely distributed across the Lesser Sunda Ecoregion and within Indonesian waters the lower intertidal and

<sup>2</sup> Values and sensitivities outside but proximal to the modelled EMBA, such as Scott Reef Nature Reserve (inclusive of Scott Reef and Seringapatam Reef) to the southwest of the modelled EMBA, have been included in the risk assessment for unplanned events.

upper subtidal zones are considered important areas for the growth of seagrass (Hutumo & Moosa, 2005). Pioneering vegetation in the intertidal zone is dominated by *Halophila ovalis* and *Halodule pinifolia* while *Thalassodendron ciliatum* dominate the lower subtidal zones (Hutumo & Moosa, 2005). Data from the United Nations Environment Program (UNEP) World Conservation Monitoring Centre has identified the south-west and west Lombok, Savu and the south coast of Timor-Leste as potential areas of importance for seagrass (DeVantier et al. 2008).

### 3.4 Plankton

Plankton abundance and distribution is patchy, dynamic and strongly linked to localised and seasonal productivity (Evans et al., 2016). Fluctuations in abundance and distribution occur both vertically and horizontally in response to tidal cycles, seasonal variation (light, water temperature and chemistry, currents and nutrients) and cyclonic events. As a key indicator for ecosystem health and change, plankton distribution and abundance has been measured for more than a century in Australia (Richardson et al., 2005). The compilation of this data has been made publicly available (see Australian Ocean Data Network 2017) and was used in the *Australia State of the Environment 2016* report (Jackson et al., 2017) to nationally assess marine ecosystem health. According to their findings, warming ocean temperatures have extended the distribution of tropical phytoplankton species (which have a lower productivity) further south, resulting in a decline in primary productivity in oceanic waters north of 35°C, especially the North West Shelf (Evans et al., 2016). Trends in primary productivity across Australia are variable, with the south-west of Australia experiencing an increase in productivity and northern Australia experiencing no change between 2002 and 2016 (Evans et al., 2016).

During the marine studies program (Jacobs, 2016a), phytoplankton and zooplankton species were sampled along 300-m-long surface water transect tows during three field surveys (June 2014, January 2015 and April 2015) using plankton nets. Four of the sites were near the permit area (only three of which were sampled in winter), three were at Evans Shoal (with only two sampled in winter), three were at Tassie Shoal (only one sampled in winter) and two were at Lynedoch Bank (autumn and summer only).

The study found phytoplankton assemblage composition was relatively similar across the seasons. Diatoms (*Bacillariophyceae*), blue-green algae (*Cyanobacteria*) and dinoflagellates (*Dinophyceae*) were recorded in all seasons, cryptomonads (*Cryptophyceae*) in two seasons (summer and autumn), and silicoflagellates (*Dictyochophyceae*) and green algae (*Chlorophyceae*) in only a single season (winter and autumn respectively) (Jacobs, 2016a).

Blue-green algae were the most abundant phytoplankton assemblage. They were recorded in about 87% of the transect tows and had a mean abundance of 74%. *Trichodesmium erythraeum* (a blue-green alga) was the most abundant phytoplankton species at the majority of sites during each season.

The zooplankton assemblage composition was relatively similar across the season, with summer and winter being most similar (Jacobs, 2016a). The summer survey recorded the most diverse assemblage (14 classes of organisms), while autumn was the least diverse (either classes) (Jacobs, 2016a).

## 4 Shoreline habitats

Shoreline habitats are defined as those habitats that are adjacent to the water along the mainland and of islands that occur above the lowest astronomical tide (LAT) and most often in the intertidal zone. The shorelines relevant to the EMBA are those of Indonesia and Timor-Leste, South Scott Reef, Ashmore Reef and Cartier Island.

### 4.1 Mangroves

Within the EMBA, only the Indonesian and Timor-Leste coastlines have mangrove habitat.

Mangroves are important primary producers and have several ecological and economic values. For example, they play a key role in reducing coastal erosion by stabilising sediment with their complex root systems (Kathireson & Bingham 2001). They are recognised for their capacity to help protect coastal areas from the damaging effects of erosion during storms and storm surge. Mangroves are important in the filtration of runoff from land, which helps maintain water clarity for the coral reefs that are often found offshore in tropical locations (NOAA, 2010). Indonesia has the largest total mangrove coverage of any country, with at least 31,890 km<sup>2</sup>. This is slightly more than 20% of the global mangrove forest coverage (UNESCO, 2020). On the other hand, mangroves in Timor-Leste are not so abundant. There are some fringing mangroves restricted to coastal lagoons and estuaries, due to the otherwise high-energy beaches, which are not suitable for natural mangrove establishment. (UNESCO, 2022).

The muddy sediments that occur in mangrove forests are home to a variety of epibenthic, infaunal and meiofaunal invertebrates (Kathireson & Bingham 2001). Crustaceans known to inhabit the mud in mangrove systems include fiddler crabs, mud crabs, shrimps and barnacles. Within the water channels of the mangrove systems, various finfish are found from the smaller fish such as gobies and mudskippers (which are restricted to life in the mangroves) through to larger fish such as barramundi (*Lates calcarifer*) and the mangrove jack (*Lutjanus argentimaculatus*). Mangroves and their associated invertebrate-rich mudflats are an important habitat for migratory shorebirds from the northern hemisphere, as well as some avifauna that are restricted to mangroves as their sole habitat (Garnet & Crowley 2000).

### 4.2 Intertidal mud/sand flats

Within the EMBA the following receptors have intertidal mud/sandflats:

- + South Scott Reef<sup>3</sup>
- + Ashmore Reef
- + Cartier Island
- + Indonesian and Timor-Leste coastlines.

Intertidal mudflats form when fine sediment carried by rivers and the ocean is deposited in a low-energy environment. Intertidal mudflats are highly productive components of shelf ecosystems, responsible for recycling organic matter and nutrients through microbial activity. This microbial activity helps stabilise organic fluxes by reducing seasonal variation in primary productivity which ensures a more constant food supply. Intertidal sand and mudflats support a wide range of benthic infauna and epifauna which graze on microscopic algae and microbenthos, such as bivalves, molluscs, polychaete worms and crustaceans (Zell, 2007).

<sup>3</sup> Values and sensitivities outside but proximal to the modelled EMBA, such as Scott Reef Nature Reserve (inclusive of Scott Reef, Seringapatam Reef) to the southwest of the modelled EMBA, have been included in the risk assessment for unplanned events.

Ashmore Reef has intertidal sand flats and these, combined with shingle and pebble shores meet the definition of Ramsar wetland type E which is unique for the bioregion (Hale and Butcher, 2013). Back reef sands are characterised by intertidal and sub-tidal sands and comprise 40% of the Ashmore Reef. Ashmore Reef Nature Reserve also contains mud flats which meet the definition of Ramsar wetland type G, unique for the bioregion (Hale and Butcher, 2013).

Cartier Island is characterised as having sand flat habitats, which are specifically identified as supporting species such as turtles, stingrays, echinoderms, molluscs and crustaceans (Commonwealth of Australia, 2002)

The high abundance of invertebrates found in intertidal sand and mudflats provides an important food source for finfish and shellfish which swim over the area at high tide. Mudflats have also been shown to be significant nursery areas for flatfish. During low tide, these intertidal areas are also important foraging areas for indigenous and migratory shorebirds.

The habitats and communities found on the Tiwi islands, Scott Reef, Ashmore Reef and Cartier Island have been further described in **Table 2-4**.

### 4.3 Sandy beaches

Within the EMBA the following receptors have sandy beaches:

- + Scott Reef<sup>4</sup>
- + Ashmore Reef
- + Cartier Island
- + Indonesian and Timor-Leste coastlines.

Sandy beaches at Ashmore Reef and Cartier Island are critical habitats, supporting nesting turtles and shorebirds, including resting areas during their migration. Scott Reef has one sandy shoreline habitat located north of South Scott Reef called Sandy Islet. Sandy Islet is significant for breeding green turtles, which nest here during the summer months (Gilmour et al. 2013).

The southern coastlines of the Lesser Sunda Ecoregion of Indonesia and Timor-Leste islands are known to contain sandy beaches consisting of soft black sand, formed by volcanic activity. Within this region, a number of important sites for turtle nesting beaches have been identified (Huffard et al. 2012).

Sandy beaches are those areas within the intertidal zone where unconsolidated sediment has been deposited (and eroded) by wave and tidal action. Sandy beaches can vary from low- to high-energy zones; the energy experienced influences the beach profile due to varying rates of erosion and accretion.

Sandy beaches provide habitat to a variety of burrowing invertebrates and subsequently provide foraging grounds for shorebirds (Garnet & Crowley, 2000). The number of species and densities of benthic macroinvertebrates that occur in the sand are typically inversely correlated with sediment grain- size and exposure to wave action, and positively correlated with sedimentary organic content and the amount of detached and attached macrophytes (Wildsmith et al., 2005). However, the distributions of these faunas among habitats will also reflect differences in the suite of environmental variables that characterise those habitats (Wildsmith et al., 2005).

Sandy habitats are important for both resident and migratory seabirds and shorebirds (see **Section 8**). While sand flats and beaches generally support fewer species and numbers of birds than mudflats of similar size; some species such as the beach thick knee (*Esacus giganteus*), a crab eater, are commonly associated with sandy beaches (Garnet & Crowley, 2000). Sandy beaches can also provide an important habitat for turtle nesting and breeding (see marine turtles, **Section 6.1**).

The habitats and communities found on the Scott Reef, Ashmore Reef and Cartier Island have been further described in **Table 2-4**.

<sup>4</sup> Values and sensitivities outside but proximal to the modelled EMBA, such as Scott Reef Nature Reserve (inclusive of Scott Reef and Seringapatam Reef) to the southwest of the modelled EMBA, have been included in the risk assessment for unplanned events.



#### 4.4 Rocky shorelines

Within the EMBA, only the Indonesian and Timor-Leste coastlines have rocky shorelines.

Rocky shores can include pebble/cobble, boulders and rocky limestone cliffs (often at the landward edge of reef platforms). Rocky outcrops typically consist of hard bedrock, but some of the coastline has characteristic limestone karsted cliffs with an undercut notch. Rocky shorelines can vary from habitats where there is bedrock protruding from soft sediments to cliff-like structures that form headlands. Rocky shorelines are an important foraging area for seabirds and habitat for invertebrates found in the intertidal splash zone (Morton & Britton cited in Jones 2004).

## 5 Fish and sharks

Species listed as threatened and migratory under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) that may occur in the EMBA have been identified using the online Protected Matters Search Tool (PMST). These species are shown in **Table 5-1** along with their WA and NT conservation listing (as applicable) and discussed in **Section 5.1** below.

The following WA conservation codes apply to WA conservation significant fauna:

- + Threatened species (listed under the *Biodiversity Conservation Act 2016* (BC Act)):
  - o critically endangered
  - o endangered
  - o vulnerable.
- + Specially protected species (listed under the BC Act):
  - o migratory
  - o species of special conservation interest (conservation dependent fauna)
  - o other specially protected species.
- + Priority species (non-statutory state based administrative process):
  - o priority 1, 2 and 3: poorly-known species – possible threatened species that do not meet survey criteria or are otherwise data deficient. Ranked in order of priority. In urgent need of further survey.
  - o priority 4: species that are adequately known, are either: rare but not threatened; meet criteria for near threatened; or delisted as threatened species within last five years for reasons other than taxonomy. Requiring regular monitoring.

The following NT conservation codes apply to NT conservation significant fauna:

- + Threatened wildlife (listed under the *Territory Parks and Wildlife Conservation Act 1976*):
  - o extinct in the wild
  - o critically endangered
  - o endangered
  - o vulnerable
  - o data deficient
- + Protected wildlife (listed under the *Territory Parks and Wildlife Conservation Act 1976*):
  - o wildlife in a territory park, reserve, sanctuary, wilderness zone or area of essential habitat
  - o any vertebrate that is indigenous to Australia.

A detailed account of commercial and recreational fisheries that operate in the region is provided in **Section 14.7**.

Table 5-1: EPBC listed fish and shark species in the EMBA

Species	Conservation status				Likelihood of occurrence in EMBA	BIA present
	EPBC Act 1999	BC Act 2016 <sup>1</sup>	Priority species	Territory Parks and Wildlife Conservation Act 1976		
Dwarf sawfish ( <i>Pristis clavata</i> )	Vulnerable, Migratory	-	Priority 1	Vulnerable	Species or species habitat know to occur within area	None
Freshwater sawfish ( <i>Pristis pristis</i> )	Vulnerable, Migratory	-	Priority 3	Vulnerable	Species or species habitat may occur within area	None
Giant manta ray ( <i>Mobula birostris</i> )	Migratory	-	-	-	Species or species habitat likely to occur within area	None – no BIA defined
Great white shark ( <i>Carcharodon carcharias</i> )	Vulnerable, Migratory	Vulnerable	-	-	Species or species habitat may occur within area	None
Green sawfish ( <i>Pristis zijsron</i> )	Vulnerable Migratory	Vulnerable	-	Vulnerable	Species or species habitat known to occur within area.	None
Longfin mako ( <i>Isurus paucus</i> )	Migratory	-	-	-	Species or species habitat likely to occur within area	None – no BIA defined
Narrow sawfish ( <i>Anoxypristis cuspidata</i> )	Migratory	-	-	-	Species or species habitat known to occur within area	None – no BIA defined
Northern river shark ( <i>Glyphis garicki</i> )	Endangered	-	Priority 1	Endangered	Species or species habitat may occur within area	None – no BIA defined
Oceanic whitetip shark ( <i>Carcharhinus longimanus</i> )	Migratory	-	-	-	Species or species habitat may occur within area	None – no BIA defined
Reef manta ray ( <i>Mobula alfredi</i> )	Migratory	-	-	-	Species or species habitat known to occur within area.	None – no BIA defined
Scalloped hammerhead ( <i>Sphyma lewini</i> )	Conservation Dependent	-	-	-	Species or species habitat known to occur within area.	None – no BIA defined

Species	Conservation status				Likelihood of occurrence in EMBA	BIA present
	EPBC Act 1999	BC Act 2016 <sup>1</sup>	Priority species	Territory Parks and Wildlife Conservation Act 1976		
Shortfin mako ( <i>Isurus oxyrinchus</i> )	Migratory	-	-	-	Species or species habitat likely to occur within area	None – no BIA defined
Southern Bluefin Tuna ( <i>Thunnus maccoyii</i> )	Conservation Dependent	-	-	-	Breeding known to occur within area.	None – no BIA defined
Speartooth Shark ( <i>Glyphis glyphis</i> )	Critically endangered	-	-	Vulnerable	Species or species habitat may occur within the area	None – no BIA defined
Whale shark ( <i>Rhincodon typus</i> )	Vulnerable, Migratory	-	-	-	Foraging, feeding or related behaviour known to occur within area	Yes – see <b>Table 5-2</b>
Brock's Pipefish ( <i>Halicampus brocki</i> )	Listed marine	-	-	-	Species or species habitat may occur within area	None – no BIA defined
Pallid Pipehorse, Hardwick's Pipehorse ( <i>Solegnathus hardwickii</i> )	Listed marine	-	-	-	Species or species habitat may occur within area	None – no BIA defined
Short-keel Pipefish, Short-keeled Pipefish ( <i>Hippichthys parvicarinatus</i> )	Listed marine	-	-	-	Species or species habitat may occur within area	None – no BIA defined
Double-end Pipehorse, Double-ended Pipehorse, Alligator Pipefish ( <i>Syngnathoides biaculeatus</i> )	Listed marine	-	-	-	Species or species habitat may occur within area	None – no BIA defined
Bluestripe Pipefish, Indian Blue-stripe Pipefish, Pacific Blue-stripe Pipefish ( <i>Doryrhamphus excisus</i> )	Listed marine	-	-	-	Species or species habitat may occur within area	None – no BIA defined
Fijian Banded Pipefish, Brown-banded Pipefish ( <i>Corythoichthys amplexus</i> )	Listed marine	-	-	-	Species or species habitat may occur within area	None – no BIA defined
Tiger Pipefish ( <i>Filicampus tigris</i> )	Listed marine	-	-	-	Species or species habitat may occur within area	None – no BIA defined

Species	Conservation status				Likelihood of occurrence in EMBA	BIA present
	EPBC Act 1999	BC Act 2016 <sup>1</sup>	Priority species	Territory Parks and Wildlife Conservation Act 1976		
Banded Pipefish, Ringed Pipefish ( <i>Doryrhamphus dactylophorus</i> )	Listed marine	-	-	-	Species or species habitat may occur within area	None – no BIA defined
Girdled Pipefish ( <i>Festucalex cinctus</i> )	Listed marine	-	-	-	Species or species habitat may occur within area	None – no BIA defined
Pig-snouted Pipefish ( <i>Choeroichthys suillus</i> )	Listed marine	-	-	-	Species or species habitat may occur within area	None – no BIA defined
Hedgehog Seahorse ( <i>Hippocampus spinosissimus</i> )	Listed marine	-	-	-	Species or species habitat may occur within area	None – no BIA defined
Spiny Seahorse, Thorny Seahorse ( <i>Hippocampus histrix</i> )	Listed marine	-	-	-	Species or species habitat may occur within area	None – no BIA defined
Flat-face Seahorse ( <i>Hippocampus planifrons</i> )	Listed marine	-	-	-	Species or species habitat may occur within area	None – no BIA defined
Beady Pipefish, Steep-nosed Pipefish ( <i>Hippichthys penicillus</i> )	Listed marine	-	-	-	Species or species habitat may occur within area	None – no BIA defined
Spotted Seahorse, Yellow Seahorse ( <i>Hippocampus kuda</i> )	Listed marine	-	-	-	Species or species habitat may occur within area	None – no BIA defined
Western Spiny Seahorse, Narrow-bellied Seahorse ( <i>Hippocampus angustus</i> )	Listed marine	-	-	-	Species or species habitat may occur within area	None – no BIA defined
Spiny-snout Pipefish ( <i>Halicampus spinirostris</i> )	Listed marine	-	-	-	Species or species habitat may occur within area	None – no BIA defined
Mud Pipefish, Gray's Pipefish ( <i>Halicampus grayi</i> )	Listed marine	-	-	-	Species or species habitat may occur within area	None – no BIA defined
Ribboned Pipehorse, Ribboned Seadragon ( <i>Haliichthys taeniophorus</i> )	Listed marine	-	-	-	Species or species habitat may occur within area	None – no BIA defined

Species	Conservation status				Likelihood of occurrence in EMBA	BIA present
	EPBC Act 1999	BC Act 2016 <sup>1</sup>	Priority species	Territory Parks and Wildlife Conservation Act 1976		
Pacific Short-bodied Pipefish, Short-bodied Pipefish ( <i>Choeroichthys brachysoma</i> )	Listed marine	-	-	-	Species or species habitat may occur within area	None – no BIA defined
Three-keel Pipefish ( <i>Campichthys tricarinatus</i> )	Listed marine	-	-	-	Species or species habitat may occur within area	None – no BIA defined
Red-hair Pipefish, Duncker's Pipefish ( <i>Halicampus dunckeri</i> )	Listed marine	-	-	-	Species or species habitat may occur within area	None – no BIA defined
Straightstick Pipefish, Long-nosed Pipefish, Straight Stick Pipefish ( <i>Trachyrhamphus longirostris</i> )	Listed marine	-	-	-	Species or species habitat may occur within area	None – no BIA defined
Bentstick Pipefish, Bend Stick Pipefish, Short-tailed Pipefish ( <i>Trachyrhamphus bicoarctatus</i> )	Listed marine	-	-	-	Species or species habitat may occur within area	None – no BIA defined
Robust Ghostpipefish, Blue-finned Ghost Pipefish, ( <i>Solenostomus cyanopterus</i> )	Listed marine	-	-	-	Species or species habitat may occur within area	None – no BIA defined
Corrugated Pipefish, Barbed Pipefish ( <i>Bhanotia fasciolata</i> )	Listed marine	-	-	-	Species or species habitat may occur within area	None – no BIA defined
Blue-speckled Pipefish, Blue-spotted Pipefish ( <i>Hippichthys cyanospilos</i> )	Listed marine	-	-	-	Species or species habitat may occur within area	None – no BIA defined
Tidepool Pipefish ( <i>Micrognathus micronotopus</i> )	Listed marine	-	-	-	Species or species habitat may occur within area	None – no BIA defined
Gunther's Pipehorse, Indonesian Pipefish ( <i>Solegnathus lettiensis</i> )	Listed marine	-	-	-	Species or species habitat may occur within area	None – no BIA defined
Schultz's Pipefish ( <i>Corythoichthys schultzi</i> )	Listed marine	-	-	-	Species or species habitat may occur within area	None – no BIA defined

Species	Conservation status				Likelihood of occurrence in EMBA	BIA present
	EPBC Act 1999	BC Act 2016 <sup>1</sup>	Priority species	Territory Parks and Wildlife Conservation Act 1976		
Roughridge Pipefish ( <i>Cosmocampus banneri</i> )	Listed marine	-	-	-	Species or species habitat may occur within area	None – no BIA defined
Reticulate Pipefish, Yellow-banded Pipefish, Network Pipefish ( <i>Corythoichthys flavofasciatus</i> )	Listed marine	-	-	-	Species or species habitat may occur within area	None – no BIA defined
Reef-top Pipefish ( <i>Corythoichthys haematopterus</i> )	Listed marine	-	-	-	Species or species habitat may occur within area	None – no BIA defined
Australian Messmate Pipefish, Banded Pipefish ( <i>Corythoichthys intestinalis</i> )	Listed marine	-	-	-	Species or species habitat may occur within area	None – no BIA defined
Cleaner Pipefish, Janss' Pipefish ( <i>Doryrhamphus janssi</i> )	Listed marine	-	-	-	Species or species habitat may occur within area	None – no BIA defined

1 The Wildlife Conservation (Specially Protected Fauna) Notice 2018 has been repealed and replaced by the Biodiversity Conservation (Listing of Native Species) (Fauna) Order 2022 (which lists specially protected, threatened and extinct species), pursuant to sections 13(1), 19(1) and 23(1) of the BC Act and regulation 174(1) of the Biodiversity Conservation Regulations 2018.

## 5.1 Fish

The EMBA is likely to support offshore pelagic and demersal fish assemblages which are typical of those found in the NMR and NWMR.

Listed species include the southern bluefin tuna (threatened) (*Thunnus maccoyii*), as well as a number of marine species of fish largely from the family *Syngnathidae*. Syngnathids are a group of bony fishes that include seahorses, pipefishes, pipehorses and sea dragons, although taxonomic uncertainty still surrounds a number of these (DEWHA, 2012a). Knowledge about the distribution, abundance and ecology of syngnathids is limited, however, it is likely they are present within the shallower waters of the EMBA, particularly around macroalgal beds, coral reefs and coastal areas (Lim et al., 2011).

Threatened and/or migratory species under the EPBC Act have been described in **Table 5-1**.

Although the tropical waters off the NT coast contain a diverse range (about 1,400 species) of fish with tropical Indo-West Pacific affinities, fish abundance is considered low in the deep, relatively featureless waters that characterise the permit area and surrounds. About 20 types of ray-finned fish have been observed in varying densities and diversities during the marine studies program (Jacobs, 2016c).

AIMS has undertaken detailed characterisation of the fish communities associated with Evans Shoal and Tassie Shoal in conjunction with the survey of benthic habitats (results of the benthic habitat surveys are included in **Table 2-3**) (Heyward et al., 2017). The shoals and banks located within or near the pipeline route corridor (e.g. Goodrich Bank, Marie Shoal and Shepparton Shoal) are expected to attract similar fish species to Evans Shoal and Tassie Shoal (Heyward et al., 2017). **Section 5.1.2** describes fish communities present at the Evans Shoal and Tassie Shoal with reference to the results from the AIMS benthic habitats fish communities' study (Heyward et al., 2017).

### 5.1.1 Southern bluefin tuna

The southern bluefin tuna is regarded as a highly migratory species and occurs globally in waters between 30°S and 50°S. In Australia, southern bluefin tuna range from northern Western Australia around the southern region of the continent into northern New South Wales. Spawning occurs near the surface in warmer waters (at least 24°C) during August-April, peaking in October-February (Honda et al., 2010). The single known spawning ground for the species is located in the Indian Ocean between Java and northern Western Australia, which intersects the region surrounding the proposed development. However, the habitat of the southern bluefin tuna does not overlap with the operational area and thus presence of the species will be limited to the western surrounding region (TSSC 2010).

### 5.1.2 Fish communities – Evans Shoal and Tassie Shoal

A total of 7,256 fish from 300 species were recorded as part of the Barossa shoals and shelf survey in 2015: benthic habitats fish communities. Observations included a diverse range of demersal and semi-pelagic fishes, eels, sharks and rays (Heyward et al. 2017). Most of the individual fish observed (about 91%) and consequently the most commonly recorded species (261 species), were perch-like fishes (Order Perciformes). The next most common fish were puffer and triggerfish (Order Tetraodontiformes) and herrings (Order Clupeiformes), which accounted for about 6% and 3% of individuals observed respectively. It was noted that fish abundance was influenced most by the presence of any epibenthos on the seafloor and by calcareous reef composition of the substratum (Heyward et al., 2017).

The fish community comprised both shelf-based species normally found on reefs and some 'oceanic' species, such as the spotted oceanic triggerfish (Heyward et al., 2017). Some commercially targeted fish species were recorded in low numbers in deeper waters and included the red emperor and goldband snapper. Heyward et al. (2017) commented that the numbers of large fish observed at the shoals were lower than expected for such habitats.

Tassie Shoal displayed a higher diversity of fish compared with Evans Shoal. Tassie Shoal was observed to support an average of 32 fish species, while Evans Shoal was observed to support an average of 14 fish species (Heyward et al., 2017). The diversity and abundance were observed to decrease with increasing depth at both shoals, which is to be expected. Heyward et al. (2017) observed that Tassie Shoal supported consistently high fish diversity and abundance that was similar to or greater than other shoals and reefs at similar depths around Australia, which had been surveyed by AIMS.

While no fish species listed under the EPBC Act were sighted during the AIMS survey, three of the species represent new records for Australia: undescribed emperor (*Lethrinus* species; not yet classified in scientific literature) and two parrotfish known to occur in Indonesia – yellowtail parrotfish (*Scarus hypselopterus*) and darktail parrotfish (*Scarus fuscodorsalis*) (Heyward et al., 2017).

## 5.2 Sharks, rays and sawfishes

The EPBC Act PMST (**Appendix D to the Drilling and Completions EP**) identified 14 species of sharks, rays and sawfishes listed as threatened and/or migratory under the EPBC Act (**Table 5-1**). These include:

- + dwarf sawfish (*Pristis clavata*)
- + freshwater sawfish (*Pristis pristis*)
- + giant manta ray (*Mobula birostris*)
- + great white shark (*Carcharodon carcharias*)
- + green sawfish (*Pristis zijsron*)
- + longfin mako (*Isurus paucus*)
- + narrow sawfish (*Anoxypristis cuspidata*)
- + northern river shark (*Glyphis garricki*)
- + oceanic whitetip shark (*Carcharhinus longimanus*)
- + reef manta ray (*Mobula alfredi*)
- + shortfin mako (*Isurus oxyrinchus*)



- + speartooth shark (*Glyphis glyphis*)
- + whale shark (*Rhincodon typus*).
- + scalloped hammerhead (*Sphyrna lewini*).

The whale shark is the only fish species with a BIA within the EMBA (**Figure 5-1**).

The grey nurse shark (*Carcharias taurus*) was observed during the marine studies program at a seamount about 18 km to the west of the permit area (see **Section 2.6.1**). A description of this species has therefore been included in **Section 5.2.9**.

### 5.2.1 Dwarf sawfish

The Australian distribution of the dwarf sawfish (*Pristis clavata*) is considered to extend across northern Australia and along the Kimberley and Pilbara coasts (Last & Stevens 2009; Stevens et al., 2005). However, most of the dwarf sawfish recorded in WA and the NT have been from the shallow estuarine waters of the Kimberley region which are believed to be nursery (pupping) areas, with immature juveniles remaining in these areas up until three years of age (Thorburn et al., 2004). Adults are known to seasonally migrate back into inshore waters (Peeverell, 2007), although it is unclear how far offshore the adults travel – given captures in offshore surveys are very uncommon. The range of the species is restricted to brackish and salt water (Thorburn et al., 2007).

Based on the habitat preferences of dwarf sawfish, it is considered highly unlikely the species occurs within the deeper offshore waters of the EMBA.

### 5.2.2 Freshwater and green sawfish

Sawfishes generally inhabit inshore coastal, estuarine and riverine environments. The freshwater sawfish (*Pristis pristis*) has been recorded in north-west Australia from rivers (including isolated waterholes), estuaries and marine environments (Stevens et al., 2005). Newborns and juveniles primarily occur in the freshwater reaches of rivers and in estuaries, while most adult freshwater sawfish have been recorded in marine and estuarine environments (Peeverell, 2005; Thorburn et al., 2007). It is believed that mature freshwater sawfish enter fewer saline waters during the wet season to give birth (Peeverell, 2005) and freshwater river reaches play an important role as nursery areas (DoE, 2014c).

The green sawfish (*Pristis zijsron*) has predominantly been recorded in inshore coastal areas, including estuaries and river mouths with a soft substrate, although there have been records of sawfish offshore in depths up to 70 m (Stevens et al., 2005). This species does not occupy freshwater habitats (DoE, 2014c).

Short-term tracking has shown that green sawfish appear to have limited movements that are tidally influenced. They are likely to occupy a restricted range of only a few square kilometres within the coastal fringe, having a strong association with mangroves and adjacent mudflats (Stevens et al. 2008). Sawfishes feed close to the benthos on a variety of teleost fishes and benthic invertebrates, including cephalopods, crustaceans and molluscs (Compagno & Last, 1999; Last & Stevens, 2009; Pogonoski et al., 2002; Thorburn et al., 2007, 2008).

Baseline surveys undertaken for Chevron's Wheatstone project identified green sawfish habitat and nursery area for juveniles within the north-eastern lagoon of the Ashburton Delta and in Hooley Creek near Onslow. Distribution of sawfish in these creeks is spatially and seasonally variable due to changing tidal and environmental conditions. However, they typically return to inshore waters to breed and pup during the wet season (i.e. January) (Chevron, 2011).

Based on the habitat preferences of freshwater and green sawfish, it is considered highly unlikely that dwarf sawfish would occur within the deeper offshore waters of the EMBA.

### 5.2.3 Narrow sawfish

Narrow sawfish (*Anoxypristis cuspidata*) have been recorded in inshore marine or brackish waters in water depths up to 40 m (Great Barrier Reef Marine Park Authority 2012). While limited information is available on the narrow sawfish, it is thought that the species preferred habitat is on or near the seabed in shallow coastal waters and estuaries (Great Barrier Reef Marine Park Authority 2012). The distribution of the species in Australian waters is unknown, however, it is most common in the Gulf of Carpentaria with southward ranges extending to Broad Sound (Queensland) and the Pilbara coast (WA) (Great Barrier Reef Marine Park Authority 2012). Popping is understood to coincide with the wet season (DSEWPaC 2012a).

Based on the habitat preferences of freshwater and green sawfish, it is considered highly unlikely that dwarf sawfish would occur within the deeper offshore waters of the EMBA. However, they may be found within coastal habitats.

### 5.2.4 Giant manta ray /reef manta ray

The giant manta ray (*Mobula birostris*) appears to be a seasonal visitor to coastal or offshore sites. Giant manta rays are often seen aggregating in large numbers to feed, mate or clean. Sightings of these giant rays are often seasonal or sporadic but in a few locations their presence is a more common occurrence. This species is not regularly encountered in large numbers and, unlike some other rays, do not often appear in large schools (>30 individuals) when feeding. Overall, they are encountered with far less frequency than the smaller manta species, despite having a larger distribution across the globe (IUCN, 2019).

The giant manta ray occurs in tropical, sub-tropical and temperate waters of the Atlantic, Pacific and Indian oceans. They are commonly sighted along productive coastlines with regular upwelling, oceanic island groups and particularly offshore pinnacles and seamounts. The giant manta ray is commonly encountered on shallow reefs while being cleaned or is sighted feeding at the surface inshore and offshore. It is also occasionally observed in sandy bottom areas and seagrass beds (IUCN 2019).

The reef manta ray (*Mobula alfredi*) has a circumtropical and sub-tropical distribution, existing in the Pacific, Atlantic and Indian oceans. Within this broad range, however, actual populations appear to be sparsely distributed and highly fragmented. This is likely due to the specific resource and habitat needs of this species.

Overall population size is unknown, but subpopulations appear, in most cases, to be small (about 100 to 2,000 individuals). A proportion of the individuals in some populations undertake significant coastal migrations (IUCN, 2019).

Based on the habitat preferences of these rays and the location of the Barossa development (i.e. deep offshore marine environment with no significant benthic features), it is considered highly unlikely they would occur in significant numbers— although individuals might transit through the area. However, they may be found within coastal waters of the EMBA.

### 5.2.5 Great white shark

In Australia, great white sharks (*Carcharodon carcharias*) have been recorded from central Queensland around the south coast to north-west WA, but may occur further north on both coasts (Last & Stevens, 2009). They are

widely but not evenly distributed in Australian waters and are considered uncommon to rare compared with most other large sharks (CITES, 2004).

Study into great white shark populations is difficult (Cailliet, 1996) given uncertainty about their movements, emigration, immigration and difficulty in estimating the rates of natural or fishing mortality.

Great white sharks can be found from close inshore around rocky reefs, surf beaches and shallow coastal bays to outer continental shelf and slope areas (Pogonoski et al., 2002). They also make open ocean excursions and can cross ocean basins (for instance from South Africa to the western coast of Australia and from the eastern coast of Australia to New Zealand). Great white sharks are often found in regions with high prey density, such as pinniped colonies (DEWHA, 2009)

Sightings of the great white shark within the permit area are not expected to be common. Their presence is likely to be limited to infrequent individuals transiting through the EMBA.

### 5.2.6 Shortfin mako and longfin mako sharks

The longfin mako (*Isurus paucus*) is a widely distributed but rarely encountered oceanic shark that ranges from Geraldton in WA and around the north coast, to at least Port Stephens in New South Wales (DSEWPaC, 2012). The shortfin mako (*Isurus oxyrinchus*) is an oceanic and pelagic species, although they are occasionally seen inshore. They are found throughout temperate seas but are rarely found in waters colder than 16°C.

These species are not expected to be common within the permit area but may be found within the EMBA.

### 5.2.7 Northern river shark

The northern river shark (*Glyphis garricki*) is one of the rarest species of shark in the world. Adults have only been recorded in marine habitats, whereas neonates, juveniles and subadults have been recorded in freshwater, estuarine and marine environments.

The associated recovery plan (*Sawfish and river sharks multispecies recovery plan*, Commonwealth of Australia 2015) cites observations of adults and juveniles in marine waters north of Derby, WA. Pupping and juvenile sharks are known to occur in Cambridge Gulf and pupping is also identified as likely to occur in King Sound. Under the recovery plan, all areas where aggregations of individuals have been recorded as displaying biologically important behaviours (e.g. breeding, foraging, resting or migrating) are considered critical to the survival of the species unless population data suggests otherwise.

It is considered possible that individuals may be encountered in low numbers within the permit area and EMBA.

### 5.2.8 Oceanic whitetip shark

The oceanic whitetip shark (*Carcharhinus longimanus*) is widespread throughout tropical and subtropical waters of the world (30° N to 35° S) (IUCN, 2019). They are an oceanic and pelagic species that regularly occurs in waters of 18 to 28°C, usually >20°C (IUCN, 2019). Within Australian waters, they are found from Cape Leeuwin (Western Australia) through parts of the Northern Territory, down the east coast of Queensland and New South Wales to Sydney (Last & Stevens, 2009). They are usually found in surface waters, though can reach depths of >180 m. They have occasionally been recorded inshore but are more typically found offshore or around oceanic islands and areas with narrow continental shelves (Last & Stevens, 1994).

It is considered possible that individuals may be encountered in low numbers within the permit area and EMBA.

### 5.2.9 Grey nurse shark

The grey nurse shark (*Carcharias taurus*) was observed during the marine studies program at a seamount about 18 km to the west of the permit area (see **Section 2.6.1**) and therefore may also be present within the EMBA. The grey nurse shark has also been recorded by Momigliano and Jateh (2015) at oceanic coral reefs in the Timor Sea. In Australia, the grey nurse shark is now restricted to two populations: one on the east coast from southern Queensland to southern NSW and the other mostly from the south-west coast of WA but also up as far as the North West Shelf (DEWHA, 2012b; Pogonoski et al., 2002). The east and west coast populations are genetically different, with low frequency of immigrant exchange among each of these populations (Ahonen et al., 2009).

While it is thought that grey nurse sharks have a high degree of site fidelity, grey nurse sharks have been observed to move between different habitats and localities, exhibiting migratory characteristics (Bansemmer and Bennett, 2011). In certain areas grey nurse sharks are vulnerable to localised pressure due to high endemism. The status of the west coast population is poorly understood although they are reported to remain widely distributed along the WA coast and are still regularly encountered, albeit with low and indeterminate frequency (Chidlow et al., 2006).

Grey nurse sharks are often observed hovering motionless just above the seabed, in or near deep sandy-bottomed gutters or rocky caves, and near inshore rocky reefs and islands (Pollard et al., 1996). The species has been recorded at varying depths, but it is generally found between 15 to 40 m (Otway & Parker, 2000). Grey nurse sharks have also been recorded in the surf zone, around coral reefs, and to depths of around 200 m on the continental shelf (Pollard et al., 1996). Grey nurse sharks feed primarily on a variety of teleost and elasmobranch fishes and some cephalopods (Gelsleichter et al.; 1999; Smale, 2005).

Given a grey nurse shark has been observed during the marine studies program at a seamount about 18 km to the west of the permit area and species have also been observed by Momigliano and Jateh (2015) at oceanic coral reefs in the Timor sea, it is likely the species will be present in the EMBA, around reefs, banks and seamounts. Given the lack suitable habitat for grey nurse shark in the permit area, it is likely the species would be transiting only.

#### 5.2.10 Spartooth shark

The spartooth shark (*Glyphis glyphis*) is a medium-sized shark found in tidal rivers and estuaries in the NT and Queensland (DCCEEW 2023a). The species is capable of living in both freshwater and seawater, tending to use tropical river systems as primary habitat (Stevens et al, 2005). It has been recorded in tidal rivers and estuaries with turbid waters with fine muddy substrates in temperatures ranging from 27 to 33 °C (Pillans et al, 2009).

There are three distinct geographical locations where the spartooth shark is known to occur, with only one of these areas close to the EMBA: the Van Diemen Gulf. In the NT, the spartooth shark has been recorded in the Adelaide River, South, East and West Alligator Rivers, Murganella Creek and Marrakai Creek (DoE, 2014d). Records from the Adelaide River indicate that the species inhabits the upper reaches of the river system (Ward & Larson, 2012).

#### 5.2.11 Whale shark

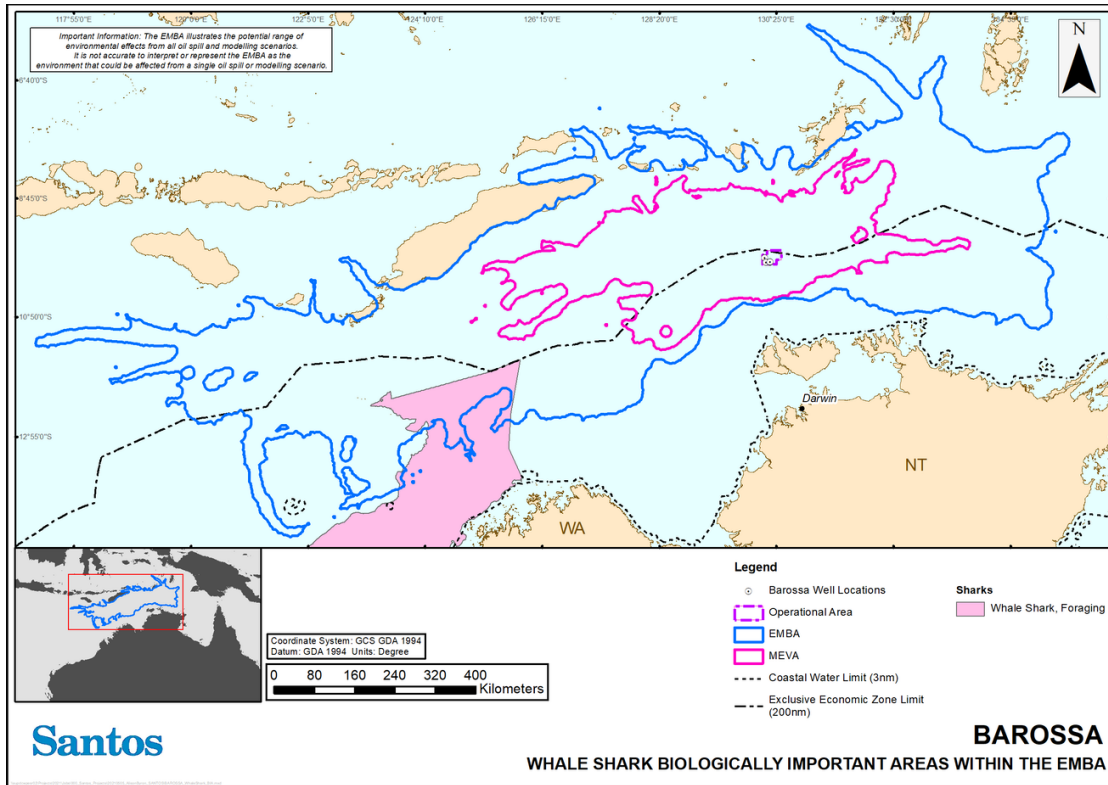
The whale shark is the largest of all fish, reaching up to 18 m (Chen et al., 1997, Compagno, 2001) and is a migratory species with worldwide geographical ranges between 30° N and 35° S (Last & Stevens, 2009). The species is oceanic but often forms aggregations in coastal waters at sites throughout the tropics. Typically, these aggregations are seasonal and often coincide with specific productivity events that are a focus of feeding for the animals (Meekan et al., 2009). For example, whale sharks aggregate to feed on dense swarms of copepods in Baja California (Clark and Nelson 1997), fish spawn off Belize (Heyman et al. 2001) and red crab larvae at Christmas Island (Meekan et al. 2009).

One of the best-known aggregation sites for whale sharks occurs along the central and north-west coast of WA from March to July, focused at Ningaloo Reef in the Exmouth region. The small size and general absence of female whale sharks from Ningaloo Reef suggests that the region may be important for feeding rather than breeding (Norman & Stevens, 2007). The timing of this aggregation coincides with a pulse in seasonal productivity that results in large abundances of tropical krill (Meekan et al., 2006; Jarman & Wilson, 2004). At Ningaloo Reef, whale sharks are often found swimming close to the reef front, within a few kilometres of the shore and in water of less than 50 m. A tourist industry based on snorkelling with the sharks in this area has developed during the past 15 years and is now estimated to be worth over \$4 million annually to the local economy of the Ningaloo region.

Whale sharks are known to be highly migratory with migrations of 13,000 km being recorded (Eckert & Stewart, 2001). Research on the migration patterns of whale sharks in the western Indian Ocean, and isolated and infrequent observations of individuals, indicate that a small number of the WA population migrate through the North West Shelf. Wilson et al. (2006) tagged 19 whale sharks in 2003 and 2004, with long-term movement patterns successfully recorded from six individuals. All travelled north-east into the Indian Ocean after departing

Ningaloo Reef, with one tracked to Ashmore Reef and another to Scott Reef (within the area surrounding the development). In general, migration along the northern WA coastline broadly follows the 200 m isobath and typically occurs between July and November (DoE, 2015).

Due to their widespread distribution and highly migratory nature, whale sharks may occur in very low numbers within the permit area and EMBA. A BIA for whale shark foraging is located in the south-west of the EMBA – see **Figure 5-1**.



**Figure 5-1: Biologically important area – whale shark**

### 5.2.12 Scalloped hammerhead

The scalloped hammerhead is globally distributed in tropical and sub-tropical waters, primarily across shallow coastal shelf waters. There are strong genetic population structures across ocean basins as the scalloped hammerhead rarely enters deep ocean waters. As a result, there is minimal structuring between Australia and Indonesia and they are likely to be a shared stock (Chin et al., 2017).

In Australian waters, its distribution ranges from New South Wales around the north of the continent as far as Geographe Bay in Western Australia. Across the north coast of Australia, the pupping season peaks from October to January (TSSC, 2018). The species is known to occur in the region surrounding proposed development and may occur within the operational area.

### 5.3 Biologically important areas (BIAs)/critical habitat – fish and sharks

BIAs are spatially defined areas where aggregations of individuals of a species are known to display biologically important behaviour such as breeding, foraging, resting or migration. BIAs are identified by DCCEEW; however, they have no legal status, but are designed to support decision making under the EPBC Act. They are not designed to identify protected areas but may inform such processes. **Table 5-2** gives an overview of BIAs within the EMBA for fish.

DCCEEW may make recovery plans for threatened fauna listed under the EPBC Act. The EPBC Act requires that ‘habitat critical to the survival of the listed threatened species’ is identified in recovery plans – see **Section 13**. BIAs may overlap these sites but may be identified for other purposes. DCCEEW states that the criteria used to identify ‘habitat critical to the survival of the species’ are more complex than those used to identify BIAs. Specifically, the *Sawfish and river sharks multispecies recovery plan* (DoEE, 2015) cites that ‘all areas where

*aggregations of individuals have been recorded displaying biologically important behaviour such as breeding, foraging, resting or migrating, are considered critical to the survival of the species unless population survey data suggests otherwise*'.

In addition, both the EPBC Act and BC Act provide for the listing of critical habitat; that is, habitat 'critical to the survival of the threatened species'. No critical habitat to the survival of the species has been identified for any fish species that may occur within the EMBA.

**Table 5-2: Biologically important areas that occur within the EMBA – fish and shark**

Species	Scientific name	Aggregation area and use	Specific geographic locations for species
Whale shark	<i>Rhincodon typus</i>	Foraging	Northward from Ningaloo along 200 m isobath

## 6 Marine reptiles

Thirty-one species of listed marine reptiles under the EPBC Act are known to occur in Australian waters in the EMBA, according to the PMST (**Appendix D to the Drilling and Completions EP**). An examination of the species profile and threats database (DoEE, 2019) showed that some listed reptile species are not expected to occur in significant numbers in the marine and coastal environments in the EMBA due to their terrestrial distributions. Hence, these species are not discussed further.

Of the remaining reptile species, eight are listed as threatened, seven are listed as migratory and 22 are listed as marine only. These species are shown in **Table 6-1** along with their WA and NT conservation listings (as applicable)<sup>2</sup>. BIAs within the EMBA are discussed in **Section 6.4**.

**Table 6-1: EPBC listed-marine reptile species in the EMBA**

Species	Conservation status				Likelihood of occurrence in EMBA	BIA present within EMBA
	EPBC Act 1999	BC Act 2016	Priority Species	NT Territory Parks and Wildlife Conservation Act 1976		
Saltwater crocodile ( <i>Crocodylus porosus</i> )	Migratory Listed marine	-	-	-	Species or species habitat likely to occur within area	None – no BIA defined
Green turtle ( <i>Chelonia mydas</i> )	Vulnerable Migratory Listed marine	Vulnerable	-	-	Foraging, feeding or related behaviour known to occur within area	Yes – see <b>Section 6.1.2</b>
Flatback turtle ( <i>Natator depressus</i> )	Vulnerable Migratory Listed marine	Vulnerable	-	-	Foraging, feeding or related behaviour known to occur within area	Yes – see <b>Section 6.1.4</b>
Hawksbill turtle ( <i>Eretmochelys imbricata</i> )	Vulnerable Migratory Listed marine	Vulnerable	-	Vulnerable	Foraging, feeding or related behaviour known to occur within area	Yes – see <b>Section 6.1.3</b>
Loggerhead turtle ( <i>Caretta caretta</i> )	Endangered Migratory Listed marine	Endangered	-	Vulnerable	Foraging, feeding or related behaviour known to occur within area	Yes – see <b>Section 6.1.1</b>
Olive ridley turtle ( <i>Lepidochelys olivacea</i> )	Endangered Migratory Listed marine	Endangered	-	Vulnerable	Foraging feeding or related behaviour known to occur within area	Yes – see <b>Section 6.1.6</b>
Leatherback turtle ( <i>Dermochelys coriacea</i> )	Endangered Migratory Listed marine	Vulnerable-	-	Critically endangered	Species or species habitat known to occur within area	No
Short-nosed sea snake ( <i>Aipysurus apraefrontalis</i> )	Critically endangered Listed marine	Critically endangered	-	-	Species or species habitat known to occur within area	None – no BIA defined

Species	Conservation status				Likelihood of occurrence in EMBA	BIA present within EMBA
	EPBC Act 1999	BC Act 2016	Priority Species	NT Territory Parks and Wildlife Conservation Act 1976		
Leaf-scaled sea snake ( <i>Aipysurus foliosquama</i> )	Critically endangered Listed marine	Critically endangered	-	-	Species or species habitat may occur within area	None – no BIA defined
Stokes' Seasnake ( <i>Astrotia stokesii</i> )	Listed marine	-	-	-	Species or species habitat may occur within area	None – no BIA defined
Spectacled Seasnake ( <i>Disteira kingii</i> )	Listed marine	-	-	-	Species or species habitat may occur within area	None – no BIA defined
Olive Seasnake ( <i>Aipysurus laevis</i> )	Listed marine	-	-	-	Species or species habitat may occur within area	None – no BIA defined
Beaked Seasnake ( <i>Enhydrina schistose</i> )	Listed marine	-	-	-	Species or species habitat may occur within area	None – no BIA defined
Olive-headed Seasnake ( <i>Disteira major</i> )	Listed marine	-	-	-	Species or species habitat may occur within area	None – no BIA defined
Turtle-headed Seasnake ( <i>Emydocephalus annulatus</i> )	Listed marine	-	-	-	Species or species habitat may occur within area	None – no BIA defined
Small-headed Seasnake ( <i>Hydrophis maddowelli</i> )	Listed marine	-	-	-	Species or species habitat may occur within area	None – no BIA defined
Northern Mangrove Seasnake ( <i>Parahydrophis mertoni</i> )	Listed marine	-	-	-	Species or species habitat may occur within area	None – no BIA defined
Yellow-bellied Seasnake ( <i>Pelamis platurus</i> )	Listed marine	-	-	-	Species or species habitat may occur within area	None – no BIA defined



Species	Conservation status				Likelihood of occurrence in EMBA	BIA present within EMBA
	EPBC Act 1999	BC Act 2016	Priority Species	NT Territory Parks and Wildlife Conservation Act 1976		
Black-headed Sea Snake, Slender-necked Seasnake ( <i>Leioselasma coggeri</i> )	Listed marine	-	-	-	Species or species habitat may occur within area	None – no BIA defined
Spine-bellied Seasnake ( <i>Lapemis curtus</i> )	Listed marine	-	-	-	Species or species habitat may occur within area	None – no BIA defined
Horned Seasnake ( <i>Acalyptophis peronii</i> )	Listed marine	-	-	-	Species or species habitat may occur within area	None – no BIA defined
Spine-tailed Seasnake ( <i>Aipysurus eydouxii</i> )	Listed marine	-	-	-	Species or species habitat may occur within area	None – no BIA defined
Dubois' Seasnake ( <i>Aipysurus duboisii</i> )	Listed marine	-	-	-	Species or species habitat may occur within area	None – no BIA defined
Dusky Seasnake ( <i>Aipysurus fuscus</i> )	Listed marine	-	-	-	Species or species habitat known to occur within area	None – no BIA defined
Black-headed Seasnake ( <i>Hydrophis atriceps</i> )	Listed marine	-	-	-	Species or species habitat may occur within area	None – no BIA defined
Black-ringed Seasnake ( <i>Hydrelaps darwiniensis</i> )	Listed marine	-	-	-	Species or species habitat may occur within area	None – no BIA defined
Elegant Seasnake ( <i>Hydrophis elegans</i> )	Listed marine	-	-	-	Species or species habitat may occur within area	None – no BIA defined
Plain Seasnake ( <i>Chitulia inornate</i> )	Listed marine	-	-	-	Species or species habitat may occur within area	None – no BIA defined

Species	Conservation status				Likelihood of occurrence in EMBA	BIA present within EMBA
	EPBC Act 1999	BC Act 2016	Priority Species	NT Territory Parks and Wildlife Conservation Act 1976		
Large-headed Seasnake, Pacific Seasnake ( <i>Leioselasma pacifica</i> )	Listed marine	-	-	-	Species or species habitat may occur within area	None – no BIA defined
Fine-spined Seasnake, Geometrical Seasnake ( <i>Leioselasma czeblukovi</i> )	Listed marine	-	-	-	Species or species habitat may occur within area	None – no BIA defined
Spotted Seasnake, Ornate Reef Seasnake ( <i>Chitulua ornate</i> )	Listed marine	-	-	-	Species or species habitat may occur within area	None – no BIA defined

<sup>2</sup> An overview of WA fauna conservation codes is provided in **Section 5** (fish and sharks).

## 6.1 Marine turtles

Six species of marine turtle use the waters in and around the EMBA. These are the green turtle (*Chelonia mydas*), flatback turtle (*Natator depressus*), hawksbill turtle (*Eretmochelys imbricata*), loggerhead turtle (*Caretta caretta*), olive ridley turtle (*Lepidochelys olivacea*) and leatherback turtle (*Dermochelys coriacea*) (**Table 6-1**).

These six species of marine turtle are in the EPBC Act's list of threatened species as either 'endangered' or 'vulnerable' and all six species are also listed as 'migratory'. They are also listed as threatened species under the BC Act and the hawksbill turtle, loggerhead turtle, olive ridley turtle and leatherback turtle are also protected under the NT *Territory Parks and Wildlife Conservation Act 1976*.

See **Table 6-2** for a summary of the different habitat types that marine turtle species use during their various life stages.

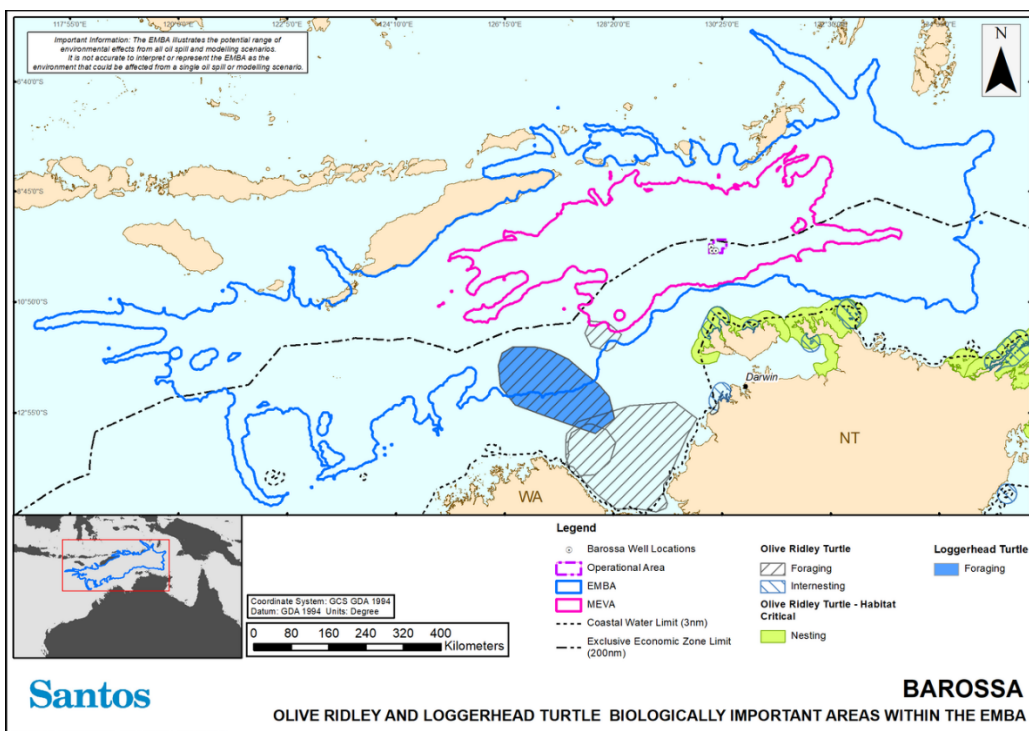
**Table 6-2: Summary of habitat types for the life stages of the six marine turtle species in the EMBA (DSEWPac, 2012b)**

Life stage		Green turtle	Flatback turtle	Hawksbill turtle	Loggerhead turtle	Olive ridley turtle	Leatherback turtle
Post-hatchling		Open ocean pelagic habitats (poorly studied for Australian populations)	Coastal waters (poorly studied for Australian populations)	Open ocean pelagic habitats (poorly studied for Australian populations)	Pelagic (poorly studied for Australian populations)	Pelagic (poorly studied for Australian populations)	Pelagic (no data for Australian populations)
Adult	Mating	Offshore from nesting beaches.	Shallow waters offshore from nesting beaches.	Offshore from nesting beaches.	Expected to occur either en-route or adjacent to nesting beaches.	Not recorded within the North and Northwest marine bioregions.	Not recorded within the North and Northwest marine bioregions.
	Nesting	Typically, high- energy, steeply sloped beaches with deep sand and deep-water approach.	Typically, low-energy beaches that are narrow with a low to moderate slope. Beach approach obstructed by broad intertidal mud or limestone platforms.	Typically beaches close to nearshore coral reefs and sediment comprised of coarse sand and coral rubble.	Generally, prefer high-energy, relatively narrow, steeply sloped, coarse-grained beaches.	Not recorded within the North and Northwest marine bioregions.	Not recorded within the North and Northwest marine bioregions.
	Inter-nesting	Shallow coastal waters within several kms of nesting beach. Inter-nesting buffers of 20 km identified around all nesting habitats.	Shallow nearshore waters within 5 to 60 km of nesting beach. Inter-nesting buffers of 40 to 60 km identified around all nesting habitats.	Shallow coastal waters within several kms of nesting beach. Inter-nesting buffers of 20 km identified around all nesting habitats.	Shallow coastal waters within several kms of nesting beach. Inter-nesting buffers of 20 km identified around all nesting habitats.	Not recorded within the North and Northwest marine bioregions. Inter-nesting buffers of 20 km identified around all nesting habitats.	Not recorded within the North and Northwest marine bioregions.
	Foraging	Neritic habitats associated with seagrass and algae, and mangrove habitats.	Turbid, shallow inshore waters, subtidal, soft-bottomed habitats of the continental shelf.	Subtidal and intertidal coral and rocky reef habitats of the continental shelf.	Subtidal and intertidal coral and rocky reefs, seagrass and deeper soft-bottomed habitats of the continental shelf.	Many feed within continental shelf waters, however it is not known if others are pelagic, as with the east Pacific population.	Mostly pelagic but will forage close to shore and over continental shelf in temperate waters.

### 6.1.1 Loggerhead turtle

The loggerhead turtle (*Caretta caretta*) has a worldwide distribution, living and breeding in subtropical to tropical locations (Limpus, 2008b). Breeding aggregations in Australia occur on both the east coast (Queensland and NSW) and the west. The annual nesting population in WA is thought to be 3,000 females annually (Baldwin et al., 2003), and this is considered to support the third-largest population in the world (Limpus, 2008b). Loggerhead turtles have one genetic breeding stock within WA (Commonwealth of Australia, 2017).

Loggerhead turtles 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 (Commonwealth of Australia, 2017a). One foraging BIA has been identified to the southwest of the permit area in the Western Joseph Bonaparte Depression, as shown in **Figure 6-1**.



**Figure 6-1: Biologically important areas – loggerhead turtle and olive ridley turtle**

### 6.1.2 Green turtle

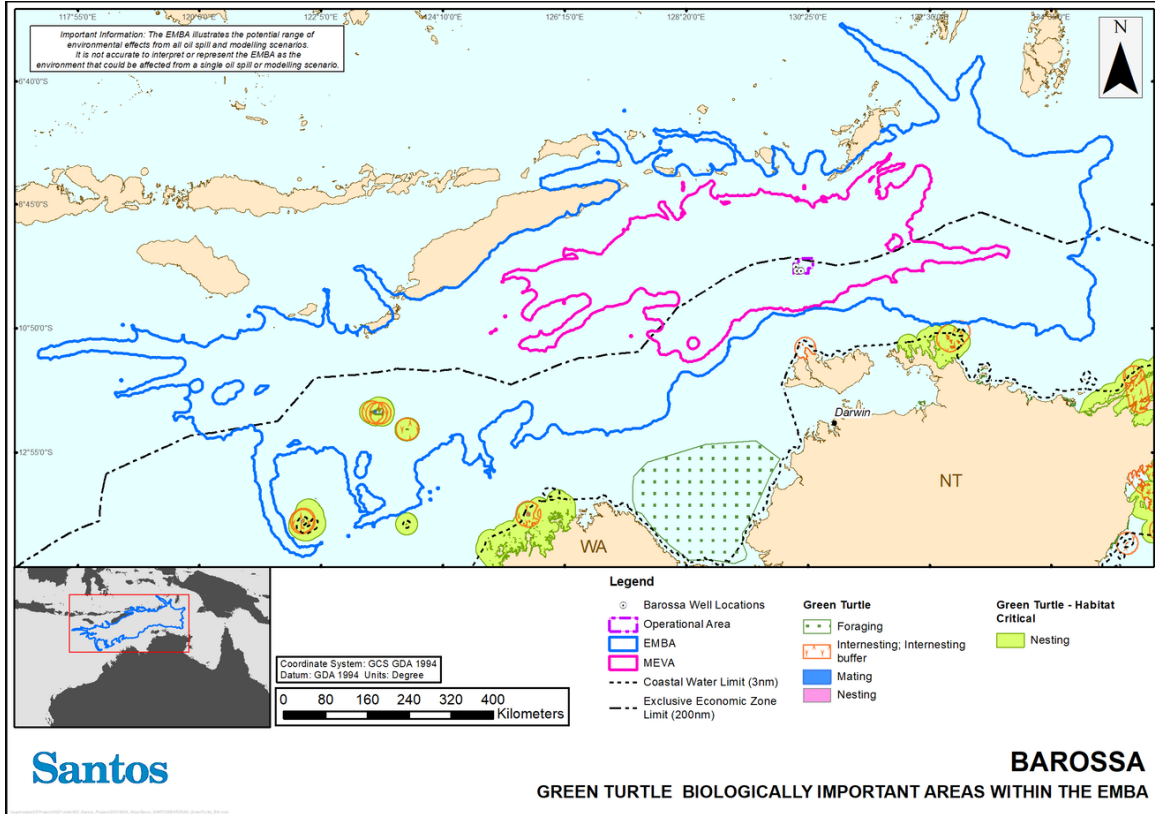
Green turtles (*Chelonia mydas*) have not been recorded nesting in the Bonaparte or Van Diemen bioregions, except for two significant nesting sites; Black/Smith Point and Lawson Island, which are east of the Tiwi Islands and near Cobourg Peninsula (Chatto & Baker, 2008a). BIAs for green turtles occur on the north coast of the Tiwi Islands and an inter-nesting buffer has been defined 20 km from the Tiwi Islands, with inter-nesting expected between October and April (DoEE, 2017).

In northern and eastern Australia, fluctuations in green turtle nesting numbers have been linked the Southern Oscillation Index (Limpus & Nicholls, 1994; Limpus & Nicholls, 1988) and sea surface temperatures (Solow et al., 2002). On average, the re-migration period for female green turtles is about five years. In the NT nesting sites occur mostly from the western end of Melville Island to near the border with Queensland (Northern Territory Government, n.d).

While primarily herbivorous, feeding mainly in shallow benthic habitats on seagrass and/or algae, green turtles are also known to feed on sponges, jellyfish and mangroves (Limpus, 2008a). Green turtles are unlikely to forage or dwell within deeper offshore waters due to the water depths; however, they may occasionally migrate

through it.

Given the preferred habitat of the green turtle, they are likely to be encountered within the EMBA, mainly within reef areas. Green turtles are unlikely to occur within the permit area, given the water depths. **Figure 6-2** illustrates the BIAs and habitat critical for green turtles, which are located in waters surrounding Ashmore Reef, Cartier Island and the Islands north-east of Cobourg Peninsula.



**Figure 6-2: Biologically important areas and critical habitat – green turtle**

### 6.1.3 Hawksbill turtle

Hawksbill turtles (*Eretmochelys imbricata*) have a global distribution throughout tropical and subtropical marine waters. In WA they are concentrated on the North West Shelf (Dampier Archipelago) (Limpus, 2009a), which is one of the largest hawksbill populations remaining in the world. There is a second major population of hawksbill turtles in Australia, which is genetically isolated from the North West Shelf population: this is located along the Northern Territory coast and north-eastern Queensland (Northern Territory Government, n.d).

In the NT, nesting occurs on islands rather than on mainland beaches. In particular, NT nesting sites are concentrated around north-eastern Arnhem land and Groote Eylandt (Northern Territory Government, n.d). Nesting is also known to occur at Ashmore Reef. Although Scott Reef<sup>5</sup> has been described as a nesting beach for hawksbill turtles, this is based on the tagging and re-capture of a single hawksbill at this location (Guinea, 2009). In the NT nesting is reported to occur from July to December (Chatto, 1997, 1998). Adults tend to forage in tropical tidal and subtidal coral and rocky reef habitat where they feed on an omnivorous diet of sponges, algae, jelly fish and cephalopods (DSEWPAC, 2012a).

<sup>5</sup> Values and sensitivities outside but proximal to the modelled EMBA, such as Scott Reef Nature Reserve (inclusive of Scott Reef and Seringapatam Reef) to the southwest of the modelled EMBA, have been included in the risk assessment for unplanned events.

Hawksbill turtles are unlikely to occur within the permit area, given the water depths. However, they may nest at Ashmore Reef and forage at banks and shoals within the EMBA. **Figure 6-3** illustrates the BIAs and habitat critical for hawksbill turtles, which are located in waters surrounding Scott Reef<sup>6</sup> and Ashmore Reef, 1,000 and 800 km to the west of the permit area respectively.

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<sup>6</sup> Values and sensitivities outside but proximal to the modelled EMBA, such as Scott Reef Nature Reserve (inclusive of Scott Reef and Seringapatam Reef) to the southwest of the modelled EMBA, have been included in the risk assessment for unplanned events.

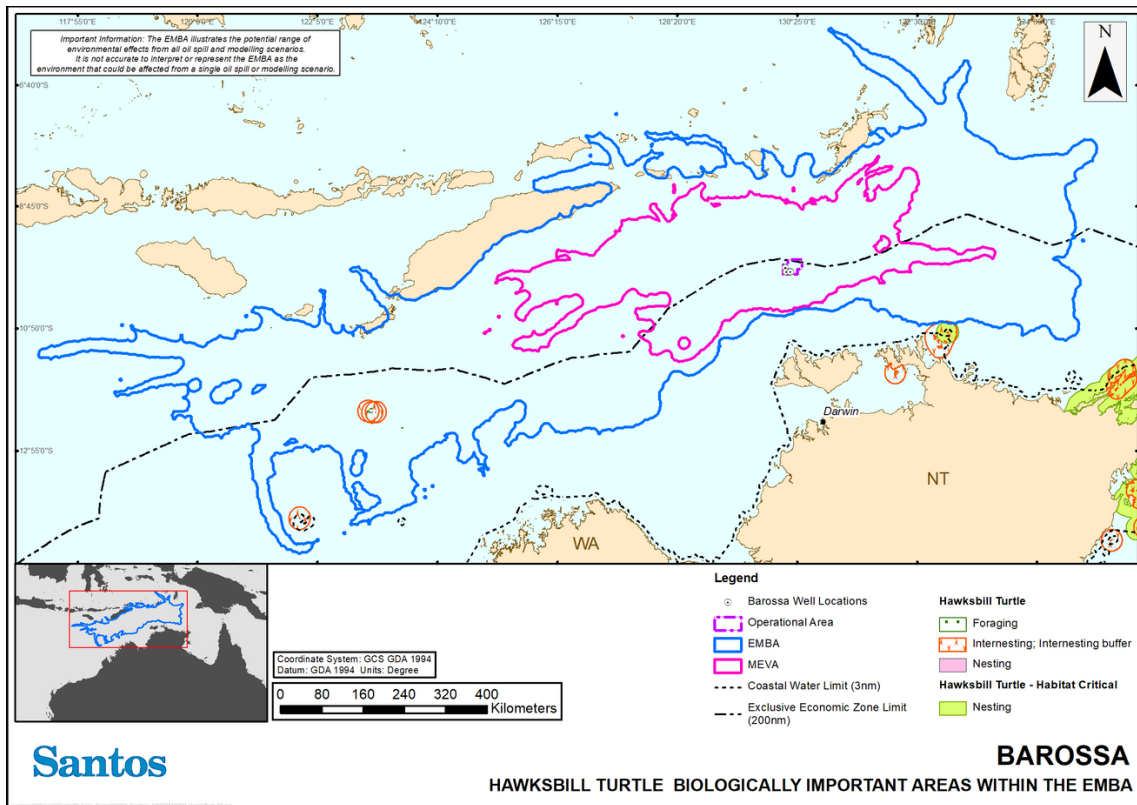


Figure 6-3: Biologically important areas and critical habitat – Hawksbill turtle

#### 6.1.4 Flatback turtle

The flatback turtle (*Natator depressus*) has an Australasian distribution, with all recorded nesting beaches occurring within tropical to subtropical Australian waters. The management of the flatback turtle in Australia is broken up into five stocks around Australia: from eastern Queensland, the Arafura Sea, Cape Domett, south-west Kimberley and the Pilbara (Commonwealth of Australia, 2017).

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 the greatest proportion of activity occurring on the west coast of Bathurst Island (Chatto & Baker, 2008a). The numbers of nesting females (about 11 to 100 females per year) is comparable to, or smaller than, other nesting sites of the Arafura Sea genetic stock. Nesting and inter-nesting occurs year-round with a peak during June and August, and hatchling emergence peaking between July and September (Commonwealth of Australia, 2017a).

The *Recovery plan for marine turtles in Australia* defines the inter-nesting buffer around the Tiwi Islands as 60 km (Commonwealth of Australia, 2017a). However, an extensive study tracking 47 inter-nesting flatback turtles from five different mainland and island rookeries over 1,289 tracking days found that flatback turtles remained in water depths of <44 m, favouring a mean depth of <10 m (Whitlock et al., 2016). Whitlock et al. (2016) defined suitable inter-nesting habitat as water 0 to 16 m deep and within 5 to 10 km of the coastline, and unsuitable inter-nesting habitat as water >25 m deep and >27 km from the coastline. To date there is no evidence to indicate flatback turtles swim out into deep offshore waters, such as those of the permit area, during the inter-nesting 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 flatback-turtle inter-nesting habitat and consequently the species is unlikely to inter-nest in the permit area. Further to the north where the continental shelf is wider and slopes more gently offshore, the 10 m-deep inter-nesting groups are located about 10 to 20 km inshore of the pipeline route corridor. Based on the outcomes of these studies, most of the nesting females in the area are not expected to inter-nest within the permit area; however, it is possible some individuals will use waters extending into the permit area and EMBA.

Figure 6-4 illustrates the BIAs for flatback turtles within the EMBA, which are predominantly located around the Tiwi Islands (inter-nesting) and the south portion of the EMBA, in the Northern Kimberley (Holothuria Banks) (foraging).

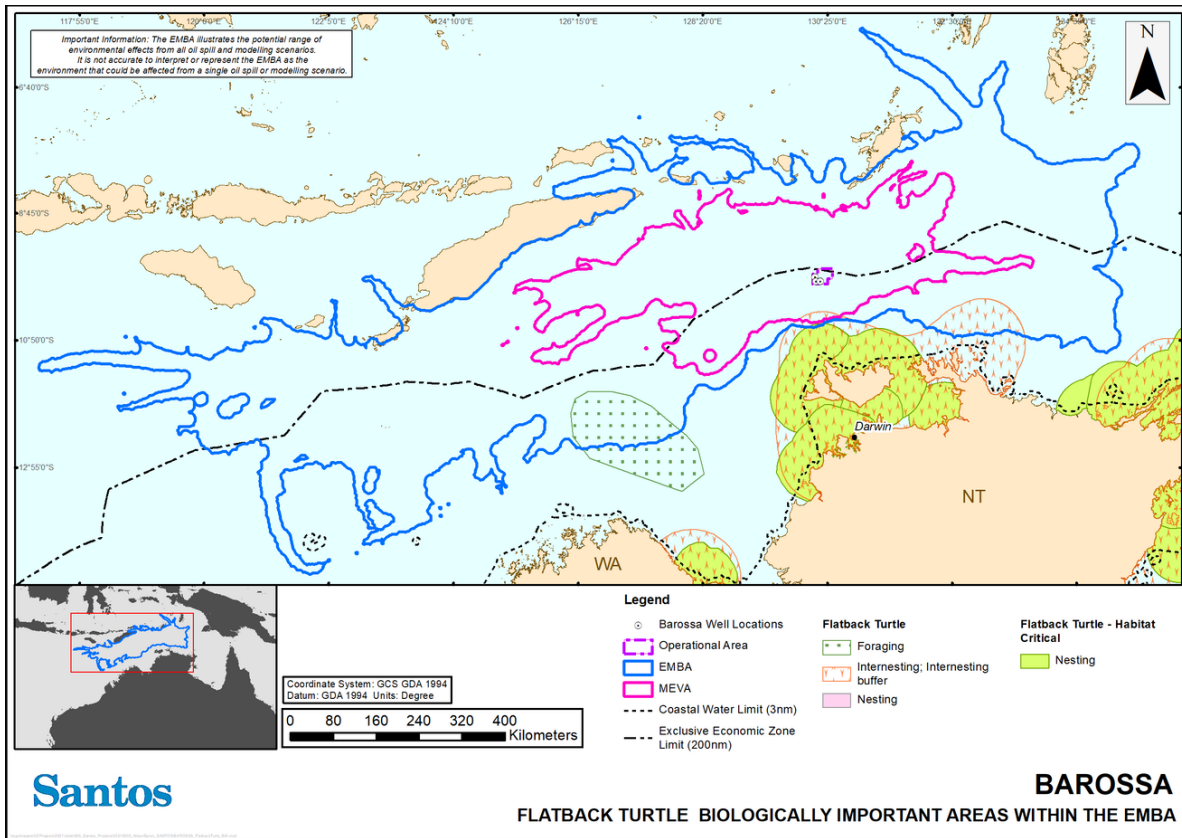


Figure 6-4: Biologically important areas– flatback turtle

### 6.1.5 Leatherback turtle

The leatherback turtle (*Dermochelys coriacea*) has the widest distribution of any marine turtle and can be found from tropical to temperate waters throughout the world. There are no major leatherback turtle centres of nesting activity that have been recorded in Australia, although scattered isolated nesting (one to three nests per year) occurs in southern Queensland and the Northern Territory (Limpus & McLachlin 1994).

Turtles have been observed south of the North-West Shelf area and in open waters (>200 m deep) (Limpus, 2009c). Due to the lack of nesting sites around Australian coastal waters, it is presumed that leatherback turtles observed in Australian waters are migrating from neighbouring countries to access feeding grounds in Australia (Limpus, 2009c).

A BIA for the leatherback turtle is not present within the EMBA. The species may be observed within the permit area and EMBA in low numbers given they have been observed in deeper waters (>200m).

### 6.1.6 Olive ridley turtle

The Olive ridley turtle (*Lepidochelys olivacea*) is known to nest on the Tiwi Islands, specifically on the west coast of Bathurst Island and the north coast of Melville Island. The turtles found nesting on the Tiwi Islands are NT genetic stock, for which the long-term trends are unknown (Commonwealth of Australia, 2017). However, the females nesting on the Tiwi Islands are considered significant genetic stock at a national and international level. 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, 2017).



Inter-nesting habitat for the Olive ridley turtle encompasses nearshore waters along the north, west and east coasts of the Tiwi Islands. Satellite tracking on a small sample of these turtles in the region found the individuals remained close to shore (waters depths typically less than 55 m deep) and within 37 km of the nesting beach during the inter-nesting interval (Whiting et al. 2007; Whiting et al. 2005). Inter-nesting Olive ridley turtles are therefore expected to be in the shallow waters around the Tiwi Islands, however unlikely to occur within the permit area, given the water depths and location from nesting beaches. **Figure 6-1** illustrates the Olive ridley turtle BIAs, which are located around the north coast of Melville Island and in the Northern portion of the Joseph Bonaparte Gulf.

## 6.2 Sea snakes

Sea snakes are essentially tropical in distribution. Several key aggregation/feeding areas for sea snakes are known within the EMBA, described below:

- + Sea snakes are typically distributed in shallow inshore regions and the Tiwi Islands, which provide suitable seabed habitat and clear waters. However, they are also found further offshore at atolls, including the shoals/banks in the Timor Sea (Guinea, 2013b).
- + Most 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, but non-pelagic species seldom, if ever, dive deeper than 100 m (Heatwole, 1975). Very few species are known to inhabit deep pelagic environments, such as the environments occurring in the permit area, given they are air-breathing (Guinea, 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, usually reside 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 & 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, no studies have been 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 months and into deeper waters at other times 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, except for the spine-bellied sea snake which breeds during June to August (DSEWPaC, 2012a).

During surveys for the Barossa marine studies program (**Section 1.2**), several species of sea snakes were observed at Evans Shoal, Tassie Shoal, Lynedoch Bank and a seamount to the north-west of the permit area. Several opportunistic sightings (species unknown) were also made during the marine baseline program in open offshore waters in the Timor Sea. The individuals able to 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 permit area and EMBA.

Twenty-four species of sea snakes listed in the EPBC Act may be present within the EMBA. Of these species two sea snakes are listed as threatened under the EPBC Act (**Table 6-1**):

- + short-nosed sea snake (*Aipysurus apraefrontalis*)
- + leaf-scaled sea snake (*Aipysurus foliosquama*).

### 6.2.1 Short-nosed Sea snake

The short-nosed sea snake (*Aipysurus apraefrontalis*) is a small snake that is fully aquatic and endemic to WA. It has been recorded from Exmouth Gulf, WA, to the reefs of the Sahul Shelf, in the eastern Indian Ocean. This species is believed to show strong site fidelity to shallow coral reef habitats in less than 10 m of water, with

most specimens having been collected from Ashmore and Hibernia reefs (Guinea & Whiting, 2005).

The species prefers the reef flats or shallow waters along the outer reef edge in water depths to 10 m. The species has been observed during daylight hours, resting beneath small coral overhangs or coral heads in 1-2 m of water. Guinea and Whiting (2005) reported that very few short-nosed sea snakes moved even as far as 50 m away from the reef flat and were therefore unlikely to be found in high numbers in offshore, deeper waters.

The short-nosed sea snake is known to occur within the EMBA. Key aggregation/feeding areas for sea snakes have been described in **Section 6.2**.

### 6.2.2 Leaf-scaled Sea snake

The leaf-scaled sea snake (*Aipysurus foliosquama*) occurs in shallow water (less than 10 m deep) in the protected parts of the reef flat, adjacent to living coral and on coral substrates (DoE, 2014). The species is found only on the reefs of the Sahul Shelf in WA, especially on Ashmore and Hibernia reefs (Minton & Heatwole, 1975). The leaf-scaled sea snake forages by searching in fish burrows on the reef flat (DoE, 2014).

The leaf-scaled sea snake may occur within the EMBA. Key aggregation/feeding areas for sea snakes have been described in **Section 6.2**.

## 6.3 Crocodiles

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

Within the NMR, the saltwater crocodile's distribution is thought 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 in freshwater swamps that have little tidal movement between December and March, with a peak period between January and February (DEWHA, 2008b). Given the crocodiles' preferred habitat, they are likely to be present in inshore/coastal areas outside the EMBA.

## 6.4 Biologically important areas / critical habitat – marine reptiles

**Table 6-3** shows the BIAs in the EMBA for marine reptiles, as identified by DCCEEW, and critical habitats identified in associated recovery plans<sup>3</sup>. Figures for these BIAs are included within **Sections 6.1.1 to 6.1.6**.

Table 6-3: Biologically important areas/critical habitats and geographic locations – reptiles

Species	Scientific name	BIA area	Description of BIA area within the EMBA	Habitat critical within the EMBA
Loggerhead turtle	<i>Caretta caretta</i>	Foraging	Western Joseph Bonaparte Depression	NA
Green turtle	<i>Chelonia mydas</i>	Nesting Inter-nesting Inter-nesting buffer Foraging Mating	Ashmore Reef Cartier Island	Ashmore Reef and Cartier Island 20 km inter-nesting buffer
Hawksbill turtle	<i>Eretmochelys imbricata</i>	Nesting Inter-nesting Inter-nesting buffer Foraging	Ashmore Reef Cartier Island	New Year Island 20 km inter-nesting buffer
Flatback turtle	<i>Natator depressus</i>	Foraging Inter-nesting	Western Joseph Bonaparte Depression Holothuria Zone (Northern Kimberley, Holothuria Banks)	NA
Olive ridley turtle	<i>Lepidochelys olivacea</i>	Foraging	Northern Joseph Bonaparte Gulf Western Joseph Bonaparte Depression	NA

<sup>3</sup> Further background information on BIA and identification of critical habitat in recovery plans is provided in **Section 5.3**.

## 7 Marine mammals

Twenty-nine marine mammal species occur in waters in the EMBA. An examination of the species profile and threats database (DCCEEW, 2023a) showed that some listed mammal species are not expected to occur in significant numbers in the marine and coastal environments in the EMBA due to their terrestrial distributions. Hence, these species are not discussed further.

Eleven marine mammal and cetacean species which may occur in the region surrounding development are listed as migratory under the Commonwealth EPBC Act, of which three are also listed as threatened. See **Table 7-1** for the listed species along with their conservation status under the WA BC Act and *Territory Parks and Wildlife Conservation Act 1976* (as applicable).

BIAs within the EMBA are discussed **Table 7-2**.

**Table 7-1: Marine mammals listed as threatened or migratory under the EPBC Act**

Species	Conservation status				Likelihood of occurrence in EMBA	BIA within EMBA
	EPBC Act 1999 (Cwth)	BC Act 2016 (WA)	Priority Species	<i>Territory Parks and Wildlife Conservation Act 1976</i> (NT)		
Blue whale ( <i>Balaenoptera musculus</i> )	Endangered, Migratory, Cetacean	Endangered	-	-	Migration route known to occur within area	Yes – see <b>Table 7-2</b>
Bryde's whale ( <i>Balaenoptera edeni</i> )	Migratory, Cetacean	-	-	-	Species or species habitat likely to occur within area	None – no BIA defined
Dugong ( <i>Dugong dugon</i> )	Migratory, Marine	-	-	-	Breeding known to occur within area	Yes – see <b>Table 7-2</b>
Fin whale ( <i>Balaenoptera physalus</i> )	Vulnerable, Migratory, Cetacean	Endangered	-	-	Foraging, feeding or related behaviour likely to occur within area	None – no BIA defined
Humpback whale ( <i>Megaptera novaeangliae</i> )	Migratory, Cetacean	Conservation Dependent	-	-	Species or species habitat known to occur within area	No
Australian Humpback Dolphin ( <i>Sousa sahulensis</i> )	Migratory Cetacean	-	-	-	Species or species habitat likely to occur within area	No
Irrawaddy dolphin (Australian snubfin dolphin) ( <i>Orcaella heinsohni</i> )	Migratory, Cetacean	-	P4	-	Species or species habitat known to occur within area	No

Species	Conservation status				Likelihood of occurrence in EMBA	BIA within EMBA
	EPBC Act 1999 (Cwth)	BC Act 2016 (WA)	Priority Species	Territory Parks and Wildlife Conservation Act 1976 (NT)		
Killer whale ( <i>Orcinus orca</i> )	Migratory, Cetacean	-	-	-	Species or species habitat may occur within area	None – no BIA defined
Sei whale ( <i>Balaenoptera borealis</i> )	Vulnerable, Migratory, Cetacean	Endangered	-	-	Foraging, feeding or related behaviour likely to occur within area	None – no BIA defined
Sperm whale ( <i>Physeter macrocephalus</i> )	Migratory, Cetacean	Vulnerable	-	-	Species or species habitat may occur within area	No
Spotted bottlenose dolphin (Arafura/Timor Sea populations) ( <i>Tursiops aduncus</i> )	Migratory, Cetacean	-	-	-	Species or species habitat known to occur within area	None – no BIA defined
Indian Ocean Bottlenose Dolphin, Spotted Bottlenose Dolphin ( <i>Tursiops aduncus</i> )	Cetacean	-	-	-	Species or species habitat likely to occur within area.	No
False Killer Whale ( <i>Pseudorca crassidens</i> )	Cetacean	-	-	-	Species or species habitat likely to occur within area.	None – no BIA defined
Pygmy Sperm Whale ( <i>Kogia breviceps</i> )	Cetacean	-	-	-	Species or species habitat may occur within area	None – no BIA defined
Cuvier's Beaked Whale, Goose-beaked Whale ( <i>Ziphius cavirostris</i> )	Cetacean	-	-	-	Species or species habitat may occur within area	None – no BIA defined
Spotted Dolphin, Pantropical Spotted Dolphin ( <i>Stenella attenuata</i> )	Cetacean	-	-	-	Species or species habitat may occur within area	None – no BIA defined

Species	Conservation status				Likelihood of occurrence in EMBA	BIA within EMBA
	EPBC Act 1999 (Cwth)	BC Act 2016 (WA)	Priority Species	Territory Parks and Wildlife Conservation Act 1976 (NT)		
Striped Dolphin, Euphrosyne Dolphin ( <i>Stenella coeruleoalba</i> )	Cetacean	-	-	-	Species or species habitat may occur within area	None – no BIA defined
Long-snouted Spinner Dolphin ( <i>Stenella longirostris</i> )	Cetacean	-	-	-	Species or species habitat may occur within area	None – no BIA defined
Risso's Dolphin, Grampus ( <i>Grampus griseus</i> )	Cetacean	-	-	-	Species or species habitat may occur within area	None – no BIA defined
Fraser's Dolphin, Sarawak Dolphin ( <i>Lagenodelphis hosei</i> )	Cetacean	-	-	-	Species or species habitat may occur within area	None – no BIA defined
Melon-headed Whale ( <i>Peponocephala electra</i> )	Cetacean	-	-	-	Species or species habitat may occur within area	None – no BIA defined
Common Dolphin, Short-beaked Common Dolphin ( <i>Delphinus delphis</i> )	Cetacean	-	-	-	Species or species habitat may occur within area	None – no BIA defined
Pygmy Killer Whale ( <i>Feresa attenuata</i> )	Cetacean	-	-	-	Species or species habitat may occur within area	None – no BIA defined
Short-finned Pilot Whale ( <i>Globicephala macrorhynchus</i> )	Cetacean	-	-	-	Species or species habitat may occur within area	None – no BIA defined
Blainville's Beaked Whale, Dense-beaked Whale ( <i>Mesoplodon densirostris</i> )	Cetacean	-	-	-	Species or species habitat may occur within area	None – no BIA defined
Rough-toothed Dolphin ( <i>Steno bredanensis</i> )	Cetacean	-	-	-	Species or species habitat may occur within area	None – no BIA defined

Species	Conservation status				Likelihood of occurrence in EMBA	BIA within EMBA
	EPBC Act 1999 (Cwth)	BC Act 2016 (WA)	Priority Species	Territory Parks and Wildlife Conservation Act 1976 (NT)		
Bottlenose Dolphin ( <i>Tursiops truncatus</i> s. str.)	Cetacean	-	-	-	Species or species habitat may occur within area	None – no BIA defined
Dwarf Sperm Whale ( <i>Kogia sima</i> )	Cetacean	-	-	-	Species or species habitat may occur within area	None – no BIA defined

## 7.1 Blue whale

Two subspecies of blue whale are recorded in Australian waters: the southern (or true) blue whale (*Balaenoptera musculus intermedia*) and the pygmy blue whale (*Balaenoptera musculus brevicauda*). Southern blue whales are believed to occur in waters south of 60°S and pygmy blue whales occur in waters north of 55°S (i.e. not in the Antarctic) (DEWHA, 2008). By this definition all blue whales in waters from Busselton, WA, to the NT border are assumed to be pygmy blue whales, so only this subspecies is discussed below.

Pygmy blue whales have a southern hemisphere distribution, migrating from tropical water breeding grounds in winter to temperate and polar water feeding grounds in summer (Bannister et al., 1996, Double et al., 2014). The WA migration path takes pygmy blue whales down the WA coast to coastal upwelling areas along southern Australia (Gill, 2002) and south at least as far as the Antarctic convergence zone (Gedamke et al., 2007).

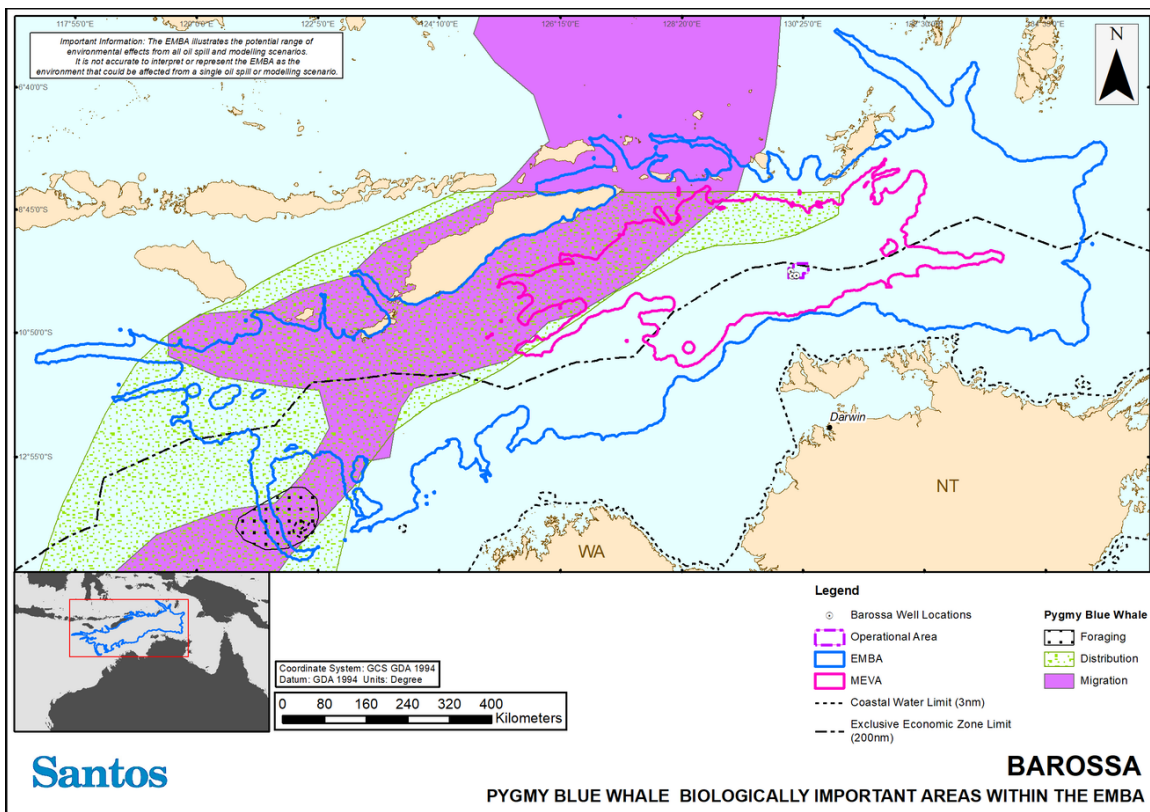
Tagging surveys have shown pygmy blue whales migrating northward relatively close to the Australian coastline (within 100 km) until reaching North West Cape, after which they travelled offshore (within 240 km) to Indonesia. Passive acoustic data has documented pygmy blue whales migrating along the Western Australian shelf break (Woodside, 2012). Tagging data collected by Gales et al. (2010) has provided the first definitive link between the blue whales that feed off the Perth Canyon and those that occur around Indonesia. This movement is concordant with the proposed ‘Tasmania to Indonesia’ population described by Branch et al. (2007).

The northern migration passes the Perth Canyon from January to May and northbound animals have been detected off Exmouth and the Montebello Islands between April and August (Double et al., 2012a; McCauley & Jenner, 2010). A noise monitoring study conducted as part of their Barossa marine studies program (see **Section 1.2**) 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 permit area. 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.

Generally, blue whales appear to travel as individuals or in small groups based on acoustic data. For example, analysis of pygmy blue whale calls from noise loggers deployed around Scott Reef (2006 to 2009) for the Woodside Browse project showed that 78% of the calls were from lone whales, 18% were from two whales and 4% were from three or more whales (McCauley, 2011; Woodside, 2014).

Possible foraging areas within the EMBA for pygmy blue whales include Scott Reef in WA (DoE, 2015). The steep gradient features in this location tend to stimulate upwelling and thus increased productivity (seasonally variable) (ConocoPhillips, 2018). There are no known breeding areas of significance to blue whales in the EMBA

A migration BIA is located along the continental shelf edge off the WA coastline, extending offshore near Scott Reef and into Indonesian waters. The foraging BIA encompasses the Scott Reef area and the distribution BIA covers the full extent of the known range for the species. See **Table 7-2** and **Figure 7-1**. Given these BIAs have been identified within the EMBA it is likely that pygmy blue whales transit through the EMBA and occasionally forage at Scott Reef in the south- west of the EMBA.



**Figure 7-1: Biologically important areas – whales**



### 7.1.1 Bryde's whale

The Bryde's whale (*Balaenoptera edeni*) is found all year round in tropical and temperate waters (Kato, 2002). Two forms are recognised: inshore and offshore Bryde's whales. It appears that the inshore form is restricted to the 200 m depth isobar, while the offshore form is found in deeper waters of 500 to 1,000 m (DoEE, 2019). Both forms are expected to be found in zones of upwelling where they feed on shrimp-like crustaceans (Bannister et al., 1996). Little is known about the population abundance of Bryde's whale, the location of exact breeding and calving grounds and large-scale migration patterns (DoEE, 2019). It is suggested, however, that the offshore form migrates seasonally, heading towards warmer tropical waters during the winter.

A few individuals of Bryde's whale were detected in the noise monitoring study for the Barossa marine studies program (see **Section 1.2**) 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. It is likely the individuals detected were 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 permit area; however, they are not expected to be present in significant numbers.

### 7.1.2 Dugongs

Dugongs (*Dugong dugon*) are large herbivorous marine mammals (up to 3 m) that feed off seagrass and generally inhabit coastal areas. Dugong feeding aggregations tend to occur in large seagrass meadows within wide and 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). Nevertheless, 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). 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 (outside the EMBA) and to the south of Melville Island.

BIAs for foraging, breeding, calving, and nursing were identified at Ashmore Reef, which is located within the region surrounding development (**Figure 7-2**). However, as the dugong's dietary preference is seagrass, the species will occur within shallow waters, such as those surrounding the Tiwi Islands. A well-known major dugong aggregation of about 4,400 individuals occurs in waters seaward (within about 50 km) of the Tiwi Islands and ranks in the top eight of dugong populations in the world.

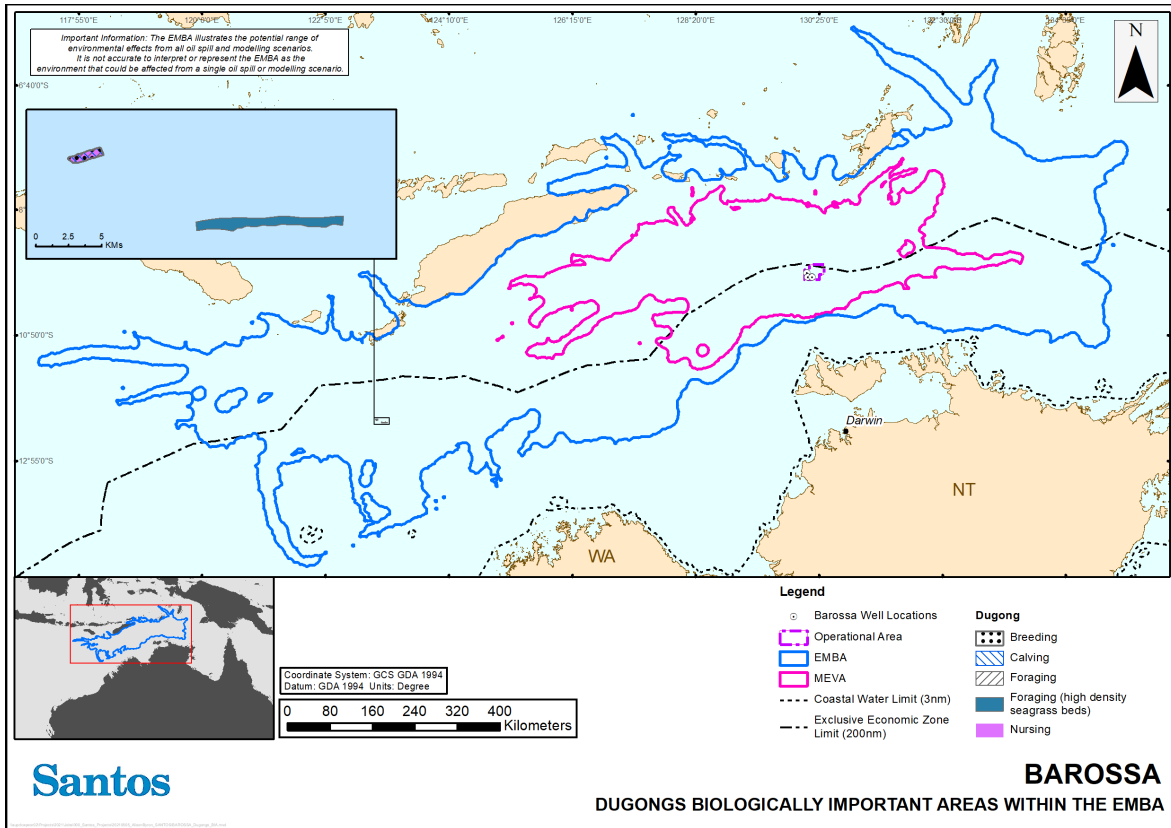


Figure 7-2: Biologically important areas – dugongs

### 7.1.3 Fin whale

Fin whales (*Balaenoptera physalus*) have a worldwide distribution generally in deeper waters, with oceanic migrations between warm-water breeding grounds and cold-water feeding grounds.

The fin whale distribution in Australia is not clear due to the sparsity of sightings. Information is known primarily from stranding events and whaling records. According to the Species Profile and Threats database (DCCEEW, 2023a), fin whales are thought to be present from Exmouth and along the southern coastline to southern Queensland.

There are no known mating or calving areas in Australian waters (DoEE, 2019a) and no BIAs for the fin whale are currently identified by the National Conservation Values Atlas (DCCEEW 2023b). However, given their known distribution and movements, it is possible that individual fin whales may pass through the EMBA in low numbers.

### 7.1.4 Humpback whale

Humpback whales (*Megaptera novaeangliae*) 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 populations on the east and west coasts. 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 (DOEE, 2019). The whale's 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 habitats exist for humpback whales within the EMBA 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 et al., 2015). Given this, the species is considered unlikely to occur within the EMBA.

#### 7.1.5 Killer whale

The killer whale (*Orcinus orca*) has a widespread global distribution and has been recorded in waters of all Australian states/territories (Bannister et al., 1996). Killer whales are commonly found in cold, deeper waters but they have been observed along the continental shelf and in shallower coastal areas. They are also more likely to be observed around seal colonies, with the closest significant seal colony to the EMBA being at the Abrolhos Islands (about 2,500 km south-west of the EMBA). 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 EMBA, although they may be present in low numbers.

#### 7.1.6 Sei whale

Sei whales (*Balaenoptera borealis*) have a worldwide oceanic distribution, ranging from polar to tropical waters. Sei whales tend to be found further offshore than other species of large whales (Bannister et al., 1996), the species 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).

Sei whales move between Australian waters and Antarctic feeding areas; however, they are only infrequently recorded in Australian waters (Bannister et al., 1996) and their movement and distribution in Australian waters is not well known (DCCEEW, 2023a).

There are no known mating or calving areas in Australian waters (Parker, 1978 in DCCEEW, 2023a). The National Conservation Values Atlas records no BIAs for this species (DCCEEW 2023b). It is possible that individual sei whales may be present in low numbers within the northern part of the EMBA.

#### 7.1.7 Sperm whale

Sperm whales (*Physeter macrocephalus*) are distributed worldwide in deep waters (greater than 200 m) off continental shelves and sometimes near shelf edges, averaging 20 to 30 nautical miles offshore (Bannister et al., 1996). The sperm whale is known to migrate northwards in winter and southwards in summer; however, detailed information on the distribution of sperm whales is not available for the timing of migrations. There are no sperm whale BIAs within the EMBA. The EMBA is unlikely to represent important habitat for this species, therefore only very low numbers of individuals might be expected.

#### 7.1.8 Spotted dolphin (Indo-pacific bottlenose dolphin)

There are four known subpopulations of Indo-Pacific bottlenose dolphins (*Tursiops aduncus*), of which the Arafura/Timor Seas population was identified as potentially occurring within the permit area and EMBA. The species occurs in NT open 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 in a small area and others undertaking long-range movements and migrations (DoEE, 2019).

No BIAs for the Indo-Pacific bottlenose dolphin are within the EMBA, although a breeding/calving BIA is located in Darwin Harbour during the dry season (usually April to September). Given the species' use of relatively deeper waters and the potential for long-range migratory movements, it is likely this species will occasionally transit the permit area and EMBA.

### 7.1.9 Australian Humpback Dolphin

Australian humpback dolphins (*Sousa sahalensis*) are found in tropical/subtropical waters of the Sahul Shelf from northern Australia to the southern waters of the island of New Guinea (Jefferson and Rosenbaum, 2014). They typically are found in small groups near estuaries, deep channels, rocky reefs, in sheltered bays, open ocean and occasionally in surf zones. At present, there is no range-wide estimate of the abundance of Australian humpback dolphins. Additionally, monitoring to estimate abundance is currently underway at several new locations in Western Australia, Northern Territory and Queensland. Overall, available abundance estimates indicate that Australian humpback dolphins occur in small populations averaging 54–89 individuals and 0.1–0.19 individuals per km<sup>2</sup> (Parra & Cagnazzi 2016). Threats to Australian humpback dolphins include habitat destruction and degradation from urban and coastal developments, noise pollution, boating activities – particularly close to population centres, and incidental capture in shark nets, trawl nets, drift nets and ghost nets. Overfishing of prey species and illegal killing are also threats (DCCEEW,2023c).

No BIAs or other EPBC-listed critical habitats exist for Australian humpback dolphins within the EMBA.

### 7.1.10 Irrawaddy dolphin (Australian snubfin dolphin)

The Australian snubfin dolphin (*Orcaella heinsohni*) is known to occur within tropical NT coastal waters off northern Australia, extending north from Broome in Western Australia to the Brisbane River in Queensland (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). Data also suggests this species occurs in small, localised populations (DSEWPaC, 2012).

Given this species' preference for nearshore waters and apparent high site fidelity, individuals are likely to only rarely transit south of the permit area and around the Tiwi Islands in low numbers.

## 7.2 Biologically important areas/critical habitat – marine mammals

**Table 7-2** below provides an overview of BIAs in the EMBA for marine mammals. A figure for the below BIAs is included within **Section 7.1**.

**Table 7-2: Biologically important areas – marine mammals**

Species	Scientific name	BIA area	Description of BIA area within the EMBA
Pygmy blue whale	<i>Balaenoptera musculus</i>	Migration – along the continental shelf edge off the WA coastline, extending offshore near Scott Reef and into Indonesian waters	Indonesia, Banda Sea Augusta to Derby. Tend to pass along the shelf edge at depths of 500m to 1000m; appear close to coast in the Exmouth-Montebello Islands area on southern migration.
		Distribution	Along the WA coastline towards and beyond Indonesia.
		Foraging	Scott Reef <sup>7</sup>
Dugong	<i>Dugong dugon</i>	Foraging (high density seagrass beds)	Ashmore Reef - South (located on sea reef side only, not interior)
		Foraging	Ashmore Reef – Far West
		Breeding	Ashmore Reef – Far West

<sup>7</sup> Values and sensitivities outside but proximal to the modelled EMBA, such as Scott Reef Nature Reserve (inclusive of Scott Reef and Seringapatam Reef) to the southwest of the modelled EMBA, have been included in the risk assessment for unplanned events.

Species	Scientific name	BIA area	Description of BIA area within the EMBA
		Calving	Ashmore Reef – Far West
		Nursing	Ashmore Reef – Far West

## 8 Birds

Marine waters in the EMBA contain key habitats that are important to birds, including offshore islands and pelagic waters. These habitats support a variety of birds which utilise the area in different ways and at different times of the year (DSEWPaC 2012a). Birds can be broadly grouped according to their preferred foraging habitat as coastal/ terrestrial birds, seabirds and shorebirds.

Coastal or terrestrial species inhabit the offshore islands and coastal areas of the mainland throughout the year. These species are either primarily terrestrial, or they may forage in coastal waters.

Seabirds include those species whose primary habitat and food source is derived from pelagic waters. These species spend the majority of their lives at sea, ranging over large distances to forage over the open ocean.

Shorebirds, including waders, inhabit the intertidal zone and adjacent areas. Some shorebird species, including oystercatchers are resident (Surman & Nicholson. 2013). Other shorebirds are migratory and include species that utilise the East Asian–Australasian Flyway, a migratory pathway, that traverses the EMBA, for millions of migratory shorebirds that travel from Northern Hemisphere breeding grounds to Southern Hemisphere resting and foraging areas.

Thirty-seven bird species listed as threatened or migratory under the EPBC Act may be present within the area surrounding the development. Of the listed bird species, two have a threatened status only, another two are listed marine only, six have a threatened and migratory status and a further 27 have a migratory status only.

An examination of the Species Profile and Threats database (DCCEEW 2023a) and *The Action Plan for Australian Birds* (Garnet 2011) showed that some listed bird species are not expected to occur in significant numbers within the marine and coastal environments of the EMBA due to their terrestrial or southern distributions. Hence, these species are not discussed further.

EPBC listed species expected to occur in the area are listed in **Table 8-1** along with their WA and NT conservation status (as applicable). Birds listed as threatened under the EPBC Act are discussed in more detail below. BIAs for birds are detailed in **Table 8-3** and depicted in **Figure 8-1**.

**Table 8-1: EPBC listed bird species within the EMBA**

Species	Conservation status				Likelihood of occurrence in EMBA	BIA within EMBA
	EPBC Act 1999	BC Act 2016	Priority Species	Territory Parks and Wildlife Conservation Act 1976 (NT)		
<b>Shorebirds</b>						
Red knot <i>(Calidris canutus)</i>	Endangered, Migratory Listed marine	Endangered	-	Vulnerable	Species or species habitat known to occur within area	None – no BIA defined
Curlew sandpiper <i>(Calidris ferruginea)</i>	Critically endangered, Migratory Listed marine	Critically endangered	-	Vulnerable	Species or species habitat known to occur within area	None – no BIA defined
Northern Siberian bar-tailed godwit <i>(Limosa lapponica menzbieri)</i>	Critically endangered, Migratory <sup>5</sup> Listed marine	Critically endangered	-	Vulnerable <sup>5</sup>	Species or species habitat known to occur within area	None – no BIA defined
Eastern curlew <i>(Numenius madagascariensis)</i>	Critically endangered, Migratory Listed marine	Critically endangered	-	Vulnerable	Species or species habitat known to occur within area	None – no BIA defined
Greater Sand Plover, Large Sand Plover <i>(Charadrius leschenaultia)</i>	Vulnerable, Migratory Listed marine	Vulnerable	-	Vulnerable	Species or species habitat known to occur within area	None – no BIA defined

Species	Conservation status				Likelihood of occurrence in EMBA	BIA within EMBA
	EPBC Act 1999	BC Act 2016	Priority Species	Territory Parks and Wildlife Conservation Act 1976 (NT)		
Common Sandpiper ( <i>Actitis hypoleucos</i> )	Migratory, Listed marine	-	-	-	Species or species habitat known to occur within area	None – no BIA defined
Red-rumped Swallow ( <i>Cecropis daurica</i> )	Migratory, Listed marine	-	-	-	Species or species habitat may occur within area	None – no BIA defined
Oriental Cuckoo, Horsfield's Cuckoo ( <i>Cuculus optatus</i> )	Migratory Listed marine	-	-	-	Species or species habitat known to occur within area	No
Oriental Reed-Warbler ( <i>Acrocephalus orientalis</i> )	Migratory, Listed marine	-	-	-	Species or species habitat known to occur within area	None – no BIA defined
Barn Swallow ( <i>Hirundo rustica</i> )	Migratory, Listed marine	-	-	-	Species or species habitat known to occur within area	None – no BIA defined
Osprey ( <i>Pandion haliaetus</i> )	Migratory, Listed marine	-	-	-	Species or species habitat known to occur within area	None – no BIA defined



Species	Conservation status				Likelihood of occurrence in EMBA	BIA within EMBA
	EPBC Act 1999	BC Act 2016	Priority Species	Territory Parks and Wildlife Conservation Act 1976 (NT)		
Common Noddy ( <i>Anous stolidus</i> )	Migratory, Listed marine	-	-	-	Breeding known to occur within area	No
Streaked Shearwater ( <i>Calonectris leucomelas</i> )	Migratory, Listed marine	-	-	-	Species or species habitat known to occur within area	None – no BIA defined
Roseate Tern ( <i>Sterna dougallii</i> )	Migratory, Listed marine	-	-	-	Breeding known to occur within area	Yes – see <b>Table 8-3</b>
Little Tern ( <i>Sternula albifrons</i> )	Migratory, Listed marine	-	-	-	Congregation or aggregation known to occur within area	Yes – see <b>Table 8-3</b>
Bridled Tern ( <i>Onychoprion anaethetus</i> )	Migratory, Listed marine	-	-	-	Breeding known to occur within area	No
Red-tailed Tropicbird ( <i>Phaethon rubricauda</i> )	Migratory, Listed marine	-	P4	-	Breeding known to occur within area	No
Pectoral Sandpiper ( <i>Calidris melanotos</i> )	Migratory, Listed marine	-	-	-	Species or species habitat may occur within area	None – no BIA defined
Sharp-tailed Sandpiper ( <i>Calidris acuminata</i> )	Migratory, Listed marine	-	-	-	Species or species habitat known to occur within area	None – no BIA defined
Yellow Wagtail ( <i>Motacilla flava</i> )	Migratory, Listed marine	-	-	-	Species or species habitat known to occur within area	None – no BIA defined

Species	Conservation status				Likelihood of occurrence in EMBA	BIA within EMBA
	EPBC Act 1999	BC Act 2016	Priority Species	Territory Parks and Wildlife Conservation Act 1976 (NT)		
Asian Dowitcher ( <i>Limnodromus semipalmatus</i> )	Migratory, Listed marine	-	-	Vulnerable	Species or species habitat known to occur within area	None – no BIA defined
Grey Wagtail ( <i>Motacilla cinerea</i> )	Migratory, Listed marine	-	-	-	Species or species habitat known to occur within area	None – no BIA defined
Great Frigatebird, Greater Frigatebird ( <i>Fregata minor</i> )	Migratory, Listed marine	-	-	-	Breeding known to occur within area	Yes – see <b>Table 8-3</b>
Lesser Frigatebird, Least Frigatebird ( <i>Fregata ariel</i> )	Migratory, Listed marine	-	-	-	Breeding known to occur within area	Yes – see <b>Table 8-3</b>
White-tailed Tropicbird ( <i>Phaethon lepturus</i> )	Migratory, Listed marine	-	-	-	Breeding known to occur within area	Yes – see <b>Table 8-3</b>
Greater Crested Tern ( <i>Thalasseus bergii</i> )	Migratory, Listed marine	-	-	-	Breeding known to occur within area	None – no BIA defined
Wedge-tailed Shearwater ( <i>Ardenna pacifica</i> )	Migratory, Listed marine	-	-	-	Breeding known to occur within area	Yes – see <b>Table 8-3</b>
Caspian Tern ( <i>Hydroprogne caspia</i> )	Migratory, Listed marine	-	-	-	Breeding known to occur within area	No

Species	Conservation status				Likelihood of occurrence in EMBA	BIA within EMBA
	EPBC Act 1999	BC Act 2016	Priority Species	Territory Parks and Wildlife Conservation Act 1976 (NT)		
Red-footed Booby ( <i>Sula sula</i> )	Migratory, Listed marine	-	-	-	Breeding known to occur within area	Yes – see Table 8-3
Brown Booby ( <i>Sula leucogaster</i> )	Migratory, Listed marine	-	-	-	Breeding known to occur within area	Yes – see Table 8-3
Masked Booby ( <i>Sula dactylatra</i> )	Migratory, Listed marine	-	-	-	Breeding known to occur within area	No
Bar-tailed Godwit ( <i>Limosa lapponica</i> )	Migratory, Listed marine	-	-	Vulnerable	Species or species habitat known to occur within area	None – no BIA defined
<b>Seabirds</b>						
Australian lesser noddy ( <i>Anous tenuirostris melanops</i> )	Vulnerable	Endangered	-	-	Breeding known to occur within area	No
Abbott's booby ( <i>Papasula abbotti</i> )	Endangered	-	-	-	Species or species habitat may occur within area	None – no BIA defined

Species	Conservation status				Likelihood of occurrence in EMBA	BIA within EMBA
	EPBC Act 1999	BC Act 2016	Priority Species	Territory Parks and Wildlife Conservation Act 1976 (NT)		
Christmas Island White-tailed Tropicbird, Golden Bosunbird ( <i>Phaethon lepturus fulvus</i> )	Endangered Migratory <sup>5</sup>	-	-	-	Species or species habitat may occur within area	None – no BIA defined
Black Noddy ( <i>Anous minutus</i> )	Listed marine	-	-	-	Breeding known to occur within area	No
Lesser Crested Tern ( <i>Thalasseus bengalensis</i> )	Listed marine	-	-	-	Breeding known to occur within area	Yes – see <b>Table 8-3</b>

<sup>5</sup> Listed as migratory at species level.

## 8.1 Shorebirds

### 8.1.1 Red knot (New Siberian Islands and north-eastern Siberia)

The red knot is a migratory shorebird, and the species includes five subspecies, including two found in Australia, *Calidris canutus piersmai* and *Calidris canutus rogersi*. The red knot breeds in Siberia and spends the non-breeding season in Australia and New Zealand. During the non-breeding season, the species spends the majority of its time on tidal mudflats or sandflats where they feed on intertidal invertebrates, especially shellfish (Garnet et al. 2011).

The red knot is listed as having habitat that is known to occur within the EMBA. In particular, Ashmore Reef is known to be a significant site for shorebirds with a maximum of 55 red knot individuals counted in 2010 (Clarke, 2011).

### 8.1.2 Curlew sandpiper

Curlew sandpiper (*Calidris ferruginea*) is a migratory shorebird that breeds in north Siberia and spends the non-breeding season from western Africa to Australia (Bamford et al. 2008). The curlew sandpiper occurs around coastal Australia and preferred habitats include coastal brackish lagoons, tidal mud and sand flats, estuaries, saltmarshes and less often inland. Their diet is mainly comprised of polychaete worms, molluscs and crustaceans (Higgins & Davies, 1996 in Garnet et al. 2011).

The curlew sandpiper is listed as having habitat that is known to occur within the EMBA. Ashmore Reef is known to be a significant site for shorebirds with a maximum 850 curlew sandpiper individuals counted in 2010 (Clarke, 2011).

### 8.1.3 Bar-tailed godwit (Northern Siberian subspecies)

Northern Siberian bar-tailed godwit (*Limosa lapponica manzbieri*) is a migratory shorebird that breeds in Siberia and migrates to the coast of Australia for the non-breeding season (Bamford et al. 2008). The northern Siberian occurs along the coast of north Western Australia and is found on muddy coastlines, estuaries, inlets, mangrove-fringed lagoons and sheltered bays, feeding on annelids, bivalves and crustaceans (DCCEEW 2023a; Higgins & Davies, 1996 in Garnet et al. 2011).

The bar-tailed godwit is listed as having habitat that is known to occur within the area surrounding the development. Ashmore Reef is known to be a significant site for shorebirds with a maximum of eight bar-tailed godwit individuals counted in 2010 (Clarke, 2011).

### 8.1.4 Eastern curlew

The eastern curlew (*Numenius madagascariensis*) is a migratory shorebird that breeds in Siberia, Kamchatka and Mongolia and migrates to coastal East Asia and Australia. The South Korean Yellow Sea is an important staging post for this species. Non-breeding birds occur around coastal Australia, are more common in the north and have disappeared or become much rarer at many sites along the south coast (Garnet, 2011).

Non-breeding birds are present at estuaries, mangroves, saltmarshes and intertidal flats, particularly those with extensive seagrass (Zosteraceae), where they feed on marine invertebrates, especially crabs and small molluscs (Higgins & Davies, 1996 in Garnet, 2011).

The eastern curlew is listed as having habitat that is known to occur within the area surrounding the development. Ashmore Reef is known to be a significant site for shorebirds with a maximum of four eastern curlew individuals counted in 2010 (Clarke, 2011).

### 8.1.5 Greater sand plover, large sand plover

The greater sand plover (*Charadrius leschenaultia*) is a migratory shorebird that breeds in north-west China, Mongolia and southern Siberia and migrates to Australasia, the Indian subcontinent and south-east Asia for the non-breeding season (TSSC 2016). The greater sand plover is widely distributed across the coast of Australia,

but are predominantly found on the northern Australia coast. Non-breeding birds are found on sheltered muddy, shelly or sandy beaches, sandbanks, mudflats, estuaries, salt-marsh, rocky island platforms, coral reefs, tidal lagoons and dunes near the coast, feeding on insects, worms, molluscs and crustaceans.

The greater sand plover is listed as having habitat that is known to occur within the area surrounding the development. This species has also been recorded on Ashmore Reef, which is known to be a significant site for shorebirds (TSSC 2016).

## 8.2 Seabirds

### 8.2.1 Australian lesser noddy

The Australian lesser noddy (*Anous tenuirostris melanops*) is usually found only around its breeding islands in the Houtman Abrolhos Islands in Western Australia (Storr et al. 1986), south of the EMBA. The Australian lesser noddy occupies coral-limestone islands that are densely fringed with white mangrove *Avicennia marina*, and it occasionally occurs on shingle or sandy beaches (Higgins & Davies 1996 in DCCEEW 2023a). This species is thought to be sedentary or resident, staying near to its breeding islands in the non-breeding season. It may leave nesting islands for short periods during the non-breeding season, and probably forages widely (Higgins & Davies, 1996 in DCCEEW, 2023a).

Breeding apparently occurs only on Morley, Wooded and Pelsaert Islands at the Houtman Abrolhos Islands (Higgins and Davies, 1996 in DoE, 2014b). Mangrove stands support about 68,000 breeding pairs spread over the three islands (Surman & Nicholson, 2006). Breeding may also occur on Ashmore Reef (Stokes & Hinchey, 1990). The breeding season extends from mid-August to early April (Higgins & Davies, 1996 in DoE 2014b).

The Australian lesser noddy is known to breed within the EMBA.

### 8.2.2 Abbott's booby

Currently, Abbott's booby (*Papasula abbotti*) is only known to breed on Christmas Island and to forage in the waters surrounding the island and south-east Asia (TSSC, 2020b). Within Christmas Island, most nests are found in the tall plateau forest on the central and western areas of the island, and in the upper terrace forest of the northern coast.

While this species may over-fly waters of the EMBA from time-to-time in transit or for foraging, they do not use the area for breeding or resting, no critical nesting or feeding areas have been identified within the EMBA.

### 8.2.3 Christmas Island White-tailed Tropicbird, Golden Bosunbird

The Christmas Island white-tailed tropicbird is only known to breed on Christmas Island and to forage and roost over the Indian Ocean (TSSC 2014). The species is widely distributed across Christmas Island and has been recorded south and south-east of the Island. The Christmas Island white-tailed tropicbird predominantly occurs north of 18°S but may occur up to about 1500km off the coast of Christmas Island at the edge of the North West continental shelf in Western Australia at 21°S (TSSC 2014).

While this species may over-fly waters of the area surrounding the development from time-to-time in transit or for foraging, they do not use the area for breeding or resting, no critical nesting or feeding areas have been identified within the EMBA.

## 8.3 Migratory species

There are thirty-three species listed as migratory under the EPBC Act that may occur within the area surrounding the development. Species that are listed as both migratory and threatened under the EPBC Act are outlined in **Table 8-1** and are repeated within **Table 8-2**.

Table 8-2: Summary of migratory birds that may occur within the EMBA

Species	Common name	Likelihood of occurrence in EMBA
<i>Limnodromus semipalmatus</i>	Asian Dowitcher	Species or species habitat known to occur within area
<i>Hirundo rustica</i>	Barn Swallow	Species or species habitat known to occur within area
<i>Limosa lapponica</i>	Bar-tailed Godwit	Species or species habitat known to occur within area
<i>Onychoprion anaethetus</i>	Bridled Tern	Breeding known to occur within area
<i>Sula leucogaster</i>	Brown Booby	Breeding known to occur within area
<i>Hydroprogne caspia</i>	Caspian Tern	Breeding known to occur within area
<i>Phaethon lepturus fulvus</i>	Christmas Island White-tailed Tropicbird, Golden Bosunbird	Species or species habitat may occur within area
<i>Anous stolidus</i>	Common Noddy	Breeding known to occur within area
<i>Actitis hypoleucos</i>	Common Sandpiper	Species or species habitat known to occur within area
<i>Calidris ferruginea</i>	Curlew Sandpiper	Species or species habitat known to occur within area
<i>Numenius madagascariensis</i>	Eastern Curlew, Far Eastern Curlew	Species or species habitat known to occur within area
<i>Fregata minor</i>	Great Frigatebird, Greater Frigatebird	Breeding known to occur within area
<i>Thalasseus bergii</i>	Greater Crested Tern	Breeding known to occur within area
<i>Charadrius leschenaultii</i>	Greater Sand Plover, Large Sand Plover	Species or species habitat known to occur within area
<i>Motacilla cinerea</i>	Grey Wagtail	Species or species habitat known to occur within area
<i>Fregata ariel</i>	Lesser Frigatebird, Least Frigatebird	Breeding known to occur within area
<i>Sternula albifrons</i>	Little Tern	Congregation or aggregation known to occur within area
<i>Limosa lapponica menzbieri</i>	Northern Siberian bar-tailed godwit	Species or species habitat known to occur within area
<i>Sula dactylatra</i>	Masked Booby	Breeding known to occur within area
<i>Cuculus optatus</i>	Oriental Cuckoo, Horsfield's Cuckoo	Species or species habitat known to occur within area
<i>Acrocephalus orientalis</i>	Oriental Reed-Warbler	Species or species habitat known to occur within area
<i>Pandion haliaetus</i>	Osprey	Species or species habitat known to occur within area
<i>Calidris melanotos</i>	Pectoral Sandpiper	Species or species habitat may occur within area

Species	Common name	Likelihood of occurrence in EMBA
<i>Calidris canutus</i>	Red Knot, Knot	Species or species habitat known to occur within area
<i>Sula sula</i>	Red-footed Booby	Breeding known to occur within area
<i>Cecropis daurica</i>	Red-rumped Swallow	Species or species habitat may occur within area
<i>Phaethon rubricauda</i>	Red-tailed Tropicbird	Breeding known to occur within area
<i>Sterna dougallii</i>	Roseate Tern	Breeding known to occur within area
<i>Calidris acuminata</i>	Sharp-tailed Sandpiper	Species or species habitat known to occur within area
<i>Calonectris leucomelas</i>	Streaked Shearwater	Species or species habitat known to occur within area
<i>Ardenna pacifica</i>	Wedge-tailed Shearwater	Breeding known to occur within area
<i>Phaethon lepturus</i>	White-tailed Tropicbird	Breeding known to occur within area
<i>Motacilla flava</i>	Yellow Wagtail	Species or species habitat known to occur within area

Australia is signatory to three international treaties with China, Japan and the Republic of Korea to safeguard migratory bird species, predominantly shorebirds. To facilitate observance of the three agreements migratory shorebirds have been listed as specially protected under the Commonwealth EPBC Act.

Ashmore reef wetland of international importance is discussed in **Section 9.1.1**.

The EPBC Act Policy Statement 3.21 sets out criteria for determining the significance of sites to migratory shorebirds based on the number of migratory species and the proportion of a species population that is supported by the site (Commonwealth of Australia, 2017b). Site significance can be difficult to assess, particularly for ephemeral inland wetlands. These areas may be used rarely, depending on weather conditions, but still provide important habitat for migratory shorebird species.

Migratory shorebirds require a particular conservation approach due to their migration patterns that take them across international boundaries (Bamford et al. 2008). These species and their habitats are sensitive to threats due to their high site fidelity, tendency to aggregate, high energy demands and the need for habitat networks containing both roosting and foraging sites (Commonwealth of Australia, 2017). Migratory shorebirds are known to use networks of connected sites (also known as site complexes). They move within these networks depending on the time of day, availability of resources and environmental conditions at the site (Commonwealth of Australia, 2017).

The types of habitats used by migratory shorebirds in Australia vary across species. Migratory shorebirds use both coastal and inland habitats that most commonly include:

- + Coastal habitats: coastal wetlands, estuaries, mudflats, rocky inlets, reefs and sandy beaches, sometimes supporting mangroves; and
- + Inland habitats: inland wetlands, floodplains and grassland areas, often with ephemeral water sources (Commonwealth of Australia, 2017).

The *Wildlife conservation plan for migratory shorebirds* (Commonwealth of Australia, 2015) provides a framework to guide the conservation of migratory shorebirds and their habitat in Australia and, in recognition of their migratory habits, outlines national activities to support their appreciation and conservation throughout the East Asian-Australasian Flyway.

There are 33 migratory bird species within the EMBA, of which seven are subject to the *Wildlife conservation plan for migratory shorebirds*.



- + Red Knot, Knot
- + Greater Sand Plover, Large Sand Plover
- + Common Sandpiper
- + Pectoral Sandpiper
- + Sharp-tailed Sandpiper
- + Asian Dowitcher
- + Bar-tailed Godwit.

Shorebird migration patterns are seasonal and vary according to species (DSEWPaC, 2012a). Generally, shorebirds migrate to northern Australia in August to November. Many birds remain in northern Australia, but others disperse southwards (Bennelongia, 2011). Migratory shorebird numbers on northern beaches peak in November then again in March as the majority of birds begin their return to the northern hemisphere between March and May. Most migratory shorebirds do not breed in Australia and juvenile birds may spend several years in Australia before reaching maturity and returning north to breed (DEWHA, 2009).

#### 8.4 Biologically important areas/critical habitat – birds

Table 8-3 and Figure 8-1 provide an overview of BIAs in the EMBA for birds <sup>6</sup>.

**Table 8-3: Critical habitat/ biologically important areas – birds**

Species	Scientific name	BIA area	Description of BIA area within the EMBA
Brown booby	<i>Sula leucogaster</i>	Breeding	Kimberley and northern Pilbara coasts and islands also Ashmore Reef
Greater frigatebird	<i>Fregata minor</i>	Breeding	Kimberley and Ashmore Reef
Lesser crested tern	<i>Thalasseus bengalensis</i>	Breeding	Kimberley, Pilbara and Gascoyne coasts and islands including Ashmore Reef
Lesser frigatebird	<i>Fregata ariel</i>	Breeding	Kimberley and Pilbara coasts and islands also Ashmore Reef
Little tern	<i>Sternula albifrons</i>	Resting	Kimberley, Pilbara and Gascoyne coasts and islands including Ashmore Reef
Red-footed booby	<i>Sula sula</i>	Breeding	North west Kimberley and Ashmore Reef
Roseate turn	<i>Sterna dougallii</i>	Breeding	Kimberley, Pilbara and Gascoyne coasts and islands including Ashmore Reef
Wedge-tailed shearwater	<i>Ardenna pacifica</i>	Breeding	Kimberley, Pilbara and Gascoyne coasts and islands including Ashmore Reef
White-tailed tropic bird	<i>Phaethon lepturus</i>	Breeding	Kimberley, Pilbara and Gascoyne coasts and islands including Ashmore Reef

<sup>6</sup> Further background information on BIA and identification of critical habitat in recovery plans is provided in **Section 5.3**.

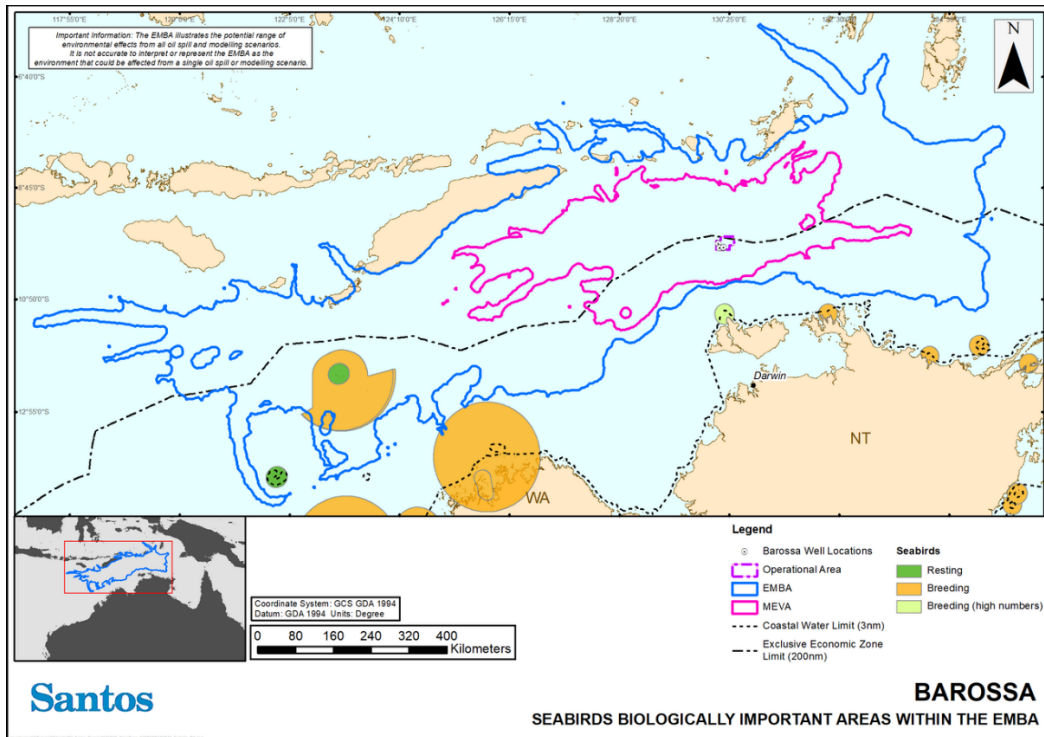


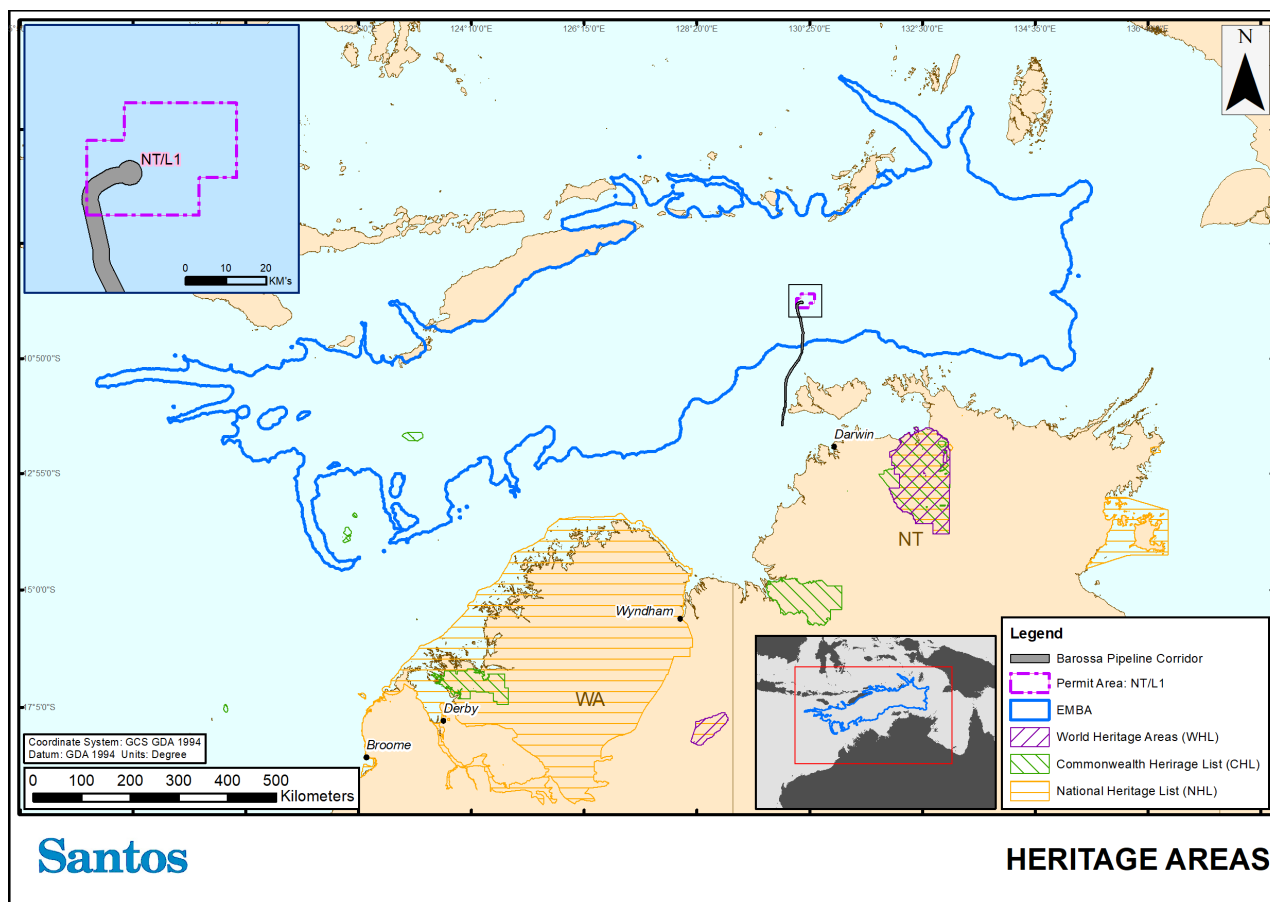
Figure 8-1: Biologically important areas – birds

## 9 Protected areas

A number of areas in the EMBA are protected under state and federal legislation. Protected areas include World Heritage Areas, wetlands of international importance (Ramsar), wetlands of national importance, national and Commonwealth heritage places. The areas that occur within the EMBA are listed in **Table 9-1**, and shown in **Figure 9-1** and **Figure 9-2**, and discussed below in **Table 9-1**. Other protected areas include KEFs (discussed in **Section 10**) and State and Commonwealth marine parks/reserves (discussed in **Section 11** and **Section 12**).

**Table 9-1: Summary of protected areas in waters within the EMBA**

Area type	Title
World Heritage Area	None
Wetlands of international importance (Ramsar)	Ashmore Marine Park ( <b>Section 12.1.1</b> )
Wetlands of national importance	Ashmore Marine Park ( <b>Section 12.1.1</b> )
National heritage place	None
Commonwealth heritage place	Scott Reef and surrounds <sup>8</sup> ( <b>Section 9.2.2</b> )
	Ashmore Reed Nature Reserve ( <b>Section 9.2.1</b> )
Threatened ecological communities	None



<sup>8</sup> Values and sensitivities outside but proximal to the modelled EMBA, such as Scott Reef Nature Reserve (inclusive of Scott Reef and Seringapatam Reef) to the southwest of the modelled EMBA, have been included in the risk assessment for unplanned events.

**Figure 9-1: Heritage areas within the EMBA**

**9.1 Wetlands of national and international importance (Ramsar)**

One wetland of international importance (Ramsar) is within in the EMBA: Ashmore Reef (**Figure 9-2**).

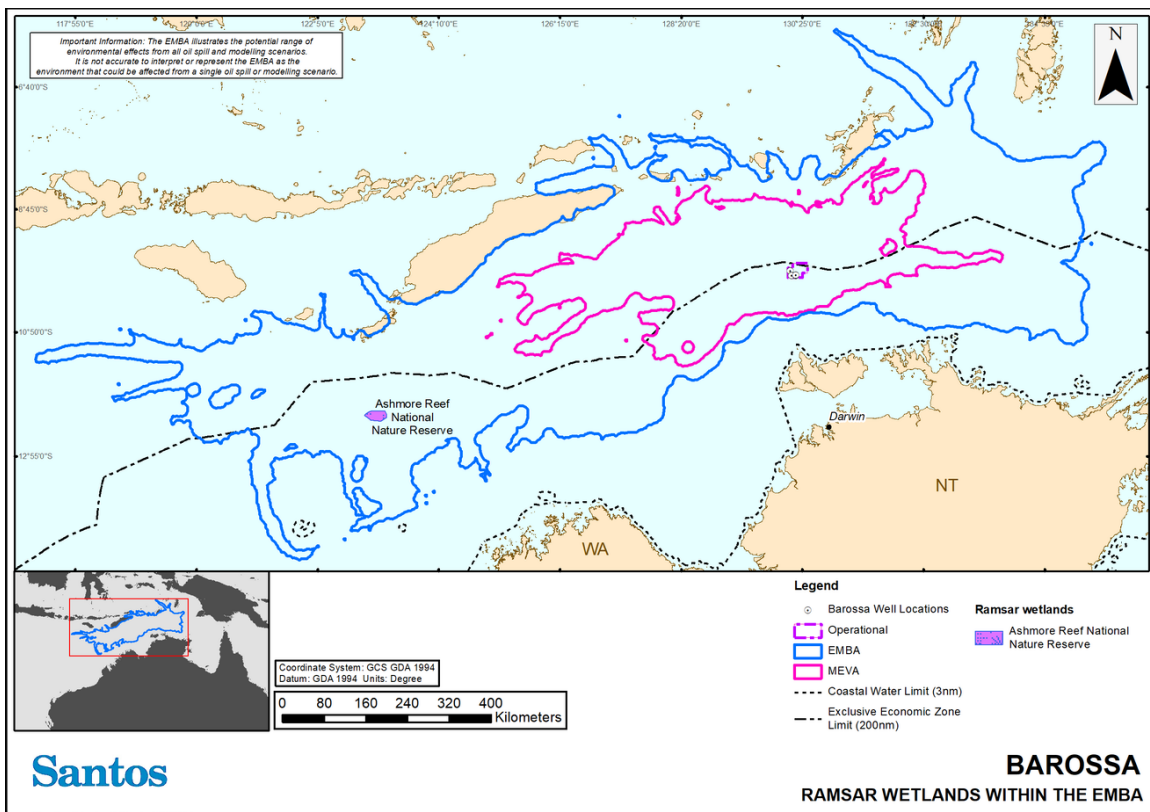
**9.1.1 Ashmore Reef**

In addition to being listed as an Australian Marine Park (**Section 12.1.1**), Ashmore Reef has been designated a Ramsar wetland of international importance due to the importance of the islands in providing a resting place for migratory shorebirds and supporting large breeding colonies of seabirds (Hale & Butcher, 2013). The reserve provides a staging point for many migratory wading birds from October to November and March to April as part of the migration between Australia and the northern hemisphere (Commonwealth of Australia, 2002). Migratory shorebirds use the reserve’s islands and sand cays as feeding and resting areas during their migration.

Ashmore Reef plays a primary role in the maintenance of biodiversity in reef systems in the region. The reserve supports 275 species of reef building coral, 13 species of sea cucumbers, and high numbers of mollusc species. There are over 760 fish species, 13 species of sea snake, 99 species of decapod crustacean and 47 species of waterbird listed as migratory under international treaties. It supports breeding of 20 species of waterbirds including the brown booby, lesser frigatebird, crested tern, bridled tern, sooty tern and common noddy. The Ramsar site is also important for feeding for green turtles, hawksbill turtle and loggerhead turtle and critical nesting and inter-nesting habitats for green and hawksbill turtles (Commonwealth of Australia, 2002).

Ashmore Reef regularly supports more than 20,000 waterbirds and has been known to support more than 65,000 waterbirds. The Ramsar site regularly supports more than one per cent of at least six species of waterbird including the sooty tern, bar-tailed godwit, grey-tailed tattler, ruddy turnstone, sanderling and greater sand plover (Commonwealth of Australia, 2002).

A summary of the habitats found at Ashmore Reef is presented in **Section 2.5**.



**Figure 9-2: Ramsar wetlands within the EMBA**

## 9.2 Commonwealth heritage places

The Commonwealth heritage places list comprises natural, Indigenous and historic heritage places which are either entirely within a Commonwealth area, or outside the Australian jurisdiction and owned or leased by the Commonwealth or a Commonwealth Authority. The following subsections describe the two Commonwealth heritage places within the EMBA.

### 9.2.1 Ashmore Reef National Nature Reserve

Ashmore Reef is a shelf edge atoll located in the Timor Sea approximately 840 km west of Darwin and 610 km north of Broome. The atoll is comprised of three low vegetated islands (West Island, East Island and Middle Island) which cover a total area of approximately 61 ha. The islands are surrounded by coral reefs and sandbanks, with the Ashmore Reef National Nature Reserve covering approximately 583 square km (Commonwealth of Australia, 2002).

Ashmore Reef has heritage significance due to the history of human occupation and use of the islands that comprise the atoll. The islands are believed to have been visited by Indonesian fisherman from the island of Rotti since the early eighteenth century, as well as by Macassans and Bajo and people from the island of Ceram. The islands were used for fishing and as a staging point for voyages to the southern reef's along Australia's coast (Commonwealth of Australia, 2002).

A summary of the habitats found at Ashmore Reef is presented in **Section 2.5**.

### 9.2.2 Scott Reef and surrounds

Scott Reef<sup>9</sup> is a large, emergent shelf atoll located on the edge of the broad continental shelf, about 300 km from mainland north-western Australia. The listing comprises the areas of Scott Reef that are within Commonwealth waters to the 50 m BSL bathymetric contour. This includes North Reef, an annular reef, 16.3 km long and 14.4 km wide and parts of the lagoon of South Reef, a crescent shaped reef 17 km across (DoE 2014).

The place is regionally significant both because of its high representation of species not found in coastal waters off Western Australia and for the unusual nature of its fauna which has affinities with the oceanic reef habitats of the Indo-West Pacific as well as the reefs of the Indonesian region (DoE, 2014).

A summary of the habitats found at Scott Reef is presented in **Section 2.5**.

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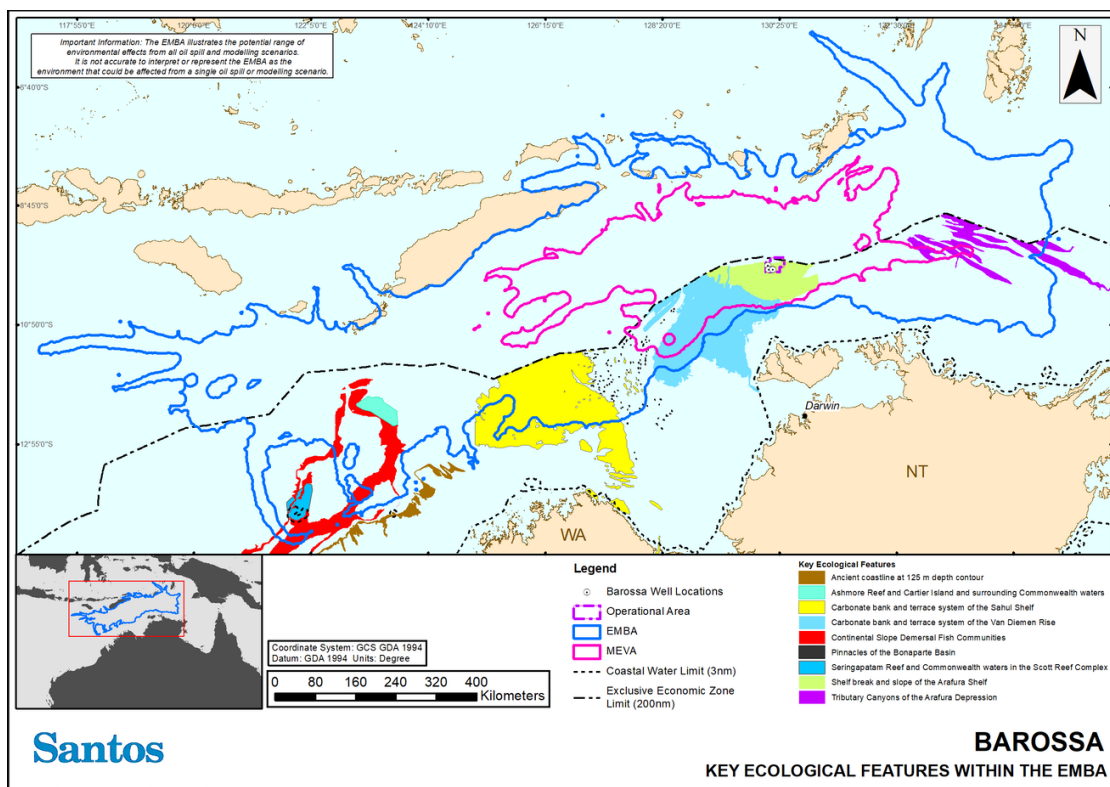
<sup>9</sup> Values and sensitivities outside but proximal to the modelled EMBA, such as Scott Reef Nature Reserve (inclusive of Scott Reef and Seringapatam Reef) to the southwest of the modelled EMBA, have been included in the risk assessment for unplanned events.

## 10 Key ecological features

Key ecological features (KEFs) are elements of the Commonwealth marine environment defined as important for either a region's biodiversity or its ecosystem function and integrity. KEFs meet one or more of the following criteria (DSEWPaC 2012a):

- + a species, group of species or a community with a regionally important ecological role
- + a species, group of species or a community that is nationally or regionally important for biodiversity
- + an area or habitat that is nationally or regionally important for:
  - enhanced or high biological productivity.
  - aggregations of marine life.
  - biodiversity and/or endemism.
- + a unique seafloor feature with ecological properties of regional significance.

Nine key ecological features of the Commonwealth waters overlap the EMBA and are shown in **Figure 10-1** and are discussed in this section. The permit area occurs within the bounds of the Shelf Break and Slope of the Arafura Shelf KEF. A portion of the pipeline route corridor occurs over the Carbonate Bank and Terrace System of the Van Diemen Rise KEF (see **Section 2.1.2**).



**Figure 10-1: Key ecological features located within the EMBA**

### 10.1 Ancient coastline at 125 m depth contour

The shelf of the North-west Marine Region contains several terraces and steps which reflect changes in sea level that occurred over the last 100,000 years. The most prominent of these features occurs at a depth of 125 m as an escarpment along the North West Shelf and Sahul Shelf (DSEWPaC, 2012a), designated the 'Ancient coastline at 125 m depth contour' KEF. Where the ancient submerged coastline provides areas of hard substrate it may contribute to higher biological diversity. Little detailed knowledge is available, but the hard substrate of the escarpment is likely to support sponges, crinoids, molluscs, echinoderms (DSEWPaC, 2012a). It is understood that changes in topography at these depths are critical points for the generation of internal waves (Holloway et al., 2001 cited in DEWHA, 2008a), playing a minor role in aiding localised upwelling or at

least regional mixing associated with the seasonal changes in currents and winds. It is also believed that this prominent floor feature could be important as a migratory pathway for cetaceans and pelagic species such as the whale shark and humpback whale, as they move north and south between feeding and breeding grounds (DEWHA, 2008a).

Parts of the ancient coastline are thought to provide biologically important habitats in areas otherwise dominated by soft sediments. The topographic complexity of these escarpments may also facilitate vertical mixing of the water column providing a relatively nutrient-rich environment for species present on the escarpment (DSEWPaC, 2012a). This enhanced productivity could potentially be attracting baitfish, which in turn provide food for the migratory species. The pressures of potential concern on the biodiversity value of this feature generally include ocean acidification as a result of climate change (DoEE, 2016a).

Ancient coastline at 125 m depth contour KEF is about 700 km to the south-west of the permit area.

## 10.2 Continental slope demersal fish communities

The Australian continental slope provides important habitat for demersal fish communities, characterised by high endemism and species diversity. Specifically, the continental slope between North West Cape and the Montebello Trough is the most diverse slope bioregion in Australia with more than 500 fish species, 76 of which are endemic (Last et al. 2005 in DSEWPaC, 2012a).

The continental slope KEF consists of two distinct community types, associated with the upper and mid slope, 225 to 500 m and 750 to 1000 m respectively. The Timor Province and Northwest Transition bioregions are the second-richest areas for demersal fish across the entire continental slope (DSEWPaC 2012a). The bacteria and fauna that is present in the system on the continental slope are the basis for the food web for demersal fish and higher order consumers in the system. Further information of this system has been poorly researched, though it has been suggested that it is a detritus-based system, where infauna and epifauna become prey for a range of teleost fish, molluscs and crustaceans (Brewer et al. 2007). The higher order consumers supported by this system are likely to be carnivorous fish, deep water sharks, large squid and toothed whales (Brewer et al. 2007). The pelagic production is known to be phytoplankton based, with hotspots located around oceanic reefs and islands (Brewer et al. 2007).

It is believed that the loss of the benthic habitat along this continental shelf region would likely lead to a decline in the species diversity and endemism that this feature is associated with (DoEE, 2019a). The endemism of the region is not supported by large data sets and is scarce. It is consequently not well understood what interactions exist between the physical processes and trophic structures that lead to this high diversity of fish and the suggested presence of endemic species in the region (DoEE. 2016a).

The 'Continental slope demersal fish communities' KEF is about 800 km to the south-west of the permit area.

## 10.3 Seringapatam Reef and Commonwealth waters in the Scott Reef Complex

Scott and Seringapatam reefs<sup>10</sup> are part of a series of submerged reef platforms that rise steeply from the sea floor between the 300–700 m contours on the north-west continental slope and lie in the Timor Province (Falkner et al. 2009). Scott Reef consists of two separate reef formations, North Reef and South Reef. The total area of the key ecological feature is about 2,418 km<sup>2</sup>. As two of the few offshore reefs in the north-west, they provide an important biophysical environment in the region.

Scott and Seringapatam reefs and the waters surrounding them attract aggregations of marine life including humpback whales on their northerly migration, Bryde's whales, pygmy blue whales, Antarctic minke whales, dwarf minke whales, minke whales, dwarf sperm whales and spinner dolphins (Jenner et al. 2008). Whale sharks and several species of sea snakes have also been recorded in this area (Donovan et al. 2008). Green and hawksbill turtles nest during the summer months on Sandy Islet on South Scott Reef. These species also interest and forage in the surrounding waters (Guinea, 2006). Scott Reef is a particularly biologically diverse system and includes more than 300 species of reef-building corals, about 400 mollusc species, 118 crustacean species, 117 echinoderm species and around 720 fish species. Corals and fish at Scott Reef have higher species diversity than the Rowley Shoals (Done et al. 1994).

<sup>10</sup> Values and sensitivities outside but proximal to the modelled EMBA, such as Scott Reef Nature Reserve (inclusive of Scott Reef and Seringapatam Reef) to the southwest of the modelled EMBA, have been included in the risk assessment for unplanned events.

Scott Reef is listed as Commonwealth Heritage Places and is discussed in **Section 9.2.2**. A general description of Scott Reef and Seringapatam Reef is presented in **Table 2-4**.

The 'Seringapatam Reef and Commonwealth waters in the Scott Reef Complex' KEF is within the EMBA<sup>11</sup> about 950 km to the south-west of the permit area.

#### 10.4 Ashmore Reef and Cartier Island and surrounding Commonwealth waters

Ashmore Reef and Cartier Island are situated on the shallow upper slope of the Sahul Shelf, north of Scott and Seringapatam reefs. Rising from a depth of more than 100 m, the reef platform is at the edge of the North West Shelf and covers an area of 239 km<sup>2</sup>. Ashmore Reef Marine Park (**Section 12.1.1**) encloses an area of about 583 km<sup>2</sup> of seabed (EA, 2002). Cartier Island lies about 350 km off Australia's Kimberley coast, 115 km south of the Indonesian island of Roti and 45 km south-east of Ashmore Reef Commonwealth Marine Reserve. Cartier Island Marine Park (**Section 12.1.2**) covers 167 km<sup>2</sup> (EA, 2002). Species at Ashmore Reef and Cartier Island include more than 225 reef-building corals, 433 molluscs, 286 crustaceans, 192 echinoderms, and the most diverse variety of fish of any region in Western Australia with 709 species (EA, 2002).

Sandy beaches provide important habitat for nesting green and hawksbill turtles throughout the year. Seagrass present at Ashmore Reef provides critical breeding (April–May) and foraging (throughout the year) habitat for a genetically distinct population of dugong with their range probably extending to other submerged shoals within the area (Whiting, 1999). The emergent habitat at Ashmore also provides important nesting sites for seabirds, many of which are migratory. Ashmore's islands are regarded as supporting some of the most important seabird rookeries on the North West Shelf seasonally, including up to 50,000 seabirds (26 species) and up to 2,000 waders (30 species, representing almost 70% of wader species that regularly migrate to Australia) (Milton, 2005).

The Ashmore Reef and Cartier Island and Surrounding Commonwealth Waters KEF is about 700 km to the south-west of the permit area and within the EMBA. A general description of Ashmore Reef and Cartier Island is presented in **Table 2-4**.

#### 10.5 Carbonate bank and terrace system of the Sahul Shelf

The carbonate bank and terrace system of the Sahul Shelf is located in the western Joseph Bonaparte Gulf and to the north of Cape Bougainville and Cape Londonderry. The banks consist of a hard substrate and flat tops at depths of 150–300 m. Each bank occupies an area generally less than 10 km<sup>2</sup> and is separated from the next bank by narrow sinuous channels with depths up to 150 m. The origin of the banks is uncertain, though the area contains predictably high levels of productivity, in comparison to the generally low productivity of the region (DSEWPaC, 2012a).

The banks are foraging areas for loggerhead, olive ridley and flatback turtles and provide habitat for humpback whales, and green and freshwater sawfish (Donovan et al. 2008 in DSEWPaC, 2012a). The hard substrate of the banks is thought to support diverse organisms including sessile benthic invertebrates such as sponges, soft and hard corals, gorgonians, bryozoans, ascidians and associated reef fish and elasmobranchs (Brewer et al. 2007). Cetaceans, green and fresh sawfish are also likely to occur in the area, as well as possibly the Australian snubfin dolphin, a migratory species occurring mostly on the northern extent of the Sahul Shelf (DSEWPaC 2012a).

According to DSEWPaC (2012a) the carbonate banks and terrace system of the Sahul Shelf are regionally important because of their role in enhancing productivity relative to their surrounds. Little is known about the banks, terraces and associated channels but they are believed to be areas of enhanced productivity and biodiversity due to the upwellings of cold nutrient-rich water at the heads of the channels and the availability of hard substrate (Brewer et al. 2007).

The 'Carbonate bank and terrace system of the Sahul Shelf' KEF is about 330 km to the south-west of the permit area and within the EMBA.

<sup>11</sup> Values and sensitivities outside but proximal to the modelled EMBA, such as Scott Reef Nature Reserve (inclusive of 'Seringapatam Reef and Commonwealth waters in the Scott Reef Complex' KEF) to the southwest of the modelled EMBA, have been included in the risk assessment for unplanned events.



## 10.6 Pinnacles of the Bonaparte Basin

The limestone pinnacles of the Bonaparte Basin are located in the mid-outer shelf of the western Joseph Bonaparte Gulf and comprise of 61% of the limestone pinnacles in the Northwest Marine Region and 8% of the total limestone pinnacles found within the Australian Exclusive Economic Zone (Baker et al. 2008). The pinnacles range from water depths of 30 to 80 m providing hard substrate in a relatively sparse soft sediment habitat for sessile species. The pinnacles are thought to be remnants of the calcareous shelf and coastal features from previous low sea-level stands, and have been recorded to be up to 50 m in height and range from 50 to 100 km long (Baker et al. 2008, Heyward et al. 1997).

Diverse communities of sessile benthic invertebrates including hard and soft corals, sponges, whips, fans, bryozoans and aggregations of demersal fish species such as snappers, emperors and groupers have been recorded (Brewer et al. 2007). Foraging and general use has been recorded within the pinnacles by marine turtles and the area has also been suggested to be used by freshwater and green sawfish as well as humpback whales (Donovan *et al.* 2008). The pinnacles have been recognised as a sponge biodiversity hotspot which has recorded greater diversity and communities than that of the surrounding seafloor (NERP MBH 2014).

According to DSEWPaC (2012a), the pinnacles of the Bonaparte Basin are regionally important because of their biodiversity value (unique sea-floor feature with ecological properties of regional significance), which apply to both the benthic and pelagic habitats. The hard substrate of the pinnacles is likely to support a high number of species, although a better understanding of the species richness and diversity associated with these structures is required.

The 'Pinnacles of the Bonaparte Basin' KEF is located about 200 km to the west south-west of the permit area and occurs within the EMBA.

## 10.7 Tributary canyons of the Arafura Depression

The tributary canyons of the Arafura Depression form an important ecological feature characterised by high nutrients from upwellings of deep ocean water, which enhance productivity of the area (DEWHA, 2008a). This is thought to occur as a result of movements of water through the canyons and surface water circulating as a result of monsoonal winds (Wilson, 2005).

Surveys of the area identified around 245 macroscopic species including a variety of invertebrates and six small fish species (Wilson, 2005). The area also contains coral communities and attract aggregations of marine life (DEWHA, 2008a). Larger species found at this key ecological feature include predatory fish, whale sharks, sawfish and marine turtles (mostly olive ridley) (DEWHA, 2008a).

The national and/or regional importance of the tributary canyons is associated with its high productivity, high levels of biodiversity and endemism.

The 'Tributary canyons of the Arafura Depression' KEF is located within the EMBA about 250 km to the east of the permit area.

## 10.8 Shelf break and slope of the Arafura Shelf

The shelf break and slope of the Arafura Shelf is an important ecological feature that creates a unique seafloor which enhances biological productivity on the edge of the shelf and attracts feeding aggregations of pelagic marine organisms. The productivity of this area has been recognised as nationally and/or regionally important (Last et al. 2005).

Although the ecosystem processes in this area are largely unknown, it is thought that the oceanographic processes associated with the Indonesian Throughflow current and monsoonal winds are strong influence (DEWHA, 2007).

The physical characteristics of this shelf break and slope comprise of continental slope, patch reefs and hard substrate pinnacles (Harris et al. 2005).

Phytoplankton and invertebrates have been sampled at this KEF and the primary production of phytoplankton is thought to be the basis for offshore food webs in the area (DEWHA, 2007). Records show about 284 demersal fish species in the area (Last et al. 2005) and other marine species that have been recorded include marine turtles, whale sharks and predatory fish species including sharks (DEWHA, 2008a).

The permit area occurs within the bounds of the 'Shelf break and slope of the Arafura Shelf' KEF. The ecological values associated with this unique seafloor feature (i.e. patch reefs and hard substrate pinnacles) were not observed during the Barossa marine studies program, nor are these topographically distinct features evident from the data derived from multiple surveys undertaken across this area (see **Section 2.1.2**).

### 10.9 Carbonate bank and terrace system of the Van Diemen Rise

The bank and terrace system of the Van Diemen Rise covers about 31,278 km<sup>2</sup> and forms part of the larger system associated with the Shaul Banks to the north and Londonderry Rise to the east. The value of this KEF is 'unique seafloor feature with ecological properties of regional significance' (DEWHA, (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 feature is characterised by carbonate terrace, banks, channels and valleys, with variability in water depth and substrate composition considered to contribute to the presence of unique ecosystems in the channels.

The variability in water depth and substrate composition across the feature may contribute to the presence of unique ecosystems in the channels. The carbonate banks and shoals found within the Van Diemen Rise make up 80% of the banks and shoals, 79% of the channels and valleys, and 63% of the terrace found across the North Marine Region. The carbonate banks and shoals rise from depths of 100 m to 200 m to within 10 m to 40 m of the sea surface (Anderson et al. 2011).

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<sup>2</sup>. 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 to 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 feature provides habitat for a high diversity of sponges, soft corals and other sessile filter feeders; epifauna and infauna; and olive ridley turtles, sea snakes and sharks. Rich sponge gardens and octocorals have been identified on the eastern Joseph Bonaparte Gulf along the banks, ridges and some terraces. Plains in deep hole/valleys are characterised by scattered epifauna and infauna that include polychaetes and ascidians. Epibenthic communities such as the sponges found in the channels are likely to support fish and second-order consumers. Pelagic fish such as mackerel, red snapper and a distinct gene pool of gold band snapper are found in the Van Diemen Rise.

The 'Carbonate bank and terrace system of the Van Diemen Rise' KEF is located about 50 km to the south-west of the permit area. The pipeline passes through the KEF twice, approximately 40 km to the north and 10 km in the south (see **Section 2.1.2**). This equates to a footprint of 3.3 hectares (0.033 km<sup>2</sup>) or 0.0001% of the total area of the KEF.

Photographic observations taken during the geotechnical survey of the pipeline route showed bare sand on the seabed at all locations within the KEF and along the whole of the pipeline route corridor. The closest sponge communities are located on Goodrich Bank (see **Section 2.4**); however, these were also sparsely distributed and found only in the shallow waters on top of the bank (Heyward et al., 2017).

## 11 State marine conservation reserves

Marine parks and reserves have been progressively established in Western Australia and the Northern Territory over time.

Marine parks are created to protect natural features and aesthetic values while allowing recreational and commercial uses that do not compromise conservation values. Scott Reef Nature Reserve, a WA state reserve, is located outside of but in close proximity to the extent of the modelled EMBA, and as such has been included in the risk assessment for unplanned events (**Figure 12-1**). This is protected by Western Australian state legislation; however, it does not include a marine reserve component and therefore has not been discussed further.

## 12 Australian and international marine parks

In agreement with the states and NT governments, the Australian Government has committed to establish Commonwealth marine parks as a component of the National Representative System of Marine Protected Areas (Director of National Parks, 2012). In November 2012, the Commonwealth Marine Reserves Network was proclaimed with the purpose of protecting the biological diversity and sustainable use of the marine environment (Director of National Parks, 2012). Commonwealth marine reserves were renamed as Australian marine parks in October 2017. Six marine regions are included in the Australian Marine Parks Network, including the Coral Sea, the South-west, the Temperate East, the South-east, the North and the North-west. The remaining networks' 10-year management plans were approved and came into effect on 1 July 2018.

The management plans establish the management and zoning of the designated marine parks. The marine park networks pertinent to the EMBA include:

- + The North-West Marine Parks Network
- + The North Marine Parks Network.

The North-West Marine Parks Network contains two marine parks that occur within the EMBA:

- + Ashmore Reef Marine Park
- + Cartier Island Marine Park.

The North Marine Parks Network contains two marine parks that occur within the EMBA:

- + Oceanic Shoals Marine Park
- + Arafura Marine Park.

The EMBA also overlaps two international marine parks, one from Indonesia and one from Timor-Leste:

- + Savu Sea (Laut Sawu) Marine National Park (MNP) (Indonesia)
- + Nino Konis Santana National Park (Timor-Leste)

See **Figure 12-1** for Australian marine parks within the EMBA.

Refer to the EP for distances from the permit area to all marine parks within the EMBA.

A summary of the North-West and North Marine Parks Networks and international marine parks is provided in the sections below.

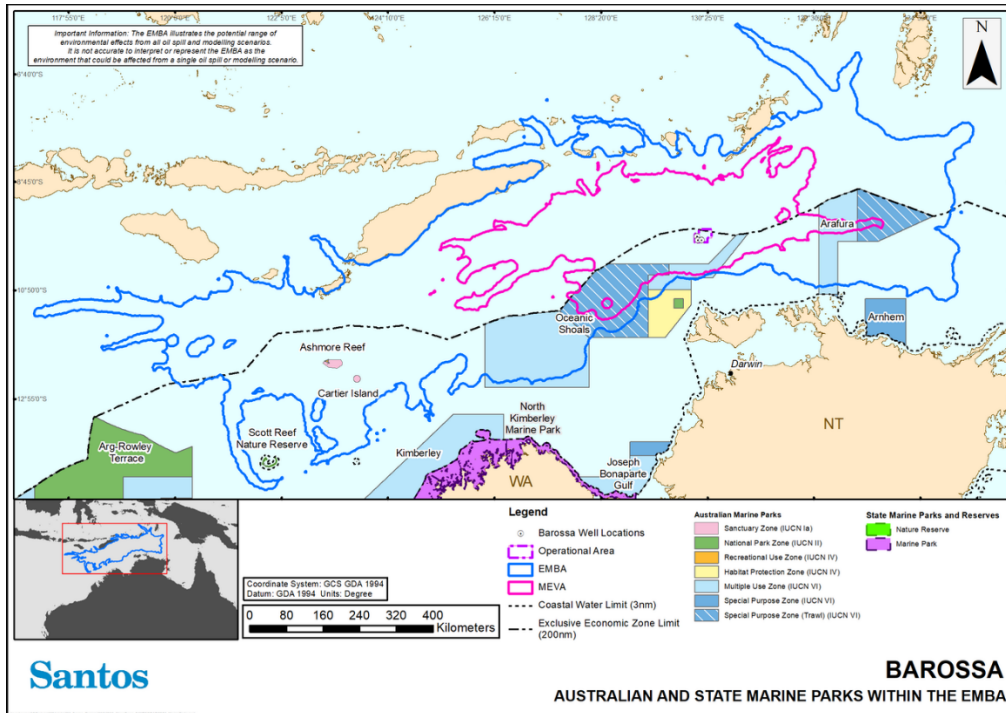


Figure 12-1: Marine Parks located within the EMBA

### 12.1 North-West Marine Parks Network

The North-West Marine Parks Network is aligned to the North-west Marine Region. The network covers 335,341 km<sup>2</sup> and includes 13 marine parks (Director of National Parks, 2018a). Its broad values include:

- + natural values
- + cultural values
- + heritage values
- + socio-economic values.

Further detail on each of the relevant marine parks within the EMBA is provided below.

#### 12.1.1 Ashmore Reef Marine Park

The Ashmore Reef Marine Park (Sanctuary Zone – IUCN Category Ia; Recreational Use Zone – IUCN Category II) is within the EMBA and covers an area of about 583 km<sup>2</sup> (Director of National Parks, 2018a). It forms part of the North-West Marine Park Network. As the only oceanic reef in the north-east Indian Ocean with vegetated islands (East, Middle and West Islands), Ashmore is also the largest of three emergent, oceanic reefs in the region (DSEWPaC, 2012). Both the Ashmore and Cartier islands fall under the legal memorandum of understanding between Indonesia and Australia, as both areas are located within Australia’s external territory (DSEWPaC, 2012).

Ashmore Reef Marine Park is located on Australia’s North West Shelf in the Indian Ocean, about 840 km west of Darwin and 610 km north of Broome. The reserve includes two extensive lagoons, shifting sand flats and cays, seagrass meadows, a large reef flat covering an area of 239 km<sup>2</sup>. Within the reserve are three small islands known as East, Middle and West Islands (Director of National Parks, 2018a).

Ashmore was designated a Ramsar wetland of international importance in 2003 (**Section 9.1**) due to the importance of its islands providing a resting place for migratory shorebirds and supporting large seabird breeding colonies.

The marine park protects the following conservation values (Director of National Parks, 2018a):

- + Ecosystems, habitats and communities associated with the North West Shelf, Timor Province and emergent oceanic reefs.
- + The island and reef habitats support:

- critical nesting and inter-nesting habitat for green turtles (including one of three genetically distinct breeding populations in the North-west Marine Region); low level nesting activity by loggerhead turtles has also been recorded.
- large and significant feeding populations of green, hawksbill and loggerhead turtles around the reefs (it is estimated that about 11,000 marine turtles feed in the area throughout the year).
- a small dugong population of less than 50 individuals that breed and feed around the reef: this population is thought to be genetically distinct from other Australian populations.
- A migratory pathway for pygmy blue whales (Director of National Parks, 2018a).
- some of the most important seabird rookeries on the North West Shelf including colonies of bridled terns, common noddies, brown boobies, eastern reef egrets, frigatebirds, tropicbirds, red-footed boobies, roseate terns, crested terns and lesser crested terns.
- an important staging point/feeding area for many migratory shorebirds.
- an internationally significant area for the abundance and diversity of sea snakes..
- + Two KEFs:
  - Ashmore Reef and Cartier Island and surrounding Commonwealth waters.
  - Continental slope demersal fish communities (Director of National Parks, 2018a).
- + Cultural and heritage sites, including;
  - Ashmore lagoon as a rest/staging area for traditional Indonesian fishers.
  - Indonesian artefacts.
  - grave sites.
  - Commonwealth heritage listing – Ashmore Reef..

Ashmore Reef and nearby islands and reefs are associated with benthic communities consisting predominantly of sand and coral rubble, with noteworthy hard coral, soft coral, algae and seagrasses (Heyward et al. 2010; Skewes et al., 1999a, 1999b). The reefs host similar benthic communities, with areas of relatively high live coral cover, although episodes of coral bleaching have been recorded (Heyward et al. 2010). Benthic organisms that depend on photosynthesis such as seagrasses, macroalgae and zooxanthellate corals are typically restricted to shallower waters around the reefs, although in the clear tropical waters may be found at considerable depths. Given the shallowest sampling location is greater than 60 m, and that most sampling locations are greater than 100 m deep, diverse benthic communities driven by primary producers such as seagrasses, algae and zooxanthellate corals are not expected to occur at the sampling locations. Data collected near Ashmore Reef indicates that corals are likely to spawn during March and April (Heyward et al. 2010).

Soft sediments are widespread in the region, with sediment infauna communities in the region dominated by polychaetes and crustaceans. These taxa accounted for over 80% of benthic infauna sampled, both in terms of numbers of species and individual organisms.

Commercial tourism, recreation and scientific research are important socio-economic values of the marine park (Director of National Parks, 2018a).

### 12.1.2 Cartier Island Marine Park

The Cartier Island Marine Park (Sanctuary Zone – IUCN Category Ia) is within the EMBA, located about 45 km south-east of Ashmore Reef Marine Park and 610 km north of Broome, Western Australia. Both the Ashmore Reef and Cartier Island marine parks are in Australia's external territory of Ashmore and Cartier Islands and are also within an area subject to a Memorandum of Understanding (MoU) between Indonesia and Australia, known as the MoU Box. The marine park covers an area of 172 km<sup>2</sup> and protects the following conservation values (Director of National Parks, 2018a):

- + Ashmore Reef and Cartier Island and surrounding Commonwealth waters
- + areas of enhanced productivity in an otherwise low-nutrient environment
- + regional importance for feeding and breeding aggregations of birds and marine life
- + continental slope demersal fish communities
- + area of high diversity in demersal fish assemblages
- + area of high diversity and abundance of hard and soft corals, gorgonians (sea fans), sponges and a range of encrusting organisms

- + breeding and foraging habitat for seabirds
- + inter-nesting, nesting and foraging habitat for marine turtles
- + foraging habitat for whale sharks
- + internationally significant for its abundance and diversity of sea snakes
- + one known shipwreck listed under the *Underwater Cultural Heritage Act 2018*: the Ann Millicent (wrecked in 1888) (**Section 14.6**).

Scientific research is an important activity in the marine park (Director of National Parks, 2018a).

## 12.2 North Marine Park Network

The North Park Network is aligned to the North Marine Region. The network covers 157,480 km<sup>2</sup> (Director of National Parks, 2018b). Broad values of this network include:

- + natural values
- + cultural values
- + heritage values
- + socio-economic values.

Further detail on the applicable Oceanic Shoals Marine Park and Arafura Marine Park is provided below.

### 12.2.1 Oceanic Shoals Marine Park

The Oceanic Shoals Marine Park is classified Multiple Use Zone – IUCN Category VI – 32,488 km<sup>2</sup>; Special Purpose Zone – IUCN VI – 24,443 km<sup>2</sup>.

The marine park protects the following conservation values (Director of National Parks, 2018b):

- + important resting area for turtles between egg laying (inter-nesting area) for the threatened flatback turtle and Olive ridley turtle
- + important foraging area for the threatened loggerhead turtle and Olive ridley turtle
- + examples of the ecosystems of two provincial bioregions: the Northwest Shelf Transition Province (which includes the Bonaparte, Oceanic Shoals and Tiwi meso-scale bioregions) and the Timor Transition Province.

KEFs represented in the park are:

- + Carbonate bank and terrace system of the Van Diemen Rise (unique sea-floor feature)
- + Carbonate bank and terrace system of the Sahul Shelf (unique sea-floor feature)
- + Pinnacles of the Bonaparte Basin (enhanced productivity, unique sea-floor feature)
- + Shelf break and slope of the Arafura Shelf (unique sea-floor feature) (Director of National Parks, 2018b).

No heritage listings apply to the marine park. Commercial fishing and mining are important socio-economic values for the park (Director of National Parks, 2018b).

#### **Benthic habitat model of the Oceanic Shoals Marine Park**

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 wider region. 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; for example, Kelly & Prezlawski (2012).

AIMS also compared the proportion and diversity of habitats along the proposed pipeline route corridor and against the habitats in the Oceanic Shoals Marine Park (Radford et al., 2019). Statistical analysis revealed no significant difference between the proportion of habitats along the pipeline route corridor 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 habitat protection zone, is well represented elsewhere in the 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 linkage 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).

Figure 12-2 shows the habitat types found in the Oceanic Shoals Marine Park and the pipeline route corridor based on the benthic habitat modelling (Radford et al., 2019).

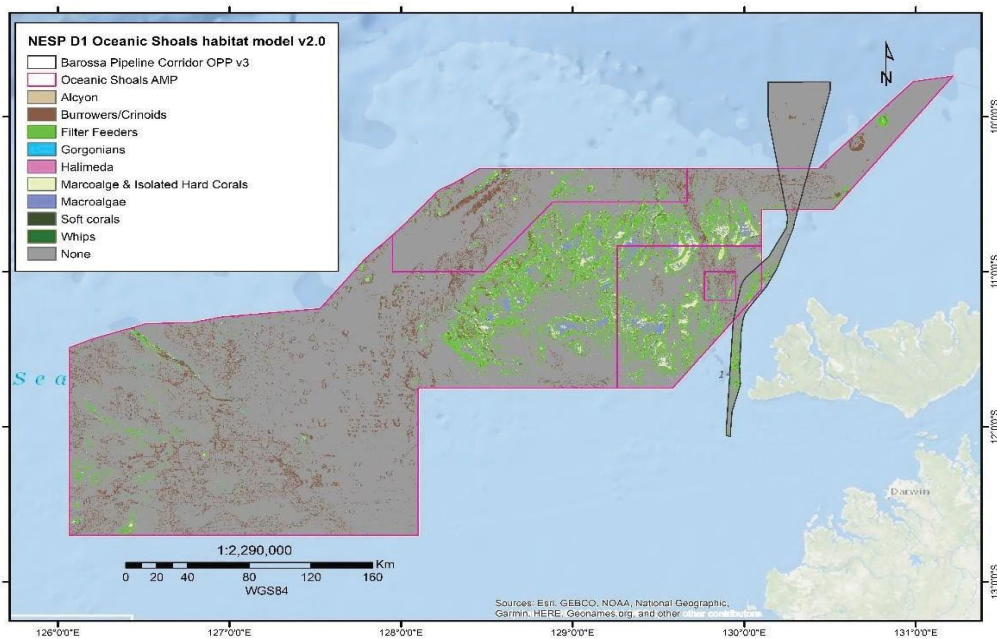


Figure 12-2: Map showing the habitat types found in the Oceanic Shoals Marine Park and the Barossa pipeline route corridor (revised from Radford et al., 2019).

### 12.2.2 Arafura Marine Park

The Arafura marine park covers 22,924 km<sup>2</sup> and is comprised of a Multiple Use Zone and Special Purpose Zone (Trawl). The marine park is almost wholly contained within the EMBA. It is located about 256 km from Darwin and extends to the outer edge of the Exclusive Economic Zone (EEZ) and the water depth ranges from 15 m to 500 m (Director of National Parks, 2018b).

The Arafura Marine Park has been deemed significant because ‘it contains habitats, species and ecological communities associated with the Northern Shelf Province and Timor Transition. It includes one key ecological feature: the tributary canyons of the Arafura Depression (valued as a unique seafloor feature with ecological properties of regional significance). It is near to important wetland systems including the Cobourg Peninsula Ramsar site, and provides important foraging habitat for seabirds’ (Director of National Parks, 2018b).

The Arafura Marine Park has both cultural and natural values. The natural values it protects include:

- + ecosystems representative of the Northern Shelf Province
- + ecosystems representative of the Timor Transition
- + BIAs for marine turtles



- + BIAs for seabirds
- + Tributary canyons of the Arafura Depression KEF (Director of National Parks, 2018b).

The sea country of the marine park is part of the responsibility of the Yuwurrumu members of the Mandilarrilduji, the Mangalara, the Murran, the Gadura-Minaga and the Ngaynjaharr clans. Sea country is valued for Indigenous cultural identity and Indigenous people have been sustainably using and managing their sea country, including that within the Arafura Marine Park, for tens of thousands of years (Director of National Parks, 2018b).

## 12.3 International Marine Parks

### 12.3.1 The Savu Sea (Laut Sawu) MNP

In addition to Australian, State/Territory Marine Parks, the EMBA overlaps the Savu Sea Marine National Park. The Savu Sea (Laut Sawu) Marine National Park (MNP) is located within the Lesser Sunda Ecoregion located to the south of the Coral Triangle and covers approximately 35,000 km<sup>2</sup> (MCI 2023; Protected Planet 2023a). It was established in 2009 and has an IUCN Category II status (UNEP-WCMC 2023a). The MNP is split into three management areas; the Pantar Strait Marine Protected Area, the Sumba Strait Marine Area and the Tiroso-Batek Marine Area.

The Savu Sea MNP acts as a marine corridor and migratory pathway for marine fauna and is also an important upwelling zone in the Indo-Pacific region due to the presence of deep ocean trenches (Perdanahardja & Lionata 2017). The MNP area is a known migration route for several cetacean species, including the blue whale and sperm whale (Huffard et al. 2012). Other cetacean species such as pygmy killer whales, melon-head whales, shortfinned pilot whales and numerous dolphin species (including Risso's dolphin, Fraser's dolphin, common dolphin, bottlenose dolphin and spinner dolphin) are known to frequent the MNP area (Coral Triangle Atlas 2023). Several species of marine turtle, including the green turtle, hawksbill turtle and leatherback turtle have also been recorded in the MNP area (Huffard et al. 2012).

The Savu Sea MNP provides productive marine habitats that support large populations of fish and artisanal and commercial fisheries. It is estimated that 65% of the East Nusa Tenggara regional fisheries production comes from the Savu Sea (Perdanahardja & Lionata 2017).

### 12.3.2 The Nino Konis Santana National Park

The EMBA also overlaps another international marine park, the Nino Konis Santana National Park. The Nino Konis Santana National Park is also located within the Lesser Sunda Ecoregion, northeast side of the Timor-Leste. Established in 2007, Nino Konis was the first national park created in the country and includes the entire eastern tip of Timor-Leste and the waters offshore (UNEP-WCMC, 2023b). It covers 1,236 km<sup>2</sup> of area and overlaps 556 km<sup>2</sup> of the Coral Triangle, which confers the park the perfect habitat for spawn tuna and marine nursery, and immigration corridor for species like the southern bluefin, bigeye, yellowfin, skipjack and albacore tuna (dos Reis Martins, 2020)

The park links important bird areas such as Lore, Mount Paitchau, Lake Ira Lalaro, and Jaco Island. The park is also habitat for rare birds like the critically endangered yellow-crested cockatoo, the endemic Timor green-pigeon, the endangered Timor imperial-pigeon, and the vulnerable Timor sparrow.

## 13 Conservation management plans

To protect, maintain and enhance recovery of certain threatened species and ecological communities, DCCEEW may prepare conservation management plans in the form of conservation advice or recovery plans.

### 13.1 Conservation advice

When a native species or ecological community is listed as threatened under the EPBC Act, conservation advice is developed to assist its recovery. Conservation advice provides guidance on immediate recovery and threat abatement activities that can be undertaken to ensure the conservation of a newly listed species or ecological community.

### 13.2 Recovery plans

The Australian Government Minister for the Environment may make or adopt and implement recovery plans for threatened fauna, threatened flora (other than conservation dependent species) and threatened ecological communities listed under the Commonwealth EPBC Act. Recovery plans set out the research and management actions necessary to stop the decline of, and support the recovery of, listed threatened species or threatened ecological communities. The aim of a recovery plan is to maximise the long-term survival in the wild of a threatened species or ecological community.

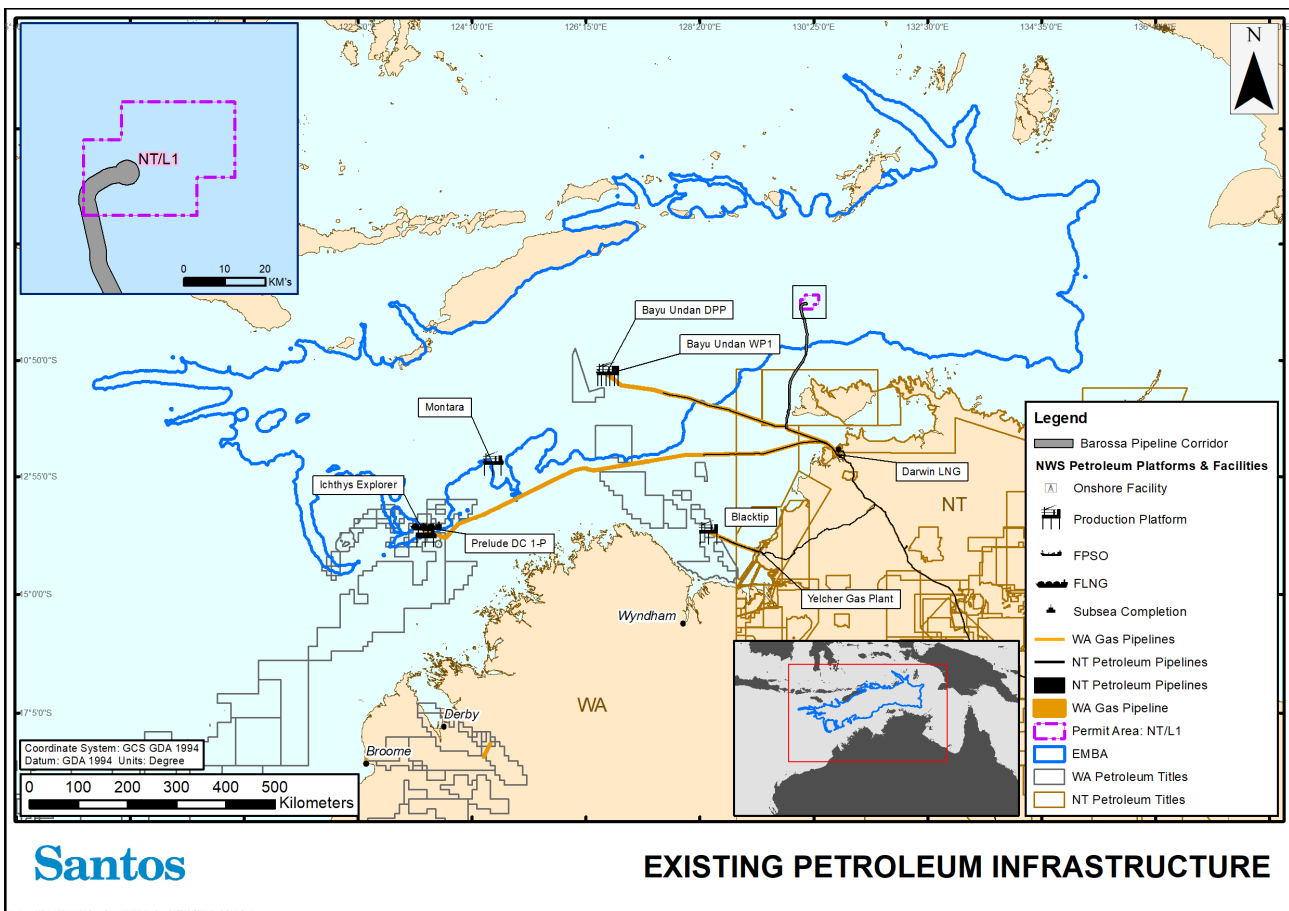
The EPs summarise the actions relevant to the Barossa petroleum activities with more information on the specific requirements of the relevant plans of management (including conservation advice, recovery plans and management plans for marine fauna) that would be applicable and demonstrates where current management requirements have been considered.

## 14 Social, economic features

### 14.1 Industry

A number of oil and gas companies hold petroleum permits in and around the EMBA. The closest operational production facility and associated in-field subsea infrastructure to the permit area is the Santos operated Bayu-Undan facility. Other subsea infrastructure includes the Bayu-Undan to Darwin gas pipeline and the Ichthys gas pipeline to the southwest of the EMBA (**Figure 14-1**).

Petroleum retention lease area and exploration permit leases, or greenhouse gas emissions assessment permits within the EMBA (not including Santos' interests) are currently held by various oil and gas operators (and subsidiaries), including Bengal Energy Ltd, Carnarvon Energy Ltd, Woodside Energy Ltd, Shell Development (Australia) Pty Ltd, Eni Australia Limited, FINDER No. 1 Pty Ltd, Jadestone Pty Ltd, Melbana Energy Pty Ltd, PTTEP Australia, Vulcan Exploration Pty Ltd and Timor Sea Oil & Gas Australia Pty Ltd.



**Figure 14-1: Existing petroleum infrastructure, permits and licences within the EMBA**

### 14.2 Shipping

The closest major commercial port to the EMBA is Darwin Port (outside the EMBA). The Darwin Port Corporation serves a number of shipping and cargo markets, including cruise and naval vessels, livestock exports, dry bulk ore, offshore oil and gas rig services, and container and general cargo.

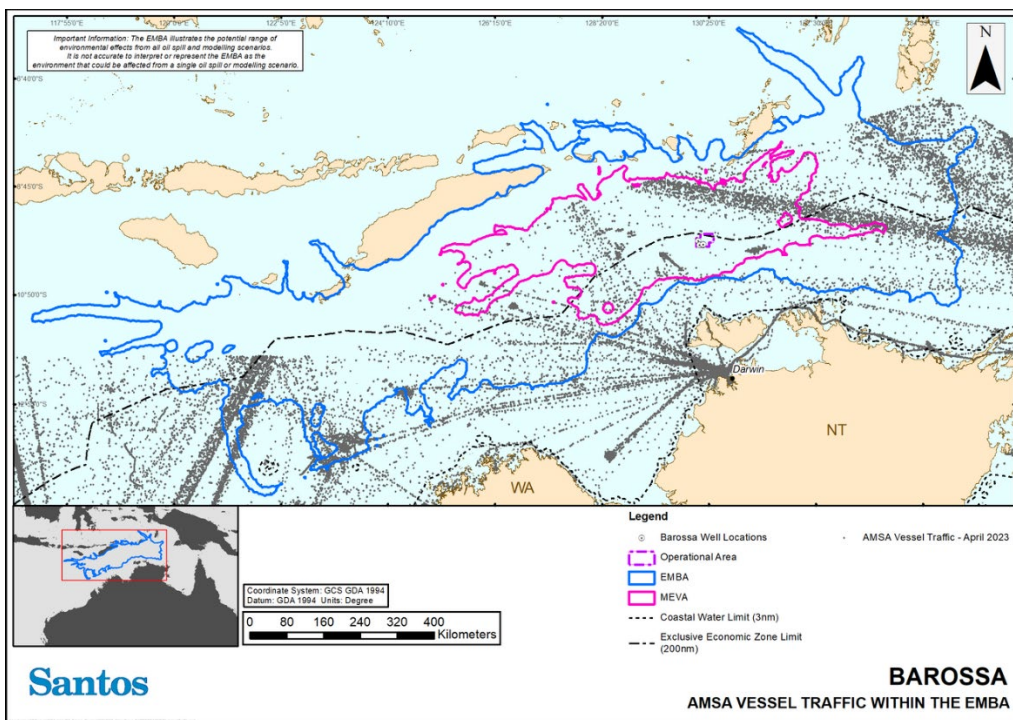
While the Darwin Port remains the primary active port in the region, there is small-scale port activity to the south and east of the project area, at the Tiwi Islands. Port Melville (outside the EMBA) is located on Melville Island and is situated on the Apsley Strait, immediately south of Barlow Point and the community of Pirlangimpi. Port Melville provides for the export of woodchips for Tiwi Plantations Corporation, and the shipment of equipment and supplied for other projects. The facility is capable of 24-hour operation, although most operates are undertaken during daylight hours. Most vessels enter and exit the Apsley Strait from its northern entrance.

This is except for barges travelling between Darwin and Port Melville, which enter and exit the Apsley Strait from its southern entrance.

The Australian Maritime Safety Authority (AMSA) has established a network of shipping fairways off the north-west coast of Australia to manage traffic patterns (AMSA 2013). The Shipping Fairways are designed to keep shipping traffic away from offshore infrastructure and aims to reduce the risk of collision (AMSA, 2013).

Use of the fairways is strongly recommended but not mandatory. The International Regulations for *Preventing Collisions at Sea 1972* apply to all vessels navigating within or outside the shipping fairways. The use of these fairways does not give vessels any special right of way (AMSA 2012).

Under the *Navigation Act 2012* (Cth), certain vessels operating in Australian waters are required to report their location on a daily basis to the Rescue Coordination Centre (RCC) in Canberra. This Australian Ship Reporting System (AUSREP) is an integral part of the Australian Maritime Search and Rescue system and is operated by AMSA through the RCC. Vessels recorded in waters within the EMBA through the AUSREP system in 2021 are shown in **Figure 14-2**.



### 14.3 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 14-3**). The NAXA comprises practice and training areas and extends about 300 km north and west from just east of Darwin into the Arafura Sea. The area is used for offshore naval exercise and onshore weapon-firing training.

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

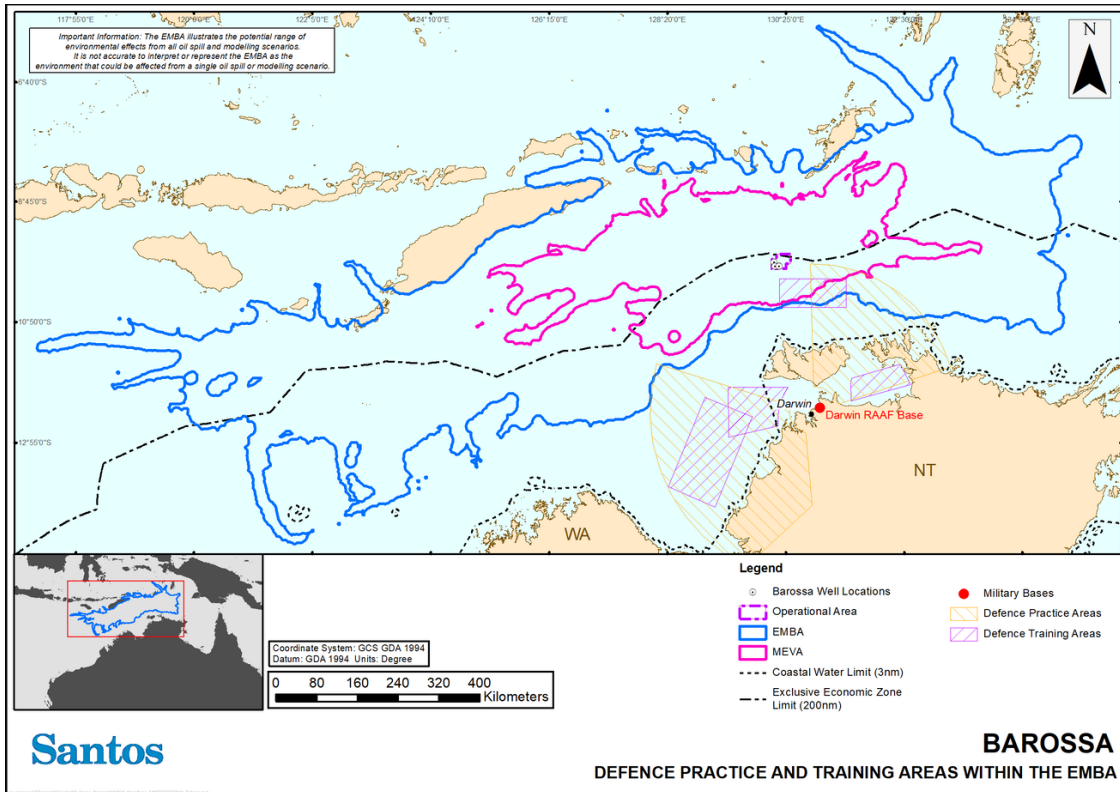


Figure 14-3: Defence activities in the EMBA

### 14.4 Tourism

Most of the EMBA is located in remote offshore waters that are not likely to be accessed for tourism activities (recreational fishing and boating and charter boats operations) which tend to be centered on nearshore waters, islands and coastal areas. A number of fishing charters operate in the coastal waters along the NT coastline (within 3 nm) and near Melville and Bathurst Islands (outside the EMBA). These waters (outside the EMBA) are also used by recreational fishers. Consultation undertaken by ConocoPhillips for the Barossa area development OPP (ConocoPhillips, 2019) identified one fishing charter operator who conducts several tours in open offshore waters near Evans Shoal and Goodrich Bank (inside the EMBA) during the main fishing season (September to December).

A specimen shell collection enterprise occurs around Ashmore Reef and Cartier Island. Fishing and diving charter companies offer tours to fishing spots off the WA coast, including Seringapatam Reef, and dive spots which include Ashmore Reef, Cartier Island, Hibernia Reef and Seringapatam Reef. These offshore areas are encompassed in the EMBA.

In summary, there are limited recreational activities observed or expected to occur in the deep-water offshore environment of the permit area. Nonetheless, some occasional activity may be encountered within the regional marine environment, including within the EMBA.

### 14.5 Cultural heritage

In addition to the heritage places that are listed and described as protected places in **Section 9**, Santos have identified Indigenous heritage and maritime heritage receptors within the EMBA. These receptors provide insight to the cultural heritage value of the EMBA.

#### 14.5.1 Indigenous heritage

Aboriginal and Torres Strait Islander peoples have a strong ongoing association with the area that extends from the beginning of human settlement in Australia some 50,000 years ago. The close, long-standing relationship between Aboriginal and Torres Strait Islander peoples and the coastal and marine environments of the area is evident in indigenous culture today. The Aboriginal and Torres Strait Islander peoples of the

northwest continue to rely on coastal and marine environments and resources for their cultural identity, health and wellbeing, as well as their domestic and commercial economies (DEWHA, 2008a). The Tiwi Islands have a long history of occupancy by Aboriginal and Torres Strait Islander peoples and the marine areas, particularly the Arafura Marine Park, are significant sea country for Aboriginal and Torres Strait Islander peoples.

Marine resource use by Aboriginal and Torres Strait Islander peoples is generally restricted to coastal waters. Fishing, hunting and the maintenance of maritime cultures and heritage through ritual, stories and traditional knowledge continue as important uses of the nearshore region and adjacent areas. However, while direct use by Aboriginal and Torres Strait Islander peoples deeper offshore waters is limited, many groups continue to have a direct cultural interest in decisions affecting the management of these waters. The cultural connections Aboriginal and Torres Strait Islander peoples maintain with the sea may be affected, for example, by offshore fisheries and industries. In addition, some Indigenous people are involved in commercial activities such as fishing and marine tourism, so have an interest in how these industries are managed in offshore waters with respect to their cultural heritage and commercial interests (DEWHA, 2008a).

#### 14.5.2 Maritime heritage

One known shipwreck listed under the *Underwater Cultural Heritage Act 2018* is located at the Cartier Island marine park: the *Ann Millicent* (wrecked in 1888).

### 14.6 Commercial fisheries

#### 14.6.1 State fisheries

State fisheries are managed by the Department of Primary Industries and Regional Development (DPIRD) in WA, and by the NT Fisheries Division Department of Industry, Tourism and Trade. State fisheries that intercept the EMBA are shown in **Figure 14-4**.

WA managed fisheries that intercept the EMBA:

- + Mackerel Managed Fishery
- + Northern Demersal Scalefish Managed Fishery. NT managed fisheries that intercept the EMBA:
- + Aquarium Fishery
- + Coastal Line Fishery
- + Demersal Fishery
- + Offshore Net and Line Fishery
- + Spanish Mackerel Fishery
- + Timor Reef Fishery.

No aquaculture occurs in the EMBA within Australian waters. Aquarium fish collection occurs on Evans Shoals (which is in the EMBA) twice a year.

#### 14.6.2 Commonwealth fisheries

Information on Commonwealth managed fisheries has been derived from the *Fishery status report 2022* (Department of Agriculture, Fisheries and Forestry 2022). Commonwealth fisheries who have permits to operate in the EMBA, as shown in **Figure 14-5**, include:

- + North West Slope Trawl (NWST)
- + Northern Prawn Fishery (NPF)
- + Southern Bluefin Tuna Fishery (SBFTF)
- + Western Tuna and Billfish Fishery (WTBF) (including Southern Tuna and Billfish Fishery)
- + Western Skipjack Tuna Fishery (STF).

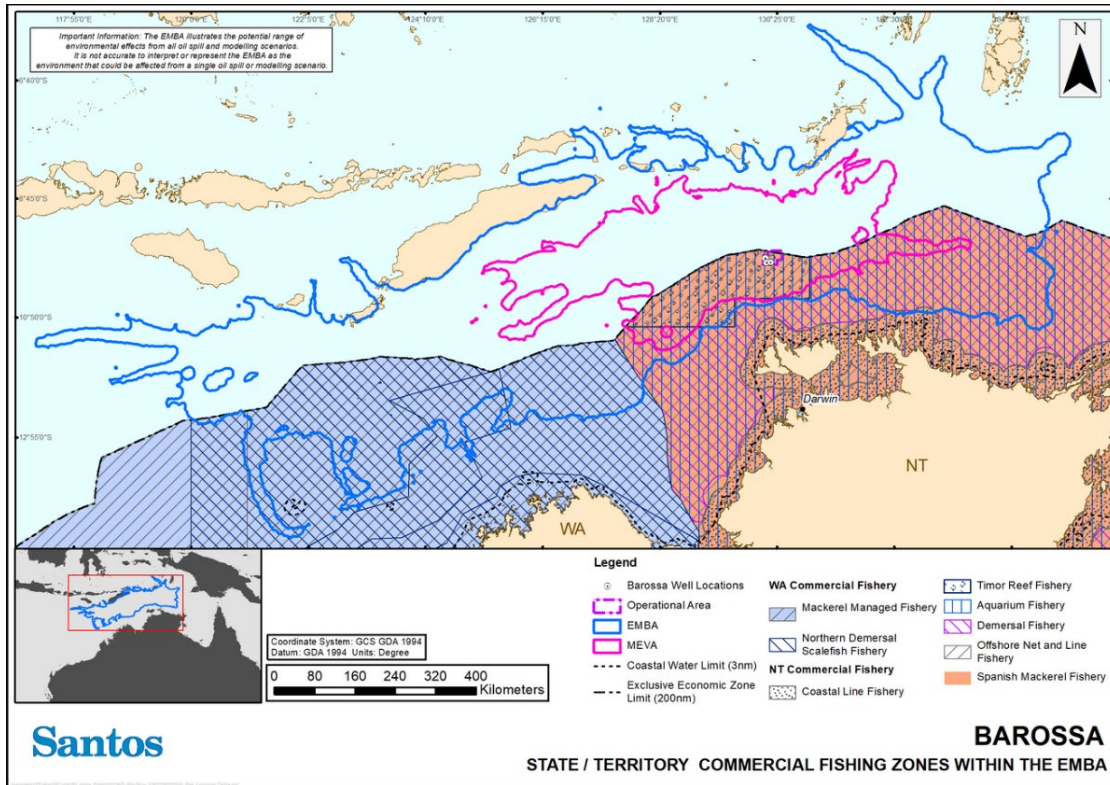


Figure 14-4: State commercial fisheries

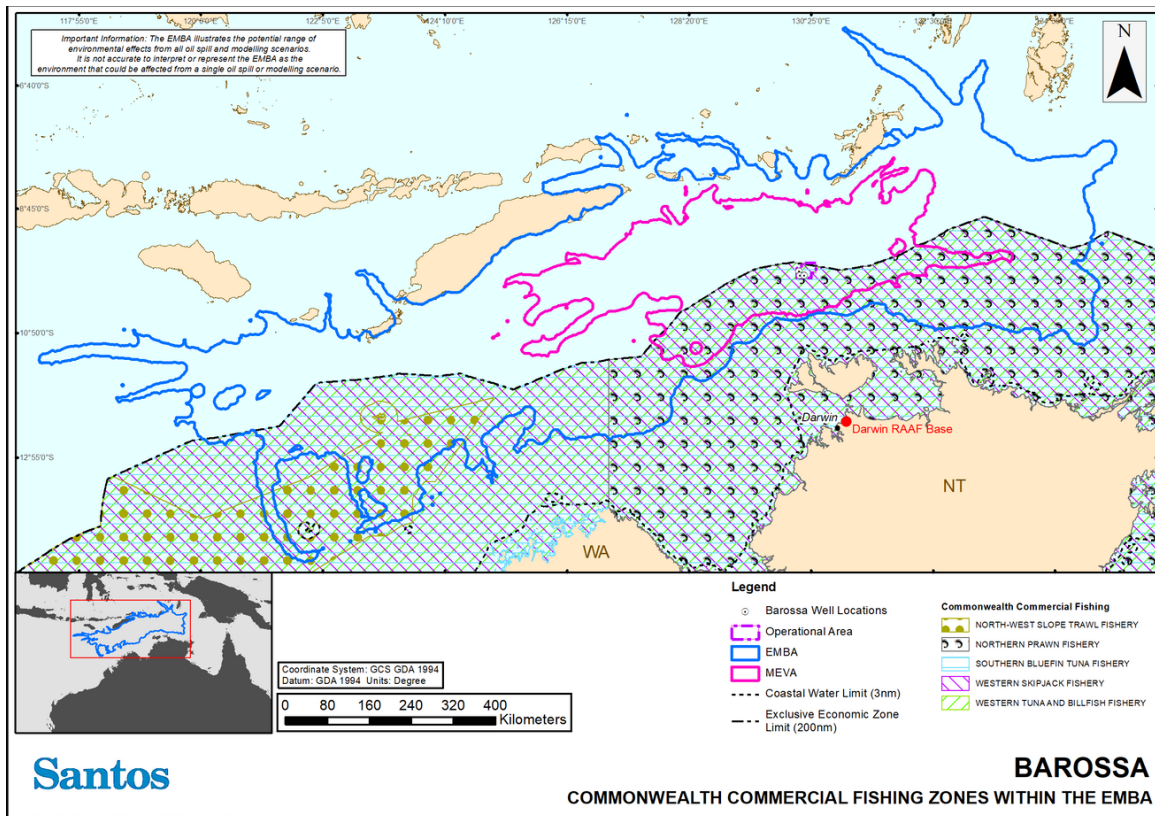


Figure 14-5: Commonwealth commercial fisheries

## 14.7 Traditional Indigenous fishing

### 14.7.1 Indonesian traditional fishing

During negotiations between the governments of Australia and Indonesia regarding the delineation of seabed boundaries, the two governments entered into a Memorandum of Understanding (MoU) recognising the rights of traditional Indonesian fisherman to access shared water to the north of Australia. Access to traditional fisherman was granted in recognition of the long historical tradition of Indonesian fishing in the area. The MoU allows Australia to manage access to its waters while allowing traditional Indonesian fisherman to continue customary fishing practices including the targeting of species such as trepang, trochus, abalone and sponges. Guidelines clarifying access boundaries for traditional fishers were agreed in 1989. The traditional Indonesian fishing area, the MOU Box, is located within the Australian Fishing Zone and the continental shelf adjacent to Ashmore Reef, Cartier Island, Scott Reef, Seringapatam Reef and Browse Island, approximately 720 km south-west of the permit area within the EMBA.

Between 2006 and 2008, a series of surveys were undertaken to understand the traditional practice of Indonesian fishers that journey to Scott Reef within the MoU Box. The majority of perahu (vessels) that travel to Scott Reef originate from the islands of Rote (near West Timor) and Tonduk and Raas (in East Java). Some crew from the Rote perahus are recruited from the region of Alor (one of the Lesser Sundas chain, located north of East Timor and east of Bali). In 2007, an estimated 800 fishers (about 80 vessels) travelled from these home islands to Scott Reef, mainly to collect trepang. Similar vessel numbers sailed to Scott Reef in 2008.

Journeys to Scott Reef are generally restricted to drier months when wind speeds and directions are more desirable. Most Indonesian fishers travel to Scott Reef during July to October, although a few Rotenese make the journey to Scott Reef in the early season between April and June. Other fishers plan to go after Idul Fitri, a religious holiday widely celebrated on Tonduk Island that celebrates the end of Ramadan.

The fishers focus their activities in and around the shallow water lagoons of Scott Reef primarily targeting trepang; and opportunistically gather trochus shells. They also catch fish largely for subsistence purposes although the average fish catch per lete-lete (traditional Indonesian fishing vessel) in 2008 increased to commercial volumes. Although deeper waters are more plentiful in trepang, deep diving is generally not undertaken by the fishers due to the MoU stipulation on the exclusive use of traditional equipment only (Woodside Energy Limited, 2012).

## 14.8 Recreational fishing

There are limited recreational activities observed or expected to occur in the EMBA due to the deep waters.



## 15 Document review

In the event that a revision to the accepted Drilling and Completions EP is required, this document will be reviewed. The review and revision will consider any changes to the values and sensitivities associated with the Barossa development as well as any changes to EPBC Act Matters of National Environmental Significance (MNES) from one review year to the next. A review of changes to MNES shall consider at a minimum any changes to EPBC Act species lists, species management/recovery plans and MNES spatial layers.

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## APPENDIX D – EPBC ACT PROTECTED MATTERS SEARCHES

**Appendix D1 – Operational Area PMST Report**

**Appendix D2 – EMBA PMST Report**

**Appendix D3 – MEVA PMST Report**



Australian Government

Department of Climate Change, Energy,  
the Environment and Water

# EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected. Please see the caveat for interpretation of information provided here.

Report created: 01-Jun-2023

[Summary](#)

[Details](#)

[Matters of NES](#)

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

[Extra Information](#)

[Caveat](#)

[Acknowledgements](#)

# Summary

## Matters of National Environment Significance

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

<a href="#">World Heritage Properties:</a>	None
<a href="#">National Heritage Places:</a>	None
<a href="#">Wetlands of International Importance (Ramsar)</a>	None
<a href="#">Great Barrier Reef Marine Park:</a>	None
<a href="#">Commonwealth Marine Area:</a>	2
<a href="#">Listed Threatened Ecological Communities:</a>	None
<a href="#">Listed Threatened Species:</a>	19
<a href="#">Listed Migratory Species:</a>	33

## Other Matters Protected by the EPBC Act

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

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

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

<a href="#">Commonwealth Lands:</a>	None
<a href="#">Commonwealth Heritage Places:</a>	None
<a href="#">Listed Marine Species:</a>	59
<a href="#">Whales and Other Cetaceans:</a>	22
<a href="#">Critical Habitats:</a>	None
<a href="#">Commonwealth Reserves Terrestrial:</a>	None
<a href="#">Australian Marine Parks:</a>	None
<a href="#">Habitat Critical to the Survival of Marine Turtles:</a>	None

## Extra Information

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

<a href="#">State and Territory Reserves:</a>	None
<a href="#">Regional Forest Agreements:</a>	None
<a href="#">Nationally Important Wetlands:</a>	None
<a href="#">EPBC Act Referrals:</a>	8
<a href="#">Key Ecological Features (Marine):</a>	1
<a href="#">Biologically Important Areas:</a>	None
<a href="#">Bioregional Assessments:</a>	None
<a href="#">Geological and Bioregional Assessments:</a>	None

# Details

## Matters of National Environmental Significance

### Commonwealth Marine Area

[\[ Resource Information \]](#)

Approval is required for a proposed activity that is located within the Commonwealth Marine Area which has, will have, or is likely to have a significant impact on the environment. Approval may be required for a proposed action taken outside a Commonwealth Marine Area but which has, may have or is likely to have a significant impact on the environment in the Commonwealth Marine Area.

#### Feature Name

EEZ and Territorial Sea

Extended Continental Shelf

### Listed Threatened Species

[\[ Resource Information \]](#)

Status of Conservation Dependent and Extinct are not MNES under the EPBC Act.

Number is the current name ID.

#### Scientific Name

#### Threatened Category

#### Presence Text

#### BIRD

##### [Calidris canutus](#)

Red Knot, Knot [855]

Endangered

Species or species habitat may occur within area

##### [Calidris ferruginea](#)

Curlew Sandpiper [856]

Critically Endangered

Species or species habitat may occur within area

##### [Numenius madagascariensis](#)

Eastern Curlew, Far Eastern Curlew [847]

Critically Endangered

Species or species habitat may occur within area

#### MAMMAL

##### [Balaenoptera borealis](#)

Sei Whale [34]

Vulnerable

Species or species habitat likely to occur within area

##### [Balaenoptera musculus](#)

Blue Whale [36]

Endangered

Species or species habitat likely to occur within area

##### [Balaenoptera physalus](#)

Fin Whale [37]

Vulnerable

Species or species habitat likely to occur within area

Scientific Name	Threatened Category	Presence Text
<b>REPTILE</b>		
<a href="#">Caretta caretta</a> Loggerhead Turtle [1763]	Endangered	Species or species habitat likely to occur within area
<a href="#">Chelonia mydas</a> Green Turtle [1765]	Vulnerable	Species or species habitat known to occur within area
<a href="#">Dermochelys coriacea</a> Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat likely to occur within area
<a href="#">Eretmochelys imbricata</a> Hawksbill Turtle [1766]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Lepidochelys olivacea</a> Olive Ridley Turtle, Pacific Ridley Turtle [1767]	Endangered	Species or species habitat likely to occur within area
<a href="#">Natator depressus</a> Flatback Turtle [59257]	Vulnerable	Species or species habitat known to occur within area
<b>SHARK</b>		
<a href="#">Carcharodon carcharias</a> White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat may occur within area
<a href="#">Glyphis garricki</a> Northern River Shark, New Guinea River Shark [82454]	Endangered	Species or species habitat may occur within area
<a href="#">Glyphis glyphis</a> Speartooth Shark [82453]	Critically Endangered	Species or species habitat may occur within area
<a href="#">Pristis pristis</a> Freshwater Sawfish, Largetooth Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish [60756]	Vulnerable	Species or species habitat may occur within area
<a href="#">Pristis zijsron</a> Green Sawfish, Dindagubba, Narrowsnout Sawfish [68442]	Vulnerable	Species or species habitat known to occur within area

Scientific Name	Threatened Category	Presence Text
<a href="#">Rhincodon typus</a> Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area
<a href="#">Sphyrna lewini</a> Scalloped Hammerhead [85267]	Conservation Dependent	Species or species habitat may occur within area

### Listed Migratory Species [ [Resource Information](#) ]

Scientific Name	Threatened Category	Presence Text
<b>Migratory Marine Birds</b>		
<a href="#">Anous stolidus</a> Common Noddy [825]		Species or species habitat may occur within area
<a href="#">Calonectris leucomelas</a> Streaked Shearwater [1077]		Species or species habitat likely to occur within area
<a href="#">Fregata ariel</a> Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat may occur within area
<a href="#">Fregata minor</a> Great Frigatebird, Greater Frigatebird [1013]		Species or species habitat may occur within area
<a href="#">Phaethon lepturus</a> White-tailed Tropicbird [1014]		Species or species habitat may occur within area

### Migratory Marine Species

<a href="#">Anoxypristis cuspidata</a> Narrow Sawfish, Knifetooth Sawfish [68448]		Species or species habitat may occur within area
<a href="#">Balaenoptera borealis</a> Sei Whale [34]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Balaenoptera edeni</a> Bryde's Whale [35]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
<a href="#">Balaenoptera musculus</a> Blue Whale [36]	Endangered	Species or species habitat likely to occur within area
<a href="#">Balaenoptera physalus</a> Fin Whale [37]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Carcharhinus longimanus</a> Oceanic Whitetip Shark [84108]		Species or species habitat may occur within area
<a href="#">Carcharodon carcharias</a> White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat may occur within area
<a href="#">Caretta caretta</a> Loggerhead Turtle [1763]	Endangered	Species or species habitat likely to occur within area
<a href="#">Chelonia mydas</a> Green Turtle [1765]	Vulnerable	Species or species habitat known to occur within area
<a href="#">Dermochelys coriacea</a> Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat likely to occur within area
<a href="#">Eretmochelys imbricata</a> Hawksbill Turtle [1766]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Isurus paucus</a> Longfin Mako [82947]		Species or species habitat likely to occur within area
<a href="#">Lepidochelys olivacea</a> Olive Ridley Turtle, Pacific Ridley Turtle [1767]	Endangered	Species or species habitat likely to occur within area
<a href="#">Megaptera novaeangliae</a> Humpback Whale [38]		Species or species habitat may occur within area



Scientific Name	Threatened Category	Presence Text
<a href="#">Mobula birostris</a> as <a href="#">Manta birostris</a> Giant Manta Ray [90034]		Species or species habitat may occur within area
<a href="#">Natator depressus</a> Flatback Turtle [59257]	Vulnerable	Species or species habitat known to occur within area
<a href="#">Orcinus orca</a> Killer Whale, Orca [46]		Species or species habitat may occur within area
<a href="#">Physeter macrocephalus</a> Sperm Whale [59]		Species or species habitat may occur within area
<a href="#">Pristis pristis</a> Freshwater Sawfish, Largetooth Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish [60756]	Vulnerable	Species or species habitat may occur within area
<a href="#">Pristis zijsron</a> Green Sawfish, Dindagubba, Narrowsnout Sawfish [68442]	Vulnerable	Species or species habitat known to occur within area
<a href="#">Rhincodon typus</a> Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area
<a href="#">Tursiops aduncus (Arafura/Timor Sea populations)</a> Spotted Bottlenose Dolphin (Arafura/Timor Sea populations) [78900]		Species or species habitat may occur within area
<b>Migratory Wetlands Species</b>		
<a href="#">Actitis hypoleucos</a> Common Sandpiper [59309]		Species or species habitat may occur within area
<a href="#">Calidris acuminata</a> Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
<a href="#">Calidris canutus</a> Red Knot, Knot [855]	Endangered	Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
<a href="#">Calidris ferruginea</a> Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
<a href="#">Calidris melanotos</a> Pectoral Sandpiper [858]		Species or species habitat may occur within area
<a href="#">Numenius madagascariensis</a> Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area

## Other Matters Protected by the EPBC Act

Listed Marine Species		[ <a href="#">Resource Information</a> ]
Scientific Name	Threatened Category	Presence Text
Bird		
<a href="#">Actitis hypoleucos</a> Common Sandpiper [59309]		Species or species habitat may occur within area
<a href="#">Anous stolidus</a> Common Noddy [825]		Species or species habitat may occur within area
<a href="#">Calidris acuminata</a> Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
<a href="#">Calidris canutus</a> Red Knot, Knot [855]	Endangered	Species or species habitat may occur within area overfly marine area
<a href="#">Calidris ferruginea</a> Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area overfly marine area
<a href="#">Calidris melanotos</a> Pectoral Sandpiper [858]		Species or species habitat may occur within area overfly marine area

Scientific Name	Threatened Category	Presence Text
<a href="#">Calonectris leucomelas</a> Streaked Shearwater [1077]		Species or species habitat likely to occur within area
<a href="#">Fregata ariel</a> Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat may occur within area
<a href="#">Fregata minor</a> Great Frigatebird, Greater Frigatebird [1013]		Species or species habitat may occur within area
<a href="#">Numenius madagascariensis</a> Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
<a href="#">Phaethon lepturus</a> White-tailed Tropicbird [1014]		Species or species habitat may occur within area
<b>Fish</b>		
<a href="#">Bhanotia fasciolata</a> Corrugated Pipefish, Barbed Pipefish [66188]		Species or species habitat may occur within area
<a href="#">Campichthys tricarinatus</a> Three-keel Pipefish [66192]		Species or species habitat may occur within area
<a href="#">Choeroichthys brachysoma</a> Pacific Short-bodied Pipefish, Short-bodied Pipefish [66194]		Species or species habitat may occur within area
<a href="#">Choeroichthys suillus</a> Pig-snouted Pipefish [66198]		Species or species habitat may occur within area
<a href="#">Corythoichthys amplexus</a> Fijian Banded Pipefish, Brown-banded Pipefish [66199]		Species or species habitat may occur within area
<a href="#">Corythoichthys flavofasciatus</a> Reticulate Pipefish, Yellow-banded Pipefish, Network Pipefish [66200]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
<a href="#">Corythoichthys intestinalis</a> Australian Messmate Pipefish, Banded Pipefish [66202]		Species or species habitat may occur within area
<a href="#">Corythoichthys schultzi</a> Schultz's Pipefish [66205]		Species or species habitat may occur within area
<a href="#">Cosmocampus banneri</a> Roughridge Pipefish [66206]		Species or species habitat may occur within area
<a href="#">Doryrhamphus dactyliophorus</a> Banded Pipefish, Ringed Pipefish [66210]		Species or species habitat may occur within area
<a href="#">Doryrhamphus excisus</a> Bluestripe Pipefish, Indian Blue-stripe Pipefish, Pacific Blue-stripe Pipefish [66211]		Species or species habitat may occur within area
<a href="#">Doryrhamphus janssi</a> Cleaner Pipefish, Janss' Pipefish [66212]		Species or species habitat may occur within area
<a href="#">Filicampus tigris</a> Tiger Pipefish [66217]		Species or species habitat may occur within area
<a href="#">Halicampus brocki</a> Brock's Pipefish [66219]		Species or species habitat may occur within area
<a href="#">Halicampus dunckeri</a> Red-hair Pipefish, Duncker's Pipefish [66220]		Species or species habitat may occur within area
<a href="#">Halicampus grayi</a> Mud Pipefish, Gray's Pipefish [66221]		Species or species habitat may occur within area
<a href="#">Halicampus spinirostris</a> Spiny-snout Pipefish [66225]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
<a href="#">Haliichthys taeniophorus</a> Ribboned Pipehorse, Ribboned Seadragon [66226]		Species or species habitat may occur within area
<a href="#">Hippichthys penicillus</a> Beady Pipefish, Steep-nosed Pipefish [66231]		Species or species habitat may occur within area
<a href="#">Hippocampus histrix</a> Spiny Seahorse, Thorny Seahorse [66236]		Species or species habitat may occur within area
<a href="#">Hippocampus kuda</a> Spotted Seahorse, Yellow Seahorse [66237]		Species or species habitat may occur within area
<a href="#">Hippocampus planifrons</a> Flat-face Seahorse [66238]		Species or species habitat may occur within area
<a href="#">Hippocampus spinosissimus</a> Hedgehog Seahorse [66239]		Species or species habitat may occur within area
<a href="#">Micrognathus micronotopterus</a> Tidepool Pipefish [66255]		Species or species habitat may occur within area
<a href="#">Solegnathus hardwickii</a> Pallid Pipehorse, Hardwick's Pipehorse [66272]		Species or species habitat may occur within area
<a href="#">Solegnathus lettiensis</a> Gunther's Pipehorse, Indonesian Pipefish [66273]		Species or species habitat may occur within area
<a href="#">Solenostomus cyanopterus</a> Robust Ghostpipefish, Blue-finned Ghost Pipefish, [66183]		Species or species habitat may occur within area
<a href="#">Syngnathoides biaculeatus</a> Double-end Pipehorse, Double-ended Pipehorse, Alligator Pipefish [66279]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
<a href="#">Trachyrhamphus bicoarctatus</a> Bentstick Pipefish, Bend Stick Pipefish, Short-tailed Pipefish [66280]		Species or species habitat may occur within area
<a href="#">Trachyrhamphus longirostris</a> Straightstick Pipefish, Long-nosed Pipefish, Straight Stick Pipefish [66281]		Species or species habitat may occur within area
<b>Reptile</b>		
<a href="#">Acalyptophis peronii</a> Horned Seasnake [1114]		Species or species habitat may occur within area
<a href="#">Aipysurus laevis</a> Olive Seasnake [1120]		Species or species habitat may occur within area
<a href="#">Astrotia stokesii</a> Stokes' Seasnake [1122]		Species or species habitat may occur within area
<a href="#">Caretta caretta</a> Loggerhead Turtle [1763]	Endangered	Species or species habitat likely to occur within area
<a href="#">Chelonia mydas</a> Green Turtle [1765]	Vulnerable	Species or species habitat known to occur within area
<a href="#">Chitulia ornata as Hydrophis ornatus</a> Spotted Seasnake, Ornate Reef Seasnake [87377]		Species or species habitat may occur within area
<a href="#">Dermochelys coriacea</a> Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat likely to occur within area
<a href="#">Disteira kingii</a> Spectacled Seasnake [1123]		Species or species habitat may occur within area
<a href="#">Disteira major</a> Olive-headed Seasnake [1124]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
<a href="#">Enhydrina schistosa</a> Beaked Seasnake [1126]		Species or species habitat may occur within area
<a href="#">Eretmochelys imbricata</a> Hawksbill Turtle [1766]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Hydrophis atriceps</a> Black-headed Seasnake [1101]		Species or species habitat may occur within area
<a href="#">Hydrophis elegans</a> Elegant Seasnake [1104]		Species or species habitat may occur within area
<a href="#">Lapemis curtus as Lapemis hardwickii</a> Spine-bellied Seasnake [83554]		Species or species habitat may occur within area
<a href="#">Leioselasma coggeri as Hydrophis coggeri</a> Black-headed Sea Snake, Slender-necked Seasnake [87373]		Species or species habitat may occur within area
<a href="#">Leioselasma pacifica as Hydrophis pacificus</a> Large-headed Seasnake, Pacific Seasnake [87378]		Species or species habitat may occur within area
<a href="#">Lepidochelys olivacea</a> Olive Ridley Turtle, Pacific Ridley Turtle [1767]	Endangered	Species or species habitat likely to occur within area
<a href="#">Natator depressus</a> Flatback Turtle [59257]	Vulnerable	Species or species habitat known to occur within area

## Whales and Other Cetaceans [ [Resource Information](#) ]

Current Scientific Name	Status	Type of Presence
Mammal		
<a href="#">Balaenoptera borealis</a> Sei Whale [34]	Vulnerable	Species or species habitat likely to occur within area

Current Scientific Name	Status	Type of Presence
<a href="#">Balaenoptera edeni</a> Bryde's Whale [35]		Species or species habitat may occur within area
<a href="#">Balaenoptera musculus</a> Blue Whale [36]	Endangered	Species or species habitat likely to occur within area
<a href="#">Balaenoptera physalus</a> Fin Whale [37]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Delphinus delphis</a> Common Dolphin, Short-beaked Common Dolphin [60]		Species or species habitat may occur within area
<a href="#">Feresa attenuata</a> Pygmy Killer Whale [61]		Species or species habitat may occur within area
<a href="#">Globicephala macrorhynchus</a> Short-finned Pilot Whale [62]		Species or species habitat may occur within area
<a href="#">Grampus griseus</a> Risso's Dolphin, Grampus [64]		Species or species habitat may occur within area
<a href="#">Kogia breviceps</a> Pygmy Sperm Whale [57]		Species or species habitat may occur within area
<a href="#">Kogia sima</a> Dwarf Sperm Whale [85043]		Species or species habitat may occur within area
<a href="#">Megaptera novaeangliae</a> Humpback Whale [38]		Species or species habitat may occur within area
<a href="#">Orcinus orca</a> Killer Whale, Orca [46]		Species or species habitat may occur within area



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

## Extra Information

EPBC Act Referrals			[ Resource Information ]
Title of referral	Reference	Referral Outcome	Assessment Status
<b>Not controlled action</b>			
<a href="#">Barossa-1 (NT/P69), Caldita-2 (NT/P61) exploration wells</a>	2006/2793	Not Controlled Action	Completed
<b>Not controlled action (particular manner)</b>			
<a href="#">2D Marine Seismic Survey</a>	2009/4728	Not Controlled Action (Particular Manner)	Post-Approval
<a href="#">2D Seismic survey</a>	2009/5076	Not Controlled Action (Particular Manner)	Post-Approval
<a href="#">Bonaparte Basin Barossa Appraisal Drilling Campaign, NT</a>	2012/6481	Not Controlled Action (Particular Manner)	Post-Approval
<a href="#">Caldita 3D Marine Seismic Survey - NT/P61, NT/P69, and acreage release area NT06-5</a>	2006/3142	Not Controlled Action (Particular Manner)	Post-Approval
<a href="#">Kingtree &amp; Ironstone-1 Exploration Wells</a>	2011/5935	Not Controlled Action (Particular Manner)	Post-Approval
<a href="#">Westralia SPAN Marine Seismic Survey, WA &amp; NT</a>	2012/6463	Not Controlled Action (Particular Manner)	Post-Approval
<b>Referral decision</b>			
<a href="#">2D Marine Seismic Survey</a>	2008/4623	Referral Decision	Completed

## Key Ecological Features [ Resource Information ]

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

Name	Region
<a href="#">Shelf break and slope of the Arafura Shelf</a>	North



# Caveat

## 1 PURPOSE

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

The report contains the mapped locations of:

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

## 2 DISCLAIMER

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

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

## 3 DATA SOURCES

Threatened ecological communities

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

Threatened, migratory and marine species

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

Where little information is available for a species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc.).

In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More detailed distribution mapping methods are used to update these distributions

## 4 LIMITATIONS

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

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

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

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

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

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

# Acknowledgements

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

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

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

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

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the Environment and Water

# EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected. Please see the caveat for interpretation of information provided here.

Report created: 17-May-2023

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# Summary

## Matters of National Environment Significance

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

<a href="#">World Heritage Properties:</a>	None
<a href="#">National Heritage Places:</a>	None
<a href="#">Wetlands of International Importance (Ramsar)</a>	1
<a href="#">Great Barrier Reef Marine Park:</a>	None
<a href="#">Commonwealth Marine Area:</a>	8
<a href="#">Listed Threatened Ecological Communities:</a>	None
<a href="#">Listed Threatened Species:</a>	28
<a href="#">Listed Migratory Species:</a>	60

## Other Matters Protected by the EPBC Act

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

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

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

<a href="#">Commonwealth Lands:</a>	3
<a href="#">Commonwealth Heritage Places:</a>	2
<a href="#">Listed Marine Species:</a>	102
<a href="#">Whales and Other Cetaceans:</a>	27
<a href="#">Critical Habitats:</a>	None
<a href="#">Commonwealth Reserves Terrestrial:</a>	None
<a href="#">Australian Marine Parks:</a>	10
<a href="#">Habitat Critical to the Survival of Marine Turtles:</a>	4

## Extra Information

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

<a href="#">State and Territory Reserves:</a>	1
<a href="#">Regional Forest Agreements:</a>	None
<a href="#">Nationally Important Wetlands:</a>	1
<a href="#">EPBC Act Referrals:</a>	135
<a href="#">Key Ecological Features (Marine):</a>	10
<a href="#">Biologically Important Areas:</a>	36
<a href="#">Bioregional Assessments:</a>	None
<a href="#">Geological and Bioregional Assessments:</a>	None



# Details

## Matters of National Environmental Significance

### Wetlands of International Importance (Ramsar Wetlands) [\[ Resource Information \]](#)

Ramsar Site Name	Proximity
<a href="#">Ashmore reef national nature reserve</a>	Within Ramsar site

### Commonwealth Marine Area [\[ Resource Information \]](#)

Approval is required for a proposed activity that is located within the Commonwealth Marine Area which has, will have, or is likely to have a significant impact on the environment. Approval may be required for a proposed action taken outside a Commonwealth Marine Area but which has, may have or is likely to have a significant impact on the environment in the Commonwealth Marine Area.

#### Feature Name

EEZ and Territorial Sea

Extended Continental Shelf

Extended Continental Shelf

Extended Continental Shelf

Extended Continental Shelf

Extended Continental Shelf

Extended Continental Shelf

Extended Continental Shelf

### Listed Threatened Species [\[ Resource Information \]](#)

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

Scientific Name	Threatened Category	Presence Text
<b>BIRD</b>		
<a href="#">Anous tenuirostris melanops</a> Australian Lesser Noddy [26000]	Vulnerable	Breeding known to occur within area
<a href="#">Calidris canutus</a> Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area

Scientific Name	Threatened Category	Presence Text
<a href="#">Calidris ferruginea</a> Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
<a href="#">Charadrius leschenaultii</a> Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat known to occur within area
<a href="#">Limosa lapponica menzbieri</a> Northern Siberian Bar-tailed Godwit, Russkoye Bar-tailed Godwit [86432]	Critically Endangered	Species or species habitat known to occur within area
<a href="#">Numenius madagascariensis</a> Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
<a href="#">Papasula abbotti</a> Abbott's Booby [59297]	Endangered	Species or species habitat may occur within area
<a href="#">Phaethon lepturus fulvus</a> Christmas Island White-tailed Tropicbird, Golden Bosunbird [26021]	Endangered	Species or species habitat may occur within area
<b>FISH</b>		
<a href="#">Thunnus maccoyii</a> Southern Bluefin Tuna [69402]	Conservation Dependent	Breeding known to occur within area
<b>MAMMAL</b>		
<a href="#">Balaenoptera borealis</a> Sei Whale [34]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
<a href="#">Balaenoptera musculus</a> Blue Whale [36]	Endangered	Migration route known to occur within area
<a href="#">Balaenoptera physalus</a> Fin Whale [37]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area

**REPTILE**

Scientific Name	Threatened Category	Presence Text
<a href="#">Aipysurus apraefrontalis</a> Short-nosed Seasnake [1115]	Critically Endangered	Species or species habitat known to occur within area
<a href="#">Aipysurus foliosquama</a> Leaf-scaled Seasnake [1118]	Critically Endangered	Species or species habitat may occur within area
<a href="#">Caretta caretta</a> Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour known to occur within area
<a href="#">Chelonia mydas</a> Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
<a href="#">Dermochelys coriacea</a> Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat known to occur within area
<a href="#">Eretmochelys imbricata</a> Hawksbill Turtle [1766]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
<a href="#">Lepidochelys olivacea</a> Olive Ridley Turtle, Pacific Ridley Turtle [1767]	Endangered	Foraging, feeding or related behaviour known to occur within area
<a href="#">Natator depressus</a> Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
<b>SHARK</b>		
<a href="#">Carcharodon carcharias</a> White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat may occur within area
<a href="#">Glyphis garricki</a> Northern River Shark, New Guinea River Shark [82454]	Endangered	Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
<a href="#">Glyphis glyphis</a> Speartooth Shark [82453]	Critically Endangered	Species or species habitat may occur within area
<a href="#">Pristis clavata</a> Dwarf Sawfish, Queensland Sawfish [68447]	Vulnerable	Species or species habitat known to occur within area
<a href="#">Pristis pristis</a> Freshwater Sawfish, Largetooth Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish [60756]	Vulnerable	Species or species habitat may occur within area
<a href="#">Pristis zijsron</a> Green Sawfish, Dindagubba, Narrowsnout Sawfish [68442]	Vulnerable	Species or species habitat known to occur within area
<a href="#">Rhincodon typus</a> Whale Shark [66680]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
<a href="#">Sphyrna lewini</a> Scalloped Hammerhead [85267]	Conservation Dependent	Species or species habitat known to occur within area

Listed Migratory Species [ [Resource Information](#) ]

Scientific Name	Threatened Category	Presence Text
<b>Migratory Marine Birds</b>		
<a href="#">Anous stolidus</a> Common Noddy [825]		Breeding known to occur within area
<a href="#">Ardenna pacifica</a> Wedge-tailed Shearwater [84292]		Breeding known to occur within area
<a href="#">Calonectris leucomelas</a> Streaked Shearwater [1077]		Species or species habitat known to occur within area
<a href="#">Fregata ariel</a> Lesser Frigatebird, Least Frigatebird [1012]		Breeding known to occur within area
<a href="#">Fregata minor</a> Great Frigatebird, Greater Frigatebird [1013]		Breeding known to occur within area

Scientific Name	Threatened Category	Presence Text
<a href="#">Hydroprogne caspia</a> Caspian Tern [808]		Breeding known to occur within area
<a href="#">Onychoprion anaethetus</a> Bridled Tern [82845]		Breeding known to occur within area
<a href="#">Phaethon lepturus</a> White-tailed Tropicbird [1014]		Breeding known to occur within area
<a href="#">Phaethon rubricauda</a> Red-tailed Tropicbird [994]		Breeding known to occur within area
<a href="#">Sterna dougallii</a> Roseate Tern [817]		Breeding known to occur within area
<a href="#">Sternula albifrons</a> Little Tern [82849]		Congregation or aggregation known to occur within area
<a href="#">Sula dactylatra</a> Masked Booby [1021]		Breeding known to occur within area
<a href="#">Sula leucogaster</a> Brown Booby [1022]		Breeding known to occur within area
<a href="#">Sula sula</a> Red-footed Booby [1023]		Breeding known to occur within area
<b>Migratory Marine Species</b>		
<a href="#">Anoxypristis cuspidata</a> Narrow Sawfish, Knifetooth Sawfish [68448]		Species or species habitat likely to occur within area
<a href="#">Balaenoptera borealis</a> Sei Whale [34]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
<a href="#">Balaenoptera edeni</a> Bryde's Whale [35]		Species or species habitat likely to occur within area

Scientific Name	Threatened Category	Presence Text
<a href="#">Balaenoptera musculus</a> Blue Whale [36]	Endangered	Migration route known to occur within area
<a href="#">Balaenoptera physalus</a> Fin Whale [37]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
<a href="#">Carcharhinus longimanus</a> Oceanic Whitetip Shark [84108]		Species or species habitat may occur within area
<a href="#">Carcharodon carcharias</a> White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat may occur within area
<a href="#">Caretta caretta</a> Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour known to occur within area
<a href="#">Chelonia mydas</a> Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
<a href="#">Crocodylus porosus</a> Salt-water Crocodile, Estuarine Crocodile [1774]		Species or species habitat likely to occur within area
<a href="#">Dermochelys coriacea</a> Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat known to occur within area
<a href="#">Dugong dugon</a> Dugong [28]		Breeding known to occur within area
<a href="#">Eretmochelys imbricata</a> Hawksbill Turtle [1766]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
<a href="#">Isurus oxyrinchus</a> Shortfin Mako, Mako Shark [79073]		Species or species habitat likely to occur within area

Scientific Name	Threatened Category	Presence Text
<a href="#">Isurus paucus</a> Longfin Mako [82947]		Species or species habitat likely to occur within area
<a href="#">Lepidochelys olivacea</a> Olive Ridley Turtle, Pacific Ridley Turtle [1767]	Endangered	Foraging, feeding or related behaviour known to occur within area
<a href="#">Megaptera novaeangliae</a> Humpback Whale [38]		Species or species habitat known to occur within area
<a href="#">Mobula alfredi as Manta alfredi</a> Reef Manta Ray, Coastal Manta Ray [90033]		Species or species habitat known to occur within area
<a href="#">Mobula birostris as Manta birostris</a> Giant Manta Ray [90034]		Species or species habitat likely to occur within area
<a href="#">Natator depressus</a> Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
<a href="#">Orcaella heinsohni</a> Australian Snubfin Dolphin [81322]		Species or species habitat known to occur within area
<a href="#">Orcinus orca</a> Killer Whale, Orca [46]		Species or species habitat may occur within area
<a href="#">Physeter macrocephalus</a> Sperm Whale [59]		Species or species habitat may occur within area
<a href="#">Pristis clavata</a> Dwarf Sawfish, Queensland Sawfish [68447]	Vulnerable	Species or species habitat known to occur within area
<a href="#">Pristis pristis</a> Freshwater Sawfish, Largetooth Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish [60756]	Vulnerable	Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
<a href="#">Pristis zijsron</a> Green Sawfish, Dindagubba, Narrowsnout Sawfish [68442]	Vulnerable	Species or species habitat known to occur within area
<a href="#">Rhincodon typus</a> Whale Shark [66680]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
<a href="#">Sousa sahalensis as Sousa chinensis</a> Australian Humpback Dolphin [87942]		Species or species habitat likely to occur within area
<a href="#">Tursiops aduncus (Arafura/Timor Sea populations)</a> Spotted Bottlenose Dolphin (Arafura/Timor Sea populations) [78900]		Species or species habitat known to occur within area
<b>Migratory Terrestrial Species</b>		
<a href="#">Cecropis daurica</a> Red-rumped Swallow [80610]		Species or species habitat may occur within area
<a href="#">Cuculus optatus</a> Oriental Cuckoo, Horsfield's Cuckoo [86651]		Species or species habitat known to occur within area
<a href="#">Hirundo rustica</a> Barn Swallow [662]		Species or species habitat known to occur within area
<a href="#">Motacilla cinerea</a> Grey Wagtail [642]		Species or species habitat known to occur within area
<a href="#">Motacilla flava</a> Yellow Wagtail [644]		Species or species habitat known to occur within area
<b>Migratory Wetlands Species</b>		
<a href="#">Acrocephalus orientalis</a> Oriental Reed-Warbler [59570]		Species or species habitat known to occur within area
<a href="#">Actitis hypoleucos</a> Common Sandpiper [59309]		Species or species habitat known to occur within area



Scientific Name	Threatened Category	Presence Text
<a href="#">Calidris acuminata</a> Sharp-tailed Sandpiper [874]		Species or species habitat known to occur within area
<a href="#">Calidris canutus</a> Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area
<a href="#">Calidris ferruginea</a> Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
<a href="#">Calidris melanotos</a> Pectoral Sandpiper [858]		Species or species habitat may occur within area
<a href="#">Charadrius leschenaultii</a> Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat known to occur within area
<a href="#">Limnodromus semipalmatus</a> Asian Dowitcher [843]		Species or species habitat known to occur within area
<a href="#">Limosa lapponica</a> Bar-tailed Godwit [844]		Species or species habitat known to occur within area
<a href="#">Numenius madagascariensis</a> Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
<a href="#">Pandion haliaetus</a> Osprey [952]		Species or species habitat known to occur within area
<a href="#">Thalasseus bergii</a> Greater Crested Tern [83000]		Breeding known to occur within area

## Other Matters Protected by the EPBC Act

### Commonwealth Lands

[\[ Resource Information \]](#)

The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

#### Commonwealth Land Name

#### State

Unknown

Commonwealth Land - [52277]

ACI

Commonwealth Land - [52276]

ACI

Commonwealth Land - [52278]

ACI

### Commonwealth Heritage Places

[\[ Resource Information \]](#)

#### Name

#### State

#### Status

Natural

[Ashmore Reef National Nature Reserve](#)

EXT

Listed place

[Scott Reef and Surrounds - Commonwealth Area](#)

EXT

Listed place

### Listed Marine Species

[\[ Resource Information \]](#)

#### Scientific Name

#### Threatened Category

#### Presence Text

Bird

[Acrocephalus orientalis](#)

Oriental Reed-Warbler [59570]

Species or species habitat known to occur within area overfly marine area

[Actitis hypoleucos](#)

Common Sandpiper [59309]

Species or species habitat known to occur within area

[Anous minutus](#)

Black Noddy [824]

Breeding known to occur within area

[Anous stolidus](#)

Common Noddy [825]

Breeding known to occur within area

[Anous tenuirostris melanops](#)

Australian Lesser Noddy [26000]

Vulnerable

Breeding known to occur within area

[Ardena pacifica as Puffinus pacificus](#)

Wedge-tailed Shearwater [84292]

Breeding known to occur within area

Scientific Name	Threatened Category	Presence Text
<a href="#">Calidris acuminata</a> Sharp-tailed Sandpiper [874]		Species or species habitat known to occur within area
<a href="#">Calidris canutus</a> Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area overfly marine area
<a href="#">Calidris ferruginea</a> Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area overfly marine area
<a href="#">Calidris melanotos</a> Pectoral Sandpiper [858]		Species or species habitat may occur within area overfly marine area
<a href="#">Calonectris leucomelas</a> Streaked Shearwater [1077]		Species or species habitat known to occur within area
<a href="#">Cecropis daurica as Hirundo daurica</a> Red-rumped Swallow [80610]		Species or species habitat may occur within area overfly marine area
<a href="#">Charadrius leschenaultii</a> Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat known to occur within area
<a href="#">Fregata ariel</a> Lesser Frigatebird, Least Frigatebird [1012]		Breeding known to occur within area
<a href="#">Fregata minor</a> Great Frigatebird, Greater Frigatebird [1013]		Breeding known to occur within area
<a href="#">Hirundo rustica</a> Barn Swallow [662]		Species or species habitat known to occur within area overfly marine area
<a href="#">Hydroprogne caspia as Sterna caspia</a> Caspian Tern [808]		Breeding known to occur within area

Scientific Name	Threatened Category	Presence Text
<a href="#">Limnodromus semipalmatus</a> Asian Dowitcher [843]		Species or species habitat known to occur within area overfly marine area
<a href="#">Limosa lapponica</a> Bar-tailed Godwit [844]		Species or species habitat known to occur within area
<a href="#">Motacilla cinerea</a> Grey Wagtail [642]		Species or species habitat known to occur within area overfly marine area
<a href="#">Motacilla flava</a> Yellow Wagtail [644]		Species or species habitat known to occur within area overfly marine area
<a href="#">Numenius madagascariensis</a> Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
<a href="#">Onychoprion anaethetus as Sterna anaethetus</a> Bridled Tern [82845]		Breeding known to occur within area
<a href="#">Pandion haliaetus</a> Osprey [952]		Species or species habitat known to occur within area
<a href="#">Papasula abbotti</a> Abbott's Booby [59297]	Endangered	Species or species habitat may occur within area
<a href="#">Phaethon lepturus</a> White-tailed Tropicbird [1014]		Breeding known to occur within area
<a href="#">Phaethon lepturus fulvus</a> Christmas Island White-tailed Tropicbird, Golden Bosunbird [26021]	Endangered	Species or species habitat may occur within area
<a href="#">Phaethon rubricauda</a> Red-tailed Tropicbird [994]		Breeding known to occur within area

Scientific Name	Threatened Category	Presence Text
<a href="#">Sterna dougallii</a> Roseate Tern [817]		Breeding known to occur within area
<a href="#">Sternula albifrons as Sterna albifrons</a> Little Tern [82849]		Congregation or aggregation known to occur within area
<a href="#">Sula dactylatra</a> Masked Booby [1021]		Breeding known to occur within area
<a href="#">Sula leucogaster</a> Brown Booby [1022]		Breeding known to occur within area
<a href="#">Sula sula</a> Red-footed Booby [1023]		Breeding known to occur within area
<a href="#">Thalasseus bengalensis as Sterna bengalensis</a> Lesser Crested Tern [66546]		Breeding known to occur within area
<a href="#">Thalasseus bergii as Sterna bergii</a> Greater Crested Tern [83000]		Breeding known to occur within area
<b>Fish</b>		
<a href="#">Bhanotia fasciolata</a> Corrugated Pipefish, Barbed Pipefish [66188]		Species or species habitat may occur within area
<a href="#">Campichthys tricarinatus</a> Three-keel Pipefish [66192]		Species or species habitat may occur within area
<a href="#">Choeroichthys brachysoma</a> Pacific Short-bodied Pipefish, Short-bodied Pipefish [66194]		Species or species habitat may occur within area
<a href="#">Choeroichthys suillus</a> Pig-snouted Pipefish [66198]		Species or species habitat may occur within area
<a href="#">Corythoichthys amplexus</a> Fijian Banded Pipefish, Brown-banded Pipefish [66199]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
<a href="#">Corythoichthys flavofasciatus</a> Reticulate Pipefish, Yellow-banded Pipefish, Network Pipefish [66200]		Species or species habitat may occur within area
<a href="#">Corythoichthys haematopterus</a> Reef-top Pipefish [66201]		Species or species habitat may occur within area
<a href="#">Corythoichthys intestinalis</a> Australian Messmate Pipefish, Banded Pipefish [66202]		Species or species habitat may occur within area
<a href="#">Corythoichthys schultzi</a> Schultz's Pipefish [66205]		Species or species habitat may occur within area
<a href="#">Cosmocampus banneri</a> Roughridge Pipefish [66206]		Species or species habitat may occur within area
<a href="#">Doryrhamphus dactyliophorus</a> Banded Pipefish, Ringed Pipefish [66210]		Species or species habitat may occur within area
<a href="#">Doryrhamphus excisus</a> Bluestripe Pipefish, Indian Blue-stripe Pipefish, Pacific Blue-stripe Pipefish [66211]		Species or species habitat may occur within area
<a href="#">Doryrhamphus janssi</a> Cleaner Pipefish, Janss' Pipefish [66212]		Species or species habitat may occur within area
<a href="#">Festucalex cinctus</a> Girdled Pipefish [66214]		Species or species habitat may occur within area
<a href="#">Filicampus tigris</a> Tiger Pipefish [66217]		Species or species habitat may occur within area
<a href="#">Halicampus brocki</a> Brock's Pipefish [66219]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
<a href="#">Halicampus dunckeri</a> Red-hair Pipefish, Duncker's Pipefish [66220]		Species or species habitat may occur within area
<a href="#">Halicampus grayi</a> Mud Pipefish, Gray's Pipefish [66221]		Species or species habitat may occur within area
<a href="#">Halicampus spirostris</a> Spiny-snout Pipefish [66225]		Species or species habitat may occur within area
<a href="#">Haliichthys taeniophorus</a> Ribbioned Pipehorse, Ribbioned Seadragon [66226]		Species or species habitat may occur within area
<a href="#">Hippichthys cyanospilos</a> Blue-speckled Pipefish, Blue-spotted Pipefish [66228]		Species or species habitat may occur within area
<a href="#">Hippichthys parvicarinatus</a> Short-keel Pipefish, Short-keeled Pipefish [66230]		Species or species habitat may occur within area
<a href="#">Hippichthys penicillus</a> Beady Pipefish, Steep-nosed Pipefish [66231]		Species or species habitat may occur within area
<a href="#">Hippocampus angustus</a> Western Spiny Seahorse, Narrow-bellied Seahorse [66234]		Species or species habitat may occur within area
<a href="#">Hippocampus histrix</a> Spiny Seahorse, Thorny Seahorse [66236]		Species or species habitat may occur within area
<a href="#">Hippocampus kuda</a> Spotted Seahorse, Yellow Seahorse [66237]		Species or species habitat may occur within area
<a href="#">Hippocampus planifrons</a> Flat-face Seahorse [66238]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
<a href="#">Hippocampus spinosissimus</a> Hedgehog Seahorse [66239]		Species or species habitat may occur within area
<a href="#">Micrognathus micronotopterus</a> Tidepool Pipefish [66255]		Species or species habitat may occur within area
<a href="#">Solegnathus hardwickii</a> Pallid Pipehorse, Hardwick's Pipehorse [66272]		Species or species habitat may occur within area
<a href="#">Solegnathus lettiensis</a> Gunther's Pipehorse, Indonesian Pipefish [66273]		Species or species habitat may occur within area
<a href="#">Solenostomus cyanopterus</a> Robust Ghostpipefish, Blue-finned Ghost Pipefish, [66183]		Species or species habitat may occur within area
<a href="#">Syngnathoides biaculeatus</a> Double-end Pipehorse, Double-ended Pipehorse, Alligator Pipefish [66279]		Species or species habitat may occur within area
<a href="#">Trachyrhamphus bicoarctatus</a> Bentstick Pipefish, Bend Stick Pipefish, Short-tailed Pipefish [66280]		Species or species habitat may occur within area
<a href="#">Trachyrhamphus longirostris</a> Straightstick Pipefish, Long-nosed Pipefish, Straight Stick Pipefish [66281]		Species or species habitat may occur within area
<b>Mammal</b>		
<a href="#">Dugong dugon</a> Dugong [28]		Breeding known to occur within area
<b>Reptile</b>		
<a href="#">Acalyptophis peronii</a> Horned Seasnake [1114]		Species or species habitat may occur within area
<a href="#">Aipysurus apraefrontalis</a> Short-nosed Seasnake [1115]	Critically Endangered	Species or species habitat known to occur within area



Scientific Name	Threatened Category	Presence Text
<a href="#">Aipysurus duboisii</a> Dubois' Seasnake [1116]		Species or species habitat may occur within area
<a href="#">Aipysurus eydouxii</a> Spine-tailed Seasnake [1117]		Species or species habitat may occur within area
<a href="#">Aipysurus foliosquama</a> Leaf-scaled Seasnake [1118]	Critically Endangered	Species or species habitat may occur within area
<a href="#">Aipysurus fuscus</a> Dusky Seasnake [1119]		Species or species habitat known to occur within area
<a href="#">Aipysurus laevis</a> Olive Seasnake [1120]		Species or species habitat may occur within area
<a href="#">Astrotia stokesii</a> Stokes' Seasnake [1122]		Species or species habitat may occur within area
<a href="#">Caretta caretta</a> Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour known to occur within area
<a href="#">Chelonia mydas</a> Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
<a href="#">Chitulia inornata as Hydrophis inornatus</a> Plain Seasnake [87379]		Species or species habitat may occur within area
<a href="#">Chitulia ornata as Hydrophis ornatus</a> Spotted Seasnake, Ornate Reef Seasnake [87377]		Species or species habitat may occur within area
<a href="#">Crocodylus porosus</a> Salt-water Crocodile, Estuarine Crocodile [1774]		Species or species habitat likely to occur within area

Scientific Name	Threatened Category	Presence Text
<a href="#">Dermochelys coriacea</a> Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat known to occur within area
<a href="#">Disteira kingii</a> Spectacled Seasnake [1123]		Species or species habitat may occur within area
<a href="#">Disteira major</a> Olive-headed Seasnake [1124]		Species or species habitat may occur within area
<a href="#">Emydocephalus annulatus</a> Turtle-headed Seasnake [1125]		Species or species habitat may occur within area
<a href="#">Enhydrina schistosa</a> Beaked Seasnake [1126]		Species or species habitat may occur within area
<a href="#">Eretmochelys imbricata</a> Hawksbill Turtle [1766]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
<a href="#">Hydrelaps darwiniensis</a> Black-ringed Seasnake [1100]		Species or species habitat may occur within area
<a href="#">Hydrophis atriceps</a> Black-headed Seasnake [1101]		Species or species habitat may occur within area
<a href="#">Hydrophis elegans</a> Elegant Seasnake [1104]		Species or species habitat may occur within area
<a href="#">Hydrophis macdowellii as Hydrophis mcdowellii</a> Small-headed Seasnake [75601]		Species or species habitat may occur within area
<a href="#">Lapemis curtus as Lapemis hardwickii</a> Spine-bellied Seasnake [83554]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
<a href="#">Leioselasma coggeri</a> as <a href="#">Hydrophis coggeri</a> Black-headed Sea Snake, Slender-necked Seasnake [87373]		Species or species habitat may occur within area
<a href="#">Leioselasma czeblukovi</a> as <a href="#">Hydrophis czeblukovi</a> Fine-spined Seasnake, Geometrical Seasnake [87374]		Species or species habitat may occur within area
<a href="#">Leioselasma pacifica</a> as <a href="#">Hydrophis pacificus</a> Large-headed Seasnake, Pacific Seasnake [87378]		Species or species habitat may occur within area
<a href="#">Lepidochelys olivacea</a> Olive Ridley Turtle, Pacific Ridley Turtle [1767]	Endangered	Foraging, feeding or related behaviour known to occur within area
<a href="#">Natator depressus</a> Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
<a href="#">Parahydrophis mertoni</a> Northern Mangrove Seasnake [1090]		Species or species habitat may occur within area
<a href="#">Pelamis platurus</a> Yellow-bellied Seasnake [1091]		Species or species habitat may occur within area

Whales and Other Cetaceans		[ Resource Information ]
Current Scientific Name	Status	Type of Presence
Mammal		
<a href="#">Balaenoptera borealis</a> Sei Whale [34]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
<a href="#">Balaenoptera edeni</a> Bryde's Whale [35]		Species or species habitat likely to occur within area
<a href="#">Balaenoptera musculus</a> Blue Whale [36]	Endangered	Migration route known to occur within area

Current Scientific Name	Status	Type of Presence
<a href="#">Balaenoptera physalus</a> Fin Whale [37]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
<a href="#">Delphinus delphis</a> Common Dolphin, Short-beaked Common Dolphin [60]		Species or species habitat may occur within area
<a href="#">Feresa attenuata</a> Pygmy Killer Whale [61]		Species or species habitat may occur within area
<a href="#">Globicephala macrorhynchus</a> Short-finned Pilot Whale [62]		Species or species habitat may occur within area
<a href="#">Grampus griseus</a> Risso's Dolphin, Grampus [64]		Species or species habitat may occur within area
<a href="#">Kogia breviceps</a> Pygmy Sperm Whale [57]		Species or species habitat may occur within area
<a href="#">Kogia sima as Kogia simus</a> Dwarf Sperm Whale [85043]		Species or species habitat may occur within area
<a href="#">Lagenodelphis hosei</a> Fraser's Dolphin, Sarawak Dolphin [41]		Species or species habitat may occur within area
<a href="#">Megaptera novaeangliae</a> Humpback Whale [38]		Species or species habitat known to occur within area
<a href="#">Mesoplodon densirostris</a> Blainville's Beaked Whale, Dense-beaked Whale [74]		Species or species habitat may occur within area
<a href="#">Orcaella heinsohni as Orcaella brevirostris</a> Australian Snubfin Dolphin [81322]		Species or species habitat known to occur within area

Current Scientific Name	Status	Type of Presence
<a href="#">Orcinus orca</a> Killer Whale, Orca [46]		Species or species habitat may occur within area
<a href="#">Peponocephala electra</a> Melon-headed Whale [47]		Species or species habitat may occur within area
<a href="#">Physeter macrocephalus</a> Sperm Whale [59]		Species or species habitat may occur within area
<a href="#">Pseudorca crassidens</a> False Killer Whale [48]		Species or species habitat likely to occur within area
<a href="#">Sousa sahalensis as Sousa chinensis</a> Australian Humpback Dolphin [87942]		Species or species habitat likely to occur within area
<a href="#">Stenella attenuata</a> Spotted Dolphin, Pantropical Spotted Dolphin [51]		Species or species habitat may occur within area
<a href="#">Stenella coeruleoalba</a> Striped Dolphin, Euphrosyne Dolphin [52]		Species or species habitat may occur within area
<a href="#">Stenella longirostris</a> Long-snouted Spinner Dolphin [29]		Species or species habitat may occur within area
<a href="#">Steno bredanensis</a> Rough-toothed Dolphin [30]		Species or species habitat may occur within area
<a href="#">Tursiops aduncus</a> Indian Ocean Bottlenose Dolphin, Spotted Bottlenose Dolphin [68418]		Species or species habitat likely to occur within area
<a href="#">Tursiops aduncus (Arafura/Timor Sea populations)</a> Spotted Bottlenose Dolphin (Arafura/Timor Sea populations) [78900]		Species or species habitat known to occur within area

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

### Australian Marine Parks [ [Resource Information](#) ]

Park Name	Zone & IUCN Categories
Oceanic Shoals	Habitat Protection Zone (IUCN IV)
Arafura	Multiple Use Zone (IUCN VI)
Oceanic Shoals	Multiple Use Zone (IUCN VI)
Oceanic Shoals	Multiple Use Zone (IUCN VI)
Ashmore Reef	Recreational Use Zone (IUCN IV)
Ashmore Reef	Sanctuary Zone (IUCN Ia)
Cartier Island	Sanctuary Zone (IUCN Ia)
Arnhem	Special Purpose Zone (IUCN VI)
Arafura	Special Purpose Zone (Trawl) (IUCN VI)
Oceanic Shoals	Special Purpose Zone (Trawl) (IUCN VI)

### Habitat Critical to the Survival of Marine Turtles

Scientific Name	Behaviour	Presence
Aug - Sep		
<a href="#">Natator depressus</a> Flatback Turtle [59257]	Nesting	Known to occur
Dec - Jan		
<a href="#">Chelonia mydas</a> Green Turtle [1765]	Nesting	Known to occur
May - Jul		

Scientific Name	Behaviour	Presence
<a href="#">Lepidochelys olivacea</a> Olive Ridley Turtle [1767]	Nesting	Known to occur
Nov - May		
<a href="#">Eretmochelys imbricata</a> Hawksbill Turtle [1766]	Nesting	Known to occur

## Extra Information

### State and Territory Reserves [\[ Resource Information \]](#)

Protected Area Name	Reserve Type	State
Scott Reef	Nature Reserve	WA

### Nationally Important Wetlands [\[ Resource Information \]](#)

Wetland Name	State
<a href="#">Ashmore Reef</a>	EXT

### EPBC Act Referrals [\[ Resource Information \]](#)

Title of referral	Reference	Referral Outcome	Assessment Status
<a href="#">Browse to North West Shelf Development, Indian Ocean, WA</a>	2018/8319		Approval
<a href="#">Northern Endeavour Phase 1 Decommissioning</a>	2022/09327		Assessment
<a href="#">Project Crux Cable Lay and Operation</a>	2022/09441		Completed

### Controlled action

Controlled action	Reference	Controlled Action	Post-Approval
<a href="#">2-D seismic survey Scott Reef</a>	2000/125	Controlled Action	Post-Approval
<a href="#">Audacious Oil Field Standalone Development</a>	2001/407	Controlled Action	Completed
<a href="#">Browse FLNG Development, Commonwealth Waters</a>	2013/7079	Controlled Action	Post-Approval
<a href="#">Conduct an exploration drilling campaign</a>	2010/5718	Controlled Action	Completed
<a href="#">Decommissioning of Buffalo Oil Field</a>	2003/984	Controlled Action	Post-Approval
<a href="#">Decommissioning of Challis Oilfield</a>	2003/942	Controlled Action	Post-Approval
<a href="#">Develop Ichthys gas-condensate field permit area W</a>	2006/2767	Controlled Action	Completed

Title of referral	Reference	Referral Outcome	Assessment Status
<b>Controlled action</b>			
<a href="#">Development of Browse Basin Gas Fields (Upstream)</a>	2008/4111	Controlled Action	Completed
<a href="#">Floating Liquefied Natural Gas facility</a>	2001/533	Controlled Action	Completed
<a href="#">Ichthys Gas Field, Offshore and onshore processing facilities and subsea pipeline</a>	2008/4208	Controlled Action	Post-Approval
<a href="#">Montara 4, 5, and 6 Oil Production Wells, and Montara 3 Gas Re-Injection Well</a>	2002/755	Controlled Action	Post-Approval
<a href="#">Prelude Floating Liquefied Natural Gas Facility and Gas Field Development</a>	2008/4146	Controlled Action	Post-Approval
<a href="#">PTTEP AA Floating LNG Facility</a>	2011/6025	Controlled Action	Completed
<a href="#">Tassie Shoal Gas Reforming and Methanol Production Plants - NT/P48</a>	2000/108	Controlled Action	Post-Approval
<a href="#">Tassie Shoal LNG Project</a>	2003/1067	Controlled Action	Post-Approval
<a href="#">Torosa South Initial Appraisal Drilling</a>	2007/3500	Controlled Action	Completed
<b>Not controlled action</b>			
<a href="#">3D marine seismic survey in WA 314P and WA 315P</a>	2004/1927	Not Controlled Action	Completed
<a href="#">Adele Trend TQ3D Seismic Survey</a>	2001/252	Not Controlled Action	Completed
<a href="#">AEC International Hydrocarbon Well Puffin 6</a>	2000/36	Not Controlled Action	Completed
<a href="#">Audacious-3 oil drilling well</a>	2003/1042	Not Controlled Action	Completed
<a href="#">Backpacker-1 Offshore Hydrocarbon Exploration Well</a>	2001/300	Not Controlled Action	Completed
<a href="#">Barossa-1 (NT/P69), Caldita-2 (NT/P61) exploration wells</a>	2006/2793	Not Controlled Action	Completed
<a href="#">Buffalo In-Fill Production Wells</a>	2001/475	Not Controlled Action	Completed
<a href="#">Caldita-1 Hydrocarbon Exploration Well, NT/P61</a>	2004/1854	Not Controlled Action	Completed



Title of referral	Reference	Referral Outcome	Assessment Status
<b>Not controlled action</b>			
<a href="#">Controlled Source Electromagnetic 2D Survey</a>	2009/4980	Not Controlled Action	Completed
<a href="#">Controlled Source Electromagnetic Survey</a>	2010/5434	Not Controlled Action	Completed
<a href="#">Coot-1 hydrocarbon exploration well, Permit Area AC/L2 or AC/L3</a>	2001/296	Not Controlled Action	Completed
<a href="#">Crux gas-liquids development in permit AC/P23</a>	2006/3154	Not Controlled Action	Completed
<a href="#">Drilling of 12 Hydrocarbon Exploration Wells, Permit Area WA-371-P</a>	2006/3005	Not Controlled Action	Completed
<a href="#">Drilling of exploration well Audacious-1 in AC/P17</a>	2000/5	Not Controlled Action	Completed
<a href="#">Drilling of exploration wells, Permit areas WA-301-P to WA-305-P</a>	2002/769	Not Controlled Action	Completed
<a href="#">Echuca Shoals-2 Exploration of Appraisal Well</a>	2006/3020	Not Controlled Action	Completed
<a href="#">Exploration Drilling in AC/P17, AC/P18 and AC/P24</a>	2001/359	Not Controlled Action	Completed
<a href="#">Exploration Well AC/P23</a>	2001/234	Not Controlled Action	Completed
<a href="#">Geo-scientific survey</a>	2005/2004	Not Controlled Action	Completed
<a href="#">Kaleidoscope exploration well</a>	2001/182	Not Controlled Action	Completed
<a href="#">Marine Survey for the Australia-ASEAN Power Link AAPL</a>	2020/8714	Not Controlled Action	Completed
<a href="#">Montara-3 Offshore Hydrocarbon Exploration Well Permit Area AC/RL3</a>	2001/489	Not Controlled Action	Completed
<a href="#">NT/P68 2007 Two Well Drilling Program</a>	2007/3569	Not Controlled Action	Completed
<a href="#">P30 Hydrocarbon Exploration Well</a>	2001/293	Not Controlled Action	Completed
<a href="#">Project Highclere Geophysical Survey</a>	2021/9023	Not Controlled Action	Completed
<a href="#">Puffin Oil wells 7, 8 &amp; 9 development</a>	2005/2336	Not Controlled Action	Completed

Title of referral	Reference	Referral Outcome	Assessment Status
<b>Not controlled action</b>			
<a href="#">Saucepan 1 Exploration Well ACP23</a>	2000/2	Not Controlled Action	Completed
<a href="#">Skua and Swift Oilfields</a>	2006/3195	Not Controlled Action	Completed
<a href="#">Woodside Geotechnical Investigation Sunrise Bank</a>	2000/13	Not Controlled Action	Completed
<b>Not controlled action (particular manner)</b>			
<a href="#">2 (3D) Marine Seismic Surveys</a>	2009/4994	Not Controlled Action (Particular Manner)	Completed
<a href="#">2D and 3D Seismic Survey</a>	2011/6197	Not Controlled Action (Particular Manner)	Post-Approval
<a href="#">2D and 3D Seismic Survey WA-405-P</a>	2009/5104	Not Controlled Action (Particular Manner)	Post-Approval
<a href="#">2D and 3D Seismic Survey WA-405-P</a>	2008/4133	Not Controlled Action (Particular Manner)	Post-Approval
<a href="#">2D Marine Seismic Survey</a>	2009/4728	Not Controlled Action (Particular Manner)	Post-Approval
<a href="#">2D marine seismic survey of Braveheart, Kurrajong, Sunshine and Crocodile</a>	2006/2917	Not Controlled Action (Particular Manner)	Post-Approval
<a href="#">2D or 3D Marine Seismic Survey in Petroleum Permit Area AC/P35</a>	2009/4864	Not Controlled Action (Particular Manner)	Post-Approval
<a href="#">2D Seismic Marine Survey</a>	2001/363	Not Controlled Action (Particular Manner)	Post-Approval
<a href="#">2D Seismic survey</a>	2009/5076	Not Controlled Action (Particular Manner)	Post-Approval
<a href="#">2D seismic survey in permit areas WA-274P and WA-281P</a>	2004/1521	Not Controlled Action (Particular	Post-Approval

Title of referral	Reference	Referral Outcome	Assessment Status
<b>Not controlled action (particular manner)</b>			
		Manner)	
<a href="#">2D Seismic Survey - Petroleum Exploration Area NT/P68, Eastern Bonaparte Basin</a>	2006/2922	Not Controlled Action (Particular Manner)	Post-Approval
<a href="#">2 geotechnical surveys - preliminary and final</a>	2006/2886	Not Controlled Action (Particular Manner)	Post-Approval
<a href="#">3D Marine Seismic Survey</a>	2008/4437	Not Controlled Action (Particular Manner)	Post-Approval
<a href="#">3D Marine Seismic Survey, Permit AC/P 23</a>	2005/2364	Not Controlled Action (Particular Manner)	Post-Approval
<a href="#">3D marine seismic Survey - Maxima 3D MSS</a>	2006/2945	Not Controlled Action (Particular Manner)	Post-Approval
<a href="#">3D Seismic Survey</a>	2006/2729	Not Controlled Action (Particular Manner)	Post-Approval
<a href="#">3D Seismic Survey, Browse Basin, WA</a>	2009/5048	Not Controlled Action (Particular Manner)	Post-Approval
<a href="#">3D Seismic Survey, near Scott Reef, Browse Basin</a>	2005/2126	Not Controlled Action (Particular Manner)	Post-Approval
<a href="#">3D Seismic Survey, petroleum exploration permit AC/P33</a>	2006/2918	Not Controlled Action (Particular Manner)	Post-Approval
<a href="#">3D Seismic Survey (NT/P68)</a>	2008/4121	Not Controlled Action (Particular Manner)	Post-Approval
<a href="#">3D Seismic Survey (NT/P68)</a>	2006/2980	Not Controlled Action (Particular Manner)	Post-Approval

Title of referral	Reference	Referral Outcome	Assessment Status
<b>Not controlled action (particular manner)</b>			
<a href="#">3D seismic survey of AC/P4, AC/P17 and AC/P24</a>	2006/2857	Not Controlled Action (Particular Manner)	Post-Approval
<a href="#">3D Seismic Survey WA-406-P Bonaparte Basin</a>	2007/3904	Not Controlled Action (Particular Manner)	Post-Approval
<a href="#">AC/P37 3D Seismic Survey Ashmore Cartier</a>	2007/3774	Not Controlled Action (Particular Manner)	Post-Approval
<a href="#">Auralandia 3D marine seismic survey</a>	2011/5961	Not Controlled Action (Particular Manner)	Post-Approval
<a href="#">Aurora MC3D Marine Seismic Survey</a>	2010/5510	Not Controlled Action (Particular Manner)	Post-Approval
<a href="#">Bassett 3D Marine Seismic Survey</a>	2010/5538	Not Controlled Action (Particular Manner)	Post-Approval
<a href="#">Bonaparte 2D &amp; 3D marine seismic survey</a>	2011/5962	Not Controlled Action (Particular Manner)	Post-Approval
<a href="#">Bonaparte 3D &amp; 2D Seismic Survey, in NT/P82, Timor Sea</a>	2012/6398	Not Controlled Action (Particular Manner)	Post-Approval
<a href="#">Bonaparte Basin Barossa Appraisal Drilling Campaign, NT</a>	2012/6481	Not Controlled Action (Particular Manner)	Post-Approval
<a href="#">Bonaparte Basin Seabed Mapping Survey</a>	2009/4951	Not Controlled Action (Particular Manner)	Post-Approval
<a href="#">Bonaparte Seismic and Bathymetric Survey</a>	2012/6295	Not Controlled Action (Particular Manner)	Post-Approval
<a href="#">Braveheart 2D Infill Marine Seismic Survey 100km offshore</a>	2008/4442	Not Controlled Action (Particular	Post-Approval

Title of referral	Reference	Referral Outcome	Assessment Status
<b>Not controlled action (particular manner)</b>			
		Manner)	
<a href="#">Braveheart 2D Marine Seismic Survey</a>	2005/2322	Not Controlled Action (Particular Manner)	Post-Approval
<a href="#">Caldita 3D Marine Seismic Survey - NT/P61, NT/P69, and acreage release area NT06-5</a>	2006/3142	Not Controlled Action (Particular Manner)	Post-Approval
<a href="#">Canis 3D Marine Seismic Survey</a>	2008/4492	Not Controlled Action (Particular Manner)	Post-Approval
<a href="#">Cartier East and Cartier West 3D Marine Seismic Surveys</a>	2009/5230	Not Controlled Action (Particular Manner)	Post-Approval
<a href="#">Caswell MC3D Marine Seismic Survey</a>	2012/6594	Not Controlled Action (Particular Manner)	Post-Approval
<a href="#">Conduct an exploration drilling campaign</a>	2011/5964	Not Controlled Action (Particular Manner)	Post-Approval
<a href="#">Deep Water Northwest Shelf 2D Seismic Survey</a>	2007/3260	Not Controlled Action (Particular Manner)	Post-Approval
<a href="#">Dillon South-1 Exploration Well Drilling - AC/P4, Territory of Ashmore/Cartier</a>	2013/6849	Not Controlled Action (Particular Manner)	Post-Approval
<a href="#">Drilling of Audacious-5 appraisal well</a>	2008/4327	Not Controlled Action (Particular Manner)	Post-Approval
<a href="#">Drilling of two appraisal wells</a>	2011/5840	Not Controlled Action (Particular Manner)	Post-Approval
<a href="#">Endurance 3D Marine Seismic Data Acquisition Survey</a>	2007/3667	Not Controlled Action (Particular Manner)	Post-Approval

Title of referral	Reference	Referral Outcome	Assessment Status
<b>Not controlled action (particular manner)</b>			
<a href="#">Eni Bathurst 3D Seismic Survey</a>	2011/6118	Not Controlled Action (Particular Manner)	Post-Approval
<a href="#">Exploration Drilling Campaign</a>	2011/6047	Not Controlled Action (Particular Manner)	Post-Approval
<a href="#">Exploration Drilling Campaign, Browse Basin, WA-341-P, AC-P36 and WA-343-P</a>	2013/6898	Not Controlled Action (Particular Manner)	Post-Approval
<a href="#">Exploration Drilling in Permit Areas WA-402-P &amp; WA-403-P</a>	2010/5297	Not Controlled Action (Particular Manner)	Post-Approval
<a href="#">Exploration Drilling Program - Permit areas - WA-314-P, WA-315-P, WA-398-P.</a>	2008/4064	Not Controlled Action (Particular Manner)	Post-Approval
<a href="#">Gicea 3D Marine Seismic Survey</a>	2008/4389	Not Controlled Action (Particular Manner)	Post-Approval
<a href="#">Gold 2D Marine Seismic Survey Permit Areas WA375P and WA376P</a>	2009/4698	Not Controlled Action (Particular Manner)	Post-Approval
<a href="#">Ichthys 3D Marine Seismic Survey</a>	2010/5550	Not Controlled Action (Particular Manner)	Post-Approval
<a href="#">Joseph Bonaparte Gulf Seabed mapping survey</a>	2010/5517	Not Controlled Action (Particular Manner)	Post-Approval
<a href="#">Kingtree &amp; Ironstone-1 Exploration Wells</a>	2011/5935	Not Controlled Action (Particular Manner)	Post-Approval
<a href="#">Kraken, Lusca &amp; Asperus 3D Marine Seismic Survey</a>	2013/6730	Not Controlled Action (Particular Manner)	Post-Approval
<a href="#">Malita West 3D Seismic Survey WA-402-P and WA-403-P</a>	2007/3936	Not Controlled Action (Particular	Post-Approval

Title of referral	Reference	Referral Outcome	Assessment Status
<b>Not controlled action (particular manner)</b>			
		Manner)	
<a href="#">NT/P74 &amp; NT/P75 - 2D marine seismic survey</a>	2008/4316	Not Controlled Action (Particular Manner)	Post-Approval
<a href="#">NT/P80 2010 2D Marine Seismic Survey</a>	2010/5487	Not Controlled Action (Particular Manner)	Post-Approval
<a href="#">Octantis 3D Marine Seismic Survey, Permit Area AC/P41 off northern Western Australia</a>	2007/3369	Not Controlled Action (Particular Manner)	Post-Approval
<a href="#">Offshore Fibre Optic Cable Network Construction &amp; Operation, Port Hedland WA to Darwin NT</a>	2014/7223	Not Controlled Action (Particular Manner)	Post-Approval
<a href="#">Offshore Gas Exploration Drilling Campaign</a>	2012/6384	Not Controlled Action (Particular Manner)	Post-Approval
<a href="#">Panda NT/P76 3D Seismic Acquisition Survey Program</a>	2009/4992	Not Controlled Action (Particular Manner)	Post-Approval
<a href="#">Petrel MC2D Marine Seismic Survey</a>	2010/5368	Not Controlled Action (Particular Manner)	Post-Approval
<a href="#">Rosebud 3D Marine Seismic Survey in WA-30-R and TR/5</a>	2012/6493	Not Controlled Action (Particular Manner)	Post-Approval
<a href="#">Sandalford 3D Seismic Survey</a>	2012/6261	Not Controlled Action (Particular Manner)	Post-Approval
<a href="#">Schild MC3D Marine Seismic Survey</a>	2012/6373	Not Controlled Action (Particular Manner)	Post-Approval
<a href="#">Schild Phase 11 MC3D Marine Seismic Survey, Browse Basin</a>	2013/6894	Not Controlled Action (Particular Manner)	Post-Approval

Title of referral	Reference	Referral Outcome	Assessment Status
<b>Not controlled action (particular manner)</b>			
<a href="#">Scott Reef Seismic Research</a>	2006/2647	Not Controlled Action (Particular Manner)	Post-Approval
<a href="#">Searcher bathymetry &amp; geochemical seismic survey, Browse Basin, Timor Sea, WA</a>	2013/6980	Not Controlled Action (Particular Manner)	Post-Approval
<a href="#">Sonar and Acoustic Trials</a>	2001/345	Not Controlled Action (Particular Manner)	Post-Approval
<a href="#">Songa Venus Drilling and Testing Operations</a>	2009/5122	Not Controlled Action (Particular Manner)	Post-Approval
<a href="#">Songa Venus Drilling Programme, Bonaparte Basin</a>	2009/4990	Not Controlled Action (Particular Manner)	Post-Approval
<a href="#">Sunshine Infill 2D and Mimosa 2D Marine Seismic Surveys</a>	2009/4699	Not Controlled Action (Particular Manner)	Post-Approval
<a href="#">Thoar 3D Marine Seismic Survey</a>	2010/5668	Not Controlled Action (Particular Manner)	Post-Approval
<a href="#">Tiffany 3D Seismic Survey</a>	2010/5339	Not Controlled Action (Particular Manner)	Post-Approval
<a href="#">Tow West Atlas wreck from present location to boundary of EEZ</a>	2010/5652	Not Controlled Action (Particular Manner)	Post-Approval
<a href="#">Ursa 3D Marine Seismic Survey</a>	2008/4634	Not Controlled Action (Particular Manner)	Post-Approval
<a href="#">Vampire 2D Non Exclusive Seismic Survey, WA</a>	2010/5543	Not Controlled Action (Particular Manner)	Post-Approval
<a href="#">Westralia SPAN Marine Seismic Survey, WA &amp; NT</a>	2012/6463	Not Controlled Action (Particular	Post-Approval



Title of referral	Reference	Referral Outcome	Assessment Status
<b>Not controlled action (particular manner)</b>			
		Manner)	
<a href="#">Woodside Southern Browse 3D Seismic Survey, WA</a>	2007/3534	Not Controlled Action (Particular Manner)	Post-Approval
<a href="#">Zeppelin 3D Seismic Survey</a>	2011/6148	Not Controlled Action (Particular Manner)	Post-Approval
<b>Referral decision</b>			
<a href="#">2D Marine Seismic Survey</a>	2008/4623	Referral Decision	Completed
<a href="#">3D Seismic Survey (NT/P68)</a>	2006/2949	Referral Decision	Completed
<a href="#">BRSN08 3D Marine Seismic Survey</a>	2008/4582	Referral Decision	Completed
<a href="#">Experimental Study of Behavioural and Physiological Impact on Fish of Seismic Ex</a>	2006/2625	Referral Decision	Completed
<a href="#">Puffin South-West Development of Oil Reserves</a>	2007/3834	Referral Decision	Completed
<a href="#">Seismic Data Acquisition, Browse Basin</a>	2010/5475	Referral Decision	Completed

## Key Ecological Features

[ [Resource Information](#) ]

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

Name	Region
<a href="#">Ancient coastline at 125 m depth contour</a>	North-west
<a href="#">Ashmore Reef and Cartier Island and surrounding Commonwealth waters</a>	North-west
<a href="#">Carbonate bank and terrace system of the Sahul Shelf</a>	North-west
<a href="#">Carbonate bank and terrace system of the Van Diemen Rise</a>	North
<a href="#">Continental Slope Demersal Fish Communities</a>	North-west
<a href="#">Pinnacles of the Bonaparte Basin</a>	North
<a href="#">Pinnacles of the Bonaparte Basin</a>	North-west

Name	Region
<a href="#">Seringapatam Reef and Commonwealth waters in the Scott Reef Complex</a>	North-west
<a href="#">Shelf break and slope of the Arafura Shelf</a>	North
<a href="#">Tributary Canyons of the Arafura Depression</a>	North

## Biologically Important Areas

Scientific Name	Behaviour	Presence
<b>Dugong</b>		
<a href="#">Dugong dugon</a>		
Dugong [28]	Breeding	Known to occur
<a href="#">Dugong dugon</a>		
Dugong [28]	Calving	Known to occur
<a href="#">Dugong dugon</a>		
Dugong [28]	Foraging	Known to occur
<a href="#">Dugong dugon</a>		
Dugong [28]	Foraging (high density seagrass beds)	Known to occur
<a href="#">Dugong dugon</a>		
Dugong [28]	Nursing	Known to occur
<b>Marine Turtles</b>		
<a href="#">Caretta caretta</a>		
Loggerhead Turtle [1763]	Foraging	Known to occur
<a href="#">Chelonia mydas</a>		
Green Turtle [1765]	Foraging	Likely to occur
<a href="#">Chelonia mydas</a>		
Green Turtle [1765]	Internesting	Likely to occur
<a href="#">Chelonia mydas</a>		
Green Turtle [1765]	Internesting buffer	Likely to occur
<a href="#">Chelonia mydas</a>		
Green Turtle [1765]	Internesting buffer	Known to occur
<a href="#">Chelonia mydas</a>		
Green Turtle [1765]	Mating	Likely to occur

Scientific Name	Behaviour	Presence
<a href="#">Chelonia mydas</a> Green Turtle [1765]	Nesting	Likely to occur
<a href="#">Chelonia mydas</a> Green Turtle [1765]	Nesting	Known to occur
<a href="#">Eretmochelys imbricata</a> Hawksbill Turtle [1766]	Foraging	Likely to occur
<a href="#">Eretmochelys imbricata</a> Hawksbill Turtle [1766]	Internesting	Likely to occur
<a href="#">Eretmochelys imbricata</a> Hawksbill Turtle [1766]	Internesting buffer	Likely to occur
<a href="#">Eretmochelys imbricata</a> Hawksbill Turtle [1766]	Internesting buffer	Known to occur
<a href="#">Eretmochelys imbricata</a> Hawksbill Turtle [1766]	Nesting	Known to occur
<a href="#">Eretmochelys imbricata</a> Hawksbill Turtle [1766]	Nesting	Likely to occur
<a href="#">Lepidochelys olivacea</a> Olive Ridley Turtle [1767]	Foraging	Known to occur
<a href="#">Lepidochelys olivacea</a> Olive Ridley Turtle [1767]	Internesting	Likely to occur
<a href="#">Natator depressus</a> Flatback Turtle [59257]	Foraging	Known to occur
<a href="#">Natator depressus</a> Flatback Turtle [59257]	Internesting	Likely to occur
<b>Seabirds</b>		
<a href="#">Ardena pacifica</a> Wedge-tailed Shearwater [84292]	Breeding	Known to occur
<a href="#">Fregata ariel</a> Lesser Frigatebird [1012]	Breeding	Known to occur
<a href="#">Fregata minor</a> Greater Frigatebird [1013]	Breeding	Known to occur

Scientific Name	Behaviour	Presence
<a href="#">Phaethon lepturus</a> White-tailed Tropicbird [1014]	Breeding	Known to occur
<a href="#">Sterna dougallii</a> Roseate Tern [817]	Breeding	Known to occur
<a href="#">Sternula albifrons sinensis</a> Little Tern [82850]	Resting	Known to occur
<a href="#">Sula leucogaster</a> Brown Booby [1022]	Breeding	Known to occur
<a href="#">Sula sula</a> Red-footed Booby [1023]	Breeding	Known to occur
<a href="#">Thalasseus bengalensis</a> Lesser Crested Tern [66546]	Breeding	Known to occur

## Sharks

<a href="#">Rhincodon typus</a> Whale Shark [66680]	Foraging	Known to occur
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## Whales

<a href="#">Balaenoptera musculus brevicauda</a> Pygmy Blue Whale [81317]	Distribution	Known to occur
<a href="#">Balaenoptera musculus brevicauda</a> Pygmy Blue Whale [81317]	Foraging	Known to occur
<a href="#">Balaenoptera musculus brevicauda</a> Pygmy Blue Whale [81317]	Migration	Known to occur

# Caveat

## 1 PURPOSE

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

The report contains the mapped locations of:

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

## 2 DISCLAIMER

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

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

## 3 DATA SOURCES

Threatened ecological communities

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

Threatened, migratory and marine species

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

Where little information is available for a species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc.).

In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More detailed distribution mapping methods are used to update these distributions

## 4 LIMITATIONS

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

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

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

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

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

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

# Acknowledgements

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

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

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

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

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# EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected. Please see the caveat for interpretation of information provided here.

Report created: 01-Jun-2023

[Summary](#)

[Details](#)

[Matters of NES](#)

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

[Extra Information](#)

[Caveat](#)

[Acknowledgements](#)



# Summary

## Matters of National Environment Significance

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

<a href="#">World Heritage Properties:</a>	None
<a href="#">National Heritage Places:</a>	None
<a href="#">Wetlands of International Importance (Ramsar)</a>	None
<a href="#">Great Barrier Reef Marine Park:</a>	None
<a href="#">Commonwealth Marine Area:</a>	4
<a href="#">Listed Threatened Ecological Communities:</a>	None
<a href="#">Listed Threatened Species:</a>	22
<a href="#">Listed Migratory Species:</a>	38

## Other Matters Protected by the EPBC Act

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

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

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

<a href="#">Commonwealth Lands:</a>	None
<a href="#">Commonwealth Heritage Places:</a>	None
<a href="#">Listed Marine Species:</a>	74
<a href="#">Whales and Other Cetaceans:</a>	26
<a href="#">Critical Habitats:</a>	None
<a href="#">Commonwealth Reserves Terrestrial:</a>	None
<a href="#">Australian Marine Parks:</a>	6
<a href="#">Habitat Critical to the Survival of Marine Turtles:</a>	None

## Extra Information

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

<a href="#">State and Territory Reserves:</a>	None
<a href="#">Regional Forest Agreements:</a>	None
<a href="#">Nationally Important Wetlands:</a>	None
<a href="#">EPBC Act Referrals:</a>	42
<a href="#">Key Ecological Features (Marine):</a>	5
<a href="#">Biologically Important Areas:</a>	4
<a href="#">Bioregional Assessments:</a>	None
<a href="#">Geological and Bioregional Assessments:</a>	None

# Details

## Matters of National Environmental Significance

### Commonwealth Marine Area

[\[ Resource Information \]](#)

Approval is required for a proposed activity that is located within the Commonwealth Marine Area which has, will have, or is likely to have a significant impact on the environment. Approval may be required for a proposed action taken outside a Commonwealth Marine Area but which has, may have or is likely to have a significant impact on the environment in the Commonwealth Marine Area.

#### Feature Name

EEZ and Territorial Sea

Extended Continental Shelf

Extended Continental Shelf

Extended Continental Shelf

### Listed Threatened Species

[\[ Resource Information \]](#)

Status of Conservation Dependent and Extinct are not MNES under the EPBC Act.

Number is the current name ID.

#### Scientific Name

#### Threatened Category

#### Presence Text

#### BIRD

##### [Calidris canutus](#)

Red Knot, Knot [855]

Endangered

Species or species habitat may occur within area

##### [Calidris ferruginea](#)

Curlew Sandpiper [856]

Critically Endangered

Species or species habitat may occur within area

##### [Numenius madagascariensis](#)

Eastern Curlew, Far Eastern Curlew [847]

Critically Endangered

Species or species habitat may occur within area

#### FISH

##### [Thunnus maccoyii](#)

Southern Bluefin Tuna [69402]

Conservation Dependent

Species or species habitat likely to occur within area

#### MAMMAL

Scientific Name	Threatened Category	Presence Text
<a href="#">Balaenoptera borealis</a> Sei Whale [34]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Balaenoptera musculus</a> Blue Whale [36]	Endangered	Species or species habitat likely to occur within area
<a href="#">Balaenoptera physalus</a> Fin Whale [37]	Vulnerable	Species or species habitat likely to occur within area

## REPTILE

<a href="#">Aipysurus apraefrontalis</a> Short-nosed Seasnake [1115]	Critically Endangered	Species or species habitat likely to occur within area
<a href="#">Aipysurus foliosquama</a> Leaf-scaled Seasnake [1118]	Critically Endangered	Species or species habitat may occur within area
<a href="#">Caretta caretta</a> Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour likely to occur within area
<a href="#">Chelonia mydas</a> Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
<a href="#">Dermochelys coriacea</a> Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour likely to occur within area
<a href="#">Eretmochelys imbricata</a> Hawksbill Turtle [1766]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
<a href="#">Lepidochelys olivacea</a> Olive Ridley Turtle, Pacific Ridley Turtle [1767]	Endangered	Foraging, feeding or related behaviour known to occur within area

Scientific Name	Threatened Category	Presence Text
<a href="#">Natator depressus</a> Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area

## SHARK

<a href="#">Carcharodon carcharias</a> White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat may occur within area
<a href="#">Glyphis garricki</a> Northern River Shark, New Guinea River Shark [82454]	Endangered	Species or species habitat may occur within area
<a href="#">Glyphis glyphis</a> Speartooth Shark [82453]	Critically Endangered	Species or species habitat may occur within area
<a href="#">Pristis pristis</a> Freshwater Sawfish, Largetooth Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish [60756]	Vulnerable	Species or species habitat may occur within area
<a href="#">Pristis zijsron</a> Green Sawfish, Dindagubba, Narrowsnout Sawfish [68442]	Vulnerable	Species or species habitat known to occur within area
<a href="#">Rhincodon typus</a> Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area
<a href="#">Sphyrna lewini</a> Scalloped Hammerhead [85267]	Conservation Dependent	Species or species habitat known to occur within area

## Listed Migratory Species

[ [Resource Information](#) ]

Scientific Name	Threatened Category	Presence Text
<b>Migratory Marine Birds</b>		
<a href="#">Anous stolidus</a> Common Noddy [825]		Species or species habitat may occur within area
<a href="#">Calonectris leucomelas</a> Streaked Shearwater [1077]		Species or species habitat likely to occur within area

Scientific Name	Threatened Category	Presence Text
<a href="#">Fregata ariel</a> Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat likely to occur within area
<a href="#">Fregata minor</a> Great Frigatebird, Greater Frigatebird [1013]		Species or species habitat likely to occur within area
<a href="#">Phaethon lepturus</a> White-tailed Tropicbird [1014]		Species or species habitat likely to occur within area
<b>Migratory Marine Species</b>		
<a href="#">Anoxypristis cuspidata</a> Narrow Sawfish, Knifetooth Sawfish [68448]		Species or species habitat may occur within area
<a href="#">Balaenoptera borealis</a> Sei Whale [34]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Balaenoptera edeni</a> Bryde's Whale [35]		Species or species habitat may occur within area
<a href="#">Balaenoptera musculus</a> Blue Whale [36]	Endangered	Species or species habitat likely to occur within area
<a href="#">Balaenoptera physalus</a> Fin Whale [37]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Carcharhinus longimanus</a> Oceanic Whitetip Shark [84108]		Species or species habitat may occur within area
<a href="#">Carcharodon carcharias</a> White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat may occur within area
<a href="#">Caretta caretta</a> Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour likely to occur within area

Scientific Name	Threatened Category	Presence Text
<a href="#">Chelonia mydas</a> Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
<a href="#">Crocodylus porosus</a> Salt-water Crocodile, Estuarine Crocodile [1774]		Species or species habitat likely to occur within area
<a href="#">Dermochelys coriacea</a> Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour likely to occur within area
<a href="#">Eretmochelys imbricata</a> Hawksbill Turtle [1766]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
<a href="#">Isurus oxyrinchus</a> Shortfin Mako, Mako Shark [79073]		Species or species habitat likely to occur within area
<a href="#">Isurus paucus</a> Longfin Mako [82947]		Species or species habitat likely to occur within area
<a href="#">Lepidochelys olivacea</a> Olive Ridley Turtle, Pacific Ridley Turtle [1767]	Endangered	Foraging, feeding or related behaviour known to occur within area
<a href="#">Megaptera novaeangliae</a> Humpback Whale [38]		Species or species habitat likely to occur within area
<a href="#">Mobula alfredi as Manta alfredi</a> Reef Manta Ray, Coastal Manta Ray [90033]		Species or species habitat likely to occur within area
<a href="#">Mobula birostris as Manta birostris</a> Giant Manta Ray [90034]		Species or species habitat likely to occur within area

Scientific Name	Threatened Category	Presence Text
<a href="#">Natator depressus</a> Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
<a href="#">Orcaella heinsohni</a> Australian Snubfin Dolphin [81322]		Species or species habitat may occur within area
<a href="#">Orcinus orca</a> Killer Whale, Orca [46]		Species or species habitat may occur within area
<a href="#">Physeter macrocephalus</a> Sperm Whale [59]		Species or species habitat may occur within area
<a href="#">Pristis pristis</a> Freshwater Sawfish, Largetooth Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish [60756]	Vulnerable	Species or species habitat may occur within area
<a href="#">Pristis zijsron</a> Green Sawfish, Dindagubba, Narrowsnout Sawfish [68442]	Vulnerable	Species or species habitat known to occur within area
<a href="#">Rhincodon typus</a> Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area
<a href="#">Sousa sahalensis as Sousa chinensis</a> Australian Humpback Dolphin [87942]		Species or species habitat may occur within area
<a href="#">Tursiops aduncus (Arafura/Timor Sea populations)</a> Spotted Bottlenose Dolphin (Arafura/Timor Sea populations) [78900]		Species or species habitat may occur within area
<b>Migratory Wetlands Species</b>		
<a href="#">Actitis hypoleucos</a> Common Sandpiper [59309]		Species or species habitat may occur within area
<a href="#">Calidris acuminata</a> Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
<a href="#">Calidris canutus</a> Red Knot, Knot [855]	Endangered	Species or species habitat may occur within area
<a href="#">Calidris ferruginea</a> Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
<a href="#">Calidris melanotos</a> Pectoral Sandpiper [858]		Species or species habitat may occur within area
<a href="#">Numenius madagascariensis</a> Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area

## Other Matters Protected by the EPBC Act

Listed Marine Species		[ <a href="#">Resource Information</a> ]
Scientific Name	Threatened Category	Presence Text
Bird		
<a href="#">Actitis hypoleucos</a> Common Sandpiper [59309]		Species or species habitat may occur within area
<a href="#">Anous stolidus</a> Common Noddy [825]		Species or species habitat may occur within area
<a href="#">Calidris acuminata</a> Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
<a href="#">Calidris canutus</a> Red Knot, Knot [855]	Endangered	Species or species habitat may occur within area overfly marine area
<a href="#">Calidris ferruginea</a> Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area overfly marine area



Scientific Name	Threatened Category	Presence Text
<a href="#">Calidris melanotos</a> Pectoral Sandpiper [858]		Species or species habitat may occur within area overfly marine area
<a href="#">Calonectris leucomelas</a> Streaked Shearwater [1077]		Species or species habitat likely to occur within area
<a href="#">Fregata ariel</a> Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat likely to occur within area
<a href="#">Fregata minor</a> Great Frigatebird, Greater Frigatebird [1013]		Species or species habitat likely to occur within area
<a href="#">Numenius madagascariensis</a> Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
<a href="#">Phaethon lepturus</a> White-tailed Tropicbird [1014]		Species or species habitat likely to occur within area
<b>Fish</b>		
<a href="#">Bhanotia fasciolata</a> Corrugated Pipefish, Barbed Pipefish [66188]		Species or species habitat may occur within area
<a href="#">Campichthys tricarinatus</a> Three-keel Pipefish [66192]		Species or species habitat may occur within area
<a href="#">Choeroichthys brachysoma</a> Pacific Short-bodied Pipefish, Short-bodied Pipefish [66194]		Species or species habitat may occur within area
<a href="#">Choeroichthys suillus</a> Pig-snouted Pipefish [66198]		Species or species habitat may occur within area
<a href="#">Corythoichthys amplexus</a> Fijian Banded Pipefish, Brown-banded Pipefish [66199]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
<a href="#">Corythoichthys flavofasciatus</a> Reticulate Pipefish, Yellow-banded Pipefish, Network Pipefish [66200]		Species or species habitat may occur within area
<a href="#">Corythoichthys haematopterus</a> Reef-top Pipefish [66201]		Species or species habitat may occur within area
<a href="#">Corythoichthys intestinalis</a> Australian Messmate Pipefish, Banded Pipefish [66202]		Species or species habitat may occur within area
<a href="#">Corythoichthys schultzi</a> Schultz's Pipefish [66205]		Species or species habitat may occur within area
<a href="#">Cosmocampus banneri</a> Roughridge Pipefish [66206]		Species or species habitat may occur within area
<a href="#">Doryrhamphus dactyliophorus</a> Banded Pipefish, Ringed Pipefish [66210]		Species or species habitat may occur within area
<a href="#">Doryrhamphus excisus</a> Bluestripe Pipefish, Indian Blue-stripe Pipefish, Pacific Blue-stripe Pipefish [66211]		Species or species habitat may occur within area
<a href="#">Doryrhamphus janssi</a> Cleaner Pipefish, Janss' Pipefish [66212]		Species or species habitat may occur within area
<a href="#">Festucalex cinctus</a> Girdled Pipefish [66214]		Species or species habitat may occur within area
<a href="#">Filicampus tigris</a> Tiger Pipefish [66217]		Species or species habitat may occur within area
<a href="#">Halicampus brocki</a> Brock's Pipefish [66219]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
<a href="#">Halicampus dunckeri</a> Red-hair Pipefish, Duncker's Pipefish [66220]		Species or species habitat may occur within area
<a href="#">Halicampus grayi</a> Mud Pipefish, Gray's Pipefish [66221]		Species or species habitat may occur within area
<a href="#">Halicampus spirostris</a> Spiny-snout Pipefish [66225]		Species or species habitat may occur within area
<a href="#">Haliichthys taeniophorus</a> Ribbioned Pipehorse, Ribbioned Seadragon [66226]		Species or species habitat may occur within area
<a href="#">Hippichthys cyanospilos</a> Blue-speckled Pipefish, Blue-spotted Pipefish [66228]		Species or species habitat may occur within area
<a href="#">Hippichthys parvicarinatus</a> Short-keel Pipefish, Short-keeled Pipefish [66230]		Species or species habitat may occur within area
<a href="#">Hippichthys penicillus</a> Beady Pipefish, Steep-nosed Pipefish [66231]		Species or species habitat may occur within area
<a href="#">Hippocampus histrix</a> Spiny Seahorse, Thorny Seahorse [66236]		Species or species habitat may occur within area
<a href="#">Hippocampus kuda</a> Spotted Seahorse, Yellow Seahorse [66237]		Species or species habitat may occur within area
<a href="#">Hippocampus planifrons</a> Flat-face Seahorse [66238]		Species or species habitat may occur within area
<a href="#">Hippocampus spinosissimus</a> Hedgehog Seahorse [66239]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
<a href="#">Micrognathus micronotopterus</a> Tidepool Pipefish [66255]		Species or species habitat may occur within area
<a href="#">Solegnathus hardwickii</a> Pallid Pipehorse, Hardwick's Pipehorse [66272]		Species or species habitat may occur within area
<a href="#">Solegnathus lettiensis</a> Gunther's Pipehorse, Indonesian Pipefish [66273]		Species or species habitat may occur within area
<a href="#">Solenostomus cyanopterus</a> Robust Ghostpipefish, Blue-finned Ghost Pipefish, [66183]		Species or species habitat may occur within area
<a href="#">Syngnathoides biaculeatus</a> Double-end Pipehorse, Double-ended Pipehorse, Alligator Pipefish [66279]		Species or species habitat may occur within area
<a href="#">Trachyrhamphus bicoarctatus</a> Bentstick Pipefish, Bend Stick Pipefish, Short-tailed Pipefish [66280]		Species or species habitat may occur within area
<a href="#">Trachyrhamphus longirostris</a> Straightstick Pipefish, Long-nosed Pipefish, Straight Stick Pipefish [66281]		Species or species habitat may occur within area
<b>Reptile</b>		
<a href="#">Acalyptophis peronii</a> Horned Seasnake [1114]		Species or species habitat may occur within area
<a href="#">Aipysurus apraefrontalis</a> Short-nosed Seasnake [1115]	Critically Endangered	Species or species habitat likely to occur within area
<a href="#">Aipysurus duboisii</a> Dubois' Seasnake [1116]		Species or species habitat may occur within area
<a href="#">Aipysurus eydouxii</a> Spine-tailed Seasnake [1117]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
<a href="#">Aipysurus foliosquama</a> Leaf-scaled Seasnake [1118]	Critically Endangered	Species or species habitat may occur within area
<a href="#">Aipysurus laevis</a> Olive Seasnake [1120]		Species or species habitat may occur within area
<a href="#">Astrotia stokesii</a> Stokes' Seasnake [1122]		Species or species habitat may occur within area
<a href="#">Caretta caretta</a> Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour likely to occur within area
<a href="#">Chelonia mydas</a> Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
<a href="#">Chitulia inornata as Hydrophis inornatus</a> Plain Seasnake [87379]		Species or species habitat may occur within area
<a href="#">Chitulia ornata as Hydrophis ornatus</a> Spotted Seasnake, Ornate Reef Seasnake [87377]		Species or species habitat may occur within area
<a href="#">Crocodylus porosus</a> Salt-water Crocodile, Estuarine Crocodile [1774]		Species or species habitat likely to occur within area
<a href="#">Dermochelys coriacea</a> Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour likely to occur within area
<a href="#">Disteira kingii</a> Spectacled Seasnake [1123]		Species or species habitat may occur within area
<a href="#">Disteira major</a> Olive-headed Seasnake [1124]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
<a href="#">Emydocephalus annulatus</a> Turtle-headed Seasnake [1125]		Species or species habitat may occur within area
<a href="#">Enhydrina schistosa</a> Beaked Seasnake [1126]		Species or species habitat may occur within area
<a href="#">Eretmochelys imbricata</a> Hawksbill Turtle [1766]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
<a href="#">Hydrophis atriceps</a> Black-headed Seasnake [1101]		Species or species habitat may occur within area
<a href="#">Hydrophis elegans</a> Elegant Seasnake [1104]		Species or species habitat may occur within area
<a href="#">Hydrophis macdowelli as Hydrophis mcdowelli</a> Small-headed Seasnake [75601]		Species or species habitat may occur within area
<a href="#">Lapemis curtus as Lapemis hardwickii</a> Spine-bellied Seasnake [83554]		Species or species habitat may occur within area
<a href="#">Leioselasma coggeri as Hydrophis coggeri</a> Black-headed Sea Snake, Slender-necked Seasnake [87373]		Species or species habitat may occur within area
<a href="#">Leioselasma czeblukovi as Hydrophis czeblukovi</a> Fine-spined Seasnake, Geometrical Seasnake [87374]		Species or species habitat may occur within area
<a href="#">Leioselasma pacifica as Hydrophis pacificus</a> Large-headed Seasnake, Pacific Seasnake [87378]		Species or species habitat may occur within area
<a href="#">Lepidochelys olivacea</a> Olive Ridley Turtle, Pacific Ridley Turtle [1767]	Endangered	Foraging, feeding or related behaviour known to occur within area

Scientific Name	Threatened Category	Presence Text
<a href="#">Natator depressus</a> Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
<a href="#">Parahydrophis mertoni</a> Northern Mangrove Seasnake [1090]		Species or species habitat may occur within area
<a href="#">Pelamis platurus</a> Yellow-bellied Seasnake [1091]		Species or species habitat may occur within area

## Whales and Other Cetaceans [ [Resource Information](#) ]

Current Scientific Name	Status	Type of Presence
Mammal		
<a href="#">Balaenoptera borealis</a> Sei Whale [34]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Balaenoptera edeni</a> Bryde's Whale [35]		Species or species habitat may occur within area
<a href="#">Balaenoptera musculus</a> Blue Whale [36]	Endangered	Species or species habitat likely to occur within area
<a href="#">Balaenoptera physalus</a> Fin Whale [37]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Delphinus delphis</a> Common Dolphin, Short-beaked Common Dolphin [60]		Species or species habitat may occur within area
<a href="#">Feresa attenuata</a> Pygmy Killer Whale [61]		Species or species habitat may occur within area
<a href="#">Globicephala macrorhynchus</a> Short-finned Pilot Whale [62]		Species or species habitat may occur within area

Current Scientific Name	Status	Type of Presence
<a href="#">Grampus griseus</a> Risso's Dolphin, Grampus [64]		Species or species habitat may occur within area
<a href="#">Kogia breviceps</a> Pygmy Sperm Whale [57]		Species or species habitat may occur within area
<a href="#">Kogia sima</a> Dwarf Sperm Whale [85043]		Species or species habitat may occur within area
<a href="#">Megaptera novaeangliae</a> Humpback Whale [38]		Species or species habitat likely to occur within area
<a href="#">Mesoplodon densirostris</a> Blainville's Beaked Whale, Dense-beaked Whale [74]		Species or species habitat may occur within area
<a href="#">Orcaella heinsohni</a> Australian Snubfin Dolphin [81322]		Species or species habitat may occur within area
<a href="#">Orcinus orca</a> Killer Whale, Orca [46]		Species or species habitat may occur within area
<a href="#">Peponocephala electra</a> Melon-headed Whale [47]		Species or species habitat may occur within area
<a href="#">Physeter macrocephalus</a> Sperm Whale [59]		Species or species habitat may occur within area
<a href="#">Pseudorca crassidens</a> False Killer Whale [48]		Species or species habitat likely to occur within area
<a href="#">Sousa sahalensis</a> Australian Humpback Dolphin [87942]		Species or species habitat may occur within area



Current Scientific Name	Status	Type of Presence
<a href="#">Stenella attenuata</a> Spotted Dolphin, Pantropical Spotted Dolphin [51]		Species or species habitat may occur within area
<a href="#">Stenella coeruleoalba</a> Striped Dolphin, Euphrosyne Dolphin [52]		Species or species habitat may occur within area
<a href="#">Stenella longirostris</a> Long-snouted Spinner Dolphin [29]		Species or species habitat may occur within area
<a href="#">Steno bredanensis</a> Rough-toothed Dolphin [30]		Species or species habitat may occur within area
<a href="#">Tursiops aduncus</a> Indian Ocean Bottlenose Dolphin, Spotted Bottlenose Dolphin [68418]		Species or species habitat may occur within area
<a href="#">Tursiops aduncus (Arafura/Timor Sea populations)</a> Spotted Bottlenose Dolphin (Arafura/Timor Sea populations) [78900]		Species or species habitat may occur within area
<a href="#">Tursiops truncatus s. str.</a> Bottlenose Dolphin [68417]		Species or species habitat may occur within area
<a href="#">Ziphius cavirostris</a> Cuvier's Beaked Whale, Goose-beaked Whale [56]		Species or species habitat may occur within area

Australian Marine Parks		[ Resource Information ]
Park Name	Zone & IUCN Categories	
Oceanic Shoals	Habitat Protection Zone (IUCN IV)	
Arafura	Multiple Use Zone (IUCN VI)	
Oceanic Shoals	Multiple Use Zone (IUCN VI)	
Oceanic Shoals	Multiple Use Zone (IUCN VI)	
Arafura	Special Purpose Zone (Trawl) (IUCN VI)	

Park Name	Zone & IUCN Categories
Oceanic Shoals	Special Purpose Zone (Trawl) (IUCN VI)

## Extra Information

### EPBC Act Referrals [ [Resource Information](#) ]

Title of referral	Reference	Referral Outcome	Assessment Status
<a href="#">Northern Endeavour Phase 1 Decommissioning</a>	2022/09327		Assessment

### Controlled action

<a href="#">Decommissioning of Buffalo Oil Field</a>	2003/984	Controlled Action	Post-Approval
<a href="#">Floating Liquefied Natural Gas facility</a>	2001/533	Controlled Action	Completed
<a href="#">Tassie Shoal Gas Reforming and Methanol Production Plants - NT/P48</a>	2000/108	Controlled Action	Post-Approval
<a href="#">Tassie Shoal LNG Project</a>	2003/1067	Controlled Action	Post-Approval

### Not controlled action

<a href="#">Barossa-1 (NT/P69), Caldita-2 (NT/P61) exploration wells</a>	2006/2793	Not Controlled Action	Completed
<a href="#">Buffalo In-Fill Production Wells</a>	2001/475	Not Controlled Action	Completed
<a href="#">Caldita-1 Hydrocarbon Exploration Well, NT/P61</a>	2004/1854	Not Controlled Action	Completed
<a href="#">Controlled Source Electromagnetic 2D Survey</a>	2009/4980	Not Controlled Action	Completed
<a href="#">Controlled Source Electromagnetic Survey</a>	2010/5434	Not Controlled Action	Completed
<a href="#">Geo-scientific survey</a>	2005/2004	Not Controlled Action	Completed
<a href="#">NT/P68 2007 Two Well Drilling Program</a>	2007/3569	Not Controlled Action	Completed

Title of referral	Reference	Referral Outcome	Assessment Status
<b>Not controlled action</b>			
<a href="#">Woodside Geotechnical Investigation Sunrise Bank</a>	2000/13	Not Controlled Action	Completed
<b>Not controlled action (particular manner)</b>			
<a href="#">2D and 3D Seismic Survey</a>	2011/6197	Not Controlled Action (Particular Manner)	Post-Approval
<a href="#">2D Marine Seismic Survey</a>	2009/4728	Not Controlled Action (Particular Manner)	Post-Approval
<a href="#">2D marine seismic survey of Braveheart, Kurrajong, Sunshine and Crocodile</a>	2006/2917	Not Controlled Action (Particular Manner)	Post-Approval
<a href="#">2D or 3D Marine Seismic Survey in Petroleum Permit Area AC/P35</a>	2009/4864	Not Controlled Action (Particular Manner)	Post-Approval
<a href="#">2D Seismic survey</a>	2009/5076	Not Controlled Action (Particular Manner)	Post-Approval
<a href="#">2D Seismic Survey - Petroleum Exploration Area NT/P68, Eastern Bonaparte Basin</a>	2006/2922	Not Controlled Action (Particular Manner)	Post-Approval
<a href="#">3D Seismic Survey</a>	2006/2729	Not Controlled Action (Particular Manner)	Post-Approval
<a href="#">3D Seismic Survey (NT/P68)</a>	2008/4121	Not Controlled Action (Particular Manner)	Post-Approval
<a href="#">3D Seismic Survey (NT/P68)</a>	2006/2980	Not Controlled Action (Particular Manner)	Post-Approval
<a href="#">3D Seismic Survey WA-406-P Bonaparte Basin</a>	2007/3904	Not Controlled Action (Particular Manner)	Post-Approval
<a href="#">Auralandia 3D marine seismic survey</a>	2011/5961	Not Controlled Action (Particular Manner)	Post-Approval

Title of referral	Reference	Referral Outcome	Assessment Status
<b>Not controlled action (particular manner)</b>			
<a href="#">Bonaparte 2D &amp; 3D marine seismic survey</a>	2011/5962	Not Controlled Action (Particular Manner)	Post-Approval
<a href="#">Bonaparte 3D &amp; 2D Seismic Survey, in NT/P82, Timor Sea</a>	2012/6398	Not Controlled Action (Particular Manner)	Post-Approval
<a href="#">Bonaparte Basin Barossa Appraisal Drilling Campaign, NT</a>	2012/6481	Not Controlled Action (Particular Manner)	Post-Approval
<a href="#">Bonaparte Basin Seabed Mapping Survey</a>	2009/4951	Not Controlled Action (Particular Manner)	Post-Approval
<a href="#">Caldita 3D Marine Seismic Survey - NT/P61, NT/P69, and acreage release area NT06-5</a>	2006/3142	Not Controlled Action (Particular Manner)	Post-Approval
<a href="#">Eni Bathurst 3D Seismic Survey</a>	2011/6118	Not Controlled Action (Particular Manner)	Post-Approval
<a href="#">Joseph Bonaparte Gulf Seabed mapping survey</a>	2010/5517	Not Controlled Action (Particular Manner)	Post-Approval
<a href="#">Kingtree &amp; Ironstone-1 Exploration Wells</a>	2011/5935	Not Controlled Action (Particular Manner)	Post-Approval
<a href="#">NT/P74 &amp; NT/P75 - 2D marine seismic survey</a>	2008/4316	Not Controlled Action (Particular Manner)	Post-Approval
<a href="#">Offshore Fibre Optic Cable Network Construction &amp; Operation, Port Hedland WA to Darwin NT</a>	2014/7223	Not Controlled Action (Particular Manner)	Post-Approval
<a href="#">Panda NT/P76 3D Seismic Acquisition Survey Program</a>	2009/4992	Not Controlled Action (Particular Manner)	Post-Approval
<a href="#">Songa Venus Drilling Programme, Bonaparte Basin</a>	2009/4990	Not Controlled Action (Particular	Post-Approval

Title of referral	Reference	Referral Outcome	Assessment Status
<b>Not controlled action (particular manner)</b>			
		Manner)	
<a href="#">Sunshine Infill 2D and Mimosa 2D Marine Seismic Surveys</a>	2009/4699	Not Controlled Action (Particular Manner)	Post-Approval
<a href="#">Ursa 3D Marine Seismic Survey</a>	2008/4634	Not Controlled Action (Particular Manner)	Post-Approval
<a href="#">Vampire 2D Non Exclusive Seismic Survey, WA</a>	2010/5543	Not Controlled Action (Particular Manner)	Post-Approval
<a href="#">Westralia SPAN Marine Seismic Survey, WA &amp; NT</a>	2012/6463	Not Controlled Action (Particular Manner)	Post-Approval

<b>Referral decision</b>			
<a href="#">2D Marine Seismic Survey</a>	2008/4623	Referral Decision	Completed
<a href="#">3D Seismic Survey (NT/P68)</a>	2006/2949	Referral Decision	Completed

## Key Ecological Features [\[ Resource Information \]](#)

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

Name	Region
<a href="#">Carbonate bank and terrace system of the Sahul Shelf</a>	North-west
<a href="#">Carbonate bank and terrace system of the Van Diemen Rise</a>	North
<a href="#">Pinnacles of the Bonaparte Basin</a>	North
<a href="#">Shelf break and slope of the Arafura Shelf</a>	North
<a href="#">Tributary Canyons of the Arafura Depression</a>	North

## Biologically Important Areas

Scientific Name	Behaviour	Presence
<b>Marine Turtles</b>		
<a href="#">Lepidochelys olivacea</a>		
Olive Ridley Turtle [1767]	Foraging	Known to occur

Scientific Name	Behaviour	Presence
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[Natator depressus](#)

Flatback Turtle [59257]

Internesting

Likely to occur

## Whales

[Balaenoptera musculus brevicauda](#)

Pygmy Blue Whale [81317]

Distribution

Known to occur

[Balaenoptera musculus brevicauda](#)

Pygmy Blue Whale [81317]

Migration

Known to occur

# Caveat

## 1 PURPOSE

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

The report contains the mapped locations of:

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

## 2 DISCLAIMER

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

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

## 3 DATA SOURCES

Threatened ecological communities

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

Threatened, migratory and marine species

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

Where little information is available for a species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc.).

In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More detailed distribution mapping methods are used to update these distributions

## 4 LIMITATIONS

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

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

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

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

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

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

# Acknowledgements

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

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

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



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

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**APPENDIX E - RELEVANT PERSONS CONSULTATION  
SUMMARY FOR DRILLING AND COMPLETIONS  
ENVIRONMENT PLAN REVISION 3**

**Table 4-2: Relevant persons consultation summary**

Relevant person	Relevant persons consultation summary (OPGGs(E) Regulation 16 (b)(i))	
Commonwealth departments/agencies		
Australian Communications and Media Authority (ACMA)	<p>ACMA was provided the Barossa Development Drilling and Completions Stakeholder Consultation package via email on 11 June 2021 inviting comment.</p> <p>ACMA was provided a follow-up email on 2 July 2021 inviting comment.</p> <p>ACMA responded via email on 7 July 2021 and advised that the proposed activities are not in the vicinity of any existing protection zones for subsea communications infrastructure and therefore it had no comments. ACMA encouraged Santos to contact the operator of any submarine cables in the area. <b>[CLAIM 001]</b></p> <p>Santos responded to ACMA on 15 July 2021 and addressed each of the matters raised in their correspondence of 7 July 2021.</p> <p>ACMA receives the Barossa Development Quarterly Consultation Update. The Q2 2021 Update was distributed on 11 June 2021.</p> <p>Santos considers the level of consultation to be adequate and will address any comments from this stakeholder should they arise in the future.</p>	
	<p><b>Assessment of the merits of objections and claims (OPGGs(E) Regulation 16 (b)(ii))</b></p>	<p><b>Statement of response, or proposed response, to the objections and claims (OPGGs(E) Regulation 16 (b)(iii))</b></p>
	<p><b>[CLAIM 001]</b> Santos reviewed ACMA’s advice and on assessment confirmed there are no operators of any submarine cables within the operational area.</p>	<p>Santos responded to ACMA on 15 July 2021 confirming the information would be taken into consideration in the drafting of the EP.</p> <p>Due to the absence of any submarine cables within the operational area (refer to <b>Section 3.2.6.4</b>) no further consultation or action related to this claim is required.</p>
Australian Fisheries Management Authority	<p>AFMA was provided the Barossa Development Drilling and Completions Stakeholder Consultation package via email on 11 June 2021 inviting comment.</p> <p>AFMA responded on 16 June 2021 and advised that due to limited resources, it is unable to comment on individual proposals; however, it is important to consult with all fishers who have entitlements to fish within the proposed area, either through the relevant fishing industry associations or directly with fishers who hold entitlements in the area. <b>[CLAIM 001]</b></p>	

Relevant person	Relevant persons consultation summary (OPGGs(E) Regulation 16 (b)(i))	
	<p>AFMA was provided a follow-up email on 2 July 2021 inviting any further comment.                      AFMA provided the same response (as above) on 5 July 2021.                      Santos responded to AFMA on 15 July 2021 and addressed each of the matters raised in their correspondence of 16 June and 5 July 2021.                      AFMA receives the Barossa Development Quarterly Consultation Update. The Q2 2021 Update was distributed on 11 June 2021.                      Santos considers the level of consultation to be adequate and will address any comments from this stakeholder should they arise in the future.</p>	
	Assessment of the merits of objections and claims (OPGGs(E) Regulation 16 (b)(ii))	Statement of response, or proposed response, to the objections and claims (OPGGs(E) Regulation 16 (b)(iii))
	<p><b>[CLAIM 001]</b> On assessment of the advice and in consideration of AFMA’s consultation guidelines, Santos identified the relevant commercial fishing organisations as the Northern Prawn Fishery Pty Ltd, NT Seafood Council, Commonwealth Fisheries Association and Australian Southern Bluefin Tuna Industry Association and consulted with these organisations as well as the lists of licence holders provided by AMSA and NT DITT-Fisheries as listed in <b>Table 4-1</b>.</p>	<p>Santos responded to AFMA on 15 July 2021 and advised that consultation with relevant commercial fishers has occurred as evidenced in <b>Table 4.2</b> and the <b>Sensitive Stakeholder Consultation Report</b>.                      All relevant fisheries are described in <b>Section 3.2.6.1</b>. Potential impacts and risks to fisheries and fishers (including traditional, recreational and commercial) have been assessed as environmentally acceptable and ALARP (primarily <b>Sections 6.4.4, 6.5.4, 6.6.4, 6.7.4, 7.6.4</b> and <b>7.7.4</b>).</p>
<p>Australian Hydrographic Office</p>	<p>AHO was provided the Barossa Development Drilling and Completions Stakeholder Consultation package via email on 11 June 2021 inviting comment.                      AHO acknowledged receipt of the email on 15 June 2021 and confirmed the data supplied would now be registered, assessed, prioritised and validated in preparation for updating AHO’s Navigational Charting products. <b>[CLAIM 001]</b>                      AHO was provided a follow-up email on 2 July 2021 inviting any further comment.                      AHO receives the Barossa Development Quarterly Consultation Update. The Q2 2021 Update was distributed on 11 June 2021.                      Santos considers the level of consultation to be adequate and will address any comments from this stakeholder should they arise in the future.</p>	
	Assessment of the merits of objections and claims (OPGGs(E) Regulation 16 (b)(ii))	Statement of response, or proposed response, to the objections and claims (OPGGs(E) Regulation 16 (b)(iii))
	<p><b>[CLAIM 001]</b> On assessment of the AHO’s advice, Santos reviewed its processes to ensure the AHO’s notification requirements will be part of the ongoing communications for this activity (refer to <b>Table 8-4</b>).</p>	<p>No response was required. The AHO’s notification requirements and advice will be part of the ongoing</p>

Relevant person	Relevant persons consultation summary (OPGGs(E) Regulation 16 (b)(i))	
		communications for this activity (refer to <b>Section 8.9.1</b> and <b>Section 4.5</b> ).
<p>Australian Maritime Safety Authority</p>	<p>AMSA was provided the Barossa Development Drilling and Completions Stakeholder Consultation package via email on 11 June 2021 inviting comment.</p> <p>AMSA was provided a follow-up email on 2 July 2021 inviting comment.</p> <p>AMSA responded on 6 July 2021 advising:</p> <p>Santos should contact AHO no less than four working weeks before operations, with relevant details. AHO will then promulgate the appropriate Notice to Mariners (NTM), which will ensure other vessels are informed of activities. <b>[CLAIM 001]</b></p> <p>Santos should notify AMSA’s Joint Rescue Coordination Centre (JRCC) for promulgation of radio-navigation warnings at least 24-48 hours before operations commence. JRCC will also need to be advised when operations start and end. <b>[CLAIM 002]</b></p> <p>Santos should plan to provide updates to both AHO and JRCC on progress and any changes to the intended operations. <b>[CLAIM 003]</b></p> <p>To obtain a vessel traffic plot showing Automatic Identification System (AIS) traffic data for the area of interest, Santos should visit AMSA’s spatial data gateway and portal to download digital data sets and maps. <b>[CLAIM 004]</b></p> <p>Vessels must comply with the International Rules for Preventing Collisions at Sea, in particular the use of appropriate lights and shapes to reflect the nature of operations. They should also ensure their navigation status is set correctly in the AIS unit. <b>[CLAIM 005]</b></p> <p>Santos responded to AMSA on 15 July 2021 and addressed each of the matters raised in their correspondence of 6 July 2021.</p> <p>AMSA also receives the Barossa Development Quarterly Consultation Update. The Q2 2021 Update was also distributed on 11 June 2021.</p> <p>Santos considers the level of consultation to be adequate and will address any comments from this stakeholder should they arise in the future.</p>	
	<p><b>Assessment of the merits of objections and claims (OPGGs(E) Regulation 16 (b)(ii))</b></p>	<p><b>Statement of response, or proposed response, to the objections and claims (OPGGs(E) Regulation 16 (b)(iii))</b></p>
	<p><b>[CLAIM 001] [CLAIM 002] [CLAIM 003] [CLAIM 004] [CLAIM 005]</b> On assessment of AMSA’s advice, Santos reviewed the ongoing communications plan and notification requirements for this EP (Refer <b>Table 8-4</b>).</p>	<p>Santos responded to AMSA on 15 July 2021 confirming its notification requirements and advice will be part of the ongoing communications for this activity and be addressed in the EP (Refer <b>Section 4.5</b> and <b>8.9.1</b>).</p>
<p>Department of Defence (DoD)</p>	<p>DoD was provided the Barossa Development Drilling and Completions Stakeholder Consultation package via email on 11 June 2021 inviting comment.</p> <p>DoD was provided a follow-up email on 2 July 2021 inviting comment. No response has been received.</p> <p>DoD receives the Barossa Development Quarterly Consultation Update. The Q2 2021 Update was also distributed on 11 June 2021.</p>	

Relevant person	Relevant persons consultation summary (OPGGG(E) Regulation 16 (b)(i))	
	Santos considers the level of consultation to be adequate and will address any comments from this stakeholder should they arise in the future.	
	Assessment of the merits of objections and claims (OPGGG(E) Regulation 16 (b)(ii))	Statement of response, or proposed response, to the objections and claims (OPGGG(E) Regulation 16 (b)(iii))
	No assessment required	No response required.
Department of Agriculture, Water and the Environment – Biosecurity (marine pests)	<p>DAWE – Biosecurity was provided the Barossa Development Drilling and Completions Stakeholder Consultation package via email on 11 June 2021 inviting comment.</p> <p>DAWE – Biosecurity responded on 30 June 2021, providing the following advice on the Australian Government’s vessel movement requirements:</p> <ul style="list-style-type: none"> <li>+ The department will assess whether the project and the level of biosecurity risk is low, within the meaning of the Biosecurity (Exposed Conveyances – Exceptions from Biosecurity Control ) Determination 2016; <b>[CLAIM 001]</b></li> <li>+ To have risk status assessed, offshore installation projects must apply to the department at least one month prior to the project’s commencement; <b>[CLAIM 002]</b></li> <li>+ Please review the department’s offshore installations webpage, Offshore Installations Biosecurity Guide, ballast water and biofouling requirements, pre-arrival reporting using MARS and airport biosecurity reporting requirements. <b>[CLAIM 003]</b></li> </ul> <p>DAWE – Biosecurity was provided a follow-up email on 2 July 2021 inviting any further comment.</p> <p>Santos responded to DAWE – Biosecurity on 15 July 2021 and addressed each of the matters raised in their correspondence of 30 June 2021.</p> <p>DAWE’s ongoing notification requirements will be part of the ongoing communications for this activity and are addressed in <b>Table 8-4</b>.</p> <p>DAWE also receives the Barossa Development Quarterly Consultation Update. The Q2 2021 Update was also distributed on 11 June 2021.</p> <p>Santos considers the level of consultation to be adequate and will address any comments from this stakeholder should they arise in the future.</p>	
	Assessment of the merits of objections and claims (OPGGG(E) Regulation 16 (b)(ii))	Statement of response, or proposed response, to the objections and claims (OPGGG(E) Regulation 16 (b)(iii))
	<p><b>[CLAIM 001] [CLAIM 002] [CLAIM 003]</b> On assessment of DAWE’s advice, Santos reviewed the biosecurity arrangements for this activity and inclusion of DAWE’s advice and requirements in this EP.</p>	<p>Santos responded to DAWE on 15 July 2021 confirming its requirements and advice will be addressed in the EP, including the application process that would be required for the DAWE biosecurity risk assessment.</p> <p>Management of invasive marine pest species is addressed in <b>Section 7.2</b> and notifications in <b>Section 8.9.1</b>.</p>

Relevant person	Relevant persons consultation summary (OPGGs(E) Regulation 16 (b)(i))	
Department of Agriculture, Water and the Environment – Fisheries	<p>DAWE – Fisheries was provided the Barossa Development Drilling and Completions Stakeholder Consultation package via email on 11 June 2021 inviting comment.</p> <p>DAWE – Fisheries was provided a follow-up email on 2 July 2021 inviting comment. No other response has been received.</p> <p>DAWE – Fisheries also receives the Barossa Development Quarterly Consultation Update. The Q2 2021 Update was also distributed on 11 June 2021.</p> <p>No response has been received. DAWE – Fisheries’ responsibilities in commercial fisheries management are filled by one of its agencies, the Australian Fisheries Management Authority, which is also consulted for this EP.</p> <p>Santos considers the level of consultation to be adequate and will address any comments from this stakeholder should they arise in the future.</p>	
	<b>Assessment of the merits of objections and claims (OPGGs(E) Regulation 16 (b)(ii))</b>	<b>Statement of response, or proposed response, to the objections and claims (OPGGs(E) Regulation 16 (b)(iii))</b>
	No assessment required.	No response required.
Department of Foreign Affairs and Trade (DFAT)	<p>DFAT was provided the Barossa Development Drilling and Completions Stakeholder Consultation package via email on 11 June 2021 inviting comment.</p> <p>DFAT was provided a follow-up email on 2 July 2021 inviting any further comment.</p> <p>DFAT responded via email on 5 July 2021, acknowledging receipt of Santos’ emails and advising it would respond if it had any comment. No response has been received.</p> <p>DFAT receives the Barossa Development Quarterly Consultation Update. The Q2 2021 Update was also distributed on 11 June 2021.</p> <p>Santos considers the level of consultation to be adequate and will address any comments from this stakeholder should they arise in the future.</p>	
	<b>Assessment of the merits of objections and claims (OPGGs(E) Regulation 16 (b)(ii))</b>	<b>Statement of response, or proposed response, to the objections and claims (OPGGs(E) Regulation 16 (b)(iii))</b>
	No assessment required.	No response required.
Director of National Parks (DNP)	<p>DNP was provided the Barossa Development Drilling and Completions Stakeholder Consultation package via email on 11 June 2021 inviting comment.</p> <p>DNP was provided a follow-up email on 2 July 2021 inviting comment.</p> <p>DNP provided feedback via email on 2 July 2021 with the key points summarised as follows:</p> <p>The planned activities do not overlap any Australian Marine Parks and are located around 50 km from the Oceanic Shoals Marine Park, therefore there are no authorisation requirements from the DNP. <b>[CLAIM 001]</b></p>	

Relevant person	Relevant persons consultation summary (OPGGs(E) Regulation 16 (b)(i))	
	<p>NOPSEMA has worked closely with Parks Australia to develop and publish a guidance note (N-04750-GN1785 A620236) that outlines what titleholders need to consider and evaluate when preparing an EP, including consideration of Australian marine parks and their representativeness. In the context of the management plan objectives and values, the EP should identify and manage all impacts and risks on Australian marine park values (including ecosystem values) to an acceptable level and consider all options to avoid or reduce them to as low as reasonably practicable and clearly demonstrate that the activity will not be inconsistent with the management plan. <b>[CLAIM 002]</b></p> <p>The North Marine Parks Network Management Plan 2018 (management plan) came into effect in 2018 and provides further information on values for the Oceanic Shoals Marine Park. Information on the values for the marine parks is also located on the Australian Marine Parks Science Atlas. <b>[CLAIM 003]</b></p> <p>DNP does not require further notification of progress made in relation to this activity unless details regarding the activity change and result in an overlap with or new impact to a marine park, or for emergency responses. <b>[CLAIM 004]</b></p> <p>The DNP should be made aware of oil/gas pollution incidences likely to impact on a marine park as soon as possible. Details of the notification process and required content was also provided. <b>[CLAIM 005]</b></p> <p>Santos responded on 15 July 2021 and addressed each of the matters raised in their correspondence of 2 July 2021.</p> <p>DNP also receives the Barossa Development Quarterly Consultation Update. The Q2 2021 Update was also distributed on 11 June 2021.</p> <p>Santos considers the level of consultation to be adequate and will address any comments from this stakeholder should they arise in the future.</p>	
	Assessment of the merits of objections and claims (OPGGs(E) Regulation 16 (b)(ii))	Statement of response, or proposed response, to the objections and claims (OPGGs(E) Regulation 16 (b)(iii))
	<p><b>[CLAIM 001]</b> DNP’s assessment confirms Santos’ understanding that no DNP authorisations are required.</p>	<p>Santos responded to and advised the DNP on 15 July 2021 that the relevant sections of these documents had been reviewed and the expectations incorporated into relevant sections of the EP. Refer to <b>Section 3.2</b> and <b>Section 6.8</b>, while the DNP’s notification requirements are incorporated into <b>Table 8-4</b>.</p>
	<p><b>[CLAIM 002]</b> <b>[CLAIM 003]</b> On assessment of the DNP’s advice, Santos has ensured the cited documentation (North Marine Parks Network Management Plan 2018, guidance note and Australian Marine Parks Science Atlas) has been considered for this activity and referenced in the EP (refer <b>Section 6.8</b>).</p>	
	<p><b>[CLAIM 004]</b> <b>[CLAIM 005]</b> Santos confirms the EP will reflect DNP incident notification requirements (refer to <b>Table 8-4</b>).</p>	



Relevant person	Relevant persons consultation summary (OPGGG(E) Regulation 16 (b)(i))	
Northern Territory Government Departments		
Department of Infrastructure, Planning and Logistics (DIPL)	<p>DIPL was provided the Barossa Development Drilling and Completions Stakeholder Consultation package via email on 11 June 2021 inviting comment.</p> <p>DIPL was provided a follow-up email on 2 July 2021 inviting any further comment.</p> <p>DIPL responded to Santos on 20 July 2021 requesting a briefing on the Barossa Project, including the Development Drilling and Completions EP.</p> <p>Santos responded on 20 July advising it could provide a briefing on the date requested by DIPL.</p> <p>Santos provided a briefing to DIPL on 29 July 2021 at which no specific issues or concerns were raised in relation to the Development Drilling &amp; Completions EP or the proposed activities.</p> <p>DIPL receives the Barossa Development Quarterly Consultation Update. The Q2 2021 Update was also distributed on 11 June 2021.</p> <p>Santos considers the level of consultation to be adequate and will address any comments from this stakeholder should they arise in the future.</p>	
	<b>Assessment of the merits of objections and claims (OPGGG(E) Regulation 16 (b)(ii))</b>	<b>Statement of response, or proposed response, to the objections and claims (OPGGG(E) Regulation 16 (b)(iii))</b>
	No assessment required.	No response required
Department of Industry, Tourism and Trade (DITT) – Fisheries Division	<p>Santos contacted DITT – Fisheries via email on 21 May 2021 to offer a briefing on the Barossa Project, including the Barossa Development Drilling and Completions EP.</p> <p>Santos provided a briefing to DITT – Fisheries on 2 June 2021. Discussion points on Barossa Development Drilling and Completions EP were as follows:</p> <p>DITT – Fisheries asked about the extent/impacts from turbidity during drilling. <b>[CLAIM 001]</b></p> <p>In relation to exclusion zones around wells, DITT – Fisheries stated the future management framework for the combined Timor Reef Fishery and Demersal Fishery would mean no trawling would occur in the area of the Barossa Development, just trap and line. <b>[CLAIM 002]</b></p> <p>DITT – Fisheries stated while the Barossa field was in deeper water and little fishing occurred there, there was more fishing activity further south near the Caldita Field. <b>[CLAIM 003]</b></p> <p>DITT – Fisheries asked whether inclement weather impacted drilling activities. <b>[CLAIM 004]</b></p> <p>Santos advised that meetings were also being held with Austral Fisheries, NT Seafood Council, Northern Prawn Fishery and some licence holders and that DITT – Fisheries, fishing organisations and licence-holders would receive a quarterly update from now on and opportunity to meet on an ongoing basis to discuss planning and execution of on-water activities.</p> <p>A meeting record was provided to DITT – Fisheries by Santos on 5 July 2021. Santos has addressed each of the matters raised. DITT’s CEO acknowledged receipt of the meeting record via email on 5 July 2021.</p>	

Relevant person	Relevant persons consultation summary (OPGGs(E) Regulation 16 (b)(i))	
	<p>DITT – Fisheries was provided the Barossa Development Drilling and Completions Stakeholder Consultation package and additional information for commercial fishers via email on 11 June 2021 inviting comment.</p> <p>DITT – Fisheries was provided a follow-up email on 2 July 2021 inviting any further comment. No further response has been received.</p> <p>DITT – Fisheries receives the Barossa Development Quarterly Consultation Update. The Q2 2021 Update was also distributed on 11 June 2021. Santos considers the level of consultation to be adequate and will address any comments from this stakeholder should they arise in the future.</p>	
	Assessment of the merits of objections and claims (OPGGs(E) Regulation 16 (b)(ii))	Statement of response, or proposed response, to the objections and claims (OPGGs(E) Regulation 16 (b)(iii))
	<p><b>[CLAIM 001]</b> Santos responded at the meeting that it had not seen any significant impacts from any drilling activities in the past, plumes did not extend very far from the drill rig and dispersion is rapid in the open ocean.</p> <p><b>[CLAIM 004]</b> Santos stated at the meeting that drilling is suspended in certain weather conditions but the rig itself is built to withstand the conditions and remains on location</p>	<p>Santos responded to DITT – Fisheries’ queries at the meeting held on 2 July 2021 and in a written response on 5 July 2021, advising that the information provided by the department would be taken into consideration in the drafting of the EP.</p>
<p><b>[CLAIM 002][CLAIM 003]</b> On Assessment of the Department’s advice, Santos determined that the information on fishing effort and process correlated with Santos’ understanding and previous information provided by the Department.</p>	<p>All relevant fisheries are described in <b>Section 3.2.6.1</b>. Potential impacts and risks to fisheries and fishers (including traditional, recreational and commercial) have been assessed as environmentally acceptable and ALARP (primarily <b>Sections 6.4.4, 6.5.4, 6.6.4, 6.7.4, 7.6.4 and 7.7.4</b>).</p>	
<p>Department of Industry, Tourism and Trade (DITT) – Energy Division</p>	<p>Santos contacted DITT – Energy via email on 21 May 2021 to offer a briefing on the Barossa Project, including the Barossa Development Drilling and Completions EP.</p> <p>DITT – Energy met with Santos on 5 June and was provided a briefing. No specific issues or concerns were raised in respect to the Barossa Development Drilling and Completions EP.</p> <p>DITT – Energy was provided the Barossa Development Drilling and Completions Stakeholder Consultation package via email on 11 June 2021 inviting comment.</p> <p>DITT – Energy was provided a reminder email on 2 July 2021 inviting comment.</p> <p>A meeting record was provided by Santos to DITT – Energy on 5 July 2021.</p> <p>DITT’s CEO acknowledged receipt, via email on 5 July 2021, of Santos’ reminder email of 5 July 2021.</p> <p>DITT – Energy receives the Barossa Development Quarterly Consultation Update. The Q2 2021 Update was also distributed on 11 June 2021. Santos considers the level of consultation to be adequate and will address any comments from this stakeholder should they arise in the future.</p>	

Relevant person	Relevant persons consultation summary (OPGGs(E) Regulation 16 (b)(i))	
	Assessment of the merits of objections and claims (OPGGs(E) Regulation 16 (b)(ii))	Statement of response, or proposed response, to the objections and claims (OPGGs(E) Regulation 16 (b)(iii))
	No assessment required.	No response required.
Other stakeholders		
Australian Marine Oil Spill Centre	<p>AMOSC was provided the Barossa Development Drilling and Completions Stakeholder Consultation package via email on 11 June 2021 inviting comment.</p> <p>AMOSC was provided a follow-up email on 2 July 2021 inviting any further comment. No response has been received.</p> <p>AMOSC receives the Barossa Development Quarterly Consultation Update. The Q2 2021 Update was also distributed on 11 June 2021.</p> <p>Santos considers the level of consultation to be adequate and will address any comments from this stakeholder should they arise in the future.</p>	
	Assessment of the merits of objections and claims (OPGGs(E) Regulation 16 (b)(ii)), information and requests	Statement of response, or proposed response, to the objections and claims (OPGGs(E) Regulation 16 (b)(iii)), and information and requests
	No assessment required.	No response required.
Australian Marine Sciences Association – NT (AMSA-NT)	<p>AMSA-NT was provided the Barossa Development Drilling and Completions Stakeholder Consultation package via email on 15 June 2021 inviting comment.</p> <p>AMSA-NT advised Santos via email on 30 June 2021 that two representatives had extensive experience in tropical marine environments and industry engagement and would appreciate Santos engaging with them as the Barossa project continues. They could provide impartial scientific comment on marine matters and looked forward to working with Santos as the Barossa project progresses.</p> <p>AMSA-NT was provided a follow-up email on 2 July 2021 inviting any further comment.</p> <p>Santos responded to AMSA-NT via email on 5 July 2021 and asked whether the representatives would be available to meet during the week of 12 to 16 July. One of the representatives responded via email on 9 July 2021 advising their availability during 14 to 16 July. However, meeting did not occur due to unavailability of AMSA-NT second representative.</p> <p>AMSA-NT provided a formal response on 9 July 2021, via letter and covering email, to Santos’ email of 15 June 2021. AMSA’s response is summarised as follows:</p> <p>Santos should lead a best practice approach to address potentially complex impacts and implement the sustainability principles incorporated into the EPBC Act (as per the Convention for Biological Diversity) and consider complexities of cumulative pressures, multiple stressors and various spatial and temporal scales in the EP. <b>[CLAIM 001]</b></p>	

Relevant person	Relevant persons consultation summary (OPGGs(E) Regulation 16 (b)(i))	
	<p>The Proposed Consultation and 4-page Information Brochure does not provide sufficient information to provide appropriate technical input and make an ‘informed assessment’. Santos should expand or supplement the 4-page Information Brochure with information upon which AMSA-NT can provide expert comment, including external context, thresholds of acceptable impact and risk, risk mitigation strategies, and implementation of control measures. <b>[CLAIM 002]</b></p> <p>The following information should be made public: <b>[CLAIM 003]</b></p> <ul style="list-style-type: none"> <li>– the draft Drilling EP or, if the draft is not yet prepared, then information, including any reports, analyses, assessments, modelling and/or other documents, in relation to the potential environmental impacts and risks of activities, including in relation to a worst case oil spill, greenhouse gas (GHG) emissions and cumulative impacts.</li> <li>– information, including any reports, assessments and/or other documents that assess the potential international and transboundary environmental and social-ecological impacts and risks of activities, including in relation to a worst case oil spill.</li> <li>– information, including any reports, analyses, assessments and/or other documents, that demonstrates that the environmental impacts and risks of the activities will be reduced to as low as reasonably practicable and be of an acceptable level.</li> </ul> <p>Santos responded to AMSA-NT on 15 July 2021 acknowledging the correspondence received on 9 July 2021 and advising it would make further contact after reviewing the information.</p> <p>Santos responded to AMSA-NT on 18 August 2021 and addressed each of the matters raised in their correspondence of 9 July 2021.</p> <p>AMSA-NT has been added to the distribution list for the Barossa Development Quarterly Consultation Update.</p> <p>Santos considers the level of consultation to be adequate and will address any comments from this stakeholder should they arise in the future.</p>	
	Assessment of the merits of objections and claims (OPGGs(E) Regulation 16 (b)(ii)), information and requests	Statement of response, or proposed response, to the objections and claims (OPGGs(E) Regulation 16 (b)(iii)), and information and requests
	<p><b>[CLAIM 001]</b> Santos considered AMSA-NT’s claim relating to strategic and cumulative impact assessment. The EP will be prepared in accordance with requirements of the OPGGs(E) Regulations.</p>	<p>Santos responded to AMSA-NT on 15 July 2021.</p> <p>Santos advised it will comply with Australian legislated requirements for environmental assessment.</p> <p>Santos included information relating to strategic and cumulative assessment in the Barossa Area Development Offshore Project Proposal (OPP), Section 6.5 (Cumulative Impacts) commencing on page 435.</p>

Relevant person	Relevant persons consultation summary (OPGGs(E) Regulation 16 (b)(i))	
	<p><b>[CLAIM 002] [CLAIM 003]</b> Santos considered AMSA-NT’s claim and provided supplementary information to that contained in the initial consultation package.</p>	<p>Santos provided AMSA-NT with supplementary information relevant to the Drilling and Completions EP and, wherever practicable, information already publicly available specifically in the NOPSEMA-accepted Barossa OPP. This included information on GHG emissions as relevant to the proposed drilling and completions activities.</p> <p>In relation to information requests on project GHG emissions, Santos will present in the Barossa Production Operations Environment Plan a greenhouse gas (Scopes 1 to 3) life cycle analysis associated with production operations. Relevant persons, including AMSA-NT, will be consulted during the development of this EP. Should AMSA-NT request information on GHG emissions associated with production operations during this consultation then Santos will provide sufficient information to allow AMSA-NT to make an informed assessment of the possible consequences of the activity on its functions, interests or activities.</p> <p>Since Santos’ response to AMSA-NT, the Barossa Drilling and Completions EP containing all relevant environmental impact and risk information has been made available for public review (October 2021). AMSA-NT has access to this information and was advised that the EP would be made publicly available. Santos also advised AMSA-NT that consultation for this activity would be ongoing until activity completion. Santos considers that AMSA-NT has all relevant information and has been afforded sufficient time to raise any further objections or claims.</p>

<p>Australian National University (ANU) – individual</p>	<p>A Professor working at the Australian National University, also a representative of the Australian Marine Sciences Association NT, was provided the Barossa Development Drilling and Completions Stakeholder Consultation package on 15 June 2021 after requesting to be consulted. Santos also advised it was available to meet with the individual.</p> <p>AMSA-NT advised Santos via email on 30 June 2021 that two representatives, including this individual (from ANU), had extensive experience in tropical marine environments and industry engagement and would appreciate Santos engaging with them as the Barossa project continues. They could provide impartial scientific comment on marine matters and looked forward to working with Santos as the Barossa project progresses.</p> <p>Santos responded via email on 5 July 2021 and suggested a meeting date. The individual responded on 7 July and 15 July advising they would confirm a meeting date. However, the meeting did not occur due to unavailability of an AMSA-NT representative.</p> <p>The Professor, in their capacity at ANU, provided a formal response to Santos on 9 July 2021 via letter and covering email which presented information and technical advice to assist in the development of the EP, focusing on the importance and relevance of international and transboundary issues in the assessing and/or undertaking of development activities in the Arafura and Timor Seas region. Identified ANU claims are as follows:</p> <p><b>[CLAIM 1]</b> There is an unresolved Australia-Indonesia maritime seabed boundary, and that the drilling activity and indeed, the entire Barossa Offshore Gas project would firmly sit within Indonesian territorial waters, if the current seabed boundary (negotiated in 1972) reflected the latest agreed understanding of maritime boundaries under UNCLOS.</p> <p><b>[CLAIM 2]</b> The waters of the tropical Arafura and Timor Seas (ATS) are ‘shared’ by Indonesia, Timor-Leste, Papua New Guinea (PNG) and Australia. As such, they are legally defined as a ‘semi-enclosed seas’ under Article 122 of the 1982 United Nations Convention on the Law of the Sea (UNCLOS). Significantly, Article 123 of UNCLOS places a responsibility and an obligation on countries bordering ‘enclosed’ and ‘semi-enclosed seas’ to cooperate in resource management, the protection of the marine environment and marine scientific research.</p> <p><b>[CLAIM 3]</b> Transboundary issues are highly relevant in the shared ATS ‘semi-enclosed seas’, particularly in relation to the Barossa Offshore Gas Project and the offshore oil/gas industry in the Timor Sea. This very high level of ‘ecological connectivity’ and vulnerability of the ATS ‘semi-enclosed seas’ and the following relevant ‘transboundary’ issues should be fully acknowledged and addressed in formal consultation processes, and relevant environmental assessments and EPs for the Barossa Offshore Gas Project:</p> <ul style="list-style-type: none"> <li>– a). Potential impacts on transboundary, straddling ‘fish stocks’ and commercial fisheries in the Timor Sea – particularly snapper fisheries.</li> <li>– b). Potential impacts on known migratory, rare, threatened, endangered, and protected marine species in the Timor Sea – particularly cetaceans, sea turtles and sharks/rays.</li> <li>– c). Potential impacts of maritime transport and marine pollution in the Timor Sea – particularly shipping impacts, oil/gas spills and acoustic noise.</li> </ul> <p><b>[CLAIM 4]</b> In developing potential ‘environmental offsets’ for the Barossa Offshore Gas Project, NOPSEMA and the Proponent should also consider UNCLOS obligations and include activities with broader, transboundary environmental and socio-economic benefits. ATSEA23 is currently now being implemented (2019-2023) with US\$10M of GEF/UNDP IW funding with a joint commitment to a ‘regional response for improving management and governance of the Arafura and Timor Seas (ATS) ecosystems’. To this end, there remains significant opportunities for the</p>
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Relevant person	Relevant persons consultation summary (OPGG(E) Regulation 16 (b)(i))	
	<p>Proponent to help support the development of ATS-wide and ‘transboundary’ environmental activities... Significantly, the Barossa Offshore Gas Project (with its location, scale and transboundary nature of potential impacts) not only has the potential to protect the ATS’s global ecological values (through risk reduction/minimization), but also, has significant opportunities (through environmental offsets) to potentially support and assist with the improved regional-level, ecosystem-based conservation and management of this globally-significant but vulnerable ecosystem.</p> <p><b>[CLAIM 5]</b> The Proponent (and NOPSEMA) need to recognize the global significance of the ‘semi-enclosed’ Arafura and Timor Seas and also, it’s high levels of ‘ecological connectivity’ and also, vulnerability to human impacts. In informing the development of Drilling EP (and other EPs) and assessing and considering the overall environmental risk and potential impact of the Barossa Offshore Gas Project, attention is drawn to the following global values and also, vulnerabilities of the region:</p> <ul style="list-style-type: none"> <li>– Global significance of the marine habitats and ecosystems of northern Australia.</li> <li>– Global stronghold for marine megafauna.</li> <li>– Major marine megafauna migration corridor.</li> <li>– The waters of the Timor Sea also include the eastern Indian Ocean migration corridor for the endangered Blue Whale <i>Balaenoptera musculus brevicauda</i> (Austral-Indonesian population).</li> <li>– The Barossa Offshore Gas Project is in close proximity to the Timor Trough, one of the three major outflow channels of the Indonesian Throughflow, and one of the most important ‘marine megafauna migration corridors’ in the Western Indo-Pacific.</li> <li>– Globally-significant fisheries within the ATS region, particularly in the Indonesian waters of the ATS.</li> <li>– Impacts on fisheries stock has major impacts on food security, poverty and human health in the ATS.</li> </ul> <p>Santos responded to the individual on 18 August 2021 and addressed the information provided in their correspondence of 9 July 2021.</p> <p>The individual has been added to the distribution list for the Barossa Development Quarterly Consultation Update.</p> <p>Santos considers the level of consultation to be adequate and will address any comments from this stakeholder should they arise in the future.</p>	
	<p><b>Assessment of the merits of objections and claims (OPGG(E) Regulation 16 (b)(ii)), information and requests</b></p> <p><b>[CLAIM 1]</b> Santos has reviewed the claim and has determined that there are well established and operational agreements/seabed treaties between the Australian and Indonesian governments. The seabed and its resources are governed by the continental shelf regime under international law. In 1971 and 1972, Australia and Indonesia agreed to maritime boundaries establishing the limits of their respective continental shelves. These seabed treaties have been ratified. Australia has jurisdiction over the seabed area relevant to the Barossa project.</p>	<p><b>Statement of response, or proposed response, to the objections and claims (OPGG(E) Regulation 16 (b)(iii)),</b></p> <p>Santos responded to ANU’s claims on 18 August 2021 confirming the information would be taken into consideration in the drafting of the EP.</p> <p>Australia has current jurisdiction over the seabed area relevant to the drilling activity. Santos is proposing to conduct development drilling activities in accordance with its petroleum production licence, as granted and</p>

Relevant person	Relevant persons consultation summary (OPGGs(E) Regulation 16 (b)(i))	
	<p>The Barossa operational area is located within Australian Commonwealth petroleum production licence NT/L1, as offered in July 2020 by the Commonwealth-Northern Territory Offshore Petroleum Joint Authority in accordance with the Commonwealth <i>Offshore Petroleum and Greenhouse Gas Storage Act 2006</i>.</p>	<p>regulated by the Australian government. Santos will act on any Australian government advice on international boundary and/or petroleum licencing issues should they arise in the future.</p>
	<p><b>[CLAIM 2]</b> Santos has reviewed the claim and understands that the Australian government is actively involved in the management of the ATS and supports the Arafura and Timor Seas Ecosystems Action (ATSEA) program.</p> <p>The Australian government has developed the Australian Marine Parks North Marine Parks Network Management Plan (2018) which includes the Arafura and Timor seas. The plan contemplates a range of Commonwealth as well as international conventions and agreements that relate to protection of the marine environment including UNCLOS. The proposed drilling activity is not within the northern marine parks network.</p>	<p>The Australia government is actively involved in the management of the ATS. Santos has consulted with relevant Australian government departments including DFAT, DAWE and DNP. No issue relating to the ATS has been raised. The North Marine Parks Network Management Plan 2018 (<b>Section 3.2.4</b>), which considers the ATS, has been considered in the development of this EP. Acceptable levels of impact and risks have been informed by relevant Australian government management plans, including the Australian Marine Parks North Marine Parks Network Management Plan (<b>Section 6.8, 7.5 and 7.6</b>).</p>
	<p><b>[CLAIM 3a]</b> Santos has reviewed the claim and has assessed potential impacts on commercial fisheries in the Timor Sea including the snapper fisheries (Timor Reef and Demersal fisheries; refer to <b>Section 3.2.6.1 and 3.2.6.2</b>). Santos has consulted with relevant Australian government departments responsible for fisheries management being AFMA and NT Department of Industry, Tourism and Trade – Fisheries Division in the development of this plan. Potential impacts to fisheries and fishers (traditional, recreational, and commercial) from planned activities and unplanned events have been assessed).</p>	<p>Santos has engaged with relevant Australian government departments responsible for fisheries management, and no significant fisheries-related issues have been raised (<b>Table 4-2</b>). Potential impacts and risks to fisheries and fishers (including traditional, recreational and commercial) have been assessed as environmentally acceptable and ALARP (primarily <b>Sections 6.4.4, 6.5.4, 6.6.4, 6.7.4, 7.6.4 and 7.7.4</b>).</p>
	<p><b>[CLAIM 3b]</b> Santos has reviewed the claim and has assessed potential impacts on known migratory, rare, threatened, endangered, and protected marine species in the Timor Sea – particularly cetaceans, sea turtles and sharks/rays. Acceptable levels of impact and risks to marine species have been informed by relevant Australian government species recovery plans, threat abatement plans, conservation advice and marine park management plans throughout <b>Sections 6 and 7</b>.</p>	<p>Santos has assessed potential impacts on known migratory, rare, threatened, endangered, and protected marine species in the Timor Sea – including cetaceans, sea turtles and sharks/rays (as described in <b>Section 3.2.5</b>). Potential impacts and risks to marine fauna have been assessed as environmentally acceptable and ALARP.</p>



Relevant person	Relevant persons consultation summary (OPGGs(E) Regulation 16 (b)(i))	
	<p><b>[CLAIM 3c]</b> Santos has reviewed the claim and has assessed potential impacts of maritime transport and marine pollution in the Timor Sea – particularly shipping impacts, oil/gas spills and acoustic noise.</p>	<p>Santos has assessed potential impacts of maritime transport and marine pollution in the Timor Sea – including shipping impacts (<b>Sections 6.2, 6.3, 6.5, 6.6, 7.1, 7.2 and 7.3</b>), oil/gas spills (<b>Section 6.8, 7.5, 7.6, 7.7 and 7.8</b>) and acoustic noise (<b>Section 6.1</b>). Potential impacts and risks have been assessed as environmentally acceptable and ALARP.</p>
	<p><b>[CLAIM 4]</b> Santos has reviewed the claim that there are significant opportunities through environmental offsets to potentially support and assist with the improved regional-level, ecosystem-based conservation and management of the globally-significant ATS. Through consultation with the Australian government, including DAWE and DNP, environmental offsets have not been raised. Using the method described in <b>Section 5.1</b>, Santos has conducted an environmental assessment for the proposed drilling activities and concluded that environmental impacts and risks are acceptable and ALARP. Through reasoned and supported arguments throughout <b>Sections 6 and 7</b>, Santos has demonstrated that there are no other practicable control measures that could reasonably be adopted to reduce impacts or risks further. As such, environmental offsets are not proposed for this petroleum activity.</p>	<p>Santos has assessed the claim and concluded that environmental impacts and risks will be managed to levels that are acceptable and ALARP without the requirement for environmental offsets. The Australian government has not identified the requirement for environmental offsets.</p>
	<p><b>[CLAIM 5]</b> Santos has reviewed the claim and recognises the environmental significance of the ‘semi-enclosed’ Arafura and Timor Seas. Relevant environmental sensitives and values are described in Santos’ <i>Barossa Development Values and Sensitivities of the Marine and Coastal Environment</i> document (<b>Appendix C</b>) and <b>Section 3</b> of this Environment Plan.</p>	<p>Santos has assessed the claim and recognises the environmental significance of the semi-enclosed Arafura and Timor Seas. The relevant values and sensitives of these seas have been considered in the environmental impact and risks assessment.</p> <p>In terms of the specific values listed by ANU:</p> <p>Marine habitats and ecosystems of northern Australia are described in <b>Section 3.2</b>.</p> <p>Marine megafauna are described in <b>Section 3.2.5</b>, including the Blue Whale <i>Balaenoptera musculus brevicauda</i>.</p> <p>Timor Trough is referenced in <b>Section 3.2</b> being a notable geophysical feature within international waters.</p>

Relevant person	Relevant persons consultation summary (OPGGG(E) Regulation 16 (b)(i))	
		Significant fisheries are described in <b>Section 3.2.6.1</b> (Commercial fisheries) and <b>Section 3.2.6.2</b> (Indonesian commercial and subsistence fishing).
Darwin Port	<p>Darwin Port was provided the Barossa Development Drilling and Completions Stakeholder Consultation package via email on 11 June 2021 inviting comment.</p> <p>Darwin Port was provided a follow-up email on 2 July 2021 inviting management. No response has been received.</p> <p>Darwin Port receives the Barossa Development Quarterly Consultation Update. The Q2 2021 Update was distributed on 11 June 2021.</p> <p>Santos considers the level of consultation to be adequate and will address any comments from this stakeholder should they arise in the future.</p>	
	Assessment of the merits of objections and claims (OPGGG(E) Regulation 16 (b)(ii))	Statement of response, or proposed response, to the objections and claims (OPGGG(E) Regulation 16 (b)(iii))
	No assessment required.	No response required.
Environment Centre – NT (ECNT)	<p>Following a letter from ECNT to Santos’ CEO, Santos contacted ECNT via email on 21 May 2021 to offer a briefing on the Barossa Project. ECNT responded via email on 31 May 2021 advising a key representative was away until 16 June 2021 and would a meeting be possible after this date. Santos responded via email on 31 May 2021 advising it would contact ECNT again after that date.</p> <p>ECNT was provided the Barossa Development Drilling and Completions Stakeholder Consultation package via email on 11 June 2021 inviting comment.</p> <p>Santos contacted ECNT via email on 18 June 2021 to organise a date for a briefing on the Barossa Project.</p> <p>ECNT responded on 28 June 2021 via a letter prepared by the Environmental Defender’s Office – NT. The issues raised are summarised as follows:</p> <ul style="list-style-type: none"> <li>+ ECNT stated the reasons why it considered itself to be a ‘relevant person’ under the <i>Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009</i> <b>[CLAIM 001]</b></li> <li>+ ECNT summarised the consultation requirements under cl.11A of the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009 and ECNT’s functions, interests and activities</li> <li>+ The consultation activities, including the stated deadline, proposed in the information sent by Santos on 11 June fell short of the consultation that Santos is required to undertake with ECNT in relation to the activities under the Regulations, specifically it had not been provided ‘sufficient information’ <b>[CLAIM 002]</b> to allow it to make an informed decision or a ‘reasonable period’ for consultation <b>[CLAIM 003]</b></li> <li>+ ECNT requested <b>[CLAIM 004]</b> the draft Drilling EP or, if that is not yet prepared, information in relation to the activities the subject of the Drilling EP, including any reports, analyses, assessments, modelling and/or other documents, in relation to:</li> </ul>	

Relevant person	Relevant persons consultation summary (OPGG(S) Regulation 16 (b)(i))
	<ul style="list-style-type: none"> <li>- a description of the environment that may be affected by the activities, including in relation to a worst case oil spill</li> <li>- the potential extent and area of a worst case oil spill</li> <li>- the potential environmental impacts and risks of the activities, including in relation to a worst case oil spill, on any species listed under the <i>Environment Protection and Biodiversity Conservation Act 1999</i>, on the Oceanic Shoals Marine Park and any other significant marine ecosystem and on Tiwi Islands Sea Country and other areas of marine or terrestrial Aboriginal Cultural significance and/or heritage</li> <li>- the potential cumulative impacts of the above listed impacts or risks considered in the context of existing and proposed developments and/or activities in the vicinity of the area</li> <li>- range of detailed information related to greenhouse gas emissions and management of the associated impacts and risks.</li> <li>+ ECNT also requested <b>[CLAIM 005]</b> information including any reports, analyses, assessments and/or other documents, that:             <ul style="list-style-type: none"> <li>- demonstrates that the environmental impacts and risks of the activities will be reduced to as low as reasonably practicable</li> <li>- demonstrates that the environmental impacts and risks of the activities will be of an acceptable level</li> <li>- details the environmental performance outcomes, standards and measurement criteria to be adopted in relation to the activities</li> <li>- details the implementation strategy and monitoring, recording and reporting arrangements in relation to the environmental impacts and risks of the activities.</li> </ul> </li> </ul> <p>Santos responded to EDO-NT via email on 29 June 2021 acknowledging receipt of the letter provided on ECNT’s behalf and advised it would respond as soon as possible.</p> <p>ECNT was provided a follow-up email on 2 July 2021 inviting any further comment.</p> <p>Santos provided acknowledgement of receipt to ECNT via email on 5 July 2021 and reiterated the offer to meet with representatives. ECNT responded via email on 8 July 2021 advising it would check and revert back to Santos regarding a meeting date.</p> <p>Santos responded to the EDO-NT on 19 July 2021 acknowledging their letter of 28 June 2021 on behalf of client ECNT and advising that Santos would provide its response to EDO-NT on or before 13 August 2021.</p> <p>Santos responded to ECNT on 13 August 2021 and addressed each of the matters raised in their correspondence of 28 June 2021.</p> <p>Santos also suggested a further time frame to meet with ECNT to discuss any further queries. ECNT responded on 19 August and a meeting was organised for 3 September 2021.</p> <p>At the 3 September 2021 meeting, Santos responded to a range of questions from ECNT on the topics of:</p> <ul style="list-style-type: none"> <li>+ The project’s status to date, in particular with regard to the Commonwealth Government’s offshore regulatory process</li> <li>+ The process around public availability of documentation, including EPs and associated compliance reports, Oil Pollution Emergency Plans and Well Operations Management Plans</li> </ul>

Relevant person	Relevant persons consultation summary (OPGG(E) Regulation 16 (b)(i))
	<ul style="list-style-type: none"> <li>+ The time frames for submittal and assessment by NOPSEMA of an EP</li> <li>+ Location of documentation of decommissioning activity</li> <li>+ How worst-case oil spill scenarios are presented</li> <li>+ The time frame and process involved in the drilling campaign.</li> </ul> <p>ECNT thanked Santos for the information provided to date and the opportunity to meet and advised it intended to provide further written correspondence to Santos by mid-September.</p> <p>ECNT provided further correspondence to Santos on 24 September, again via the Environmental Defender’s Office – NT. A summary of the issues raised are as follows:</p> <ul style="list-style-type: none"> <li>+ The information provided by Santos on 13 August 2021, addressing the matters raised in ECNT’s correspondence of 28 June 2021, again falls short of the consultation that Santos is required to undertake with ECNT in relation to the activities under cl.11A of the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations, specifically it does not provide ‘sufficient information’ to allow ECNT to make an informed decision or a ‘reasonable period’ for consultation. <b>[CLAIM 006]</b></li> <li>+ In the absence of the provision of comprehensive information in response to ECNT’s questions, a copy of any draft EP is required in order to make an informed assessment of the possible consequences of the activity. <b>[CLAIM 007]</b> Further detail is specifically required about general matters, including:             <ul style="list-style-type: none"> <li>– information about the Oceanic Shoals Marine Park as part of the activity EMBA</li> <li>– controls proposed to manage environmental impacts of the drilling activity</li> <li>– risk assessments related to hydrocarbon spills from the pipeline infrastructure</li> <li>– potential environmental impacts and risks not directly within the permit area</li> <li>– risks and impacts on the activities of every species listed under the EPBC Act</li> <li>– potential cumulative impacts in the context of the development, including from, oil spills</li> <li>– clarification of the nature and availability of any peer-reviewed or independent assessments used to prepare the EP</li> <li>– the implementation strategy and its various elements, Santos Management System and Environment, Health and Safety Policy and how they relate to the environmental impacts and risks of the activities</li> <li>– proposed environmental performance outcomes, control measures performance standards and measurement criteria.</li> </ul> </li> <li>+ In relation to GHG emissions, ECNT requested information on:             <ul style="list-style-type: none"> <li>– total estimated GHG (Scopes 1, 2 and 3) for the Barossa project, including information on how atmospheric emissions have been assessed <b>[CLAIM 008]</b></li> </ul> </li> </ul>

Relevant person	Relevant persons consultation summary (OPGGG(E) Regulation 16 (b)(i))	
	<ul style="list-style-type: none"> <li>- information on the amount of emissions from flaring / venting <b>[CLAIM 009]</b></li> <li>- IEA warming scenarios the project is consistent with <b>[CLAIM 010]</b></li> <li>- physical risks to the project itself from climate change <b>[CLAIM 011]</b></li> <li>- the effect of global GHG concentrations at the time of the project’s completion <b>[CLAIM 012]</b></li> <li>- proposed GHG emission control measures, claiming that those outlined by Santos in previous correspondence are wholly inadequate <b>[CLAIM 013]</b></li> <li>+ ECNT requires confirmation that Santos will undertake its assessment of activities as part of the Drilling EP in good faith and in accordance with the objects of the legislation and regulations, acknowledging that the information in the OPP may have developed since the date of that document. <b>[CLAIM 014]</b></li> </ul> <p>Santos responded to ECNT on 06 October 2021 and addressed each of the matters raised in their correspondence of 24 September 2021.</p> <p>On 9 December 2021, Santos wrote to ECNT advising that the Development Drilling and Completions EP had been made publicly available on the NOPSEMA website on 15 October 2021. Santos further stated that it welcomed ECNT’s participation in the formal consultation process and would respond to reasonable information requests as per the OPGGS(E) Regulations. Santos stated its understanding that ECNT’s public position on the Barossa Project continues to demonstrably be one of fundamental objection. In the case of each specific EP, Santos will continue to ensure all its obligations to stakeholder consultation with relevant persons on the activities covered by each EP are satisfied. In the case of the Development Drilling and Completions EP, Santos believes it has met these obligations and the ECNT has sufficient information to make an informed assessment of the possible consequences of the proposed Development Drilling and Completions on their interests, functions and activities.</p> <p>As at 10 March 2022, Santos has not received any further correspondence from the ECNT on the 09 December 2021 letter or this EP.</p> <p>Santos considers the level of consultation to be adequate and will address any comments from this stakeholder should they arise in the future.</p>	
	Assessment of the merits of objections and claims (OPGGG(E) Regulation 16 (b)(ii))	Statement of response, or proposed response, to the objections and claims (OPGGG(E) Regulation 16 (b)(iii))
	<p><b>[CLAIM 001]</b> Santos acknowledges that ECNT is a relevant person for this activity. Santos is aware of its obligations under the <i>Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009</i> and will continue to engage with the ECNT in accordance with the Regulations.</p>	<p>Santos has acknowledged ECNT as a relevant person in the letter dated 09 December, and as listed in <b>Table 4-1</b>. Santos will continue to engage with the ECNT as a relevant person in accordance with the OPGGS(E) Regulations.</p>

Relevant person	Relevant persons consultation summary (OPGGs(E) Regulation 16 (b)(i))	
	<p><b>[CLAIM 002]</b> Santos acknowledges ECNT’s claim and provided additional written information.</p>	<p>Santos responded to ECNT on 13 August 2021 and provided supplementary information relevant to the Drilling and Completions EP and, wherever practicable, information already publicly available specifically in the NOPSEMA-accepted Barossa OPP.</p> <p>Since Santos’ response to ECNT, the Barossa Drilling and Completions EP containing all relevant environmental impact and risk information has been made available for public review (October 2021). ECNT has access to this information and was advised that the EP would be made publicly available. Santos also advised ECNT that consultation for this activity would be ongoing until activity completion. Santos considers that ECNT has all relevant information and has been afforded sufficient time to raise any further objections or claims.</p>
	<p><b>[CLAIM 003]</b> ECNT was afforded four weeks to review and comment on the initial consultation package. This initial consultation time frame is consistent with other Santos and industry environment plans. Santos acknowledges ECNT’s request for additional time to review and comment on consultation material. As such, Santos will continue to assess and respond to objections and claims raised by the ECNT at any time during the development or implementation of this EP. This commitment is reflected in <b>Section 4.5.2.</b></p>	<p>Santos responded to ECNT on 13 August 2021 and provided supplementary information to that contained in the initial consultation package. Since this time, Santos has met with ECNT on 03 September 2021 and provided a response on 06 October 2021 to further objections and claims.</p> <p>The Barossa Drilling and Completions EP containing all relevant environmental impact and risk information has been public available since October 2021. ECNT has access to this information and was advised that the EP would be made publicly available. Santos also advised ECNT that consultation for this activity would be ongoing until activity completion. Santos considers that ECNT has all relevant information and has been afforded sufficient time to raise any further objections or claims.</p>
	<p><b>[CLAIM 004] [CLAIM 005]</b> Santos acknowledges ECNT’s claims and provided additional information, as relevant to the Barossa Drilling and Completions EP.</p>	<p>Santos responded to ECNT on 13 August 2021 and provided supplementary information to that contained</p>

Relevant person	Relevant persons consultation summary (OPGGs(E) Regulation 16 (b)(i))	
		<p>in the initial consultation package, including (but not limited to):</p> <ul style="list-style-type: none"> <li>+ A description of the environment that may be affected by the proposed activities including detailed maps illustrating the EMBA;</li> <li>+ Information on protected marine fauna, marine parks and areas of aboriginal significance;</li> <li>+ Information on potential environmental impacts and risks;</li> <li>+ Information on GHG emissions, impacts and risks and control measures as relevant to the proposed drilling and completions activities;</li> <li>+ Details on proposed environmental performance outcomes and standards, control measures and measurement criteria; and</li> <li>+ Details on the proposed implementation strategy.</li> </ul> <p>The Barossa Drilling and Completions EP containing all relevant environmental impact and risk information has been public available since October 2021. ECNT has access to this information and was advised that the EP would be made publicly available. Santos also advised ECNT that consultation for this activity would be ongoing until activity completion. Santos considers that ECNT has all relevant information and has been afforded sufficient time to raise any further objections or claims.</p>
	<p><b>[CLAIM 006] [CLAIM 007]</b> Santos acknowledges ECNT’s claim and provided additional information, as relevant to the Barossa Drilling and Completions EP.</p>	<p>Santos responded to ECNT on 06 October 2021 providing further supplementary information, including (but not limited to):</p> <ul style="list-style-type: none"> <li>+ Environmental sensitivities associated with the Oceanic Shoals Marine Park and the Arafura</li> </ul>

Relevant person	Relevant persons consultation summary (OPGGs(E) Regulation 16 (b)(i))	
		<p>KEF, and Santos’ assessment of the environmental risks associated with drilling and completions activities;</p> <ul style="list-style-type: none"> <li>+ Draft <b>Section 8</b> (Implementation Strategy) of the EP containing proposed control measures and associated environmental performance standards;</li> <li>+ Information relating to the identified environmental values and sensitivities within the EMBA, and Santos’ assessment of environmental risks associated with a worst case oil spill;</li> <li>+ Information on potential environmental impacts and risks outside the drilling permit area (including IMS, unplanned discharges and marine fauna interactions); and</li> <li>+ Information on decommissioning.</li> </ul> <p>The Barossa Drilling and Completions EP containing all relevant environmental impact and risk information has been public available since October 2021. ECNT has access to this information and was advised that the EP would be made publicly available. Santos also advised ECNT that consultation for this activity would be ongoing until activity completion. Santos considers that ECNT has all relevant information and has been afforded sufficient time to raise any further objections or claims.</p>



	<p><b>[CLAIM 008]</b> Santos acknowledges ECNT’s claim and provided GHG emissions information relevant to the Barossa Drilling and Completions EP. GHG emissions associated with the whole-of-project are presented in the Barossa Development Area OPP, which is publicly available and known to the ECNT. Additional information on GHG emissions will be made available to relevant persons during the development of future Barossa activity-specific environment plans, including emissions associated with production operations.</p>	<p>Santos responded to ECNT on 06 October 2021 reiterating the position that the Drilling and Completions EP would only assess consequences pertaining to the proposed drilling and completions activities (i.e. not whole-of-project).</p> <p>Santos advised that the total Scope 1 GHG emissions (assuming an eight-well campaign, with two of these wells being contingency) is estimated to be 166,000 tonnes CO<sub>2</sub>-e. Further, that there are no Scope 2 or 3 emissions for the activities covered by the Drilling and Completions EP.</p> <p>Santos advised that Scope 1 emissions had been calculated using the Clean Energy Regulator’s Method 1, detailed in the National Greenhouse and Energy Reporting (Measurement) Determination 2008 and utilising the calculation tools provided through their website.</p> <p>In relation to information requests on project GHG emissions, Santos will present in the future Barossa Production Operations Environment Plan a greenhouse gas (Scopes 1 to 3) life cycle analysis associated with production operations. Relevant persons, including ECNT, will be consulted during the development of this EP. Should ECNT request information on GHG emissions associated with production operations during this consultation then Santos will provide sufficient information to allow ECNT to make an informed assessment of the possible consequences of the activity on its functions, interests or activities.</p>
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Relevant person	Relevant persons consultation summary (OPGGs(E) Regulation 16 (b)(i))	
	<p><b>[CLAIM 009]</b> Santos acknowledges ECNT’s claim and provided an explanation of flaring associated with drilling and completions activities.</p>	<p>Santos responded to ECNT on 06 October 2021 explaining that once completed, each Barossa well will be flowed back to the MODU to remove drilling fluids and impurities/debris from the wellbore. Further, that the well will be flowed until pre-defined clean-up criteria have been met and the necessary production data and samples have been collected, which will take approximately 24 to 36 hours pending well and surface process conditions. Flammable hydrocarbons will be flared (not vented) via an air-atomized burner. Well flowback is standard industry practice and flaring is a safety critical operation. The amount of GHG emissions from flaring is included in the above Scope 1 estimate (refer to CLAIM 008).</p> <p>In response to ECNT questions on information contained within the OPP, the OPP reference to “non-routine flaring” relates to the FPSO facility and associated process upsets or emergency shut-in of production. The consultation for the Drilling and Completions EP addresses the possible consequences of drilling and completions activities where flaring will only occur intermittently during well flowback operations.</p>
	<p><b>[CLAIM 010]</b> Santos acknowledges ECNT’s claim and provided an explanation of Santos’ position on IEA global warming scenarios.</p>	<p>Santos responded to ECNT on 06 October 2021 explaining that it does not consider the IEA scenarios to be relevant at an individual drilling campaign level. Santos stated that it considers such scenarios at a company strategy level as disclosed in its publicly available annual Climate Change Report.</p>

Relevant person	Relevant persons consultation summary (OPGGs(E) Regulation 16 (b)(i))	
	<p><b>[CLAIM 011]</b> Santos acknowledges ECNT’s claim and provided an assessment of the physical risk to the drilling and completions activities from climate change. Climate change risk for the project will be further evaluated in the future Barossa Production Operations EP.</p>	<p>Santos responded to ECNT on 06 October 2021 stating that it undertakes climate change risk assessments across all its operations.</p> <p>Santos provided a risk assessment for the drilling and completions activities, indicating that the risk for a short term activity is considered ‘very low’.</p>
	<p><b>[CLAIM 012]</b> Santos acknowledges ECNT’s claim and responded to information about the likely effect of the global concentration of greenhouse gases at the completion of the drilling and completions activities. While ECNT requested that Santos consider this effect at project completion (i.e. end of production) such consideration is not warranted for a short-term activity-specific EP.</p>	<p>Santos responded to ECNT on 06 October explaining that consultation for the Drilling and Completions EP only considers the possible consequences of drilling and completions activities. Further, that the estimated 166,000 tonnes CO<sub>2</sub>-e emissions caused by the drilling and completions activities will be a negligible contributor (&lt;0.0004%) to global annual greenhouse gas levels.</p> <p>In relation to information requests on project GHG emissions, Santos will present in the future Barossa Production Operations Environment Plan a greenhouse gas (Scopes 1 to 3) life cycle analysis associated with production operations. Relevant persons, including ECNT, will be consulted during the development of this EP. Should ECNT request information on GHG emissions associated with production operations during this consultation then Santos will provide sufficient information to allow ECNT to make an informed assessment of the possible consequences of the activity on its functions, interests or activities.</p>

Relevant person	Relevant persons consultation summary (OPGGs(E) Regulation 16 (b)(i))	
	<p><b>[CLAIM 013]</b> Santos acknowledges ECNT’s claim and provided additional information relevant to GHG emission control measures for the Drilling and Completions EP.</p>	<p>Santos responded to ECNT on 06 October 2021 with the following information on GHG emissions:</p> <p>Santos has industry-leading emissions reduction targets for the emissions from Santos’ activities, including a net-zero Scope 1 and 2 2040 target. Santos is focused on the responsible and safe conduct of all of its operations, including those relating to the Drilling and Completions EP. Santos is an experienced operator, having undertaken drilling activities in Australia for over 50 years within the detailed regulatory frameworks governing all of our activities. All impacts of activities are considered as required by these regulatory frameworks and Santos undertakes appropriate preventative and mitigation measures to address impacts of activities in accordance with legal and regulatory requirements.</p> <p>The consultation for the Drilling and Completions EP addresses the possible consequences of the drilling and completions activities. Scope 1 emissions are largely associated with hydrocarbon combustion for MODU and vessel operations, and flaring of reservoir hydrocarbons during well flowback operations.</p> <p>Santos has considered alternative fuel types (power sources) for the MODU and vessels. Reasonably practical and reliable alternatives have not been identified for the proposed activity.</p> <p>Flaring during well flowback operations is considered a safety critical activity and no reasonably practicable alternatives have been identified.</p> <p>Santos’ Climate Change Policy references Santos’ commitment to identify and pursue opportunities to</p>

Relevant person	Relevant persons consultation summary (OPGGs(E) Regulation 16 (b)(i))					
		<p>reduce greenhouse gas emissions within Santos’ operations and also where relevant, offset emissions in pursuit of Santos’ emission reduction targets. Santos will apply various levers to abate emissions across our portfolio and examples of these are included in our annual Climate Change Report. The activities to which this consultation relates are specific to the Drilling and Completions EP. At the current time, carbon offsets are not proposed to be used in relation to these specific activities.</p>				
	<p><b>[CLAIM 014]</b> On assessment, Santos considers that all required regulatory requirements have been acknowledged and will be met.</p>	<p>Santos confirms that the Drilling and Completions EP will be prepared in accordance with relevant regulatory requirements.</p>				
<p>Northern Land Council (NLC)</p>	<p>NLC was provided the Barossa Development Drilling and Completions Stakeholder Consultation package via email on 11 June 2021 inviting comment.</p> <p>NLC was provided a follow-up email on 2 July 2021 inviting comment. No response has been received.</p> <p>NLC receives the Barossa Development Quarterly Consultation Update. The Q2 2021 Update was distributed on 11 June 2021.</p> <p>Santos considers the level of consultation to be adequate and will address any comments from this stakeholder should they arise in the future.</p>	<table border="1"> <thead> <tr> <th>Assessment of the merits of objections and claims (OPGGs(E) Regulation 16 (b)(ii))</th> <th>Statement of response, or proposed response, to the objections and claims (OPGGs(E) Regulation 16 (b)(iii))</th> </tr> </thead> <tbody> <tr> <td> <p>No assessment required.</p> </td> <td> <p>No response required.</p> </td> </tr> </tbody> </table>	Assessment of the merits of objections and claims (OPGGs(E) Regulation 16 (b)(ii))	Statement of response, or proposed response, to the objections and claims (OPGGs(E) Regulation 16 (b)(iii))	<p>No assessment required.</p>	<p>No response required.</p>
Assessment of the merits of objections and claims (OPGGs(E) Regulation 16 (b)(ii))	Statement of response, or proposed response, to the objections and claims (OPGGs(E) Regulation 16 (b)(iii))					
<p>No assessment required.</p>	<p>No response required.</p>					
<p>NT Port and Marine</p>	<p>NT Port and Marine was provided the Barossa Development Drilling and Completions Stakeholder Consultation package via email on 11 June 2021 inviting comment.</p> <p>NT Port and Marine responded on 11 June 2021 acknowledging receipt of Santos’ email and advising to email another person who was already included on Santos’ stakeholder contacts list to receive all emails.</p> <p>NT Port and Marine was provided a follow-up email on 2 July 2021 inviting comment. No response has been received.</p> <p>NT Port and Marine also receives the Barossa Development Quarterly Consultation Update. The Q2 2021 Update was distributed on 11 June 2021.</p> <p>Santos considers the level of consultation to be adequate and will address any comments from this stakeholder should they arise in the future.</p>					

Relevant person	Relevant persons consultation summary (OPGGs(E) Regulation 16 (b)(i))	
	Assessment of the merits of objections and claims (OPGGs(E) Regulation 16 (b)(ii))	Statement of response, or proposed response, to the objections and claims (OPGGs(E) Regulation 16 (b)(iii))
Sea Turtle Foundation (STF)	<p>STF was provided the Barossa Development Drilling and Completions Stakeholder Consultation package via email on 11 June 2021 inviting comment.</p> <p>STF responded on 11 June 2021 acknowledging receipt of Santos' email.</p> <p>STF was provided a follow-up email on 2 July 2021 inviting any further comment. No response has been received.</p> <p>STF receives the Barossa Development Quarterly Consultation Update. The Q2 2021 Update was distributed on 11 June 2021.</p> <p>Santos considers the level of consultation to be adequate and will address any comments from this stakeholder should they arise in the future.</p>	
	Assessment of the merits of objections and claims (OPGGs(E) Regulation 16 (b)(ii))	Statement of response, or proposed response, to the objections and claims (OPGGs(E) Regulation 16 (b)(iii))
Tiwi Land Council (TLC)	<p>Santos contacted TLC via email on 11 June 2021 to offer a briefing on the Barossa Project, including Barossa Development Drilling and Completions EP.</p> <p>TLC was provided the Barossa Development Drilling and Completions Stakeholder Consultation package via email on 11 June 2021 inviting comment.</p> <p>TLC was provided a follow-up email on 2 July 2021 inviting comment. Further contact attempts were made via phone. No response raising issues or concerns has been received to date.</p> <p>TLC receives the Barossa Development Quarterly Consultation Update. The Q2 2021 Update was distributed on 11 June 2021.</p> <p>Santos considers the level of consultation to be adequate and will address any comments from this stakeholder should they arise in the future.</p>	
	Assessment of the merits of objections and claims (OPGGs(E) Regulation 16 (b)(ii))	Statement of response, or proposed response, to the objections and claims (OPGGs(E) Regulation 16 (b)(iii))
Other operators		
Woodside	Woodside was provided the Barossa Development Drilling and Completions Stakeholder Consultation package via email on 11 June 2021 inviting comment.	

Relevant person	Relevant persons consultation summary (OPGGs(E) Regulation 16 (b)(i))	
	<p>Woodside was provided a follow-up email on 2 July 2021 inviting any further comment. No response has been received.</p> <p>Woodside receives the Barossa Development Quarterly Consultation Update. The Q2 2021 Update was distributed on 11 June 2021.</p> <p>Santos considers the level of consultation to be adequate and will address any comments from this stakeholder should they arise in the future.</p>	
	<b>Assessment of the merits of objections and claims (OPGGs(E) Regulation 16 (b)(ii))</b>	<b>Statement of response, or proposed response, to the objections and claims (OPGGs(E) Regulation 16 (b)(iii))</b>
	No assessment required.	No response required.
Eni Australia	<p>Eni was provided the Barossa Development Drilling and Completions Stakeholder Consultation package via email on 11 June 2021 inviting comment.</p> <p>Eni was provided a follow-up email on 2 July 2021 inviting any further comment. No response has been received.</p> <p>Eni receives the Barossa Development Quarterly Consultation Update. The Q2 2021 Update was also distributed on 11 June 2021.</p> <p>Santos considers the level of consultation to be adequate and will address any comments from this stakeholder should they arise in the future.</p>	
	<b>Assessment of the merits of objections and claims (OPGGs(E) Regulation 16 (b)(ii))</b>	<b>Statement of response, or proposed response, to the objections and claims (OPGGs(E) Regulation 16 (b)(iii))</b>
	No assessment required.	No response required.
INPEX	<p>INPEX was provided the Barossa Development Drilling and Completions Stakeholder Consultation package via email on 11 June 2021 inviting comment.</p> <p>INPEX was provided a follow-up email on 2 July 2021 inviting any further comment. No response has been received.</p> <p>INPEX receives the Barossa Development Quarterly Consultation Update. The Q2 2021 Update was distributed on 11 June 2021.</p> <p>Santos considers the level of consultation to be adequate and will address any comments from this stakeholder should they arise in the future.</p>	
	<b>Assessment of the merits of objections and claims (OPGGs(E) Regulation 16 (b)(ii))</b>	<b>Statement of response, or proposed response, to the objections and claims (OPGGs(E) Regulation 16 (b)(iii))</b>
	No assessment required.	No response required.
<b>Fishing bodies</b>		
Western Australian Fishing Industry Council (WAFIC)	<p>WAFIC was included in the consultation for this EP as some of its members are also licence-holders in Commonwealth and/or NT fisheries relevant to this activity. The dual licence-holders are also identified through the lists provided by AFMA and the NT DITT-Fisheries. Consultation with these licence-holders is conducted directly and through the NT Seafood Council and the Northern Prawn Fishery.</p>	

Relevant person	Relevant persons consultation summary (OPGGs(E) Regulation 16 (b)(i))	
	<p>WAFIC was provided the Barossa Development Drilling and Completions Stakeholder Consultation package including additional information for commercial fishers via email on 11 June 2021 inviting comment.</p> <p>WAFIC was provided a follow-up email on 2 July 2021 inviting comment.</p> <p>WAFIC responded via email on 5 July 2021 advising that given the proposed activities are in the NT jurisdiction, WAFIC will not be providing any comments.</p> <p>Santos emailed WAFIC on 6 July 2021 acknowledging its response of 5 July 2021.</p> <p>WAFIC receives the Barossa Development Quarterly Consultation Update. The Q2 2021 Update was distributed on 11 June 2021.</p> <p>Santos considers the level of consultation to be adequate and will address any comments from this stakeholder should they arise in the future.</p>	
	Assessment of the merits of objections and claims (OPGGs(E) Regulation 16 (b)(ii))	Statement of response, or proposed response, to the objections and claims (OPGGs(E) Regulation 16 (b)(iii))
	No assessment required.	No response required.
Northern Territory Seafood Council (NTSC)	<p>Santos contacted NTSC via email on 21 May 2021 to offer a briefing on the Barossa Project, including Barossa Development Drilling and Completions EP.</p> <p>Santos met with an NTSC representative on 1 June 2021. Discussion points on Barossa Development Drilling and Completions EP were as follows:</p> <p>NTSC advised that it did not think trawling would be allowed in the proposed drilling area under future management changes for the Timor Reef and Demersal fisheries but asked Santos to confirm with DITT-Fisheries. <b>[CLAIM 001]</b></p> <p>NTSC reiterated the need for Santos to also send information to the relevant licence holders via post and to ensure key stakeholders in the Timor Reef Fishery, the most relevant to the drilling activities, were consulted. <b>[CLAIM 002]</b></p> <p>Santos advised the information to be sent to commercial fishers would address the issue of exclusion zones and confirm these would be the standard around the active drilling location</p> <p>NTSC was provided the Barossa Development Drilling and Completions Stakeholder Consultation package including additional information for commercial fishers via email on 11 June 2021 inviting comment.</p> <p>NTSC advised that the request for feedback would be included in an NTSC business update to licence-holders with email addresses.</p> <p>NTSC licence-holders in the relevant fisheries were also provided the consultation package via email on 11 June 2021 and via post on 14 June 2021, as requested by NTSC.</p> <p>NTSC was provided a reminder email on 2 July 2021 inviting comment.</p> <p>NTSC receives the Barossa Development Quarterly Consultation Update. The Q2 2021 Update was distributed on 11 June 2021.</p> <p>All fisheries are described in <b>Section 3.2.6.1</b>, and potential impact to fisheries, fish habitat and commercial fishers are discussed in <b>Section 6</b>.</p>	



Relevant person	Relevant persons consultation summary (OPGGs(E) Regulation 16 (b)(i))	
	Santos considers the level of consultation to be adequate and will address any comments from this stakeholder should they arise in the future.	
	Assessment of the merits of objections and claims (OPGGs(E) Regulation 16 (b)(ii))	Statement of response, or proposed response, to the objections and claims (OPGGs(E) Regulation 16 (b)(iii))
	<p><b>[CLAIM 001]</b> Santos met with DITT – Fisheries which confirmed the NTSC’s understanding that trawling would not be allowed under the future management changes for the Timor Reef and Demersal fisheries. This non-trawling area includes the proposed Barossa drilling locations.</p>	<p>Based on feedback from both the NTSC and DITT, it is Santos’ understanding that trawling may not be a permitted future activity in the drilling operational area. Santos will continue to engage with relevant commercial fishing licence holders, as evidenced in <b>Table 4-2</b>, to minimise impacts and risks to both parties.</p>
<p><b>[CLAIM 002]</b> In response Santos checked licence-holder lists provided by DITT-Fisheries to ensure that all appropriate licence-holders were being directly consulted in addition to via the NTSC.</p>	<p>Santos has responded that consultation with relevant commercial fishers, including licence holders, has occurred as evidenced in <b>Table 4-2</b> and the <b>Sensitive Stakeholder Consultation Report</b>.</p>	
<p>Northern Prawn Fishing Industry Pty Ltd (NPMI)</p>	<p>Santos contacted NPMI via email on 21 May 2021 to offer a briefing on the Barossa Project, including the Development Drilling and Completions EP. NPMI accepted the invitation via email response to Santos on 26 May 2021.</p> <p>Santos met with representatives of NPMI and NPF licence-holder Austral Fisheries on 3 June 2021. Discussion points on Barossa Development Drilling and Completions EP were as follows:</p> <p>Santos was asked to what depth the production wells would be drilled and advised approximately 3,000 to 4,000 metres.</p> <p>NPMI confirmed that some scampi fishers (less than five boats) operated on occasions in the deep waters north of the operational area and south of the edge of Australia’s EEZ. <b>[CLAIM 001]</b></p> <p>NPMI would check the data to determine exactly where and the level of effort. Santos advised that it had had spoken to one of the scampi fishers who was also checking whether there would be any overlap with his activities.</p> <p>NPMI advised it would provide Santos with written comment on the activities discussed at the meeting.</p> <p>NPMI was provided the Barossa Development Drilling and Completions Stakeholder Consultation package including additional information for commercial NPF fishers via email on 11 June 2021 inviting comment. NPF has previously advised that it prefers to provide the information to its licence-holders.</p> <p>NPMI was provided a follow-up email on 2 July 2021 inviting any further comment as well as a separate email with the record of the meeting held on 3 June 2021.</p>	

Relevant person	Relevant persons consultation summary (OPGGs(E) Regulation 16 (b)(i))	
	<p>NPFI provided a response via email to Santos on 20 July 2021. A summary of the comments is as follows:</p> <p>Due to confidentiality restrictions NPFI is unable to share the fishery catch and effort data but can confirm that scampi fishing does occur in the area of the proposed Barossa development drilling activity. <b>[CLAIM 001]</b></p> <p>December and January are the peak NPF scampi fishing periods. NPFI notes that the survey of the pipeline route is scheduled to occur between October and November 2021. NPFI strongly recommends that this activity is completed before the commencement of the Scampi season on 1 December 2021. <b>[CLAIM 002]</b></p> <p>NPFI has investigated fishing activity and interactions with Threatened, Endangered and Protected (TEP) species in the area of the Barossa Development Drilling project. Our records indicate that the proposed activity will also occur in areas inhabited by endangered sawfish. There are four species of sawfish in Australia, all inhabit the inshore and offshore waters of the NPF including the area of this proposal and when they do so depends on their life stage (i.e., pups inhabit riverine habitat and move offshore as juveniles/sub-adults). <b>[CLAIM 003]</b></p> <p>NPFI is concerned that due consideration has not been given to the potential immediate and long-term impacts on sawfish, particularly given that NPFI invests considerable time and resources to better understand sawfish populations, mitigate interactions with the species and protect important sawfish habitat. <b>[CLAIM 004]</b></p> <p>NPFI requests that the impacts of both the pipeline survey and production drilling on both the NPF Scampi fishery and endangered sawfish are specifically addressed in the development EP. <b>[CLAIM 005]</b></p> <p>Santos responded to NPFI on 18 August 2021 and addressed each of the matters raised in their correspondence of 20 July 2021.</p> <p>NPFI receives the Barossa Development Quarterly Consultation Update. The Q2 2021 Update was distributed on 11 June 2021.</p> <p>Santos considers the level of consultation to be adequate and will address any comments from this stakeholder should they arise in the future.</p>	
	Assessment of the merits of objections and claims (OPGGs(E) Regulation 16 (b)(ii))	Statement of response, or proposed response, to the objections and claims (OPGGs(E) Regulation 16 (b)(iii))
	<p><b>[CLAIM 001]</b> Santos acknowledges that scampi fishing occurs in the ‘area of the proposed Barossa drilling activity’. Through consultation with scampi fishers, it is Santos’ understanding that fishers primarily target deeper water closer to the Australian EEZ boundary which is at the northern extremity of the petroleum production licence (NT/L1). Drilling will be undertaken at three locations in the southern end of the petroleum production licence at water depths between 230 and 280 metres. Santos understands that there is a low level of fishing effort spread across two-to-three months of the year (December to February).</p>	<p>Santos responded to NPFI on 18 August 2021.</p> <p>Scampi fishers whose activities could be affected by the proposed drilling activities have been asked to engage with Santos directly or through the NPFI.</p> <p>Santos’ understanding of the scampi fishery and fishing effort is described in <b>Section 3.2.6.1</b>.</p>

Relevant person	Relevant persons consultation summary (OPGGs(E) Regulation 16 (b)(i))	
	<p><b>[CLAIM 002]</b> Santos' assessment of the claim is that while valid it does not relate to the development drilling activity covered by this EP. The pipeline route survey is covered under the ongoing communications and notifications requirements in the NOPSEMA-accepted Barossa Gas Export Pipeline Installation EP.</p>	<p>Santos responded to the NPFI with information on the planned pipeline survey activity and time frame, and the required advance notification process.</p> <p>The pipeline survey was completed before 1 December as requested.</p>
	<p><b>[CLAIM 003], [CLAIM 004] [CLAIM 005]</b> Potential impacts to the endangered sawfish were specifically addressed in the Barossa Development Area OPP and the Gas Export Pipeline Installation EP as accepted by NOPSEMA in March 2018 and 2020 respectively. During the consultation phase for the Barossa GEP Installation EP specific information on sawfish was provided to the NPFI. Santos has addressed potential impacts to the scampi fishery and endangered sawfish in the Development Drilling and Completions EP.</p>	<p>All relevant fisheries are described in <b>Section 3.2.6.1</b>. Potential impacts and risks to fisheries and fishers, including scampi fisheries and fishers, have been assessed as environmentally acceptable and ALARP (primarily <b>Sections 6.4.4, 6.5.4, 6.6.4, 6.7.4, 7.6.4 and 7.7.4</b>).</p> <p>Potential impacts to the endangered sawfish have been specifically addressed in the Barossa Development Area OPP and the Gas Export Pipeline Installation EP as accepted by NOPSEMA in March 2018 and 2020 respectively. Additional information and impact assessment on endangered sawfish is provided in this EP including in <b>Table 3-7, Table 3-9, Sections 6.4 and 6.7</b>.</p>
<p>Commonwealth Fisheries Association</p>	<p>CFA was provided the Barossa Development Drilling and Completions Stakeholder Consultation package via email on 11 June 2021 inviting comment.</p> <p>CFA was provided a follow-up email on 2 July 2021 inviting any further comment. No response has been received.</p> <p>CFA receives the Barossa Development Quarterly Consultation Update. The Q2 2021 Update was distributed on 11 June 2021.</p> <p>Santos considers the level of consultation to be adequate and will address any comments from this stakeholder should they arise in the future.</p>	
	<p><b>Assessment of the merits of objections and claims (OPGGs(E) Regulation 16 (b)(ii))</b></p>	<p><b>Statement of response, or proposed response, to the objections and claims (OPGGs(E) Regulation 16 (b)(iii))</b></p>
	<p>No assessment required.</p>	<p>No response required.</p>

Relevant person	Relevant persons consultation summary (OPGGG(E) Regulation 16 (b)(i))	
<p>Pearl Producers Association (PPA)</p>	<p>Neither the NTSC or WAFIC advised that pearl oyster fisheries were relevant for this activity. This correlated with Santos’ understanding. Nonetheless, the PPA was provided the Barossa Development Drilling and Completions Stakeholder Consultation package and Barossa Development Drilling and Completions Additional Information for Commercial Fishers package on 11 June 2021.</p> <p>PPA provided alternative contact details via email on 11 June 2021. These were used by Santos for communications from that date on. The above information was re-sent to these contacts on 11 June 2021.</p> <p>Santos sent a follow-up email on 2 July 2021 inviting comment. No response has been received.</p> <p>PPA receives the Barossa Development Quarterly Consultation Update. The Q2 2021 Update was distributed on 11 June 2021.</p> <p>Santos considers the level of consultation to be adequate and will address any comments from this stakeholder should they arise in the future.</p>	
	<p><b>Assessment of the merits of objections and claims (OPGGG(E) Regulation 16 (b)(ii))</b></p>	<p><b>Statement of response, or proposed response, to the objections and claims (OPGGG(E) Regulation 16 (b)(iii))</b></p>
	<p>No assessment required.</p>	<p>No response required.</p>
<p>Australian Southern Bluefin Tuna Industry Association</p>	<p>ASBTIA has previously advised that no fishing activity occurs in the operational area. Nonetheless, ASBTIA was provided the Barossa Development Drilling and Completions Stakeholder Consultation package via email on 29 September 2020.</p> <p>ASBTIA was provided a follow-up email on 2 July 2021 inviting comment. No response has been received.</p> <p>ASBTIA receives the Barossa Development Quarterly Consultation Update. The Q2 2021 Update was distributed on 11 June 2021.</p> <p>Santos considers the level of consultation to be adequate and will address any comments from this stakeholder should they arise in the future.</p>	
	<p><b>Assessment of the merits of objections and claims (OPGGG(E) Regulation 16 (b)(ii))</b></p>	<p><b>Statement of response, or proposed response, to the objections and claims (OPGGG(E) Regulation 16 (b)(iii))</b></p>
	<p>No assessment required.</p>	<p>No response required.</p>
<p>Amateur Fisherman’s Association of the Northern Territory (AFANT)</p>	<p>AFANT has previously advised that recreational fishing activity does not occur in the area within which development drilling activities would occur. Nonetheless, AFANT was provided the Barossa Development Drilling and Completions Stakeholder Consultation package via email on 11 June 2021 inviting comment.</p> <p>AFANT was provided a follow-up email on 2 July 2021 inviting any further comment.</p> <p>AFANT receives the Barossa Development Quarterly Consultation Update. The Q2 2021 Update was distributed on 11 June 2021.</p> <p>Santos considers the level of consultation to be adequate and will address any comments from this stakeholder should they arise in the future.</p>	

Relevant person	Relevant persons consultation summary (OPGGs(E) Regulation 16 (b)(i))	
	Assessment of the merits of objections and claims (OPGGs(E) Regulation 16 (b)(ii))	Statement of response, or proposed response, to the objections and claims (OPGGs(E) Regulation 16 (b)(iii))
NT Guided Fishing Industry Association (NTGFIA)	<p>NTGFIA has previously advised that fishing tourism activities are unlikely to occur in the operational area due to the distance from the NT mainland.</p> <p>Nonetheless, NTGFIA was provided the Barossa Development Drilling and Completions Stakeholder Consultation package via email on 11 June 2021 inviting comment.</p> <p>NTGFIA was provided a follow-up email on 2 July 2021 inviting any further comment.</p> <p>NTGFIA receives the Barossa Development Quarterly Consultation Update. The Q2 2021 Update was distributed on 11 June 2021.</p> <p>Santos considers the level of consultation to be adequate and will address any comments from this stakeholder should they arise in the future.</p>	No response required.
Fishing tourism operators: Clearwater Island Resort Tiwi Adventures Tiwi Island Retreat Top End Arafura Charters	<p>Some operators who may transit the operational area were provided the Barossa Development Drilling and Completions Stakeholder Consultation package via email on 11 June 2021 inviting comment.</p> <p>The operators were provided a follow-up email on 2 July 2021 inviting any further comment. No responses have been received.</p> <p>The operators also receive the Barossa Development Quarterly Consultation Update. The Q2 2021 Update was distributed on 11 June 2021.</p> <p>Santos considers the level of consultation to be adequate and will address any comments from this stakeholder should they arise in the future.</p>	No response required.
<b>Commercial fishing licence-holders</b>		
Austral Fisheries	<p>Santos contacted Austral Fisheries via email on 21 May 2021 to offer a briefing on the Barossa Project, including the Development Drilling and Completions EP.</p> <p>Austral Fisheries accepted the invitation via email response to Santos on 21 May 2021.</p>	No response required.

Relevant person	Relevant persons consultation summary (OPGG(E) Regulation 16 (b)(i))	
	<p>Santos met with Austral Fisheries on 28 May 2021. Discussion points on Barossa Development Drilling and Completions EP were as follows:</p> <p>Austral is the largest Goldband Snapper licence-holder in the Timor Reef Fishery and plans to increase its TRF operations (from one to four trap vessels) over the next two years. The Barossa operational area overlaps the TRF area. Austral is also a major operator in the Northern Prawn Fishery with 11 of the 52 vessels. The Barossa GEP will overlap the NPF area. <b>[CLAIM 001]</b></p> <p>Austral advised that while it was happy to hold discussions with Santos when specifically required, its preference is for formal consultation to be undertaken via the representative bodies, NT Seafood Council and NPF Limited. Austral would like to continue to be informed during EP preparations, but responses would be co-ordinated via the two organisations. <b>[CLAIM 002]</b></p> <p>Austral requested that Santos seeks the views of a specific NPF licence-holder who is the predominant scampi fisher conducting activities to the north of the Barossa operational area. <b>[CLAIM 003]</b></p> <p>Santos provided Austral via email on 4 June 2021 with a record of the meeting held 28 May 2021 and information on the actions being taken as a result.</p> <p>An Austral Fisheries representative attended the meeting held on 3 June 2021 between Santos and the NPFI. Refer to separate NPFI entry for details.</p> <p>Austral Fisheries was provided the Barossa Development Drilling and Completions Stakeholder Consultation package, including additional information for commercial fishers, via email on 11 June 2021 inviting comment.</p> <p>Austral Fisheries was provided a follow-up email on 2 July 2021 inviting any further comment.</p> <p>Austral Fisheries receives the Barossa Development Quarterly Consultation Update. The Q2 2021 Update was distributed on 11 June 2021.</p> <p>Santos considers the level of consultation to be adequate and will address any comments from this stakeholder should they arise in the future.</p>	
	Assessment of the merits of objections and claims (OPGG(E) Regulation 16 (b)(ii))	Statement of response, or proposed response, to the objections and claims (OPGG(E) Regulation 16 (b)(iii))
	<p><b>[CLAIM 001]</b> On assessment, the information provided correlates with Santos' understanding that the development drilling operational area is within the Timor Reef Fishery (TRF) while the Barossa Gas Export Pipeline (GEP) operational area is relevant to the Northern Prawn Fishery (NPF). Santos acknowledges that some scampi fishers are active within the NPF that target deeper water to the north of the development drilling operational area.</p>	<p>Santos responded to Austral Fisheries via email on 4 June 2021 with a record of the meeting held 28 May 2021 and information on the actions being taken as a result.</p> <p>All relevant fisheries are described in <b>Section 3.2.6.1</b>, including the NPF and TRF. Santos acknowledges that both fisheries overlap the drilling operational area, and that there maybe active fishing within this area.</p>

Relevant person	Relevant persons consultation summary (OPGGs(E) Regulation 16 (b)(i))	
	<p><b>[CLAIM 002]</b> Santos notes Austral Fisheries’ preferred consultation process, i.e. through the relevant representative organisations. It is also noted that the two identified organisations adopt different processes for consultation with their licence-holders and these are followed by Santos.</p>	<p>Santos understands that Austral Fisheries’ preferred consultation process is via representative organisations and confirms that this process will be followed.</p>
	<p><b>[CLAIM 003]</b> Santos included the requested licence-holder in its consultation process.</p>	<p>Santos confirms that the licence-holder identified by Austral Fisheries was one of the relevant persons being consulted for this EP and on an ongoing basis.</p>
<p>Australia Bay Seafoods</p>	<p>Santos contacted NPMI via email on 21 May 2021 to offer a briefing on the Barossa Project, including the Development Drilling and Completions EP. NPMI passed the invitation on to a licence holder at Australia Bay Seafoods.</p> <p>Santos met with representatives of two licence-holders, including one from Australia Bay Seafoods, on 1 June 2021. Discussion points on Barossa Development Drilling and Completions EP were as follows:</p> <p>The Australia Bay Seafoods representative sought clarification from Santos that meeting and providing feedback did not preclude his right to potentially seek compensation from Santos in the future if he determined his business had been impacted by the company’s activities. <b>[CLAIM 001]</b></p> <p>The representatives acknowledged that Santos had been given approval to conduct its activities, but it was important that the rights and entitlements of commercial fishers were respected and impacts minimised on their activities. <b>[CLAIM 002]</b></p> <p>One representative advised he was one of two NPF licence-holders who fished for scampi north of the operational area along the Australian side of the EEZ. He would check on the drilling location co-ordinates to determine whether these impacted his activities. <b>[CLAIM 003]</b></p> <p>In response to a question, Santos advised that water depths in the operational area ranged from 220m to 280m. Santos advised it understood this water depth was too deep for prawn fishing and not deep enough for scampi fishing.</p> <p>The Australia Bay Seafoods representative stated that from his perspective there was no impact in the operational area, but fishing did occur in the vicinity of the proposed pipeline route. He reiterated that this could be managed through consultation between both parties, but fishers may still seek compensation if their activities were impacted. <b>[CLAIM 004]</b></p> <p>Santos was advised to also contact two other specific licence-holders. <b>[CLAIM 005]</b></p> <p>Australia Bay Seafoods was provided a summary of Santos’ actions resulting from the meeting, via email on 23 July 2021.</p> <p>Australia Bay Seafoods was provided the Barossa Development Drilling and Completions Stakeholder Consultation package, including additional information for commercial fishers, via email on 11 June 2021 inviting comment.</p> <p>Australia Bay Seafoods was provided a follow-up email on 2 July 2021 inviting any further comment.</p> <p>Australia Bay Seafoods receives the Barossa Development Quarterly Consultation Update. The Q2 2021 Update was distributed on 11 June 2021.</p> <p>Santos considers the level of consultation to be adequate and will address any comments from this stakeholder should they arise in the future.</p>	

Relevant person	Relevant persons consultation summary (OPGGs(E) Regulation 16 (b)(i))	
	Assessment of the merits of objections and claims (OPGGs(E) Regulation 16 (b)(ii))	Statement of response, or proposed response, to the objections and claims (OPGGs(E) Regulation 16 (b)(iii))
	<p><b>[CLAIM 001]</b> Santos agrees that the provision of feedback by a stakeholder during a consultation process should not preclude the right to potentially seek evidenced-based compensation in the future.</p>	<p>Santos responded at the meeting held on 1 June 2021, that Santos confirmed to Australia Bay Seafoods that this right was not precluded.</p>
	<p><b>[CLAIM 002]</b> Santos agrees that the rights and entitlements of commercial fishers should be respected and efforts taken to minimise impacts on their activities. Both Santos and commercial fisheries have legitimate rights to conduct their business within the drilling operational area.</p>	<p>Santos responded at the meeting held on 1 June 2021, that Santos confirmed to Australia Bay Seafoods that the rights and entitlements of commercial fishers would be respected and efforts taken to minimise impacts on their activities. Such efforts (control measures) are described in <b>Section 6.5</b>.</p>
	<p><b>[CLAIM 003]</b> Santos will consider any additional information provided by any licence-holder and/or their representative organisation.</p>	<p>Santos responded that the catch effort information that has been provided by the Northern Prawn Fishery indicated the targeted scampi grounds would not be affected but Santos would be pleased to receive further information. This understanding of scampi fishing effort is reflected in <b>Table 3-11</b>.</p>
	<p><b>[CLAIM 004]</b> Santos acknowledges the fishing effort within the operational area and surroundings, that ongoing consultation will assist in minimise interference with commercial fishers and that commercial fishers with licence rights may seek compensation for their activities being impacted.</p>	<p>Santos responded at the meeting held on 1 June 2021 to Australia Bay Seafoods that it acknowledged their right to claim compensation. Santos’ understanding of fishing effort is reflected in <b>Table 3-11</b>, and ongoing consultation commitments with commercial fishers are described in <b>Table 6-10</b>.</p>
	<p><b>[CLAIM 005]</b> On assessment, Santos reviewed its licence-holder lists to ensure those identified by the stakeholder were being consulted.</p>	<p>Santos responded at the meeting held on 1 June 2021 that Santos confirmed that the identified relevant persons were being consulted.</p>
	<p>Refer to separate entry for NPFI Pty Ltd as the representative body for licence-holders. Individual licence-holders contacted by Santos in each instance stated that the NPFI would provide the consolidated, formal comment to Santos on their behalf.</p>	



Relevant person	Relevant persons consultation summary (OPGGs(E) Regulation 16 (b)(i))	
Northern Prawn Fishery (Commonwealth) licence-holders	<p>NPFI licence holders were provided with the Barossa Development Drilling and Completions Stakeholder Consultation package and Barossa Development Drilling and Completions Additional Information for Commercial Fishers package (for Northern Prawn Fishery) via their representative body NPFI Pty Ltd or directly by Santos via email on 11 June 2021.</p> <p>NPFI was provided a follow-up email on 2 July 2021 inviting any further comment.</p> <p>NPFI receives the Barossa Development Quarterly Consultation Update. The Q2 2021 Update was distributed on 11 June 2021.</p> <p>Santos considers the level of consultation to be adequate and will address any comments from this stakeholder should they arise in the future.</p>	
	Assessment of the merits of objections and claims (OPGGs(E) Regulation 16 (b)(ii))	Statement of response, or proposed response, to the objections and claims (OPGGs(E) Regulation 16 (b)(iii))
	Refer to separate entry for NPFI.	Refer to separate entry for NPFI.
Timor Reef Fishery Licence-Holders	<p>TRF licence-holders were provided the Barossa Development Drilling and Completions Stakeholder Consultation package and Barossa Development Drilling and Completions Additional Information for Commercial Fishers package via email on 11 June 2021 or post on 14 June 2021.</p> <p>Their representative body, the NTSC, was also provided the Barossa Development Drilling and Completions Stakeholder Consultation package including additional information for commercial fishers, via email on 11 June 2021 inviting comment.</p> <p>NTSC advised that the request for feedback would also be included in an NTSC business update to licence-holders with email addresses.</p> <p>The licence-holders and NTSC were provided a reminder email on 2 July 2021 inviting comment. Refer to NTSC comments received. No comments received to date from individual fishers in this fishery.</p> <p>The licence-holders and the NTSC receive the Barossa Development Quarterly Consultation Update. The Q2 2021 Update was distributed on 11 June 2021.</p> <p>Santos considers the level of consultation to be adequate and will address any comments from this stakeholder should they arise in the future.</p>	
	Assessment of the merits of objections and claims (OPGGs(E) Regulation 16 (b)(ii))	Statement of response, or proposed response, to the objections and claims (OPGGs(E) Regulation 16 (b)(iii))
	Refer to separate entry for NTSC.	Refer to separate entry for NTSC.

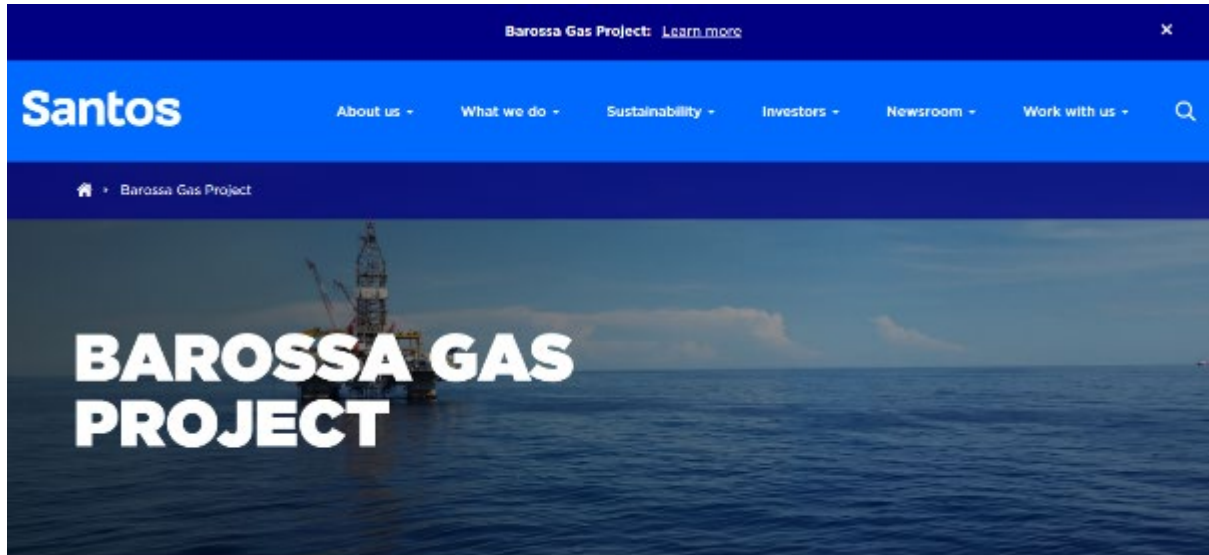
Relevant person	Relevant persons consultation summary (OPGGs(E) Regulation 16 (b)(i))	
Spanish Mackerel Fishery (NT) Licence-Holders	<p>This fishery currently does not overlap with the operational area. DITT – Fisheries has also advised that little fishing activity occurs in the Barossa Field area, within which drilling activities would occur.</p> <p>Nonetheless, SMF licence-holders were provided the Barossa Development Drilling and Completions Stakeholder Consultation package and Barossa Development Drilling and Completions Additional Information for Commercial Fishers package via email on 11 June 2021 or post on 14 June 2021.</p> <p>Their representative body, the NTSC, was also provided the Barossa Development Drilling and Completions Stakeholder Consultation package including additional information for commercial fishers, via email on 11 June 2021 inviting comment.</p> <p>NTSC advised that the request for feedback would also be included in an NTSC business update to licence-holders with email addresses.</p> <p>The licence-holders and NTSC were provided a reminder email on 2 July 2021 inviting comment. Refer to NTSC comments received. No comments received to date from individual fishers in this fishery.</p> <p>The licence-holders and the NTSC receive the Barossa Development Quarterly Consultation Update. The Q2 2021 Update was distributed on 11 June 2021.</p> <p>Santos considers the level of consultation to be adequate and will address any comments from this stakeholder should they arise in the future.</p>	
	<b>Assessment of the merits of objections and claims (OPGGs(E) Regulation 16 (b)(ii))</b>	<b>Statement of response, or proposed response, to the objections and claims (OPGGs(E) Regulation 16 (b)(iii))</b>
	Refer to separate entry for NTSC.	Refer to separate entry for NTSC.
Demersal Fishery (NT) Licence-Holders	<p>DF licence-holders were provided the Barossa Development Drilling and Completions Stakeholder Consultation package and Barossa Development Drilling and Completions Additional Information for Commercial Fishers package via email on 11 June 2021 or post on 14 June 2021.</p> <p>Their representative body, the NTSC, was also provided the Barossa Development Drilling and Completions Stakeholder Consultation package including additional information for commercial fishers, via email on 11 June 2021 inviting comment.</p> <p>NTSC advised that the request for feedback would also be included in an NTSC business update to licence-holders with email addresses.</p> <p>The licence-holders and NTSC were provided a reminder email on 2 July 2021 inviting comment. Refer to NTSC comments received. No comments received to date from individual fishers in this fishery.</p> <p>The licence-holders and the NTSC receive the Barossa Development Quarterly Consultation Update. The Q2 2021 Update was distributed on 11 June 2021.</p> <p>Santos considers the level of consultation to be adequate and will address any comments from this stakeholder should they arise in the future.</p>	
	<b>Assessment of the merits of objections and claims (OPGGs(E) Regulation 16 (b)(ii))</b>	<b>Statement of response, or proposed response, to the objections and claims (OPGGs(E) Regulation 16 (b)(iii))</b>

Relevant person	Relevant persons consultation summary (OPGGs(E) Regulation 16 (b)(i))	
	Refer to separate entry for NTSC.	Refer to separate entry for NTSC.
Aquarium Fishery (NT) Licence-Holders	<p>Aquarium Fishery licence-holders were provided the Barossa Development Drilling and Completions Stakeholder Consultation package and Barossa Development Drilling and Completions Additional Information for Commercial Fishers package via email on 11 June 2021 or post on 14 June 2021. Their representative body, the NTSC, was also provided the Barossa Development Drilling and Completions Stakeholder Consultation package including additional information for commercial fishers, via email on 11 June 2021 inviting comment.</p> <p>NTSC advised that the request for feedback would also be included in an NTSC business update to licence-holders with email addresses.</p> <p>The licence-holders and NTSC were provided a reminder email on 2 July 2021 inviting comment. Refer to NTSC comments received. No comments received to date from individual fishers in this fishery.</p> <p>The licence-holders and the NTSC receive the Barossa Development Quarterly Consultation Update. The Q2 2021 Update was distributed on 11 June 2021..</p> <p>Santos considers the level of consultation to be adequate and will address any comments from this stakeholder should they arise in the future.</p>	
	Assessment of the merits of objections and claims (OPGGs(E) Regulation 16 (b)(ii))	Statement of response, or proposed response, to the objections and claims (OPGGs(E) Regulation 16 (b)(iii))
	Refer to separate entry for NTSC.	Refer to separate entry for NTSC.

APPENDIX F – RELEVANT PERSONS CONSULTATION  
MATERIALS FOR DRILLING AND COMPLETIONS  
ENVIRONMENT PLAN REVISION 4

# 1. Webpage

## Barossa Project webpage



## 2. Information booklets and factsheets

### Drilling and Completions information booklet



**Santos**

BAROSSA GAS PROJECT

# **Drilling and Completions Information Booklet**

Santos is continuing its Barossa Gas Project consultation efforts to further ascertain, understand and assess values and sensitivities of the environment that may be affected by our proposed activities, and potential environmental impacts and risks.

There may be information Santos is not yet aware of but needs to properly understand to assess potential activity impacts and risks. Consultation may inform this. It may also inform what control measures are to be proposed to reduce environmental impacts and risks to as low as reasonably practicable and to an acceptable level.

This consultation material specifically relates to the Drilling and Completions Environment Plan.

## Overview

Santos is a global energy company committed to helping the world decarbonise to reach net-zero emissions through reliable and affordable energy. For more than 65 years, Santos has been working in partnership with local communities, providing local jobs and business opportunities, safely developing its natural gas resources, and powering industries and households.

The Santos-operated Barossa Gas Project is an offshore gas and condensate project that proposes to provide a new source of gas to the existing Darwin Liquefied Natural Gas (DLNG) facility in the Northern Territory.

Natural gas would be extracted from the Barossa field, located in Commonwealth waters approximately 285 kilometres offshore north-north west from Darwin, and transported via a gas pipeline (Gas Export Pipeline GEP and Darwin Pipeline Duplication DPD) to the existing DLNG facility, with first gas targeted for 2025.

Project infrastructure would comprise a Floating Production Storage and Offloading (FPSO) facility, a subsea production system, supporting in-field subsea infrastructure, the GEP and the DPD.

Santos plans to drill six (6) subsea development wells at three (3) drill centres, with contingency plans for an additional two (2) wells. Gas and condensate would be gathered from the wells through the subsea production system and then brought to the FPSO facility via a network of subsea infrastructure.

Initial processing would occur at the FPSO facility, to separate the natural gas, water and condensate extracted from the Barossa field. The dry natural gas would be transported through the gas pipeline for onshore processing at the DLNG facility. Condensate would be transferred from the FPSO to specialised tankers for export.

## Environmental approvals

The Commonwealth Government's independent expert regulator for offshore oil and gas development, the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA), accepted the Barossa Offshore Project Proposal (OPP) in March 2018.

Acceptance of the OPP is the government's project-level environmental approval for offshore projects, with construction and operations subject to further acceptance of activity-level environment plans (EPs).

To be accepted by NOPSEMA, an EP must meet the requirements set out in the *Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009* (OPGGGS Environment Regulations).

The OPGGS Environment Regulations set out that an EP must (among other things):

- + comprehensively describe the activity to be carried out under the EP
- + describe the environment that may be affected by the activity, including the values and sensitivities of that environment
- + detail and evaluate the environmental impacts and risks for the relevant activity
- + demonstrate that the impacts and risks of the activity will be reduced to as low as reasonably practicable and an acceptable level (and detail the control measures to be used to achieve this)
- + demonstrate that Santos has consulted, in accordance with regulatory requirements, with each relevant person, including those whose functions, interests or activities may be affected by the activities to be carried out under the EP
- + demonstrate that the measures (if any) that Santos has adopted, or proposes to adopt, because of the consultations are appropriate.

The Barossa Drilling and Completions Environment Plan (Revision 3) was accepted by NOPSEMA in March 2022. Subsequently, drilling under the EP commenced on 18 July 2022.

Following Court proceedings, NOPSEMA's decision to accept Revision 3 of the EP was set aside. Santos has partially drilled and completed one development well. Santos is preparing a new revision of the EP for submission to NOPSEMA. The new revision is being prepared in line with the guidance of the Full Federal Court in relation to Revision 3 of the EP and in particular, guidance provided concerning consultation under the OPGGS Environment Regulations.

In order to meet its proposed schedule for the broader Barossa Project, Santos is aiming to resubmit the Drilling and Completions EP to NOPSEMA and, subject to regulatory approval, to recommence activities in 2023. This timeline has been developed by Santos in order to meet this objective, while still providing a reasonable period for meaningful consultation, having regard to Santos' regulatory obligations and to feedback from relevant persons.

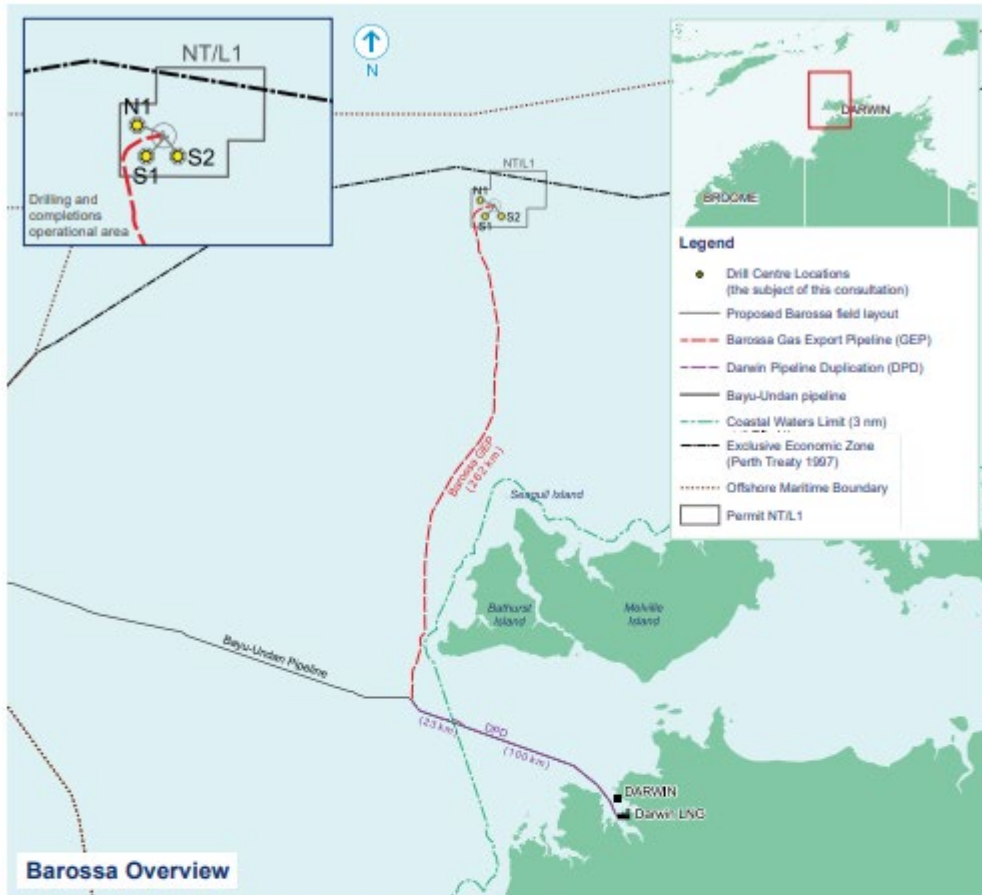


Figure 1 Barossa overview and drilling and completions environment plan operational area

## Activity and location

Santos plans to drill six (6) subsea development wells at three (3) drill centres (S1, S1, N1 – refer to Figure 1) in the Barossa field. Contingency plans provide for an additional two (2) development wells to be drilled. The final well locations are subject to change (by up to 1km) but will remain within the defined operational area. Wells are to be drilled using a moored semi-submersible mobile offshore drilling unit (MODU).

A MODU is a moored drilling vessel that floats semi-submerged while drilling. A picture of a MODU is shown in Figure 2. The water depth at the three drill centres ranges from 230 metres to 280 metres deep.

The MODU will be supported by up to four (4) support vessels which will transit between the drilling area (see Figure 1) and the onshore supply base in Darwin. The offshore support vessels are specially designed ships that will cater for the logistical servicing of the offshore activity. This includes activities such as delivering supplies and equipment, moving equipment and positioning the MODU.

The permit area NT/L1 has been defined as the operational area

within which drilling activities will occur (Figure 1). During drilling, a 500-metre exclusion zone (known as a petroleum safety zone (PSZ)) will be in place around the MODU. The exclusion zone will remain around each well until eventual field decommissioning. Vessels are prohibited from entering or being present in a petroleum safety zone without authorisation. For more information, visit the National Offshore Petroleum Safety and Environmental Management Authority [website](#).

During drilling, a cautionary zone will also be in place around the MODU and anchors, which may extend up to 2.5 km from the MODU within which marine traffic will be monitored and clear communications maintained to reduce the risk of vessel interactions. Each well is expected to take about 90 days of continuous well operations (24 hours per day, seven days per week) to drill and complete. Activities are anticipated to be completed within about two years, subject to, for example, weather and operational performance.

Once drilling of a well is complete, an offshore light well intervention vessel (LWIV) or the MODU will install pressure-containing safety equipment at the top of each well, referred to as a subsea "Christmas Tree". The Christmas Tree will act like a tap, so Santos can control the





flow and pressure of the gas. The Christmas Tree is the primary mechanism for shutting in the well at the seabed and serves as the interface for well re-entry operations. The installation of well casing and the Christmas Tree is known as completion of the well.

A subsea control module attached to the tree contains the instrumentation, electronics and hydraulics connections needed for safe operation of the subsea tree valves, chokes and downhole valves.

Once installed, the wells remain suspended until future commissioning and production phases (which will be addressed in separate activity EPs).

## Overview of proposed activities under Drilling and Completions EP

Further to the Activity Summary above, the list below provides an indicative breakdown of the types of activities proposed to be carried out under the Drilling and Completions EP:

- + movement of the MODU within the operational area (including the entry and exit of the area)
- + MODU and vessel commissioning and demobilising activities (e.g., equipment testing, tank flushing and cleaning, inventory management, etc.)
- + deployment and recovery of the MODU anchors and mooring lines (including potential for pre-lay anchors)
- + deployment and operation, and eventual removal, of a temporary acoustic survey positioning system
- + riserless drilling
- + drilling with a conventional closed-circulating fluid system and riserless mud recovery
- + installation of casing strings
- + drilling using water-based and non-aqueous drilling fluid systems
- + installation and operation of a blow-out preventer (BOP)
- + cementing
- + well completions, including perforating and well flowback (i.e., sampling, clean up, and flaring)
- + installation of Christmas Trees
- + contingency activities such as side-track drilling, re-drilling sections, re-spud and abandonment
- + light well intervention
- + ongoing well inspection, maintenance and management
- + general operations associated with the use of a MODU, vessels, helicopters and remotely operated vehicles (ROVs) within the operational area.

More detail about the specific activities proposed to be carried out under the Drilling and Completions EP can also be provided during consultation. If you have questions or would like further information about the detail of the activities listed above or what they involve, please ask us. Visit [santos.com/barossa](https://santos.com/barossa), phone 1800 267 600, email [offshore.consultation@santos.com](mailto:offshore.consultation@santos.com).

## Regional existing environment summary

### EMBA – environment that may be affected

In the preparation and assessment of EPs, each of the following is considered part of the 'environment' (under regulation 4 of the OPGSS Environment Regulations):

- + ecosystems and their constituent parts, including people and communities
- + natural and physical resources
- + the qualities and characteristics of locations, places and areas
- + the heritage value of places.

'Environment' includes the social, economic and cultural features of each of the above.

Santos recognises the region's various environmental values and sensitivities. In an EP, it is common to present a geographically defined area of the environment that may be affected (EMBA) by an offshore activity, primarily from a hydrocarbon spill.

The EMBA was defined by overlaying hundreds of individual hypothetical spill model simulations into a single map using the low threshold exposure values (which can equate to approximately 1 millilitre of hydrocarbon per 1000 litres of sea water) to identify the full geographical extent of the environment that might be contacted by hydrocarbons. This also provides the basis for assessing the range of potential socio-economic risks and establishes a planning area for scientific monitoring.

The entirety of an EMBA is not considered to be representative of biological impact, but is used for identifying the full geographical extent of the environment that could potentially be affected (including where the effect may not constitute a significant impact).

As EMBA threshold values are very low, the Moderate Exposure Value (MEVA) thresholds (which equate to approximately 10 millilitres of hydrocarbon per 1000 litres of sea water) is used to inform environmental assessment, identify potential environmental consequences, and develop spill response plans. The EMBA and MEVA are illustrated in Figure 3 below.

It should be noted that an actual spill is more accurately represented by only one of the simulations from the modelling, meaning a much smaller geographical area would be affected in the event of an actual spill.

To learn more about spill modelling, exposure values and spill responses, see [NOPSEMA Spill Modelling Video](#).

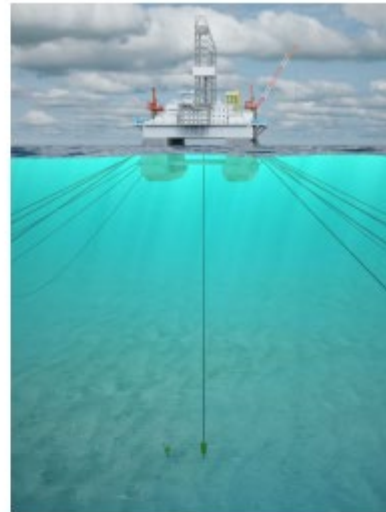


Figure 2 Graphical representation of MODU drilling



Figure 3 The EMBA and MEVA



### Regional protected and significant areas

Table 1 contains a summary of known values and significant areas within the EMBA recognised under relevant environmental legislation. Further information in relation to each area can be found in Revision 3 of the Drilling EP. Note that Revision 3 is in the process of being updated by Santos for resubmission to NOPSEMA.

Protected and significant areas	Summary of known values and significant areas	Operational area	EMBA	Distance to operational area (km)
<b>Australian marine parks</b>				
<b>Oceanic Shoals Marine Park</b>	Important resting area for flatback and Olive Ridley turtles between egg laying (inter-nesting area) and foraging area for the loggerhead and olive ridley turtle.	✘	✔	33
<b>Arafura Marine Park</b>	This area may contain cultural and natural values, including sea country. Ecosystems representative of the Northern Shelf Province, Timor Transition and Tributary canyons of the Arafura Depression key ecological feature. There are turtle and seabird biologically important areas within the marine park.	✘	✔	230
<b>Ashmore Reef Marine Park</b>	Ecosystems representative of the North West Shelf, Timor Province and emergent oceanic reefs. This marine park has turtle, seabird, dugong and whale biologically important areas, including critical nesting and inter-nesting habitat for green turtles. The Ashmore Reef Marine Park is located in Australia's external territory and is subject to a memorandum of understanding between Indonesia and Australia. The marine park may also contain cultural and heritage sites. Commercial tourism, recreation and scientific research are important socioeconomic values of the marine park.	✘	✔	796
<b>Ashmore/ Cartier Island Marine Park</b>	Ecosystems representative of the Timor Province. This marine park has regional importance for feeding and breeding aggregations of birds and marine life, and contains a high diversity of fish, and hard and soft corals. The marine park provides inter-nesting, nesting and foraging habitat for marine turtles. The Cartier Island Marine Park is located in Australia's external territory and is subject to a memorandum of understanding between Indonesia and Australia.	✘	✔	770

Protected and significant areas	Summary of known values and significant areas	Operational area	EMBA	Distance to operational area (km)
<b>State marine parks, management areas and reserves</b>				
<b>Scott Reef Nature Reserve</b>	Valued due to a rich ecosystem supported by a group of atoll-like reefs surrounded by open ocean.	✘	✔	1004
<b>Commonwealth heritage places</b>				
<b>Ashmore Reef National Nature Reserve</b>	Significant due to the history of human use and occupation of the atoll. Islands are believed to have been visited by Indonesian fishermen, as well as Macassans and Bajo and people from the island of Ceram.	✘	✔	800
<b>Scott Reef and surrounds – Commonwealth area</b>	Significant due to its high representation of species with affinities with oceanic and Indonesian reef habitats that are not found in coastal waters.	✘	✔	1004
<b>Wetlands of international and national importance (EPBC)</b>				
<b>Ashmore Reef Ramsar Site &amp; Marine Park</b>	Significant due to the importance of the islands in providing a resting place for migratory shorebirds and supporting large breeding colonies of seabirds. Ashmore Reef plays a primary role in the maintenance of biodiversity in reef systems in the region.	✘	✔	796
<b>Key ecological features</b>				
<b>North Marine Region</b>				
<b>Carbonate bank and terrace system of the Van Diemen Rise</b>	Unique seafloor features characterised by terrace, banks, channels and valleys. Supports rich sponge gardens, corals and diversity of fish life. Foraging areas for loggerhead, olive ridley and flatback turtles and provide habitat for humpback whales and sawfish. Regionally important due to enhancing productivity relative to their surrounds.	✘	✔	50
<b>Pinnacles of the Bonaparte Basin</b>	Unique seafloor features characterised by the largest concentration of pinnacles along the Australian margin. Recognised as a sponge biodiversity hotspot, and regionally important due to biodiversity value.	✘	✔	191
<b>Shelf break and slope of the Arafura Shelf</b>	Unique seafloor features characterised by continental slope, patch reefs and hard substrate pinnacles. An important ecological feature that enhances biological productivity and attracts pelagic organisms.		✔	0
			Yes, however, surveys confirm that the values associated with the key ecological feature are not within or proximal to the operational area.	
<b>Tributary canyons of the Arafura Depression</b>	Tributary canyons are seabed features that are approximately 80- 100 metres deep and 20km wide. Nationally and regionally important due to high productivity, high levels of biodiversity and endemism.	✘	✔	242
<b>North-West Marine Region</b>				
<b>Ancient coastline at 125 m depth contour</b>	The hard seabed substrate may provide a habitat for higher diversity and enhanced species richness relative to surrounding areas of predominantly soft sediment.	✘	✔	698

Protected and significant areas	Summary of known values and significant areas	Operational area	EMBA	Distance to operational area (km)
<b>Ashmore Reef and Cartier Island and surrounding Commonwealth waters</b>	Areas of enhanced productivity in an otherwise low-nutrient environment of regional importance for feeding and breeding aggregations of marine fauna. Includes the most diverse variety of fish of any region in Western Australia.	✘	✔	765
<b>Carbonate bank and terrace system of the Sahul Shelf</b>	Unique seafloor features characterised by terrace, banks, channels and valleys. Foraging areas for loggerhead, olive ridley and flatback turtles and habitat for humpback whales and green sawfish.	✘	✔	321
<b>Continental slope demersal fish communities</b>	High diversity of demersal fish assemblages. The EMBA covers about 50% of the total area of this key ecological feature.	✘	✔	771
<b>Seringapatam Reef and Commonwealth waters in the Scott Reef Complex</b>	Regionally important in supporting the diverse aggregations of marine life including whales in migration, high primary productivity and high species richness associated with the reefs themselves.	✘	✔	971

Table 1 Regional protected and significant areas

## Marine fauna and biologically important areas

The Australian Government has not defined any biologically important areas or habitat critical to the survival of any species under the Environment Protection and Biodiversity Conservation Act 1999 within or close to the operational area. Within the EMBA there are biologically important areas for whale sharks, blue whales, dugongs, turtles and birds (Figure 4).

Drilling and completion activities will be conducted in water depths ranging from 230-280 metres where there is a variety of highly mobile marine fauna with a wide distribution that may transit the area in low numbers, such as:

- + blue, fin and sei whales
- + olive ridley, loggerhead, leatherback and flatback turtles
- + whale sharks
- + seabirds and migratory shorebirds
- + fish and sharks.

Santos has considered government guidance, including wildlife management plans, recovery plans, conservation advice and threat abatement plans in the development of the EP and to develop control measures to reduce impacts and risks to marine fauna and biologically important areas to as low as reasonably possible and to an acceptable level.

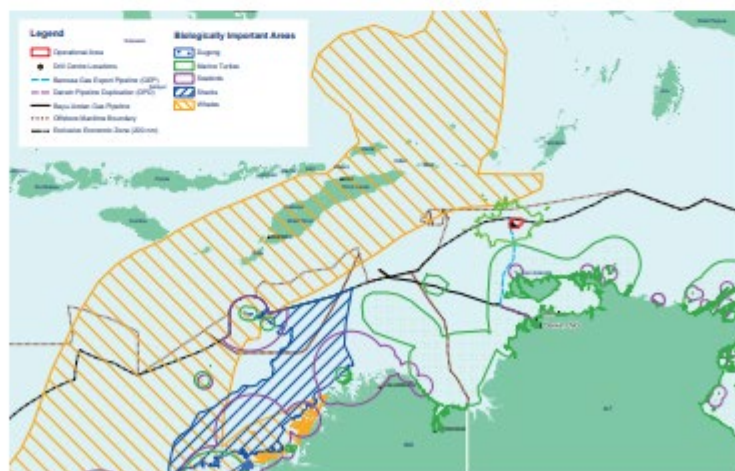


Figure 4 Closest biologically important area to the operational area

## Regional socio-economic summary

Regional socio-economic activities may include commercial, recreational and traditional fishing, aquaculture, tourism, petroleum industry activities, defence and shipping. Heritage and cultural values may also exist across the region due to the water depth and the remote offshore location of the operational area. The most likely marine users in the vicinity will be commercial fishing and shipping.

### Nearest population centres

The operational area is located approximately 131km from Seagull Island which is part of the Tiwi Islands, Northern Territory (NT) with 2,348 residents reported during the 2021 Australian Bureau of Statistics census. Darwin, NT, is the closest city, located approximately 300km from the operational area, with a population of 148,801 residents. Darwin will be the logistics hub and supply base for the drilling activities, bringing employment and economic benefits to the local community.

### Summary of other uses within the EMBA

Santos' understanding of the uses and values of the area, and its strategies to reduce impacts or risks to these uses and values, will be informed by consultation. Santos has set out in the list below a summary of the uses and values of the area of which it has knowledge based on existing information or previous consultation. Santos welcomes further information and encourages stakeholders to raise any further uses with Santos.



#### Commercial fishing

Santos recognises the presence and rights of commercial fishers within the operational area and EMBA. While the operational area is remote and water depths preclude most commercial fishing, the Timor Reef Fishery operates throughout the year. Low-level fishing effort for scampi also occurs in December and January each year in the north of the operational area. Other Commonwealth and NT managed fisheries provide rights to fish in the operational area, but activity has not recently occurred within the operational area and is considered highly unlikely due to the water depth, remoteness, distribution of targeted species and concentration of effort near coastal areas. Santos has been consulting with the relevant fisheries representative associations, licence-holders and government over many years.



#### Tourism and recreational fishing

The operational area is located in offshore waters that are not likely to be accessed for tourism activities (e.g. charter boat operations) or recreational fishing, as these tend to be centred around nearshore waters, islands and coastal areas. However, previous consultation has identified one fishing charter operator who may on occasions conduct tours near Evans Shoal, 62km west of the operational area. There are several shoals and banks within the EMBA, and some of these may be visited by small numbers of recreational fishers/charter vessels targeting fish that inhabit these shallower features. Indonesian and Timorese traditional fishers, as well as Australian recreational fishers, are expected to transit and fish in the EMBA. Some fishers may transit the operational area when travelling between sites.



#### Shipping

The Darwin Port is Australia's nearest port to Asia and the nation's 'northern gateway' for Australasian trade. It is the only port between Townsville (Queensland) and Fremantle (Western Australia) with full access to multi-modal transport services. The types of trading vessels include barges, rig tenders, LNG vessels, bunkers, livestock carriers, liquid bulk carriers and other types of vessels, with 1,510 trading vessel calls to port from 2021 to 2022. In addition to trading vessels, Darwin Port also services cruise ships and naval and fishing vessels.

There is also a port, Port Melville, located at Garden Point, Tiwi Islands, NT. Port Melville is a multi-user facility supporting the Northern Territory oil & gas industry, marine transport industry and local Tiwi community through the provision of a port facility and ancillary services (such as laydown areas and accommodation).



#### Petroleum industry

The closest operational offshore production facility is the Santos-operated Bayu-Undan platform located approximately 409km southwest of the operational area. The Bayu-Undan field produces natural gas that is exported via pipeline to the DLNG facility. Petroleum retention lease area and exploration permit leases within the region are currently held by various oil and gas operators (and subsidiaries), including Carnarvon Petroleum Limited, Woodside Energy Ltd, Shell Development (Australia) Pty Ltd, Osaka Gas Australia Pty Ltd, Eni Australia Limited, Origin Energy, and Timor Sea Oil & Gas Australia Pty Ltd.



#### Heritage

The closest world heritage property, national heritage place or Commonwealth heritage place is Ashmore Reef National Nature Reserve (a Commonwealth heritage place found 800km south-west of the operational area). Both the Ashmore Reef National Nature Reserve and the Scott Reef and Surrounds – Commonwealth area intersect the EMBA.



#### Cultural values

Santos has been alerted to Traditional Owners' connections with Gas Country. Santos is seeking to identify cultural features within the EMBA including through consultation with Traditional Owners and their relevant representative bodies. There are currently no native title claims or determinations within the EMBA.







## Summary of environmental impacts and risks

Environmental impact and risk assessment is the process by which planned and unplanned events (that will or may occur during an activity) are assessed for their impacts (consequences) on the environment (physical, biological and socio-economic). In addition, unplanned events are assessed based on their potential impact (consequence) and likelihood of occurrence, which informs the associated risk level.

An environmental assessment workshop was held in June 2021 to consider the potential environmental impacts of drilling and completions activity on the environment. The workshop involved participants from various Santos departments (Health, Safety, and Environment; Drilling, and Operations) and specialist environmental consultants. Outcomes from the workshop are summarised below and more detailed information can be found in the EP, Revision 3. Revision 3 is currently being revised by Santos. The identification of potential impacts and risks, and the controls proposed to reduce these impacts and risks, may be developed as a result of the consultation process. This includes consultation to inform Santos' understanding and assessment of potential impacts and risks in light of cultural values within the EMBA and any appropriate control measures if needed.

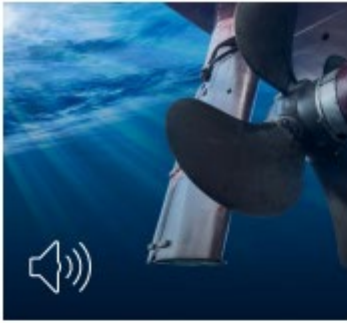
## Planned activities

The Santos environmental assessment identified the following main potential impacts or risks associated with the planned activities:

	NOISE SOURCES		INTERACTIONS WITH OTHER MARINE USERS
	LIGHT SOURCES		AIR EMISSIONS
	SEABED DISTURBANCE		DISCHARGES

Santos proposes to adopt a suite of Santos and contractor systems, procedures and standard control measures to reduce impacts and risks associated with these planned activities to a level that results in a minor or negligible environmental consequence. These consequence levels are considered by Santos to be acceptable and as low as reasonably practicable.

Santos continues to consult on the proposed drilling and completions activities to inform its understanding of environmental and cultural values and sensitivities, and the assessment of associated impacts, risks and control measures.



## NOISE SOURCES

During the activity, noise will be generated by the MODU, drilling operations and flaring and from support vessels and helicopters. The MODU does not have propulsion so will not generate noise from propellers. The majority of the noise sources involved in the activity are lower pressure and not subject to sharp increases or decreases (e.g., engine noise) and will therefore be typical of other marine noise in the region (commercial shipping, fishing etc).

### What impacts are expected?

Santos engaged subject matter experts to conduct several underwater noise assessments.

Studies supporting the risk assessment indicated potential temporary impacts to marine fauna are limited to 12km from the MODU and vessel noise sources, with no significant impacts at the species population level.

There are no known significant feeding, breeding or aggregation areas for any fauna within the operational area. The closest biologically important areas are for the pygmy blue whale and marine turtles, which are greater than 50km away. Although no biologically important area is within or close to the operational area, individual noise-sensitive fauna (including whales and turtles) may transit the area.

The activities will be conducted over a limited timeframe in a remote offshore location where there is a relatively low probability of encountering significant numbers of noise-sensitive fauna. Transiting marine fauna are expected to demonstrate short-term avoidance behaviour within the operational area. Overall, negligible environmental consequences are predicted.

### How will Santos manage impacts?

Vessels are required to comply with Santos' Protected Marine Fauna Interaction and Sighting Procedure which requires compliance with regulatory requirements for managing noise impacts to fauna.

Control measures include restrictions on vessel and helicopter direction and speed to limit noise impacts to marine fauna.



## LIGHT SOURCES

Artificial lighting is required for operational and navigational safety during the activity. Light sources include:

- + safety and navigational lighting on vessels, including the MODU (24 hours per day)
- + spot lighting when needed, such as when deploying or retrieving equipment
- + light from flaring during well flowback (intermittent, typically occurs for approximately 2-3 days).

Due to the size and height of the MODU, light from the MODU will be more visible than from other vessels.

### What impacts are expected?

Light may impact light-sensitive marine fauna such as fish, turtles, seabirds and migratory shorebirds. Industry drilling lighting studies estimate that direct light from intermittent emergency MODU flaring may be visible up to ~52km from the MODU.

The most significant risk posed to marine turtles from artificial lighting is the potential disorientation of hatchlings following their emergence from nests by light spill on beaches, although breeding adult turtles can also be disoriented. The nearest turtle nesting beaches are greater than 138km from the operational area, where the MODU will be located.

While seabird species such as wedge-tailed shearwaters may be present within the operational area, the nearest wedge-tailed shearwater BIA is located more than 700km from the operational area and the nearest breeding colony further still.



Lighting is, therefore, expected to have a negligible impact on breeding or hatching turtles and seabirds. Fish and seabirds may be attracted to artificial light leading to a short-term localised increase in fauna activity. The activity is assessed as unlikely to impact species abundance or distribution. Marine mammals are not known to be attracted to light sources at sea. Whales predominantly use acoustic senses rather than visual cues.

#### How will Santos manage impacts?

The vessels, including the MODU, are expected to produce similar light levels to other marine vessels in the region. Lighting is to be limited to that required for safe operations and compliance with maritime regulations.



### INTERACTIONS WITH OTHER MARINE USERS

Other marine users that may be in the vicinity of the Barossa field include commercial fishing, shipping and other incidental marine traffic. Tourism and recreational fishing vessels are not expected in the operational area given the water depth and distance offshore.

Helicopter operations will be infrequent and unlikely to interfere with other marine users. Helicopters will not fly over the Tiwi Islands or Seagull Island unless in the case of an emergency.

#### What impacts may occur?

The area that other marine users will be excluded from is small when compared to the large area available for their use. Marine users have coexisted with previous Barossa petroleum activities (e.g., exploration drilling) and other nearby maritime activities (e.g., military exercises). Communication before and during the activity with other marine users is designed to reduce the likelihood of unplanned interactions.

#### How will Santos manage the impacts?

Santos is to communicate with other marine users before, during and at the end of the activity. Standard maritime notifications (e.g., Notice to Mariners) are designed to inform other marine users of the activity.

The MODU and vessels are to use automatic identification systems to aid in their detection at sea. Support vessels are to actively communicate with third-party vessels to inform them of the drilling activities. Well locations are to be marked on nautical charts. These proposed control measures are designed to be consistent with maritime regulations and industry practices.



### AIR EMISSIONS

Air emissions will occur from:

- + fuel combustion to operate the MODU, vessels and helicopters
- + operation of vessel incinerators
- + hydrocarbon combustion through the MODU flare during well flowback activities
- + tank venting when transferring dry bulk drill products (e.g., barite, bentonite, cement) to prevent tank overpressure. The vented air will contain minor quantities of product particles.

#### What impacts are expected?

The potential impacts of air emissions identified include:

- + deterioration of local air quality
- + contribution to national greenhouse gas (GHG) levels.

Air emissions may result in a temporary, localised reduction of air quality. In the offshore environment, air emissions rapidly dissipate into the surrounding atmosphere. Impacts are very localised and not significant.

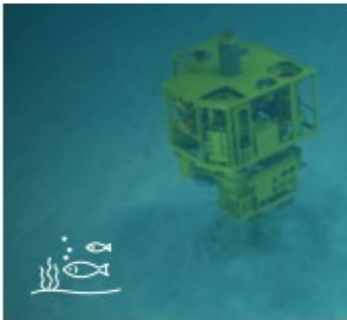
Seabirds and migratory shorebirds are unlikely to be impacted by the localised and temporary reduction in air quality. Detectable environmental impacts are not predicted from greenhouse gas emissions during drilling and completions operations.

The estimated direct GHG emissions are 168,000 tonnes of CO<sub>2</sub>-e, which is less than 0.03% of the total 2022 annual Australian GHG emissions. No indirect GHG emissions are associated with this drilling activity as there is no ability to extract, produce or transport the natural gas. The future Barossa Production Operations EP will assess indirect GHG emissions for the Barossa Development associated with end use combustion of Barossa natural gas and condensate products.

### How will Santos manage impacts?

Santos proposes to adopt numerous control measures to manage MODU and vessel emissions, including requiring contractor MODU/vessels' compliance with MARPOL requirements for use of low-sulphur fuel and air pollution prevention certifications. ('MARPOL' is a reference to the International Convention for the Prevention of Pollution from Ships).

Well flowback flaring is planned to be temporary and of short duration (approximately 2-3 days) and flowback procedures are to be adopted for effective flaring of hydrocarbons. The control measures to be adopted are designed to be consistent with maritime regulations and petroleum industry standards. Santos has a climate transition strategy and action plan to become a net-zero emissions energy and fuels business by 2040.



### SEABED DISTURBANCE

Seabed disturbance will occur because of:

- + MODU mooring (anchoring)
- + well construction
- + placement of objects on the seabed such as drilling equipment.

MODU mooring and well construction will cause an estimated seabed disturbance of 1560m<sup>2</sup> (at each of the three drill centres) and 5m<sup>2</sup> (for each well). This will result in localised impacts to benthic habitat (and associated fauna) in the operational area.

### What impacts are expected?

Extensive marine studies have been completed within the operational area to inform the impact assessment. The seabed within the area is generally flat and devoid of any significant physical seabed or habitat features. Benthic habitats and fauna assemblages expected to be impacted are considered widespread throughout the region.

The 'Shelf break and slope of the Aratara Shelf' key ecological feature (KEF) overlaps a portion of the operational area. The estimated seabed disturbance represents a very small portion of this KEF (<0.001%). This key ecological feature is valued for its sea floor, which features the shelf break and patch reefs, hard substrate pinnacles and submerged reefs of the shelf slope. The sea floor features related to this key ecological feature have not been observed within the operational area.

There is no biologically important area for any marine fauna species within the operational area. Given the small scale of seabed disturbance and knowledge of the existing environment, significant impacts to marine fauna as a result seabed disturbance are not expected to occur.

Cultural values within the operational area and associated potential risks and impacts will continue to be identified, including through consultation with First Nations Peoples and their representative bodies, so that these can also be assessed. Seabed disturbance is not expected to impact commercial fisheries based on the small size of disturbance compared with the large available fishing area.

### How will Santos manage impacts?

The MODU anchor mooring design and station keeping system are designed to limit the extent of seabed disturbance by minimising the length of mooring line deployed, and all deployed equipment is to be recovered at the end of a drilling campaign to enable seabed and habitat recovery. Santos continues to consider risks and impacts to cultural values and additional control measures may be adopted following consultation.



## DISCHARGES

Discharges will occur from the MODU and support vessels, and during drilling and completions activities.

### Vessel discharges

The types of discharges are typical of most offshore commercial vessels and include deck runoff, treated sewage and grey water, machinery cooling water, treated bilge water, ballast water, macerated food scraps and brine (from water making). These discharges will be small in volume and released into surface waters. The MODU will produce similar operational discharges.

### Drilling and completions discharges

Discharges from drilling and completions activities include drilled solids, drilling and control fluids, brines, cement, formation water, hydraulic fluids, chemicals such as tracer dyes, and tank cleaning products.

During drilling, the drill bit produces 'cuttings' (drilled solids) which become entrained in the drilling fluids (or muds). Over time, the drilled solids and fluids are discharged to the seabed and sea surface. Drilling discharges with larger particle sizes, such as large drill cuttings, are expected to settle directly around the MODU and wells. In contrast, discharges with finer particles, such as drilling muds, may be carried with prevailing currents before settling.

Cement is required for well construction. The majority of cement pumped remains downhole (i.e., in the well), but minor volumes may be discharged to the seabed or sea surface (e.g., during cement tank cleaning).

Once a well has been drilled, subsea well completion fluids will be required to render the well 'solids free' and to prevent the formation of downhole contamination. Brines (highly concentrated solutions of inorganic salts) are used for this purpose. Residual brines will be discharged at sea surface.

Formation water may be produced from the reservoir during well flowback and discharged to the sea. Well flowback notionally takes ~2-3 days per well. The non-flammable completion fluids and produced water will be treated via a water treatment package to reduce the oil-in-water content to <30 mg/L before being discharged. Methanol and mono-ethylene glycol (MEG) may also be injected into the flow stream and either flared or discharged to the sea. These substances "Pose Little or No Risk to the Environment" (FLONOR) as determined by the OSPAR Commission.

A blowout preventer (BOP) is to be installed during drilling and subsea Christmas Trees are to be installed on each of the wells once drilling is complete. The BOP and Christmas Trees are to be routinely checked by completing pressure and function testing. Each function test will release small volumes of control fluid near the seabed.

## What impacts are expected?

### Vessel discharges

Vessel discharges will be localised and limited to surface waters. Machinery cooling water discharge will be continuous but all other operational discharges will be intermittent and of short duration (minutes to hours). The discharges are expected to be dispersed and diluted rapidly within the offshore waters. Discharges may cause short-term changes to behaviour in marine fauna (avoidance or attraction). For example, fish and seabirds may be attracted to macerated food scraps discharged by vessels. Increased biological oxygen demand on the receiving waters may promote localised elevated levels of phytoplankton due to nutrient inputs and bacteria activity due to organic carbon inputs. This could subsequently impact higher order predators. However, analysis indicates that dispersion and dilution are expected to be rapid and the discharges of nutrient-rich fluids are of low volume.

### Drilling and completions discharges

Drilling and completions discharges will be intermittent during the activity, with volumes dependent on a range of variables. Discharges to the marine environment will result in a localised (around the discharge location) and temporary (minutes to hours) reduction in water quality. The operational area is in a high-energy, well mixed deep open water environment. The discharges are expected to be dispersed and diluted rapidly, with concentrations significantly dropping the further away from the discharge location. Water quality change outside the operational area is unlikely to occur.

The discharges are not expected to have significant toxicological impacts on marine biota. Marine fauna transiting the operational area are expected to either avoid turbid stretches of water or pass through with no significant effects.

The seabed within the operational area is predominantly bare sediment and contains a low abundance and diversity of infauna. Seabed disturbance caused by drilled solids and hardened cement should therefore be of minor consequence owing to the small area that would be affected and insignificant impacts on widely distributed benthic fauna. Drilling discharges are not expected to contact any surrounding shoals, banks or protected areas due to their distance from the operational area.

## How will Santos manage impacts?

### Vessel discharges

Vessel discharges are to be managed to acceptable levels as regulated by maritime laws and conventions, such as MARPOL. Industry standard oil-water filtration equipment to be used to reduce oil-in-water prior to overboard discharge. These control measures are designed to reduce the environmental consequences to minor and as low as reasonably practicable.

### Drilling and completions discharges

Santos proposes to adopt control measures to manage drilling and completions discharges to seek to minimise impacts to water quality, benthic communities and marine fauna. These are designed to be consistent with petroleum industry practices and include:

- + chemical selection procedures so that only environmentally acceptable products are to be discharged
- + specialised drilling equipment and operating procedures to seek to minimise the volume of drilling fluids to be used
- + stringent well flowback procedures are to be adopted, designed to seek to align formation water oil-in-water content with acceptable levels (<30 mg/L) prior to discharge.

The measures proposed to be adopted have been assessed as appropriate to manage impacts to a minor consequence level.

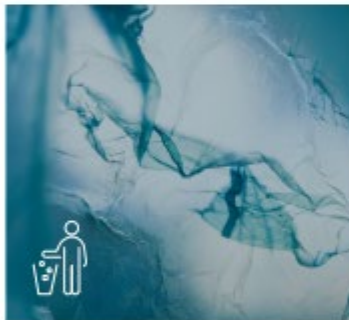
## Unplanned events

Santos uses an environmental assessment guideline to identify, analyse and evaluate incident scenarios (unplanned events). Potential unplanned events have been identified and considered and the associated potential environmental consequences and the event likelihoods (i.e. the risks) have been assessed. Based on the assessment undertaken prior to preparation of the Drilling and Completions EP (which is now under revision), the following unplanned environmental risks have been identified for this activity:

- + dropped objects
- + introduction of invasive marine species
- + interaction with marine fauna
- + non-hydrocarbon liquid release
- + condensate spill
- + marine diesel spill

Santos proposes to adopt a suite of Santos and contractor systems, procedures and standard control measures to seek to reduce the impacts and risks associated with these unplanned events to a level that results in a minor or negligible environmental consequence. These consequence levels are considered by Santos to be acceptable and as low as reasonably practicable.

Santos continues to consult on the proposed drilling and completions activity to inform its assessment of associated impacts, risks and control measures.



### DROPPED OBJECTS

Objects that could be accidentally released to the marine environment from the MODU and vessels include:

- + non-hazardous solid wastes, such as paper, plastics and packaging
- + hazardous solid wastes, such as batteries, fluorescent tubes, medical wastes and aerosol cans
- + equipment and materials, such as supplies, hard hats, tools or infrastructure parts.

Release of these objects may occur as a result of the following:

- + overfull or uncovered bins
- + incorrectly disposed items
- + incidents during transfers of waste or supplies
- + accidentally dropped objects/lost equipment.

### What environmental impacts could occur?

All non-buoyant objects are expected to sink to the seabed and remain within the operational area.

In the event of a dropped object, there will be localised and short-term damage to the seabed. The extent of the impact should be limited to the size of the object and given the size of the equipment used, any impact is expected to be very small. No significant seabed features or biota have been identified in the operational area. Therefore, it is highly unlikely that any object dropped during the activity would cause a significant impact to the ecological values associated with the seabed or benthic habitats.

Buoyant objects could potentially move beyond the operational area. In relevant recovery plans and conservation advice, marine pollution is listed as a potential threat to several marine fauna species. Depending on debris size of the dropped object, there is the potential for ingestion by marine fauna, such as marine turtles, which could potentially

result in injury or death. However, given the limited quantities, impacts to fauna would be limited to individuals and are not expected to result in a decrease of the local population size. Release of hazardous solids may result in the pollution of the immediate environment, leading to detrimental health impacts to marine fauna (including potential injury or death).

#### How will Santos manage the risk?

Santos has numerous control measures to reduce the risk of dropped objects, lost equipment or releasing waste to the environment. These measures include:

- + safety standards and procedures to reduce the risk of tools and other equipment being dropped during lifting operations
- + dropped objects, regardless of size, must be reported, and attempts made to recover the object according to safety and environment criteria.

These control measures are designed to comply with maritime legislation. In addition, these control measures are consistent with applicable actions described in the relevant fauna recovery plans and conservation advice, reducing the risk to low.



#### INTRODUCTION OF INVASIVE MARINE SPECIES

Invasive marine species (IMS) are marine flora and fauna that have been introduced into a region that is beyond their natural range but have the ability to survive and possibly thrive. The majority of climatically compatible IMS to northern Australia are found in south-east Asian countries.

Some IMS pose a significant risk to environmental values, biodiversity, ecosystem health, human health, fisheries, aquaculture, shipping, ports and tourism. The risk of introducing IMS is common for all maritime activities. The introduction of (IMS) may occur due to the following:

- + biofouling on vessels, including the MODU, external/internal niches (such as sea chests and sea water systems) and routinely submerged equipment
- + discharge of high-risk ballast water.

#### What environmental impacts could occur?

IMS, if successfully established, can:

- + outcompete native species for food or space
- + prey on native species
- + change the nature of the environment
- + impact fisheries or aquaculture.

The ability of invasive marine species to colonise a habitat depends on several environmental conditions. For example, highly disturbed environments (such as marinas) or shallower areas are more susceptible to colonisation than open-water environments. The operational area provides an unfavourable habitat for IMS due to water depths exceeding 200 metres and the vast distance to the coast. These conditions limit light availability and have low habitat biodiversity with sparse epibiota, therefore, there is a very low likelihood that IMS would be able to survive translocation and subsequently establish and colonise.

#### How will Santos manage the risk?

The pathways and vessel mitigation measures for IMS introduction are well understood and known. Vessels and MODUs contracted to Santos, and vessel ballast, are to be managed according to control measures that comply with maritime regulations, industry practices, and the Biosecurity Act 2015. With these control measures adopted, the risk of introducing an IMS is assessed as being reduced to low and as low as reasonably practicable.



## INTERACTION WITH MARINE FAUNA

### How could interactions with marine fauna occur?

There is the potential for vessels and helicopters to unintentionally interact with marine fauna, including a potential collision that could result in injury or mortality to fauna. The MODU is not self-propelled and will be stationary once on location, hence, marine fauna interactions are not anticipated.

### What environmental impacts could occur?

Marine fauna most at risk of colliding with vessels are marine mammals, turtles, whale sharks and birds. Some of these species are threatened, and some marine fauna may have cultural significance. The operational area does not intersect any biologically important area or habitat critical to the survival of any marine fauna species. Marine fauna presence, including birds, is expected to be limited to a small number of transient individuals. Vessel movements should be of relatively low frequency, albeit for an extended duration. Marine fauna tends to move away from vessels and helicopters.

While injury or death to individual animals would be highly undesirable, this would represent a small proportion of any local population and not beyond any natural variation in population size.

### How will Santos manage the risk?

The likelihood of marine fauna interaction resulting in injury or death is considered unlikely given that Santos proposes to adopt a procedure for interacting with marine fauna to reduce risks of physical and behavioural impacts to marine fauna from vessels. If they are sighted, vessels can slow down, or move away and helicopters can increase distances from sighted fauna if required. Further, there is a lack of BIAs or significant breeding, nesting and aggregation areas of marine fauna within the operational area, and marine fauna have a tendency to move away from vessels and helicopters.

This and other control measures are to be designed to align with management actions outlined in government-published fauna recovery plans and conservation advice. The risk of interactions with marine fauna is assessed as very low and reduced to as low as reasonably practicable. The risk is no higher than for any other regional maritime or aviation activity.



## NON-HYDROCARBON LIQUID RELEASE

### How could non-hydrocarbon liquids be released?

Non-hydrocarbon liquids, including miscellaneous chemicals and waste streams (brine, mixed cement, cleaning and cooling agents, stored or spent chemicals and leftover paint materials), are used or stored on board the vessels, including the MODU. An accidental release of non-hydrocarbon liquids into the marine environment has the potential to occur from:

- + transferring, storing or using bulk products (e.g., mixed cement)
- + mechanical failure of equipment, such as a tank or pipework failure
- + handling and storage spills and leaks due to insufficient fastening
- + hose or hose connection failure or leak
- + lifting – dropped objects damaging liquid vessels (containers)
- + inadequate bunding.

The maximum volume that could be released from the most likely spills is small and limited to individual container sizes (up to 1m<sup>3</sup>).

### What environmental impacts could occur?

Impacts to water quality are expected to be short-term and localised due to the selection of environmentally acceptable chemicals, the relatively small size of an unplanned spill and the rapid dispersal. A decrease in water quality is likely to be restricted to the immediate area surrounding the spill location and contained within the operational area.

Due to the small volumes and expected rapid dilution to concentrations below impact thresholds, impacts to water quality are not expected to cause flow-on effects to sediment quality or benthic habitats (greater than 200 metres below the surface).

The operational area does not overlap any biologically important areas, and marine fauna is expected to be limited to a small number of transient individuals.

### How will Santos manage the risk?

Santos has a suite of procedures to manage the selection, storage, handling and clean-up of chemicals and other non-hydrocarbon liquids. In addition, MODUs and vessels are to have spill response plans. The Santos chemical selection procedure is designed so that only environmentally acceptable chemicals are used for drilling fluids. These procedures should assist to minimise the likelihood of non-hydrocarbon liquid spills, and subsequent environmental consequences should they occur.

The control measures proposed to be adopted are designed to be consistent with maritime and petroleum industry standards and appropriate to manage the risks to low and as low as reasonably practicable and acceptable levels.



## CONDENSATE SPILL

### How could a condensate spill occur?

Natural-gas condensate, also called natural gas liquids, is a low-density mixture of hydrocarbon liquids that are present as gaseous components in the raw natural gas produced from many natural gas fields, including Barossa. Barossa condensate is a low viscosity, Group 1 (non-persistent) hydrocarbon.

The likelihood of an event leading to a spill is considered 'remote'. A condensate spill could occur due to a loss of well control caused by shallow gas, well kick, tripping, loss of primary and secondary well barriers and failure to keep the correct mud density.

The credible worst-case type of oil release scenario is subsurface loss of well control of 129,000m<sup>3</sup> of Barossa condensate released over 90 days at the seabed.

Based on industry statistics and Santos' risk assessments, the likelihood of a loss of well control event leading to a spill of this size is considered 'remote' – requires exceptional circumstances and is unlikely even in the long term.

### What environmental impacts could occur?

#### Physical environment or habitat

There are no known emergent or shoreline habitats within the MEVA (Figure 3). Water and sediment quality in the Arafura and Oceanic Shoals marine parks, several key ecological features and various banks and shoals may be affected.

There is a low probability that some shoals and banks within the MEVA may be contacted by hydrocarbons in a worst-case event, with local water quality affected.

Potential impacts that may occur as a result of hydrocarbon exposure could include sub-lethal stress and, in some cases, total or partial mortality of sensitive benthic organisms (e.g., corals) and the early life stages of resident fish and invertebrate species. This could cause localised and long-term effects to shallow hard coral communities at shoals and banks.

A condensate release could also temporarily reduce local air quality, with up to 57% of condensate evaporating within the first few hours, and 80% evaporating after two days. Vapour concentrations above human health and safety risk levels (also a proxy for environmental risk) are assessed as limited to approximately 2.5km from the release source, rapidly dispersing with the prevailing wind.



### Threatened or migratory fauna

In the event of a loss of well control, a reduction in water quality has the potential to impact marine fauna. Some species of marine fauna may have cultural significance. Impacts to marine fauna within the MEVA will be greatest within several kilometres of a spill, where condensate may be present on the sea surface. Upon release to the marine environment, condensate rapidly loses toxicity and will become thinner at the surface due to evaporation or entrainment within the water column.

Seabirds that come into contact with sea surface condensate may experience secondary effects through ingestion of condensate after eating exposed fish or preening. No condensate contact with shorelines or bird biologically important areas is predicted to occur. Therefore, it is expected that there will be no significant impacts to breeding, feeding and roosting bird populations.

Although there are no known significant feeding, breeding or aggregation areas for the pygmy blue whale within the MEVA, there is a biologically important area for distribution. Potential impacts to the pygmy blue whale and other whales are likely to be limited to individuals transiting through the area with the potential for coating of baleen (in whales), ingestion of oiled prey (plankton/fish) and behavioural impacts. No population-level impacts are expected.

The MEVA overlaps a turtle inter-nesting biologically important area. No impact to shorelines or turtle nesting beaches is predicted. Due to the distance from breeding and nesting areas, any potential impacts are likely to be limited to individuals that may be transiting or feeding at submerged shoals and banks. No population-level impacts are expected.

### Protected areas

The MEVA intersects Arafura and Oceanic Shoals marine parks. Although hydrocarbons are only predicted to occur within the 0 to 10 metre layer of the water column, one or more of the protected values within the marine parks could be impacted.

### Socio-economic receptors

There is potential for temporary disruption to fishing activities in the unlikely event of a condensate spill. Impacts include, but are not limited to, a disruption/displacement of fishing activities caused by the physical presence of the slick, loss of catch, decline in commercially important fish stocks and/or suspension of fishing operations.

A condensate spill could also disrupt other regional oil and gas operations, military exercises and commercial shipping.

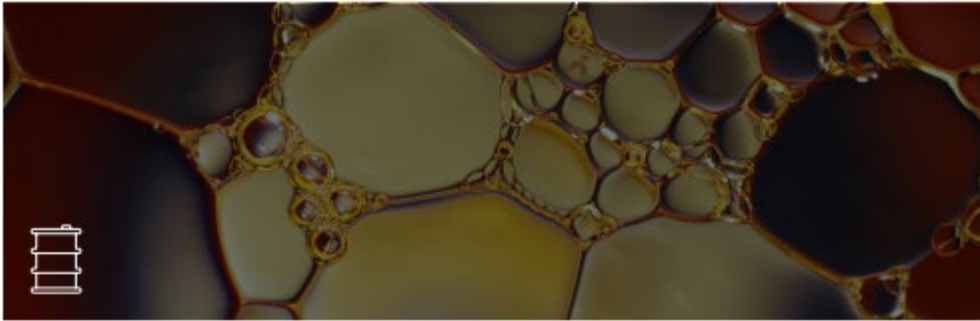
While there was no shoreline oil accumulation predicted in the event of a spill, the EMBA may overlap cultural features such as Sea Country, songlines and totemic species. Cultural features within the EMBA and associated potential risks and impacts will continue to be identified, including through consultation with Traditional Owners and their representative bodies.

### How will Santos manage the risk?

Industry standard safe drilling methodologies, including inherently safe well designs and primary and secondary well control measures, are proposed to be implemented to reduce the likelihood of a loss of containment.

Safety options have been considered in well design and equipment choice for the activity. In addition, a selection of spill response strategies and associated control measures, including those required to maintain preparedness and response arrangements, are detailed within a drilling Oil Pollution Emergency Plan (OPEP). The OPEP is a regulatory requirement that must demonstrate spill response risks have been reduced to as low as reasonably practicable.

The combination of the standard prevention control measures (i.e., safe drilling methods), and the spill response strategies, as presented in the OPEP, together reduce the hydrocarbon spill risk to a low level.



## MARINE DIESEL SPILL

### How could a marine diesel spill occur?

A marine diesel oil (MDO) spill could occur because of the following:

- + a significant collision that ruptured a fuel tank
- + a refuelling incident due to fuel hose failure or rupture, coupling failure or fuel tank overfilling.

In the event of a vessel collision, the MDO spill volume is anticipated to be less than 250m<sup>3</sup>. A maximum spill volume from refuelling incidents of 10m<sup>3</sup> is anticipated given hose couplings design and rapid shutdown of pumps.

### What environmental impacts could occur?

#### Physical environment and habitats

Water quality changes would be temporary and localised due to the rapid MDO weathering and dispersion.

Given the surface nature of the release, the maximum depth that hydrocarbons associated with a 250m<sup>3</sup> spill of MDO may entrain is ~20 to 30 metres. Any potential impacts should be limited to the upper water column (see surface to ~30 metres deep). Shallow water shoals and banks present at (less than 30 metres water depth) within the MEVA may be impacted. Potential impacts include sub-lethal stress and mortality of sensitive benthic organisms (e.g., corals) and the early life stages of resident fish and invertebrates.

#### Threatened/migratory fauna

A MDO spill from a vessel collision may impact marine fauna, including fauna which may have cultural significance.

Seabirds may contact surface MDO whilst foraging, potentially causing secondary effects through ingestion from eating oiled fish or after preening. The MEVA does not impact any bird breeding or foraging biologically important areas; hence potential impacts should be limited to individuals transiting the area.

Although there are no known significant feeding, breeding or aggregation areas for the pygmy blue whale within the MEVA, there is a biologically important area for distribution range. Potential impacts to the pygmy blue whale and other whales are likely to be limited to individuals transiting through the area with the potential for coating of baleen (in whales), ingestion of oiled prey (plankton/fish) and behavioural impacts. No population-level impacts are expected.

No MDO spill is expected to contact shoreline or turtle nesting beaches. The MEVA overlaps biologically important areas for marine turtles. Still, given the rapid dispersion of MDO, any potential impacts are likely to be limited to individuals transiting through the area and population-scale impacts are unlikely.

#### Protected areas

The open water environment within the Oceanic Shoals and Anafura mark parks may be affected by a 250m<sup>3</sup> release of MDO at or above moderate exposure values. However, impacts are predicted to be temporary and localised due to the rapid evaporation rates of the volatile components of MDO and its rapid natural degradation and dispersion in the open ocean.

#### Socio-economic receptors

A vessel collision resulting in an MDO spill may temporarily disrupt fishing activities if it spreads to fishing areas. However, due to the high MDO evaporation rate, any impacts are predicted to be localised and not detectable at a fisheries stock level. Other marine users that may be disrupted include regional oil and gas operations, military exercises and commercial shipping.

While there was no shoreline of accumulation predicted in the event of a spill, the EMBA may overlap cultural values such as Sea Country, songlines and totemic species. Cultural values within the EMBA and associated potential risks and impacts will continue to be identified, including through consultation with Traditional Owners and their representative bodies.

### How will Santos manage the risk?

Santos is to communicate with other marine users before and during the activity. Standard maritime notifications (e.g., Notice to Mariners) are designed to inform other marine users of the activity. The MODU and vessels are to have automatic identification systems and minimum navigational lighting to aid in their detection at sea. Support vessels are to actively communicate with third-party vessels to inform them of the marine activities. Operational procedures and equipment maintenance practices should minimise refuelling incidents. Spill response plans will be in place and regular exercises conducted.

These control measures are designed to comply with maritime regulations and standard industry practices. The risk of a MDO spill is low and has been reduced to as low as reasonably practicable.



### SPILL RESPONSE OPERATIONS

In the event of an unplanned hydrocarbon spill, there is the potential for response operations and activities to cause further environmental harm (if they are poorly planned and coordinated or undertaken by those with an inadequate level of training and guidance).

#### How will Santos manage the risk?

Santos has a process to ensure the environmental impacts from spill response operations are reduced to as low as reasonably practicable.

By applying a net environmental benefit analysis (NEBA), Santos can determine whether an environmental benefit will be achieved through implementing a response strategy or by undertaking no response.

Santos proposes to apply a range of industry standard procedures to manage impacts from vessel operations used in spill response operations (similar to those described for vessel discharges).

Santos also proposes to implement processes for consulting with affected stakeholders to seek to avoid spill response operations resulting in unintended impacts.



### Summary of the risk management strategy

Santos has a management system that includes specific measures to be used for the duration of the drilling and completions activity, which seek to confirm:

- + environmental impacts and risks continue to be identified for the duration of the activity and reduced to as low as reasonably practicable and acceptable levels
- + control measures are effective in reducing environmental impacts and risks to as low as reasonably practicable and acceptable levels
- + environmental performance outcomes and standards set out in the EP are being met
- + ongoing appropriate consultation with relevant authorities and other relevant interested persons or organisations
- + roles, accountabilities and responsibilities are defined and understood
- + workforce training is completed and competencies assured
- + emergency preparedness and response arrangements
- + incident reporting, investigation and follow-up
- + audits, inspections, reporting and notifications and document management.

# Your feedback and what's next

In preparing an environment plan for submission to NOPSEMA, a titleholder must consult with each 'relevant person', including relevant Commonwealth, State and Northern Territory departments or agencies and persons (or organisations) whose functions, interests or activities may be affected by the activity proposed to be carried out under an environment plan.

Examples of 'functions, interests or activities' that may be affected by the activities to be carried out under an EP may include those arising in relation to a spiritual or cultural connection to land or to sea country, tourism, recreational and commercial fishing and local communities (though these are merely illustrative examples and not an exhaustive list). The information contained in this information booklet may assist your consideration of whether you are a relevant person.

More information about 'relevant persons' can be found on our website at [www.santos.com/barossa/relevant-persons](http://www.santos.com/barossa/relevant-persons)

Relevant persons being consulted on environment plans under the OPGGS Environment Regulations should note that they:

- + are entitled to be given sufficient information to allow them to make an informed assessment of the possible consequences of the activity on their functions, interests or activities
- + are entitled to be allowed a reasonable period for the consultation
- + may request particular information provided in consultation not be published. If you do ask this, Santos will respect that and the information will not be published under the relevant regulations. Information we need to give to NOPSEMA to assess our plan will be provided in a separate report (rather than in the published EP).

Your feedback and input is important to Santos. Santos wants to understand the appropriate consultation processes for different relevant persons. Santos also wants to provide information for people in an appropriate and accessible manner so that relevant persons may make informed assessments of the possible consequences of the proposed drilling and completions activities for them, so that they can provide feedback to inform the environment plan.

We welcome input from relevant persons about additional information they seek and how they wish to be consulted. Such input may be provided by:

- + phone on 1800 267 600
- + email at [offshore\\_consultation@santos.com](mailto:offshore_consultation@santos.com)
- + or by clicking the QR code below

to seek to be included in consultations and to provide feedback on how you would like to be consulted (if a relevant person).

If you think you, your organisation or another person or organisation you know of may be a relevant person for the purposes of one of Santos's proposed activities, and we have not already contacted you (or the other person or organisation) in that capacity, please contact Santos to seek to be included in consultations and to provide feedback on how you would like to be consulted (if a relevant person). If you suggest other potential relevant persons to Santos and provide information as to how those relevant persons may be reached, we may also contact those persons or organisations and provide copies of this information. Santos also welcomes you to encourage other potential relevant persons to get in touch with Santos at the above contact details.





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## Santos drilling factsheet -Tiwi specific

# The Barossa Gas Project

## PROPOSED DRILLING AND COMPLETIONS ENVIRONMENT PLAN



Santos' proposed Barossa Gas Project will be located approximately 300 kilometres north northwest of Darwin in the Arafura Sea and will comprise a Floating Production Storage and Offloading (FPSO) facility, a subsea production system, supporting in-field subsea infrastructure and a Gas Export Pipeline (GEP).

### OVERVIEW OF PROPOSED DRILLING AND COMPLETIONS ACTIVITIES

Santos plans to drill up to eight subsea wells. The drilling area is located approximately 140 kilometres north of Seagull Island.

The way we drill a well is to use a drill on a ship that is like a telescope, extending further and further into the seabed until it reaches the gas. The hole that the drill creates is the well. Each well is lined by steel casings held in place with cement. This is designed to keep the well safe for the life of the project.

At the top of the well on the seabed, a structure called a Christmas Tree will be installed that acts like a tap, so Santos can control the flow of gas. The installation of the casings and Christmas Trees is known as completion of the well.

Each well is expected to take around 90 days to drill and complete. We anticipate that our proposed Drilling and

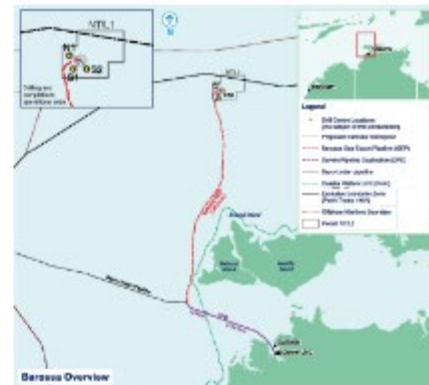
Completion activities will take approximately 2 years, subject to weather and operational performance.

### EQUIPMENT AND VESSELS

A moored semi-submersible mobile offshore drilling unit (MODU) will be supported by up to four support vessels which will transit between the drilling area and the onshore supply base in Darwin harbour. The MODU or similar will be used to install the structure called the Christmas Tree on each well.

### KEY ACTIVITIES INCLUDE:

- + MODU towing and mooring
- + MODU drilling and completions activities
- + Use of drilling fluids to lubricate the drill and maintain well pressure
- + Discharge of inert drilled solids, water-based drilling fluids, completions fluids and residual cement
- + Flowback of gas and liquids from the well for testing
- + Installation of subsea equipment
- + Use of helicopters to support activities.



We're Listening Santos

## Environment that may be affected

This map depicts the proposed operational area for the activities to be carried out (gray line) and the broader environment that may be affected by the proposed activities (orange line), referred to as the 'EMBA'. The 'EMBA' represents the greatest geographical extent that could be affected by unplanned, 'worst case' spill scenarios. The Moderate Exposure Value or MEVA (blue line) is used to inform environmental assessment, identify potential environmental consequences, and develop spill response plans. Beyond the MEVA, environmental impacts and risks are unlikely to result in measurable effects to receptors.



# Environmental impact and risk assessment

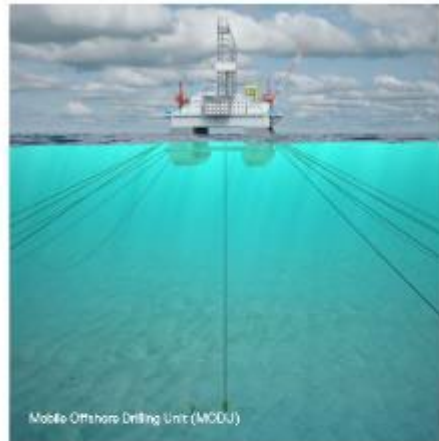
Environmental impact and risk assessment is the process by which events that will or may occur during an activity are assessed for their potential impacts on the environment (physical, biological, and socio-economic).

They are divided into planned and unplanned events.

Planned events are unavoidable impacts, such as light, noise, minor discharges of drilling fluids and interactions with other marine users.

Unplanned events are not expected to occur but are planned for to manage risk. They are also assessed based on their likelihood of occurrence.

Unplanned events include vessel collisions or an accidental release of hydrocarbons from the well.



Mobile Offshore Drilling Unit (MODU)

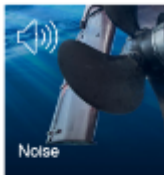


A subsea "Christmas Tree"

## Known and/or planned events

Santos has identified potential impacts or risks as a result of the drilling and completions activities. Outlined below is an overview of impacts and risks and controls we propose to use in seeking to reduce these to as low as reasonably practicable and to an acceptable level. This overview is high-level and not exhaustive. More detail can be found in the environment plan which is available at [santos.com/barocss](http://santos.com/barocss). We are also available to answer questions or can provide further information upon request. The identification of potential impacts and risks, and the controls proposed to reduce those impacts and risks, may be developed as a result of this consultation process. This includes consultation to inform Santos' understanding and assessment of potential impacts and risks in light of cultural values within the EMBA and any appropriate control measures if needed.

### POTENTIAL IMPACTS AND RISKS



Noise

Noise will be generated by MODU drilling operations and flaring and from support vessels and helicopters. The MODU does not have propulsion so will not generate noise from propellers.

The majority of the noise sources involved in the activity are lower pressure and not subject to sharp increases or decreases (e.g. engine noise) and will therefore be typical of other marine noise in the region (commercial shipping, fishing, etc).

Studies supporting the risk assessment indicated potential temporary impacts to marine fauna are limited to 12 km from MODU and vessel noise sources, with no significant impacts at the species population level.

Overall, negligible environmental consequences are predicted.



Light

Artificial lighting is required for operational and navigational safety during the activity. Light sources include:

- safety and navigational lighting on vessels, including the MODU (24 hours per day)
- spot lighting when needed, such as when deploying or retrieving equipment
- light from flaring during well flowback (intermittent, typically occurs for approximately 2-3 days).

Fauna such as marine turtles, seabirds and fish at the surface may be impacted in different ways by light: sensors from flaring or light in the same location for an extended period of time.

Industry drilling lighting studies estimate that direct light from intermittent emergency MODU flaring may be visible up to ~52 km from the MODU. The nearest turtle nesting beaches are greater than 138 km from where the MODU will be located, posing no lighting risk to nesting marine turtles.

### PROPOSED CONTROLS

Vessels are required to comply with Santos' Protected Marine Fauna Interaction and Sighting Procedure which requires compliance with regulatory requirements for managing noise impacts to fauna.

Control measures include restrictions on vessel and helicopter direction and speed to limit noise impacts to marine fauna.

MODU and vessel lighting to be limited to that required for safe operations and maritime regulations.

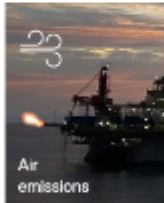
## Known and/or planned events

### POTENTIAL IMPACTS AND RISKS



Other marine users that may be in the vicinity of the Barossa field include commercial fishing, shipping and other incidental marine traffic. Tourism and recreational fishing vessels are not expected in the operational area given the water depth and distance offshore.

Helicopter operations will be infrequent and unlikely to interfere with other marine users. Helicopters will not fly over the Twin Islands or Seagull Island unless in the case of an emergency.



Air emissions may occur from:

- fuel combustion to operate the MODU, vessels and helicopter
- operation of vessel incinerators
- hydrocarbon combustion through the MODU flare during well flowback activities
- tank venting when transferring dry bulk drill products (e.g., barite, bentonite, cement) to prevent tank overpressure. The vented air will contain minor quantities of product particles.

In the offshore environment, air emissions rapidly disperse into the surrounding atmosphere. Impacts are very localized and not significant. Detectable environmental impacts are not predicted from greenhouse gas emissions during drilling and completions operations. Indirect greenhouse gas emissions for the broader Barossa Project will be addressed in a separate environment plan in respect of which there will be further consultation.

### PROPOSED CONTROLS

Santos to notify other marine users before, during and at the end of the activity.

The MODU and vessels to have automatic identification systems to aid in their detection at sea.

Santos proposes to adopt numerous control measures to manage MODU and vessel emissions, including requiring Contractor MODU/vessels' compliance with MARPOL requirements for use of low sulphur fuel and air pollution prevention certificates. ('MARPOL' is a reference to the International Convention for the Prevention of Pollution from Ships.)

Well flowback flaring to be temporary and of short duration (approximately 2-3 days) and flowback procedures to be adopted for effective flaring of hydrocarbons.

## Known and/or planned events

### POTENTIAL IMPACTS AND RISKS



Seabed disturbance will occur because of:

- MODU mooring (anchoring)
- well construction
- placement of objects on the seabed such as drilling equipment.

MODU mooring and well construction will cause an estimated seabed disturbance of 1660m<sup>2</sup> (at each of the three drill centres) and 5m<sup>2</sup> (for each well). This will result in localized impacts to benthic habitat (and associated fauna) in the operational area.

Extensive marine studies have been completed within the operational area to inform the impact assessment.

The seabed within the area is generally flat, and devoid of any significant physical seabed or habitat features.

Cultural values within the operational area and associated potential risks and impacts will continue to be identified, including through consultation with Traditional Owners and their representative bodies so that these can also be assessed.



Discharges will occur from the MODU and support vessels.

The types of discharges are typical of most offshore commercial vessels and include deck runoff, treated sewage and grey water, machinery cooling water, treated oily water, ballast water, macerated food scraps and brine (from water making).

There will be localized impacts to water quality while the discharges occur (i.e., no sustained impacts predicted).

There will be potential impacts to plankton, fish at sea surface, marine turtles and mammals, and seabirds, predicted to be short-term behavioural impacts. Santos predicts that there will be no decrease in local population size, area of occupancy of species, loss or disruption of critical habitat or disruption to the breeding cycle as a result of MODU and vessel operational discharges.

### PROPOSED CONTROLS

The MODU anchor mooring design and station keeping system are designed to limit the extent of seabed disturbance and all deployed equipment is to be recovered at the end of a drilling campaign to enable seabed and habitat recovery.

Santos continues to consider risks and impacts to cultural values and additional control measures may be implemented following consultation.

MODU and vessel discharges will be regulated according to International maritime laws. MODU and vessels to have MARPOL compliant International Sewage Pollution Prevention Certificates and International Oil Pollution Prevention Certificates.

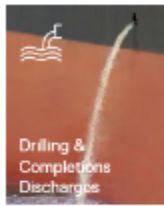
Industry standard oil-water filtration equipment to reduce oil-in-water prior to overboard discharge.

('MARPOL' is a reference to the International Convention for the Prevention of Pollution from Ships.)



# Known and/or planned events

## POTENTIAL IMPACTS AND RISKS



There will be some discharges associated with drilling and completion operations, including drilling fluids, drilling cement, salty water (brine), hydraulic fluids, chemicals such as tracer dyes and tank cleaning products. Discharges to the marine environment will result in a localized (around the discharge location) and temporary (minutes to hours) reduction in water quality and are expected to be dispersed and diluted rapidly. Given the low toxicity of the drilling and completions discharges no significant impacts are expected to marine biota.

## PROPOSED CONTROLS

Santos proposes to adopt many control measures to manage discharges to minimise impacts to water quality, benthic communities and marine fauna. These include:

- + industry standard chemical selection procedures to seek to ensure that only environmentally acceptable products are discharged
- + specialised drilling equipment
- + operating procedures to minimise the volume of drilling fluids used.

# Unplanned events

## POTENTIAL IMPACTS AND RISKS



During construction and operation activities, there is a risk of unplanned 'dropped objects' which could result in disturbance to the seabed or other marine impacts. These objects could range in size from small rubbish (carried by a worker) to a large object. All non-buoyant objects are expected to sink to the seabed and remain within the operational area. No significant seabed features have been identified in the operational area to date. Depending on debris size of the dropped object, there is the potential for ingestion by marine fauna, such as marine turtles, which could potentially result in injury or mortality. However, given the limited quantities, impacts to fauna would be limited to individuals and would not result in decrease of the local population.

## PROPOSED CONTROLS

Santos proposes to adopt numerous control measures to seek to reduce the risk of dropped objects, lost equipment or releasing waste to the environment. These include:

- + safety standards and procedures to reduce the risk of tools and other equipment being dropped during lifting operations
- + dropped objects, regardless of size, must be reported, and attempts made to recover the object according to safety and environment criteria.

Control measures to be designed to comply with maritime legislation and to be consistent with the relevant fauna recovery plans and conservation advice.



Invasive marine species (IMS) are marine flora and fauna that could be introduced into a region that is beyond their natural range but would have the ability to survive and possibly thrive. The majority of climatically compatible IMS to northern Australia are found in south-east Asian countries. They can be introduced from ballasting on vessels and discharge of ballast water. IMS, if successfully established, can outcompete native species for food or space, prey on native species or change the nature of the environment and can subsequently impact on fisheries or aquaculture. The operational area provides an unfavourable habitat for IMS due to water depths exceeding 200 metres and the vast distance to the coast.

Vessels and MODUs contracted to Santos to be managed according to Santos Invasive Marine Species Management Procedure (internationally) to reduce risks of invasive marine species spread. Vessel ballast to be managed in accordance with the Biosecurity Act 2015.



There is the potential for vessels and helicopters to unintentionally interact with marine fauna, including a potential collision that could result in injury or mortality to fauna. This fauna may have cultural significance. The operational area does not intersect any known biologically important area or habitat critical to the survival of any marine fauna species. Vessel movements are expected to be of relatively low frequency, albeit for an extended duration. Marine fauna tends to move away from vessels and helicopters.

Santos proposes to adopt a procedure for interacting with marine fauna to reduce risks of physical and behavioural impacts to marine fauna from vessels. If they are sighted, vessels can slow down, or move away and helicopters can increase distances from sighted fauna if required.

## Unplanned events

### POTENTIAL IMPACTS AND RISKS

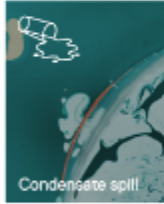


Non-hydrocarbon liquid release

A non-hydrocarbon release could occur from transferring, storing or using products, mechanical failure of equipment, handling and storage spills, hose or hose connection failure or leak.

An accidental release could result in impacts to water quality that are short-term and localised, given the small volumes and type of liquids.

Given the ocean depth, impacts to benthic habitats and fauna such as demersal fish, whale sharks, sharks and turtles are not expected.



Condensate spill

Natural gas condensate, also called natural gas liquids, are present in raw natural gas from many fields, including Barrozo. Barrozo condensate is a low viscosity, non-persistent hydrocarbon. A condensate spill could occur due to a loss of well control and loss of primary and secondary well barriers.

The likelihood of an event leading to a spill is considered 'remote'.

There are no known emergent or shoreline habitats within the MEVA, but some shoals and banks may be contacted by hydrocarbons in a worst-case event, with local water quality affected.

A condensate release could impact on benthic organisms, fish, coral and invertebrates. These species may have cultural significance. Fishing activities (traditional, recreational and commercial) could be disrupted for the medium-term. There could also be disruption to other activities in the area such as commercial shipping, military exercises and other oil and gas operations.

### PROPOSED CONTROLS

Suite of procedures in place to manage the selection, storage, handling and clean-up of chemicals. Vessels have spill response plans.

The chemical selection procedure is designed so that only environmentally acceptable chemicals should be used for drilling fluids.

Implementation of industry standard safe drilling methodologies to seek to reduce the likelihood of a loss of containment. Safety options have been considered in well design and equipment choice for the activity.

The Drilling Oil Pollution Emergency Plan (DOPPEP) details a range of spill response strategies and associated control measures, including those required to maintain preparedness and response arrangements.

The combination of the standard prevention control measures and the spill response strategies, as presented in the DOPPEP, together have been assessed as reducing the hydrocarbon spill risk to a low level.

## Unplanned events

### POTENTIAL IMPACTS AND RISKS



Marine Diesel Spill

A marine diesel oil (MDO) spill could occur because of the following:

- a significant collision that ruptured a fuel tank
- a refuelling incident due to fuel hose failure or rupture, coupling failure or fuel tank overfilling

In the event of a vessel collision, the MDO spill volume is anticipated to be less than 250m<sup>3</sup>. A maximum spill volume from refuelling incidents of 10m<sup>3</sup> is anticipated given hose couplings design and rapid shutdown of pumps.

A marine diesel spill would temporarily affect water quality and could impact on benthic organisms, fish, coral and invertebrates, seabirds, whales and turtles. These species may have cultural significance.

No shoreline accumulation of oil is anticipated based on spill modelling results, but some shoals and banks may be contacted by hydrocarbons, with potential impacts limited to upper water column layers.

Fishing activities (traditional, recreational and commercial) could be temporarily disrupted. There could also be disruption to other activities in the area such as commercial shipping, military exercises and other oil and gas operations.

### PROPOSED CONTROLS

The risk of collision is reduced through controls that manage interactions with other marine users before and during the activity. This includes standard maritime notifications, automatic identification systems and navigational lighting. Operational procedures are designed to minimise refuelling incidents.

Spill response plans to be implemented and regular overflows are planned to be conducted. These control measures are designed to comply with maritime regulations and standard industry practices. The risk has been assessed as low and as low as reasonably practicable.

# Consulting with Tiwi people

WE WELCOME YOUR FEEDBACK

We're  
Listening Santos

We are seeking your input on whether you may be affected by the proposed Drilling and Completions activities. You might be affected if, for example, you have a spiritual and cultural connection to land and sea country that might be affected by the activities, or otherwise carry out commercial or recreational activities that might be affected.

Santos is proposing to implement control measures to reduce the environmental impacts and risks of the activities. It is a requirement under relevant environmental legislation that these impacts and risks are reduced to as low as reasonably practicable (ALARP) and an acceptable level.

#### We are seeking your feedback about the activities and especially:

- the environment that may potentially be affected and any concerns or questions you may have
- the potential impacts and risks we currently have identified and any others you might be concerned about or want to talk to us about
- the control measures we propose to use, and any other measures you may want us to consider using, to seek to reduce impacts and risks to as low as reasonably practicable and an acceptable level.

Santos is committed to undertaking genuine and meaningful consultation. Any feedback we receive will be considered and addressed as appropriate in our Drilling and Completions Environment Plan that we submit to the regulator for assessment.

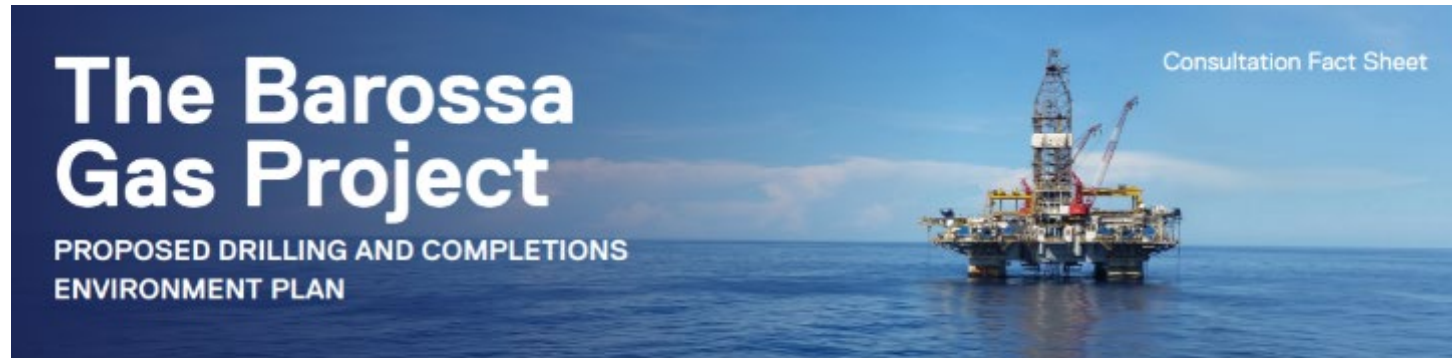
You can give us feedback through any of these ways:

- Tell us at our consultation sessions
- Tell our team when they are on the Islands
- Call us on 1800 267 600
- Email us on [offshore.consultation@santos.com](mailto:offshore.consultation@santos.com)

For more information, visit [santos.com/barossa](https://www.santos.com/barossa) or use the QR code.



## Drilling factsheet - general



Santos' proposed Barossa Gas Project involves extracting natural gas from the Barossa field, located in Commonwealth waters approximately 285 kilometres offshore north-northwest from Darwin, in the Arafura Sea, and transporting it via gas pipeline to the existing Darwin liquified natural gas (DLNG) facility. The project will comprise a Floating Production Storage and Offloading (FPSO) facility, a subsea production system, supporting in-field subsea infrastructure and a gas pipeline.

### OVERVIEW OF PROPOSED DRILLING AND COMPLETIONS ACTIVITIES

Santos plans to drill up to eight subsea wells. The drilling and completions operational area is located approximately 285 kilometres offshore north-northwest from Darwin.

The way we drill a well is to use a drill on a ship that is like a telescope, extending further and further into the seabed until it reaches the gas. The hole that the drill creates is the well. Each well is lined by steel casings held in place with cement. This is designed to keep the well safe for the life of the project.

At the top of the well on the seabed, a structure called a

Christmas Tree will be installed that acts like a tap, so Santos can control the flow of gas. The installation of the casings and Christmas Trees is known as completion of the well.

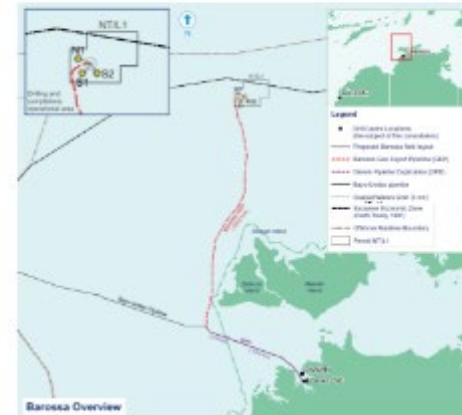
Each well is expected to take around 90 days to drill and complete. We anticipate that our proposed Drilling and Completions activities will take approximately 2 years, subject to weather and operational performance.

### EQUIPMENT AND VESSELS

A moored semi-submersible mobile offshore drilling unit (MODU) will be supported by up to four support vessels which will transit between the drilling area and the onshore supply base in Darwin harbour. The MODU or similar will be used to install the structure called the Christmas Tree on each well.

### KEY ACTIVITIES INCLUDE:

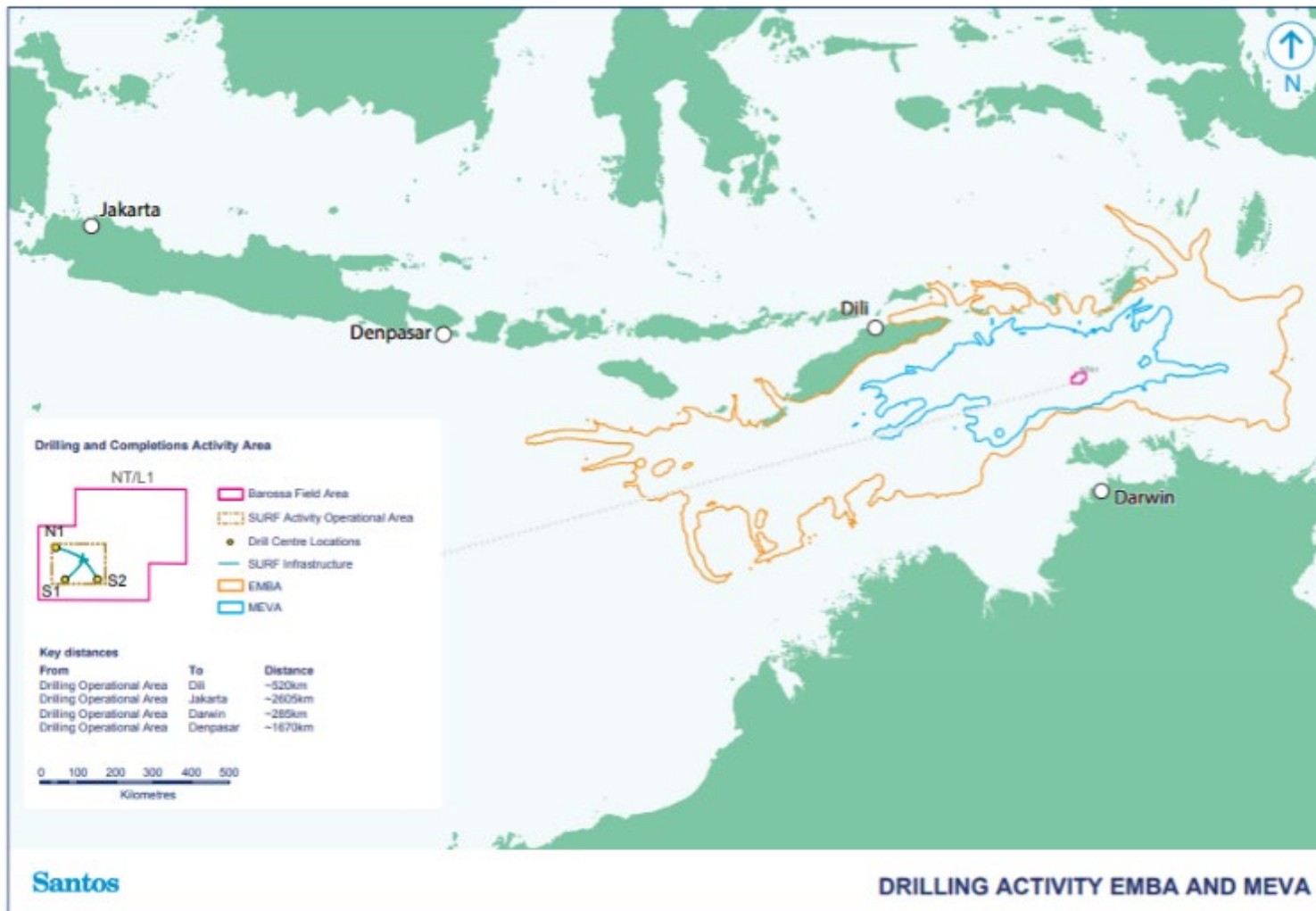
- + MODU towing and mooring
- + MODU drilling and completions activities
- + Use of drilling fluids to lubricate the drill and maintain well pressure
- + Discharge of inert drilled solids, water-based drilling fluids, completions fluids and residual cement
- + Flowback of gas and liquids from the well for testing
- + Installation of subsea equipment
- + Use of helicopters to support activities.



We're **Listening** **Santos**

# Environment that may be affected

This map depicts the proposed operational area for the activities to be carried out (grey line) and the broader environment that may be affected by the proposed activities (orange line), referred to as the 'EMBA'. The 'EMBA' represents the greatest geographical extent that could be affected by unplanned, 'worst case' spill scenarios. The Moderate Exposure Value or MEVA (blue line) is used to inform environmental assessment, identify potential environmental consequences, and develop spill response plans. Beyond the MEVA, environmental impacts and risks are unlikely to result in measurable effects to receptors.



# Environmental impact and risk assessment

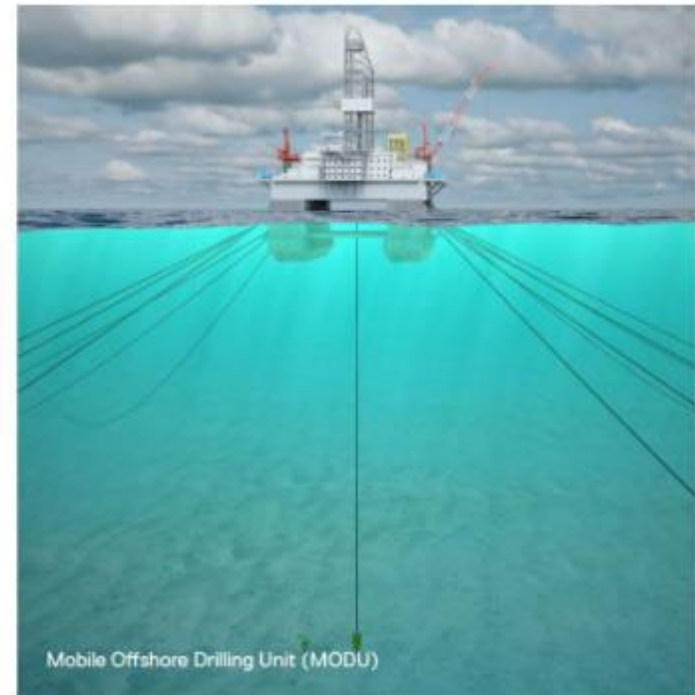
Environmental impact and risk assessment is the process by which events that will or may occur during an activity are assessed for their potential impacts on the environment (physical, biological, and socio-economic).

They are divided into planned and unplanned events.

Planned events are unavoidable impacts, such as light, noise, minor discharges of drilling fluids and interactions with other marine users.

Unplanned events are not expected to occur but are planned for to manage risk. They are also assessed based on their likelihood of occurrence.

Unplanned events include vessel collisions or an accidental release of hydrocarbons from the well.



Mobile Offshore Drilling Unit (MODU)

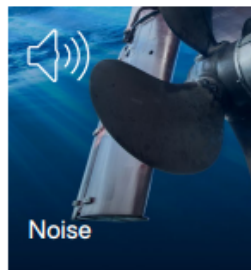


A subsea "Christmas Tree"

# Known and/or planned events

Santos has identified potential impacts or risks as a result of the drilling and completions activities. Outlined below is an overview of impacts and risks and controls we propose to use in seeking to reduce these to as low as reasonably practicable and to an acceptable level. This overview is high-level and not exhaustive. More detail can be found in the environment plan which is available at [santos.com/barossa](http://santos.com/barossa). We are also available to answer questions or can provide further information upon request. The identification of potential impacts and risks, and the controls proposed to reduce these impacts and risks, may be developed as a result of consultation processes. This includes consultation to inform Santos' understanding and assessment of potential impacts and risks in light of cultural values within the EMBA and any appropriate control measures if needed.

## POTENTIAL IMPACTS AND RISKS



Noise will be generated by MODU drilling operations and flaring and from support vessels and helicopters. The MODU does not have propulsion so will not generate noise from propellers.

The majority of the noise sources involved in the activity are lower pressure and not subject to sharp increases or decreases (e.g. engine noise) and will therefore be typical of other marine noise in the region (commercial shipping, fishing, etc).

Studies supporting the risk assessment indicated potential temporary impacts to marine fauna are limited to 12 km from MODU and vessel noise sources, with no significant impacts at the species population level.

Overall, negligible environmental consequences are predicted.



Artificial lighting is required for operational and navigational safety during the activity. Light sources include:

- + safety and navigational lighting on vessels, including the MODU (24 hours per day)
- + spot lighting when needed, such as when deploying or retrieving equipment
- + light from flaring during well flowback (intermittent, typically occurs for approximately 2-3 days).

Fauna such as marine turtles, seabirds and fish at the surface may be impacted in different ways by light emissions from flaring or light in the same location for an extended period of time.

Industry drilling lighting studies estimate that direct light from intermittent emergency MODU flaring may be visible up to ~52 km from the MODU. The nearest turtle nesting beaches are greater than 138 km from where the MODU will be located, posing no lighting risk to nesting marine turtles.

## PROPOSED CONTROLS

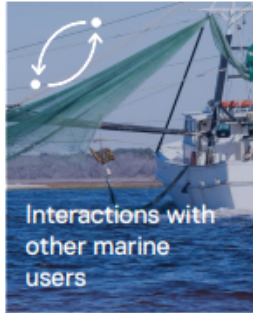
Vessels are required to comply with Santos' *Protected Marine Fauna Interaction and Sighting Procedure* which requires compliance with regulatory requirements for managing noise impacts to fauna.

Control measures include restrictions on vessel and helicopter direction and speed to limit noise impacts to marine fauna.

MODU and vessel lighting to be limited to that required for safe operations and maritime regulations.

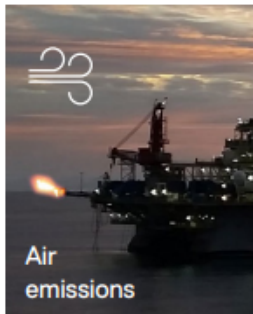
# Known and/or planned events

## POTENTIAL IMPACTS AND RISKS



Other marine users that may be in the vicinity of the Barossa field include commercial fishing, shipping and other incidental marine traffic. Tourism and recreational fishing vessels are not expected in the operational area given the water depth and distance offshore.

Helicopter operations will be infrequent and unlikely to interfere with other marine users. Helicopters will not fly over the Tiwi Islands or Seagull Island unless in the case of an emergency.



Air emissions may occur from:

- + fuel combustion to operate the MODU, vessels and helicopter
- + operation of vessel incinerators
- + hydrocarbon combustion through the MODU flare during well flowback activities
- + tank venting when transferring dry bulk drill products (e.g., barite, bentonite, cement) to prevent tank overpressure. The vented air will contain minor quantities of product particles.

In the offshore environment, air emissions rapidly dissipate into the surrounding atmosphere. Impacts are very localised and not significant.

Detectable environmental impacts are not predicted from greenhouse gas emissions during drilling and completions operations. Indirect greenhouse gas emissions for the broader Barossa Project will be addressed in a separate environment plan in respect of which there will be further consultation.

## PROPOSED CONTROLS

Santos to notify other marine users before, during and at the end of the activity.

The MODU and vessels to have automatic identification systems to aid in their detection at sea.

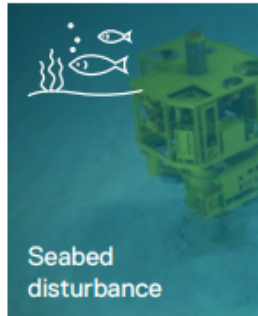
Santos proposes to adopt numerous control measures to manage MODU and vessel emissions, including requiring Contractor MODU/vessels' compliance with MARPOL requirements for use of low-sulphur fuel and air pollution prevention certificates. ('MARPOL' is a reference to the International Convention for the Prevention of Pollution from Ships.)

Well flowback flaring to be temporary and of short duration (approximately 2-3 days) and flowback procedures to be adopted for effective flaring of hydrocarbons.



# Known and/or planned events

## POTENTIAL IMPACTS AND RISKS



Seabed disturbance will occur because of:

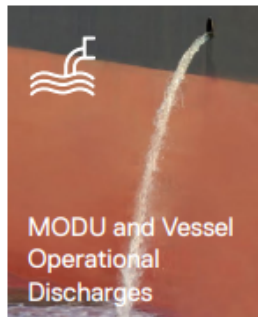
- + MODU mooring (anchoring)
- + well construction
- + placement of objects on the seabed such as drilling equipment.

MODU mooring and well construction will cause an estimated seabed disturbance of 1560m<sup>2</sup> (at each of the three drill centres) and 5m<sup>2</sup> (for each well). This will result in localised impacts to benthic habitat (and associated fauna) in the operational area.

Extensive marine studies have been completed within the operational area to inform the impact assessment.

The seabed within the area is generally flat, and devoid of any significant physical seabed or habitat features.

Cultural values within the operational area and associated potential risks and impacts will continue to be identified, including through consultation with Traditional Owners and their representative bodies so that these can also be assessed.



Discharges will occur from the MODU and support vessels.

The types of discharges are typical of most offshore commercial vessels and include deck runoff, treated sewage and grey water, machinery cooling water, treated oily water, ballast water, macerated food scraps and brine (from water making).

There will be localised impacts to water quality while the discharges occur (i.e., no sustained impacts predicted).

There will be potential impacts to plankton, fish at sea surface, marine turtles and mammals, and seabirds, predicted to be short-term behavioural impacts. Santos predicts that there will be no decrease in local population size, area of occupancy of species, loss or disruption of critical habitat or disruption to the breeding cycle as a result of MODU and vessel operational discharges.

## PROPOSED CONTROLS

The MODU anchor mooring design and station keeping system are designed to limit the extent of seabed disturbance and all deployed equipment is to be recovered at the end of a drilling campaign to enable seabed and habitat recovery.

Santos continues to consider risks and impacts to cultural values and additional control measures may be implemented following consultation.

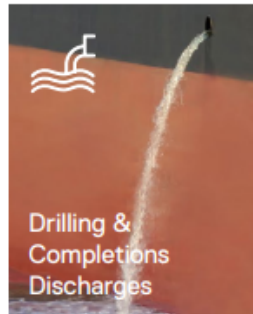
MODU and vessel discharges will be regulated according to international maritime laws. MODU and vessels to have MARPOL compliant International Sewage Pollution Prevention Certificates and International Oil Pollution Prevention Certificates.

Industry standard oil-water filtration equipment to reduce oil-in-water prior to overboard discharge.

(‘MARPOL’ is a reference to the International Convention for the Prevention of Pollution from Ships.)

# Known and/or planned events

## POTENTIAL IMPACTS AND RISKS



There will be some discharges associated with drilling and completion operations, including drilling fluids, drilling cements, salty water (brine), hydraulic fluids, chemicals such as tracer dyes and tank cleaning products.

Discharges to the marine environment will result in a localised (around the discharge location) and temporary (minutes to hours) reduction in water quality and are expected to be dispersed and diluted rapidly.

Given the low toxicity of the drilling and completions discharges no significant impacts are expected to marine biota.

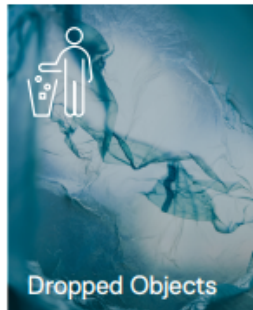
## PROPOSED CONTROLS

Santos proposes to adopt many control measures to manage discharges to minimise impacts to water quality, benthic communities and marine fauna. These include:

- + industry standard chemical selection procedures to seek to ensure that only environmentally acceptable products are discharged
- + specialised drilling equipment
- + operating procedures to minimise the volume of drilling fluids used.

# Unplanned events

## POTENTIAL IMPACTS AND RISKS



During construction and operation activities, there is a risk of unplanned 'dropped objects' which could result in disturbance to the seabed or other marine impacts.

These objects could range in size from small rubbish (carried by a worker) to a large object.

All non-buoyant objects are expected to sink to the seabed and remain within the operational area. No significant seabed features have been identified in the operational area to date.

Depending on debris size of the dropped object, there is the potential for ingestion by marine fauna, such as marine turtles, which could potentially result in injury or mortality. However, given the limited quantities, impacts to fauna would be limited to individuals and would not result in decrease of the local population.



Invasive marine species (IMS) are marine flora and fauna that could be introduced into a region that is beyond their natural range but would have the ability to survive and possibly thrive.

The majority of climatically compatible IMS to northern Australia are found in south-east Asian countries. They can be introduced from biofouling on vessels and discharge of ballast water.

IMS, if successfully established, can outcompete native species for food or space, prey on native species or change the nature of the environment and can subsequently impact on fisheries or aquaculture.

The operational area provides an unfavourable habitat for IMS due to water depths exceeding 200 metres and the vast distance to the coast.



There is the potential for vessels and helicopters to unintentionally interact with marine fauna, including a potential collision that could result in injury or mortality to fauna.

This fauna may have cultural significance.

The operational area does not intersect any known biologically important area or habitat critical to the survival of any marine fauna species. Vessel movements are expected to be of relatively low frequency, albeit for an extended duration. Marine fauna tends to move away from vessels and helicopters.

## PROPOSED CONTROLS

Santos proposes to adopt numerous control measures to seek to reduce the risk of dropped objects, lost equipment or releasing waste to the environment. These include:

- + safety standards and procedures to reduce the risk of tools and other equipment being dropped during lifting operations
- + dropped objects, regardless of size, must be reported, and attempts made to recover the object according to safety and environment criteria.

Control measures to be designed to comply with maritime legislation and to be consistent with the relevant fauna recovery plans and conservation advice.

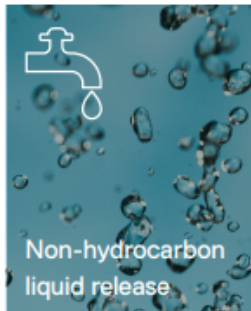
Vessels and MODUs contracted to Santos to be managed according to *Santos Invasive Marine Species Management Procedure* (international) to reduce risks of invasive marine species spread.

Vessel ballast to be managed in accordance with the *Biosecurity Act 2015*.

Santos proposes to adopt a procedure for interacting with marine fauna to reduce risks of physical and behavioural impacts to marine fauna from vessels. If they are sighted, vessels can slow down, or move away and helicopters can increase distances from sighted fauna if required.

# Unplanned events

## POTENTIAL IMPACTS AND RISKS



A non-hydrocarbon release could occur from transferring, storing or using products, mechanical failure of equipment, handling and storage spills, hose or hose connection failure or leak.

An accidental release could result in impacts to water quality that are short-term and localised, given the small volumes and type of liquids.

Given the ocean depth, impacts to benthic habitats and fauna such as demersal fish, whale sharks, sharks and turtles are not expected.



Natural-gas condensate, also called natural gas liquids, are present in raw natural gas from many fields, including Barossa. Barossa condensate is a low viscosity, non-persistent hydrocarbon. A condensate spill could occur due to a loss of well control and loss of primary and secondary well barriers.

The likelihood of an event leading to a spill is considered 'remote'.

There are no known emergent or shoreline habitats within the MEVA, but some shoals and banks may be contacted by hydrocarbons in a worst-case event, with local water quality affected.

A condensate release could impact on benthic organisms, fish, coral and invertebrates. These species may have cultural significance. Fishing activities (traditional, recreational and commercial) could be disrupted for the medium-term. There could also be disruption to other activities in the area such as commercial shipping, military exercises and other oil and gas operations.

## PROPOSED CONTROLS

Suite of procedures in place to manage the selection, storage, handling and clean-up of chemicals. Vessels have spill response plans.

The chemical selection procedure is designed so that only environmentally acceptable chemicals should be used for drilling fluids.

Implementation of Industry standard safe drilling methodologies to seek to reduce the likelihood of a loss of containment. Safety options have been considered in well design and equipment choice for the activity.

The Drilling Oil Pollution Emergency Plan (OPEP) details a range of spill response strategies and associated control measures, including those required to maintain preparedness and response arrangements.

The combination of the standard prevention control measures and the spill response strategies, as presented in the OPEP, together have been assessed as reducing the hydrocarbon spill risk to a low level.

# Unplanned events

## POTENTIAL IMPACTS AND RISKS



A marine diesel oil (MDO) spill could occur because of the following:

- + a significant collision that ruptured a fuel tank
- + a refuelling incident due to fuel hose failure or rupture, coupling failure or fuel tank overfilling.

In the event of a vessel collision, the MDO spill volume is anticipated to be less than 250m<sup>3</sup>. A maximum spill volume from refuelling incidents of 10m<sup>3</sup> is anticipated given hose couplings design and rapid shutdown of pumps.

A marine diesel spill would temporarily affect water quality and could impact on benthic organisms, fish, coral and invertebrates, seabirds, whales and turtles. These species may have cultural significance.

No shoreline accumulation of oil is anticipated based on spill modelling results, but some shoals and banks may be contacted by hydrocarbons, with potential impacts limited to upper water column layers.

Fishing activities (traditional, recreational and commercial) could be temporarily disrupted. There could also be disruption to other activities in the area such as commercial shipping, military exercises and other oil and gas operations

## PROPOSED CONTROLS

The risk of collision is reduced through controls that manage interactions with other marine users before and during the activity. This includes standard maritime notifications, automatic identification systems and navigational lighting. Operational procedures are designed to minimise refuelling incidents. Spill response plans to be implemented and regular exercises are planned to be conducted. These control measures are designed to comply with maritime regulations and standard industry practices. The risk has been assessed as low and as low as reasonably practicable.

# Consulting with relevant persons

WE WELCOME  
FEEDBACK



We're  
**Listening Santos**

We are seeking input from relevant persons on whether they may be affected by the proposed Drilling and Completions activity.

In preparing an environment plan for submission to NOPSEMA, a titleholder must consult with each 'relevant person', including relevant Commonwealth, State and Northern Territory departments or agencies and persons (or organisations) whose functions, interests or activities may be affected by the activities proposed to be carried out under an environment plan.

Examples of 'functions, interests or activities' that may be affected by the activities to be carried out under an environment plan may include those arising in relation to a spiritual or cultural connection to land or to sea country, tourism, recreational and commercial fishing and local communities (though these are merely illustrative examples and not an exhaustive list).

Santos is proposing to implement control measures to reduce the environmental impacts and risks of the activities. It is a requirement under relevant environmental legislation that these impacts and risks are reduced to as low as reasonably practicable (ALARP) and an acceptable level.

**We are seeking feedback from relevant persons about the activities and especially:**

- + the environment that may potentially be affected and any concerns or questions relevant persons may have
- + the potential impacts and risks we currently have identified and any others relevant persons might be concerned about or want to talk to us about
- + the control measures we propose to use, and any other measures relevant persons may want us to consider using, to seek to reduce impacts and risks to as low as reasonably practicable and an acceptable level.

Santos is committed to undertaking genuine and meaningful consultation. Any feedback we receive will be considered and addressed as appropriate in our Drilling and Completions Environment Plan that we submit to the regulator for assessment.

We are requesting relevant persons' feedback for our Drilling and Completions Environment Plan by 15 June 2023. Relevant persons can give us feedback through any of these ways:

- + Tell us at our consultation sessions (listed at [santos.com/barossa](https://santos.com/barossa))
- + Call us on 1800 267 600
- + Email us on [offshore.consultation@santos.com](mailto:offshore.consultation@santos.com)

Alternatively, please contact us by 29 May 2023 to seek further information or to discuss other consultation arrangements.

For more information, visit [santos.com/barossa](https://santos.com/barossa) or use the QR code.



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## Additional information for commercial fisheries

In addition to Santos' other consultation material regarding the Barossa Gas Project Drilling and Completions Environment Plan (D&C EP), the following supplementary information is for commercial fishers active in the region. The proposed drilling and completions activity has the potential to affect the following commercial fisheries:

### Commonwealth managed fisheries

- + Northern Prawn Fishery
- + Southern Bluffin Tuna Fishery
- + Western Skipjack Tuna Fishery
- + Western Tuna and Billfish Fishery
- + North West Slope Trawl Fishery

### Northern Territory (NT) managed fisheries

- + Aquaculture Fishery
- + Spanish Mackerel Fishery
- + Timor Reef Fishery
- + Demersal Fishery
- + Coastal Line Fishery
- + Offshore Net and Line Fishery
- + Small Pelagic (Development) Fishery

### Western Australia (WA) Managed fisheries

- + Mackerel Managed Fishery
- + Northern Demersal Scallops Managed Fishery

Commonwealth, Northern Territory and Western Australian managed commercial fisheries are illustrated in Figures 1, 2 and 3, and bathymetric contours are illustrated in Figure 4.

A summary of Santos' knowledge of fishing efforts undertaken by these fisheries in relation to the Barossa Field is provided in Tables 1, 2 and 3 below. A summary of key concerns raised with Santos relevant to commercial fisheries from the proposed drilling and completions activity is provided in Table 4. These concerns include:

- + Interference with commercial fishing activities and exclusion from fishing areas.
- + Introduction of Invasive Marine Species (i.e., marine pests).
- + Vessel collision and refueling incidents.
- + Loss of well control and oil spill response.

Further assessment of potential impacts and risks associated with the proposed drilling and completions activity will be included in the D&C EP.

## Relevant Person Consultation

Santos is continuing its consultation efforts for its D&C EP to further ascertain, understand and assess values and sensitivities of the environment that may be affected by our proposed activities, and potential environmental impacts and risks.

There may be information Santos is not yet aware of but needs to properly understand to assess potential activity impacts and risks in its D&C EP. Consultation may inform this. It may also inform what control measures are to be proposed to reduce environmental impacts and risks to as low as reasonably practicable and to an acceptable level.

More information about environmental approvals associated with the Barossa Gas Project D&C EP is set out below.

**Santos is committed to undertaking genuine and meaningful consultation. Any feedback we receive will be considered and addressed as appropriate in our D&C EP that we submit to the regulator for assessment.**

We are seeking your input on whether you may be affected by the proposed Drilling and Completions activity. We are seeking your feedback about the activities and especially:

- + the environment that may be affected and any concerns or questions you may have
- + the potential impacts and risks we currently have identified and any others you might be concerned about or want to talk to us about
- + the control measures we propose to use, and any other measures you may want us to consider using, to seek to reduce impacts and risks to as low as reasonably practicable and an acceptable level.

If you do not wish to receive further information from Santos on this Drilling and Completions activity, please advise Santos directly or through your representative body.

### Contact

Santos Offshore Consultation Team Telephone: 1800 257 600  
Email: [Offshore.Consultation@Santos.com](mailto:Offshore.Consultation@Santos.com)  
For more information visit [santos.com/barossa](http://santos.com/barossa)

**Table 1: Summary of Commonwealth managed fisheries**

Fishery	Summary of Fishery in relation to the Barossa Field	Assessment of Potential Drilling Impacts
Northern Prawn Fishery	<p>The Northern Prawn Fishery management area extends over Australia's northern coast, between Cape York in Queensland and Cape Londonderry in WA, from the low water mark to the outer edge of the Australian Fishing Zone (AFZ). 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.</p> <p>The key target species are banana prawns, tiger prawns and endeavour prawns. There are two fishing seasons, with the season end date depends on catch rates:</p> <ul style="list-style-type: none"> <li>+ Season 1 (mainly banana prawns caught): 1 April – 15 June</li> <li>+ Season 2 (mainly tiger prawns caught): 1 August – end of November</li> </ul> <p>The areas of low, medium and high fishing effort are distant from the Barossa Field. Based on previous industry consultation prawn fishing is not expected in water depths greater than ~150 m.</p> <p>Scampi are targeted in deeper waters north of the Barossa Field. There is a low level of fishing spread across two to three months of the year.</p>	<p>No impact to the prawn fishery expected given the location and water depth of the Barossa Field.</p> <p>Scampi fishing occurs in deeper waters (&gt;250 m) with recorded fishing effort to the north of the Barossa Field.</p> <p>Drilling activities are not expected to displace trawl fishers or affect scampi catch.</p>
Southern Bluefin Tuna Fishery	<p>The Southern Bluefin Tuna Fishery operates around Australia and extends to the high seas fishing zone (out to 200 nm from the coast). The fishery targets southern bluefin tuna only.</p> <p>Fishing activity is focused in southern Australian waters with no activity expected across the Barossa Field or surrounds.</p>	No impact to the fishery expected.
Western Skipjack Tuna Fishery	<p>This Western Skipjack Tuna Fishery extends from west from Cape York Peninsula and around Australia to the South Australian / Victorian border, out to the edge of the AFZ.</p> <p>Little fishing activity has been undertaken in this fishery since 2008. No fishing activity associated with this fishery is expected to occur within the Barossa Field or surrounds.</p>	No impact to the fishery expected.
Western Tuna and Billfish Fishery	<p>The Western Tuna and Billfish Fishery management area extends over a large area westward from Cape York Peninsula off Queensland, around the west coast of WA and eastward, across the Great Australian Bight to 141°E at the South Australian/Victorian border.</p> <p>The fishery has operated at low levels of effort since the early 2000's due to economic conditions. Target species include albacore, bigeye tuna, yellow fin tuna, swordfish and striped marlin.</p> <p>This fishery is not known to be active within the Barossa Field or surrounds.</p>	No impact to the fishery expected.
North-West Slope Trawl Fishery	<p>The North-West Slope Trawl Fishery operates off north-western Australia from 114°E to 125°E, between the 200 m isobath and the outer boundary of the AFZ. A large area of the Australia-Indonesia MoU Box falls within the North West Shelf (NWS) throughflow. The fishing method is trawling and the target species is scampi.</p>	No impact to the fishery expected. Fishery intercepts the EMBA but does not overlap the operational area.



Figure 1: Commonwealth managed fisheries in northern Australia

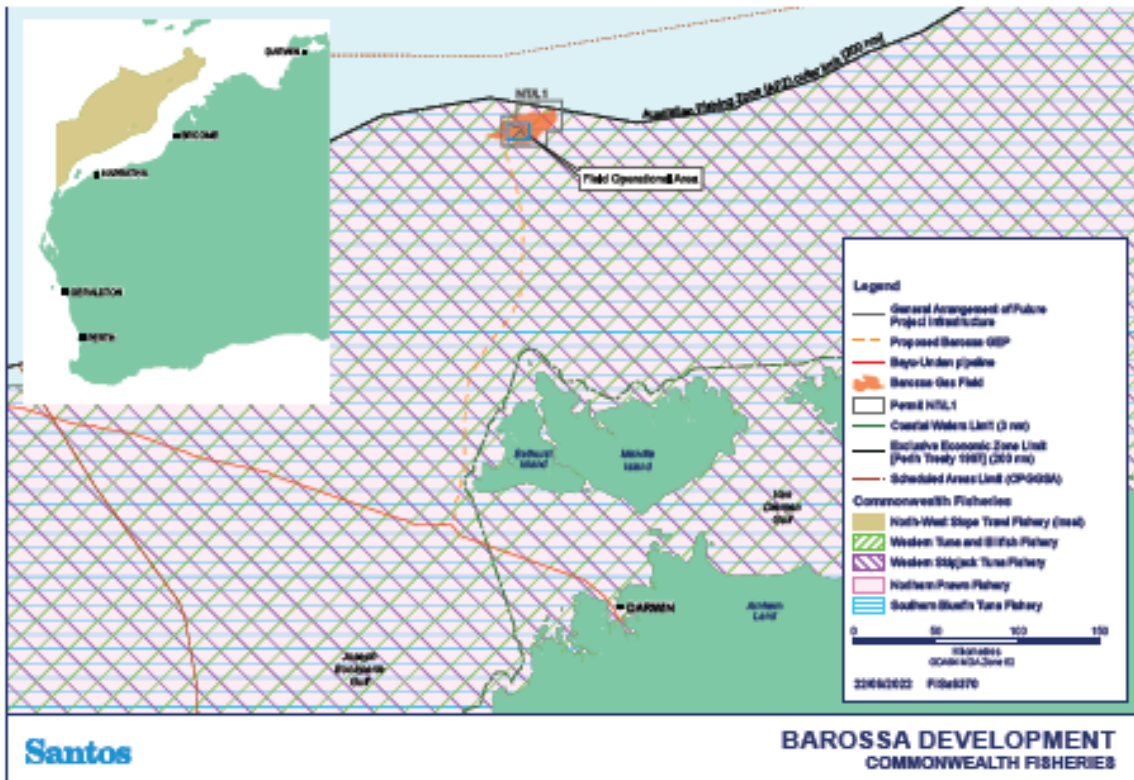


Table 2: Summary of Northern Territory managed fisheries

Fishery	Summary of Fishery in relation to the Barossa Field	Assessment of Potential Impacts
<b>Aquarium Fishery</b>	<p>The Aquarium Fishery is a small-scale, multi-species fishery that prospects freshwater, estuarine and marine habitats. The fishery extends to the outer boundary of the AFZ but the harvest of most marine species occurs within 100 km of Nhulunbuy and Darwin. One license holder does occasionally collect from offshore locations, including at Evans Shoal (approximately 65 km west of the Barossa Field).</p> <p>This fishery is not expected to be active across the Barossa Field or surrounds.</p>	No impact to the fishery expected.
<b>Spanish Mackerel Fishery</b>	<p>The fishery extends seaward from the high-water mark to the edge of the AFZ. The majority of the fishing effort occurs in the vicinity of reefs, headlands and shoals and includes waters near Bathurst Island, New Year Island, northern and western Goobernate Island, the Gove Peninsula, the Weasel Islands, the Sir Edward Pellew Group and suitable fishing grounds on the western and eastern mainland coasts.</p> <p>This fishery is not expected to be active across the Barossa Field or surrounds.</p>	No impact to the fishery expected.

Fishery	Summary of Fishery in relation to the Barossa Field	Assessment of Potential Impacts
<b>Timor Reef Fishery</b>	<p>The Timor Reef Fishery (TRF) extends north-west of Darwin to the WA-NT border and to the outer limit of the AFZ. Fishing occurs primarily in the 100 to 200-m depth range.</p> <p>Previous consultation indicates that the main target species is goldband snapper, with other tropical snappers (e.g., crimson snapper and saddletail snapper) also making up part of the catch; there are two active fishing licence holders currently operating in the fishery; main fishing method is trap fishing; fishery is most productive between October and May, with less activity during the dry season months of June-August due to strong northerly winds.</p> <p>Due to the water depth and based on a review of available historical catch data, fishing activity is not expected across the Barossa Field and surrounds.</p>	No impact to the fishery expected.
<b>Offshore Net and Line Fishery</b>	<p>The Offshore Net and Line Fishery operates in NT waters from the low water mark to the boundary of the Australian Fishing Zone (AFZ). Most fishing occurs in the coastal zone within 12 nautical miles of the coast, and immediately offshore in the Gulf of Carpentaria.</p> <p>Black-tip sharks and grey mackerel are the primary species taken in off-shore net and line fishing.</p> <p>Fishing methods include longlines or pelagic nets (there are restrictions on where certain gear can be used).</p>	Interaction with this fishery in the operational area is possible but considered unlikely due to the concentration of fishing effort in near coastal areas and distribution of the targeted species.
<b>Small Pelagic (Development) Fishery</b>	<p>The Small Pelagic (Development) Fishery is operational under a development licence. Small pelagic species such as herring, sardine, anchovy, mackerel and squid are considered important to the commercial, recreational and Indigenous fishing sectors as a source of bait, for livestock and aquaculture feed, and increasingly for human consumption. Lift nets, drop nets and purse sein methods of fishing are being used. The fishery extends to the outer limit of the AFZ. A licence has not been issued to a specific commercial fishing licence-holder to date.</p>	No impact to the fishery is expected
<b>Demersal Fishery</b>	<p>The fishery extends from waters 15 nm from the coastal waters mark to the outer limit of the AFZ, excluding the area of the Timor Reef Fishery. Hence, this fishery does not overlap with Barossa Field or surrounds.</p>	No impact to the fishery expected.
<b>Coastal Line Fishery</b>	<p>The Coastal Line Fishery extends from the NT coast between the high-water mark and 15 nautical miles out from the low water mark. Special restrictions apply in the western zone which extends from the Western Australian border to Veshon Head on Cobourg Peninsula, in the NT. Fishing is prohibited in reef fish protection areas. Access is also restricted around registered Aboriginal sacred sites and protected areas.</p> <p>Black jaw fish and golden snapper are the main species taken in the coastal line fishery.</p>	Fishery intercepts the EMBA. No impact to the fishery is expected.

Figure 2: Northern Territory managed fisheries

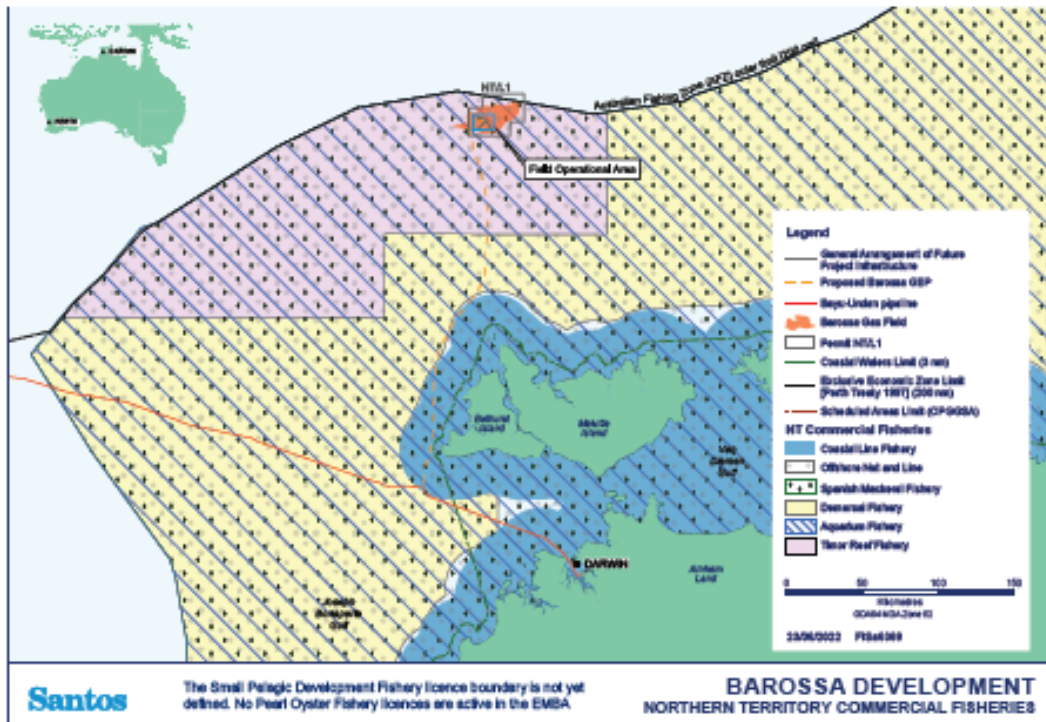


Table 3: Summary of Western Australian managed fisheries

Fishery	Summary of Fishery In relation to the Barossa Field	Assessment of Potential Impacts
<b>Mackerel Managed Fishery</b>	Commercial fishing for the target species, Spanish mackerel, is allowed from the high water mark to the outer boundary of the AFZ, which is 200 nautical miles offshore. It is fished between Geraldton and the WA/NT border. Fishing method is trolling.	No impact to the fishery is expected. Fishery intercepts the EMBA but does not overlap the operational area.
<b>Northern Demersal Scalefish Managed Fishery</b>	The Northern Demersal Scalefish Managed Fishery (NDSF) operates off WA's coast in waters east of 120° E longitude. The permitted means of operation within the fishery include handline, dropline and fish traps, although the NDSF has essentially operated as a trap-based fishery since 2002. The NDSF target red and blue spotted emperor and goldband snapper.	No impact to the fishery is expected. Fishery intercepts the EMBA but does not overlap the operational area.

The following fisheries and fishing activities have the right to occur within the boundary of the EMBA but do not currently operate there. No impacts are therefore expected to these fisheries:

- + Broome Prawn Managed Fishery
- + Kimberley Crab Managed Fishery
- + Kimberley Prawn Managed Fishery
- + Mud Crab Fishery
- + WA North Coast Shark Fishery
- + Marine Aquarium Fishery
- + South-West Coast Salmon Fishery
- + West Coast Deep Sea Crustacean Managed Fishery
- + Abalone fishing
- + Pearling
- + Collection of specimen shells
- + Collection of invertebrates

Figure 3: Western Australian managed fisheries

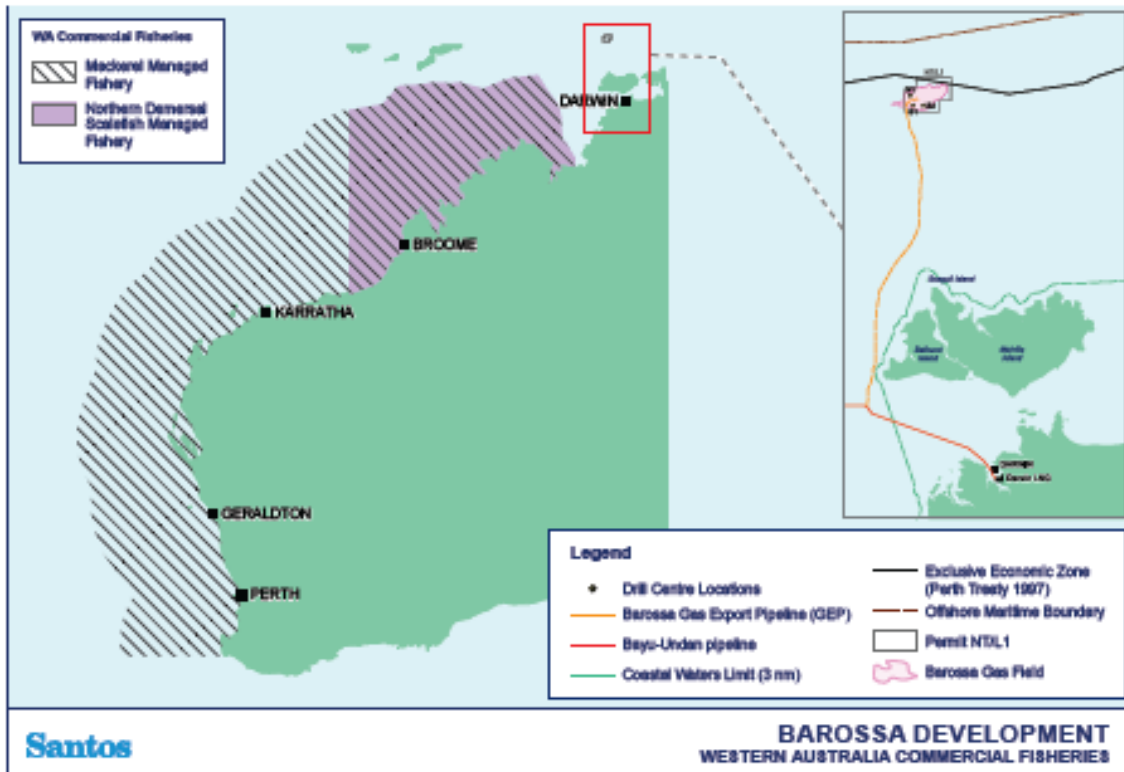
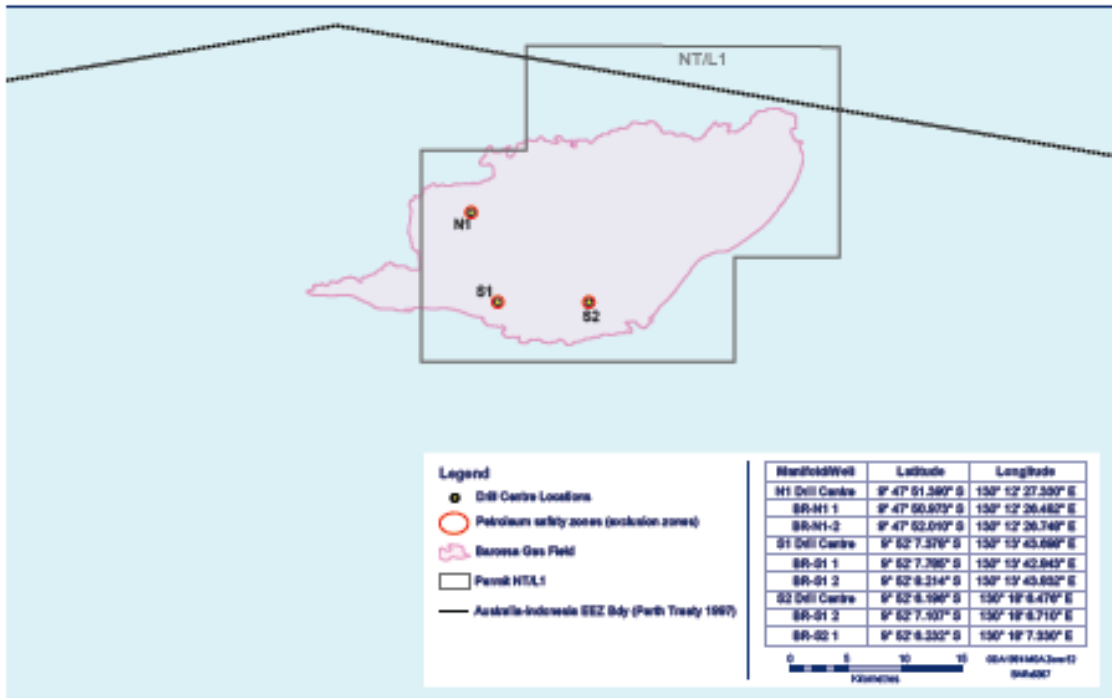


Table 4: Summary of potential impacts to commercial fisheries from the proposed Barossa Gas Project drilling and completions activity and proposed control measures

Potential Impact	Proposed Control Measures
Interference with commercial fishing activities and exclusion from fishing areas	<ul style="list-style-type: none"> <li>+ Northern Prawn and Timor Reef fishery licence holders will be notified in advance of the drilling campaign, and Santos commits to ongoing communications with licence holders as requested.</li> <li>+ Australian Hydrographic Service (AHS) Notice to Mariners and AMSA Maritime Safety Information (MSI) will be notified in advance of the drilling campaign.</li> <li>+ A 500-metre radius Petroleum Safety Zone (PSZ) will be in place around the MODU while on location and each of the completed wells until eventual abandonment.</li> <li>+ Santos will not restrict commercial fishing access to the Barossa Field, other than within PSZs, and is committed to concurrent operations where safety is not compromised.</li> <li>+ Support vessels outside of the range of the drilling activities will avoid commercial vessels that are actively fishing.</li> <li>+ The MODU and vessels to have automatic identification systems to aid in their detection at sea.</li> </ul>
Introduction of Invasive Marine Species (i.e. exotic marine pests)	<ul style="list-style-type: none"> <li>+ Vessels and MODUs contracted to Santos to be managed according to</li> <li>+ Santos Invasive Marine Species Management Procedure (International) to reduce risks of invasive marine species spread.</li> <li>+ Pursuant to the <i>Biosecurity Act 2015</i> and <i>Australian Ballast Water Management Requirements 2020</i>, MODU and support vessel(s) carrying ballast water and engaged in international voyages shall manage ballast water so that marine pest species are not introduced.</li> <li>+ Vessels will have a suitable anti-fouling coating in accordance with the <i>Protection of the Sea (Harmful Anti-fouling Systems) Act 2008</i>.</li> </ul> <p>Vessel ballast to be managed in accordance with the <i>Biosecurity Act 2015</i>.</p>

Potential Impact	Proposed Control Measures
Vessel collision and refuelling incidents	<ul style="list-style-type: none"> <li>+ The risk of collision is reduced through controls that manage interactions with other marine users before and during the activity. This includes: <ul style="list-style-type: none"> <li>+ standard maritime notifications;</li> <li>+ automatic identification systems; and</li> <li>+ navigational lighting.</li> </ul> </li> </ul> <p>Operational procedures are designed to minimise refuelling incidents. Spill response plans to be implemented and regular exercises are planned to be conducted.</p> <ul style="list-style-type: none"> <li>+ Support vessels will be equipped with an AIS and radar.</li> <li>+ At least one support vessel is available at all times to monitor the MODU 500 m PSZ to identify approaching third-party vessels and communicate with the vessels.</li> <li>+ Support vessels will be equipped and crewed in accordance with the Navigation Act 2012 and Marine Orders.</li> <li>+ All vessels will have a dedicated Ship Oil Pollution Prevention Plan (SOPEP).</li> <li>+ Diesel bunkering will be undertaken under a Permit-to-Work System and bunkering procedure to reduce the risk of a release to sea.</li> </ul> <p>These control measures are designed to comply with maritime regulations and standard industry practices. The risk has been assessed to be as low as reasonably practicable and of an acceptable level.</p>
A loss of well control, and associated gas and condensate release to sea	<ul style="list-style-type: none"> <li>+ Implementation of industry standard safe drilling methodologies to seek to reduce the likelihood of a loss of containment event.</li> <li>+ Safety options have been considered in well design and equipment choice for the activity.</li> <li>+ An Oil Pollution Emergency Plan (OPEP) will be prepared and implemented, if required.</li> <li>+ The Drilling OPEP details a range of spill response strategies and associated control measures, including those required to maintain preparedness and response arrangements.</li> <li>+ The combination of the standard prevention control measures and the spill response strategies, as presented in the OPEP, together have been assessed as reducing the hydrocarbon spill risk to a low level.</li> <li>+ A Well Operations Management Plan (WOMP) will be developed and accepted by NOPSEMA prior to the commencement of the drilling campaign.</li> <li>+ Prior to drilling there will be a well-specific Source Control Plan in place.</li> <li>+ A MODU Safety Case Revision will be prepared and accepted by NOPSEMA, which describes Santos and MODU operators agreed well control interface.</li> </ul>

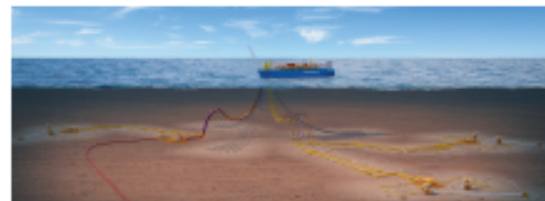
**Figure 4: Barossa Gas Project Drilling and Completions Activity Location Map**



**Santos**

**BAROSSA DEVELOPMENT**

Operational Area		
Manifold	Latitude	Longitude
N1 Manifold	9° 47' 51.390" S	130° 12' 27.330" E
S1 Manifold	9° 52' 7.376" S	130° 13' 43.696" E
S2 Manifold	9° 52' 8.195" S	130° 18' 8.476" E



**Environment approvals**

Environment approvals The Commonwealth Government's Independent expert regulator for offshore oil and gas development, the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA), accepted the Barossa Offshore Project Proposal (OPP) in March 2018.

Acceptance of the OPP is the government's project-level environmental approval for offshore projects, with construction and operations subject to further acceptance of activity-level environment plans (EPs).

To be accepted by NOPSEMA, an EP must meet the requirements set out in the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009 (OPGGs Environment Regulations).

The OPGGS Environment Regulations set out that an EP must (among other things):

- + comprehensively describe the activity to be carried out under the EP

- + describe the environment that may be affected by the activity, including the value and sensitivities of that environment
- + detail and evaluate the environmental impacts and risks for the relevant activity
- + demonstrate that the impacts and risks of the activity will be reduced to as low as reasonably practicable and an acceptable level (and detail the control measures to be used to achieve this)
- + demonstrate that Santos has consulted, in accordance with regulatory requirements, with each relevant person, including those whose functions, interests or activities may be affected by the activities to be carried out under the EP
- + demonstrate that the measures (if any) that Santos has adopted, or proposes to adopt, because of the consultations are appropriate.

The Barossa Drilling and Completions Environment Plan (Revision 3) was accepted by NOPSEMA in March 2022. Subsequently, drilling under the EP commenced on 16 July 2022.

Following Court proceedings, NOPSEMA's decision to accept Revision 3 of the EP was set aside. Santos has partially drilled and completed one development well. Santos is preparing a new revision of the EP for submission to NOPSEMA. The new revision is being prepared in line with the guidance of the Full Federal Court in relation to Revision 3 of the EP and in particular, guidance provided concerning consultation under the OPGGS Environment Regulations.

In order to meet its proposed schedule for the broader Barossa Project, Santos is aiming to resubmit the Drilling and Completions EP to NOPSEMA and, subject to regulatory approval, to recommence activities in 2023. This timeline has been developed by Santos in order to meet this objective, while still providing a reasonable period for meaningful consultation, having regard to Santos' regulatory obligations and to feedback from relevant persons.

The CPP is available at [www.nopsema.gov.au](http://www.nopsema.gov.au)

## General Commitments

In the development of the EP, Santos will incorporate control measures to ensure environmental impacts and risks are acceptable and as low as reasonably practicable. The following control measures relating to interactions with other marine users will also be included.

Any additional control measures identified during relevant person consultation will be considered for inclusion in the EP.

Potential Area of Interest	Santos Commitments
<b>Maritime notices</b> + Notice to Mariners (NTM) + AUSCOAST warnings	A notification will be provided prior to MODU/vessel arrival in the Operational Area and following departure. Notifications are provided to the Australian Maritime Safety Authority (AMSA) Joint Rescue Coordination Centre, Australian Hydrographic Office and designated port authorities so the maritime industry is aware of activities.
<b>Activity notifications</b>	Other relevant marine users identified during relevant person consultation and listed in the EP will be provided a commencement notification at least two weeks prior to the activity commencing. Santos will have a process in place to ensure feedback is recorded, evaluated and responded to.
<b>Support vessel in place during activity to reduce potential for collision or interference with other marine users</b>	At least one support vessel will be on standby at all times to monitor the MODU exclusion zone to identify approaching third-party vessels and communicate with the vessels.

## STAKEHOLDER CONSULTATION

# Barossa Development

Quarterly Update: April 2023

# Santos

The Barossa Gas Project will supply backfill natural gas to the existing Santos-operated Darwin Liquefied Natural Gas (DLNG) facility from 2025, enabling another 20 years of production and contribution to the Australian and Northern Territory economies. Stakeholder engagement on Barossa commenced in 2018. Santos continues to engage with stakeholders and keep them informed throughout the development life.

### Work Progress Highlights

Project progress is now 55 per cent complete. A major milestone was achieved with the Floating Production Storage and Offloading (FPSO) hull entering into drydock in the shipyard in South Korea on 12 March, prior to sail away to Singapore planned for later in the year.



Major equipment manufacturing is also making good progress around the world, with equipment now starting to be delivered into Darwin and Singapore for further assembly.

Santos advised stakeholders on 1 February 2023 of proposed marine surveys along the Barossa Gas Export Pipeline (GEP) route. A marine survey was completed in March. The survey data will be used to help inform the cultural heritage assessment referred to later in this Update.

### Work Opportunities

Santos has partnered with the Industry Capability Network NT (ICNNT) to assist with Australian vendor identification and raise awareness of the development. Barossa has established a presence on the Gateway website operated by ICNNT where development information and work opportunities are available. Details on the opportunities can be found on the Gateway website [here](#). Information on Australian Industry Participation (AIP) requirements and a summary of the Barossa AIP Plan are available at [www.industry.gov.au](http://www.industry.gov.au)

### Upcoming Activities

An additional offshore marine survey along the Barossa GEP route may be conducted in the coming months to help inform the cultural heritage assessment. If the survey is required, stakeholders will be notified once the timing and details are confirmed.

No construction activities are currently planned for Q2 2023.

### Drilling Update

As reported in the Q4 2022 Quarterly Update, Barossa drilling was suspended on 8 October 2022 pending resubmission of the Development Drilling and Completions Environment Plan and its acceptance by the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA).

### Gas Export Pipeline Installation Update

As reported in the Q4 2022 Quarterly Update, Santos planned to commence the Gas Export Pipeline (GEP) installation activities in late January 2023. The installation activities have now been deferred until completion of a cultural heritage assessment as detailed below.



### Cultural Heritage Assessment

Before the GEP installation starts, an assessment will be undertaken to identify "any underwater cultural heritage places" along the Barossa GEP route to which "people, in accordance with Indigenous tradition, may have spiritual and cultural connections that may be affected" by the future activities covered by the Barossa GEP Installation Environment Plan.



The assessment is being undertaken in accordance with a General Direction issued by NOPSEMA in January 2023. As required by that Direction, Santos has engaged independent experts to undertake the assessment and obtain relevant information for the purposes of the assessment.

Santos has engaged independent underwater archaeological experts, Wassex Archaeology and Extant Heritage, to inform and support the cultural heritage assessment by reviewing underwater surveys of the seabed to see if there are any features that might indicate "any underwater cultural heritage places".

Santos has also engaged independent anthropologist (Dr Brenden Corrigan, supported by a team comprising independent archaeologists) to obtain information from people and/or organisations "who have, in accordance with Indigenous tradition, spiritual and cultural connections to any underwater cultural heritage places" along the Barossa GEP route.

A report recording the cultural heritage assessment will be prepared and provided to people and/or organisations who provided information for the assessment, and to NOPSEMA.

## Pipeline Licence

The National Offshore Petroleum Titles Administrator (NOPTA) granted Pipeline Licence NT/PL5 under the Commonwealth Offshore Petroleum and Greenhouse Gas Storage Act 2006 (Cth) on 3 November 2020. As reported in the Q4 2022 Quarterly Update, Santos has taken a decision to extend the Barossa GEP to the Darwin LNG facility via the Darwin Pipeline Duplication Project to facilitate future carbon capture and storage options. This requires the installation of an additional 23-km segment of pipeline in Commonwealth waters and negates the need to tie-in to the Bayu Unden to Darwin Pipeline. A further application to NOPTA will be required for licensing of this additional pipeline segment.

## Environmental Approvals

Santos intends to make the following environmental submissions to government for acceptance in relation to the Barossa Gas Project during 2023.

### Subsea Infrastructure Installation Environment Plan (SURF EP)

Consultation on the SURF EP will commence during Q2 2023. Santos intends to identify relevant persons for this activity and begin sharing information and seeking feedback to assist with the finalisation of the EP. Relevant persons will be given information and notified how they can provide their input. Once the EP has been finalised it will be assessed by NOPSEMA. Installation activities are proposed to commence in early 2024 once all relevant approvals have been secured.

### Development Drilling and Completions Environment Plan (Drilling and Completions EP)

Following Federal Court proceedings in late 2022, NOPSEMA's decision to accept Revision 3 of the Drilling and Completions EP was set aside. As at that time, Santos had partially drilled and completed one development well. Santos is preparing a new revision of the EP for submission

to NOPSEMA later in 2023. The new revision is being prepared having regard to the guidance of the Full Federal Court in relation to Revision 3 of the EP and in particular, guidance concerning consultation with relevant persons under the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009 (Cth). Santos commenced consultation processes for the revised EP in Q1 2023 and consultation will continue in Q2 2023.

### Darwin Pipeline Duplication (DPD) Project

Santos has been preparing documentation for the Darwin Pipeline Duplication (DPD) Project for submission to relevant regulators in Q2 2023. A DPD Project Supplementary Environmental Report will be submitted to Northern Territory (NT) Environment Protection Authority for assessment and approval under the Environment Protection Act 2019 (NT). DPD Project Preliminary Documentation will be submitted to the Commonwealth Department of Climate Change, Energy, the Environment and Water for assessment and approval under the Environment Protection and Biodiversity Conservation Act 1999 (Cth). These documents will be published for public comment in Q2 2023.

Santos has also been preparing an Environment Plan for DPD Installation in Commonwealth Waters. Consultation on this EP will also commence during Q2 2023. Santos intends to identify relevant persons for this activity and begin sharing information and seeking feedback to assist with the finalisation of the EP. Relevant persons will be given information and notified how they can provide their input. Once the EP has been finalised it will be assessed by NOPSEMA. DPD Installation in Commonwealth Waters activities are proposed to commence in mid-2024 once all relevant approvals have been secured.

### Other Approvals

Santos intends to submit further environmental approvals to government for acceptance in relation to other aspects of, and activities in connection with, the Barossa Gas Project during 2023. This includes submitting the Barossa Gas Production Operations Environment Plan to NOPSEMA following additional consultation. We will provide further information and advertising about these at a later date.

## Tiwi Island Consultation

Santos has visited and conducted a number of meetings and consultations on the Tiwi Islands in February and March. Santos is grateful to the communities for welcoming us.

From 6-8 February Santos presented information about the Project and proposed activities at three community meetings held across the two main islands, Melville and Bathurst, attended by approximately 460 people. During these meetings, Santos asked for feedback and input on Santos' approach to consultation and addressed questions on the Project and the proposed activities.

From 20-24 March Santos consulted with approximately 756 Tiwi people during eight clan group consultation sessions. During the sessions, Santos explained the proposed development drilling and completions activities, their potential impacts and risks and proposed control measures. Santos invited feedback and input on Santos' approach to consultation, the potentially affected environment,

potential impacts and risks of the activity and proposed control measures (or other measures people may consider appropriate).

Santos also visited the Islands Informally many times over the last quarter to engage with, and provide information to, communities in relation to the Project.

The clan group consultation sessions (and the informal meetings) provided Santos with an opportunity to share information and facts about the Project with communities, answer questions and explain the underwater cultural heritage assessment process. Santos also provided information on how people could provide input into the cultural heritage assessment through the independent experts (see the Cultural Heritage Assessment section above).

Santos is planning further clan group consultation sessions and will provide notification of these sessions.

## Relevant Person Identification

Santos has been seeking to identify and consult with relevant persons whose functions, interests or activities may be affected by our proposed Drilling and Completions activity for the Barossa Gas Project. Such functions, interests or activities may include those arising in relation to spiritual or cultural connections to land or to sea country, tourism, recreational and commercial fishing and local communities (though these are only illustrative examples and not an exhaustive list).

If you think your functions, interests or activities may be affected by activities under the Drilling and Completions EP, you may be a relevant person. If you consider you may be a relevant person, and Santos has not already contacted you in relation to the Drilling and Completions EP, please contact us.

As part of the upcoming consultation process for the SURF and DPD Installation in Commonwealth Wetlands EPs, Santos will also be seeking to identify relevant persons whose functions, interests or activities may be affected by activities proposed under those EPs.

## Consultation

Identified relevant persons will be contacted and their feedback sought as to how they would like to be consulted on the Environment Plans, together with information on the next steps.

Santos is committed to undertaking genuine and meaningful consultation. We want to provide information for people to make informed assessments of the possible consequences of the proposed activity on them. Your feedback and input is important to us and input will be considered in the development of our Environment Plan.

We have also updated our website to include more information on the Barossa Gas Project. We will continue to update it with information about our upcoming activities – [www.santos.com/barossa](http://www.santos.com/barossa). The QR code below links directly to this site.



## Contact Us

We are committed to ongoing engagement about our activities. If you require further information or would like to speak to us, please do not hesitate to contact us.

Phone: 1800 267 800

Email: [Offshore.Consultation@santos.com](mailto:Offshore.Consultation@santos.com)

Website: [www.santos.com/barossa](http://www.santos.com/barossa)

### 3. Videos

#### Consultation Video



## Project overview video



## Drilling Activity Overview Video

### Barossa Gas Development Project D & C

Santos



1.

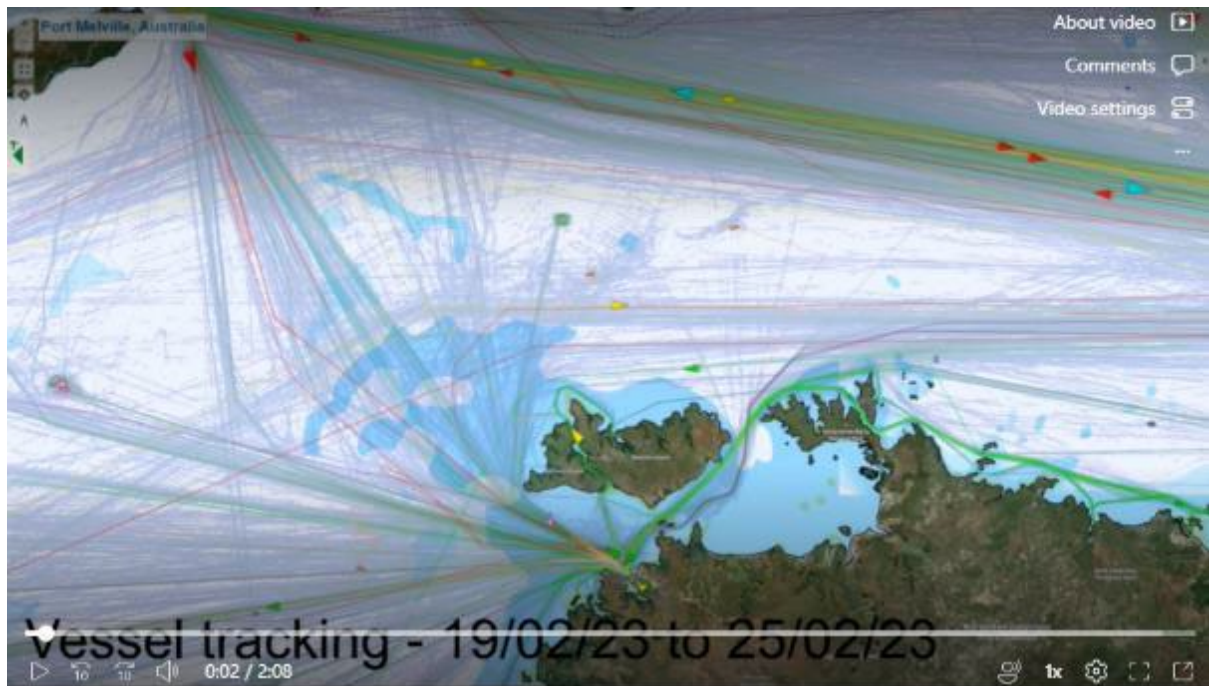
## Condensate vs oil video



## Risks and management video



## Vessel movement tracking video 2 weeks



## 4. PowerPoint presentations

### Presentation

Barossa Gas Project  
April Consultation Session

Santos



Barossa Gas Project

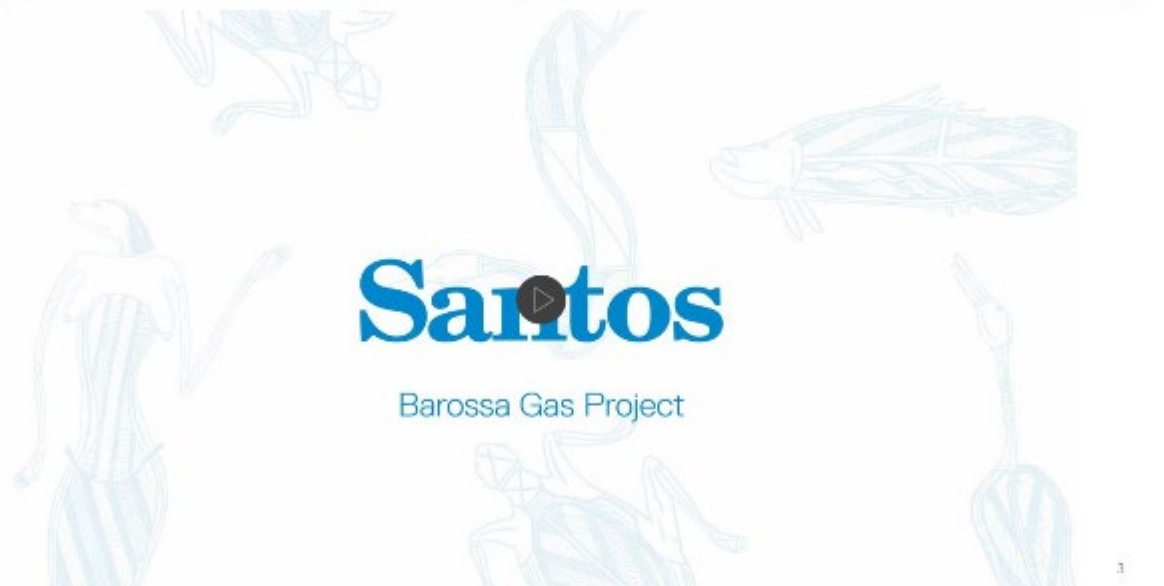
# Welcome and Introductions

Brett Darley and Peter Kirkpatrick

**Santos**

Barossa Gas Development Project

**Santos**



Barossa Gas Project

# Feedback and Responses to Questions From Last Visit

Peter Kirkpatrick, Norman Scott and Ben Fischer

**Santos**

Barossa Project Overview Video

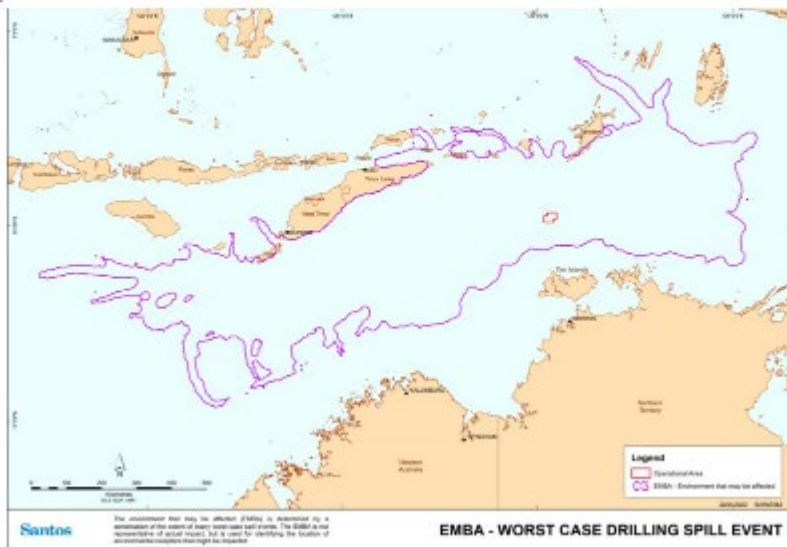
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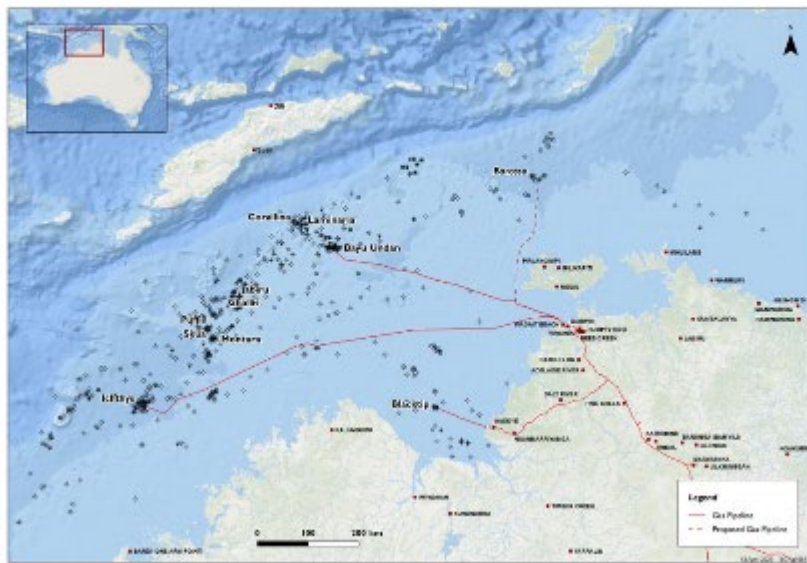
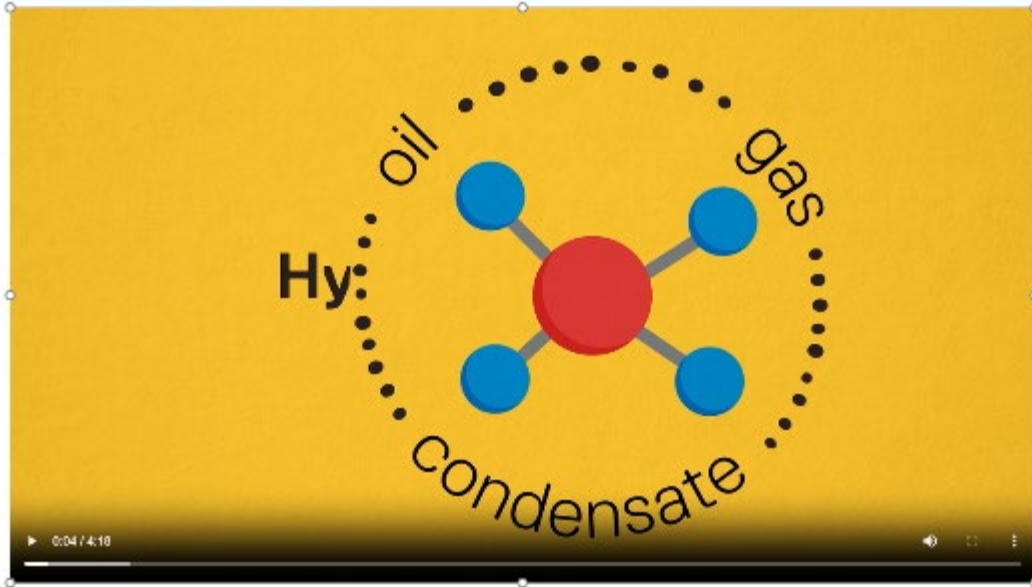






Norman Scott





Barossa Gas Project

# Drilling and Completions EP Reg 11 A Consultation

Norman Scott and Ben Fischer

Santos

Drilling Risk and Controls Video

Santos



Barossa Gas Project

# Subsea Infrastructure Installation

## Environment Plan

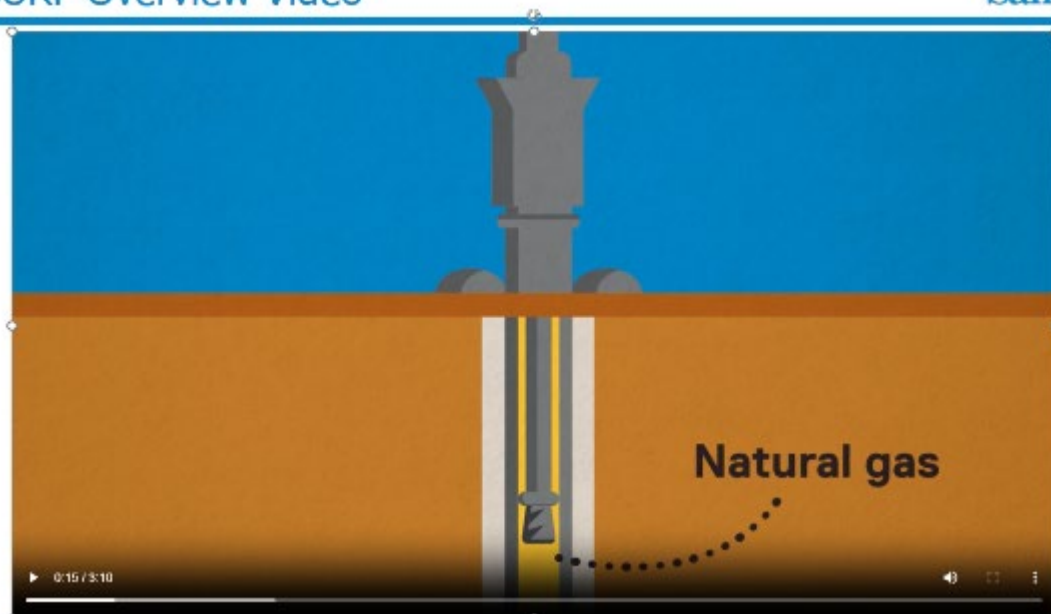
### Reg 11A Consultation

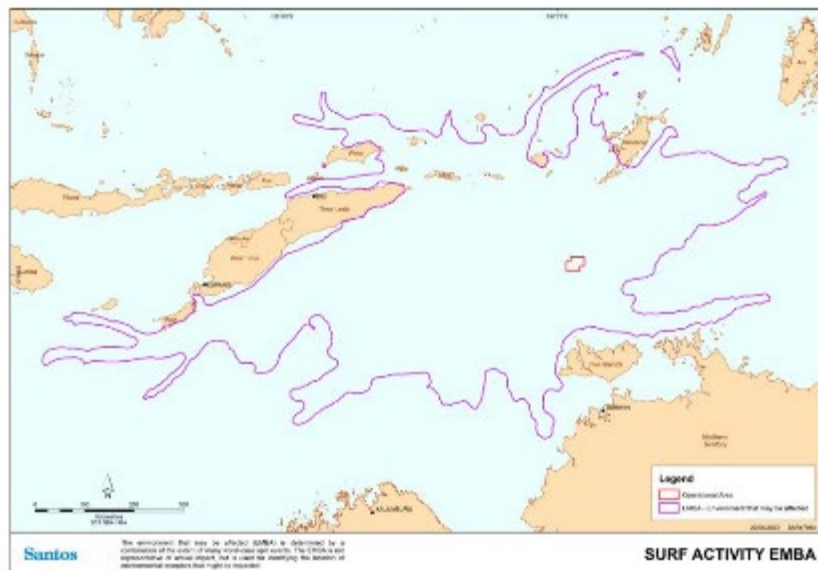
Chris Galway and Nick Philips

**Santos**

SURF Overview Video

**Santos**





# Barossa Gas Project Community Engagement

Carly Sherren

Santos

## Training and Employment – Darwin LNG

Santos



- + ~100 Darwin Santos based employees
- + 100% residential Santos employee workforce



- + DLNG established the NT's first LNG Process Operator Traineeships in 2010
- + ~10% of those who have completed identified as an Aboriginal or Torres Strait Islander



- + Electrical/ Instrumentation and Mechanical Trade Apprenticeships
- + Dedicated Indigenous Warehouse and Administration Traineeships

We partner with the communities where we operate to understand each community's needs and priority areas for investment and capacity building.

+ We partner in different ways:

- + **Santos Foundation (PNG)** – health care capacity, youth opportunities, literacy libraries and support for those affected by family violence
- + **Supporting local businesses** – landowner companies in PNG and indigenous businesses in Australia and Alaska
- + **Supporting grassroots community needs** in all our operating areas

Worked with US AID to deliver solar power to Pimaga Hospital



Vocational training

**Vocational Training:**

- + Timor-Leste:
  - Trained 40 young Timorese graduates in electrical and instrumentation skills
  - 21 trainees are due to graduate in May 2023
- + PNG – 13 youth trained and supported to work in Australian seasonal workers program

**Scholarship Program:**

- + 26 Timorese students have graduated from overseas universities and returned to Timor-Leste

Environmental

- + Darwin Harbour Clean up in partnership with the Lamakia Rangers
- + Partnered with Traditional owners in Qld – 5,000 hectares conserved in biodiversity offsets



Barossa Gas Project

# Thank you and next steps...

Carly Sherren, Nick Fox and Peter Kirkpatrick

**Santos**





Barossa Gas Project  
**Welcome and Introductions**

Brett Darley and Peter Kirkpatrick

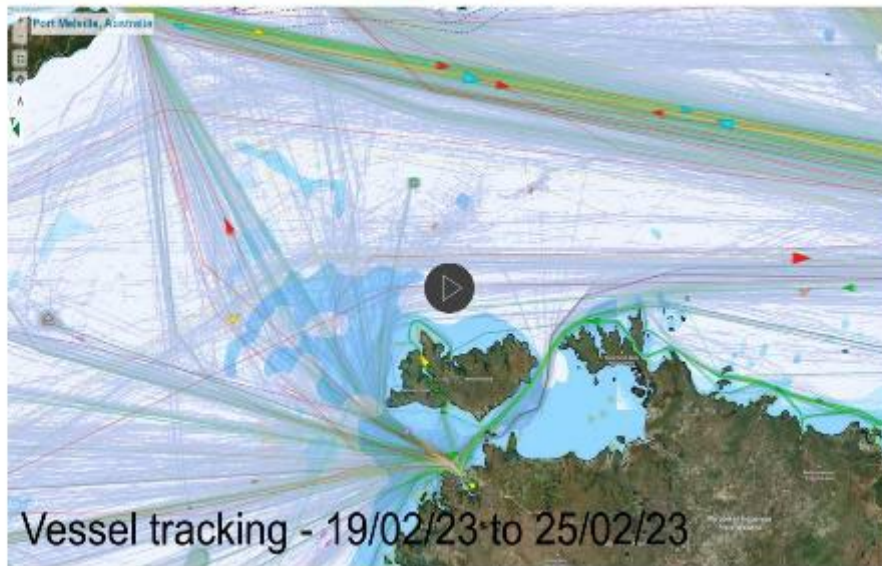


Barossa Gas Project

# Feedback and Responses to Questions From Last Visit

Peter Kirkpatrick and Ben Fischer

Santos



Barossa Gas Project  
**Drilling & Completions  
 Environment Plan  
 Reg 11A Consultation**

Ben Fischer

**Santos**

**Drilling & Completions EP – Consultation Feedback**

**Santos**

<b>Tiwi Island feedback</b>	<b>Santos' response</b>	<b>Environment Plan (EP) Oil Pollution Emergency Plan (OPEP) Controls</b>
Request to be notified prior to drilling recommencement	Santos will notify Tiwi Resources (Ranger Coordinator) and Tiwi Land Council at least 10 days before the re-commencement of drilling activity. Santos will provide a follow-up confirmation email.	Referenced in Section 8.9 of the Drilling and Completions EP
Request to have spill kits located on the Islands	Santos will make rapid assessment kits available on the Tiwi Islands, to perform sampling and monitoring.	Referenced in Table 5-7 of the Drilling and Completions OPEP
Request to be trained in spill response	Santos will deliver rapid assessment training in consultation with Tiwi Ranger groups prior to the commencement of the activity.	Referenced in Table 5-7 of the Drilling and Completions OPEP

Tiwi Island feedback	Santos' response	Environment Plan (EP) Oil Pollution Emergency Plan (OPEP) Controls
Request to be notified in the event of a spill incident	Santos will notify Tiwi Resources (Ranger Coordinator) and Tiwi Land Council via phone call within eight hours of a spill incident being identified. Santos will provide a follow-up email.	Referenced in Table 5-7 of the Drilling and Completions OPEP
Raised concerns about potential impacts to marine life	Santos acknowledges feedback received with respect to concerns about potential impacts to marine life in the event of a hydrocarbon spill. Santos has provided information about the likelihood of an incident and the response strategies to be used in the unlikely event of a spill.	Prevention and mitigation control measures in the Drilling and Completions EP (Section 7.6.3) are considered sufficient to reduce risks and impacts to as low as reasonably practicable and to an acceptable level
Raised concerns about impacts of natural disasters on drilling activity	Santos acknowledges feedback received regarding natural disasters. The Barossa wells are designed and will be drilled to reduce the risk of impacts to as low as reasonably practicable.	Wells engineering design safeguards and drilling safety control measures are considered sufficient to reduce the risks and impacts to as low as reasonably practicable and to an acceptable level

Rapid Assessment Kits



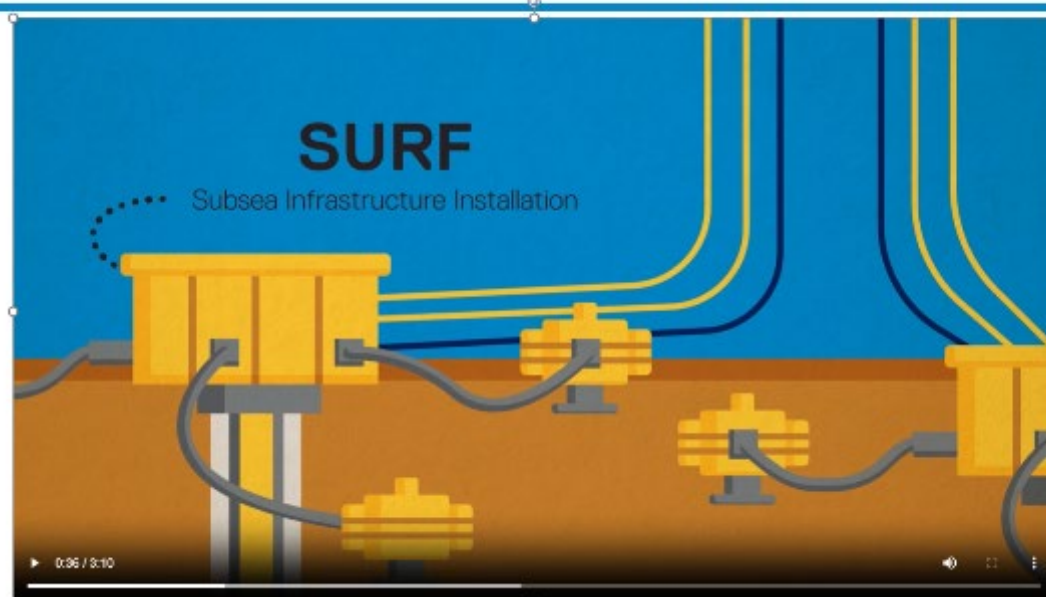
Barossa Gas Project  
**Subsea Infrastructure Installation**  
**Environment Plan**  
**Reg 11A Consultation**

Chris Galway and Joe Sanderson

**Santos**

SURF Overview Video

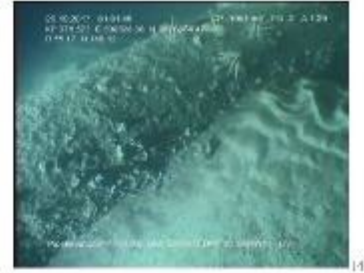
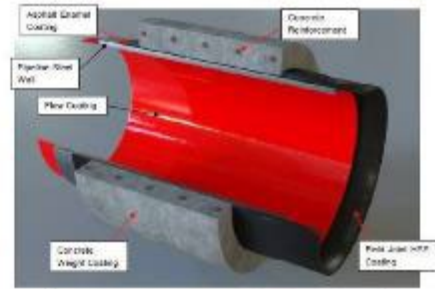
**Santos**



# Imagery and Explanation of Offshore Construction

Santos

## Pipeline Images



# Imagery and Explanation of Offshore Construction

Santos

## SURF Images

Subsea Xmas Tree



Production Manifold Module





Barossa Gas Project

Thank you and next steps...

Carly Sherren

Santos



## 5. Questions and answers

Responses to queries and feedback as part of the consultation process, published online and provided in person or to relevant persons.



### Barossa Gas Project Frequently Asked Questions

Santos is committed to providing all Relevant Persons access to information about the Barossa Gas Project in a timely and consistent manner. The following list of Frequently Asked Questions (FAQs) has been developed based on questions provided to Santos. This document will be updated on an ongoing basis during the development and delivery of the project as new information becomes available. The answers provided in this document are intended to provide clear, summary responses to the questions. Should you require more detailed information, further explanation or have any other questions, please ask one of the Santos team, contact us via telephone on 1800 267 600 or via email at [offshore.consultation@santos.com](mailto:offshore.consultation@santos.com).

**This document was updated on 12 June 2023 with answers to additional questions and minor changes to questions previously asked. FAQs that have been added or changed are marked in blue text.**

Question	Answer
<b>Spill (oil, gas, condensate)</b>	
We've already seen the impacts of the Montara oil spill. Is there a chance of an oil spill for this project?	<p>Santos was not involved in the Montara oil spill in August 2009. It resulted from a series of operator and regulatory failures which have now been comprehensively addressed through improved practices across the industry and improved regulatory regimes, now administered by NOPSEMA.</p> <p>More detail as to the initiatives undertaken by governments, regulators and industry following the Montara oil spill are available in the Australian Government Report on the implementation of the recommendations from the Montara Commission of Inquiry (September 2017): <a href="https://www.industry.gov.au/sites/default/files/2022-09/australian-government-report-on-the-implementation-of-the-recommendations-from-the-montara-commission-of-inquiry.pdf">https://www.industry.gov.au/sites/default/files/2022-09/australian-government-report-on-the-implementation-of-the-recommendations-from-the-montara-commission-of-inquiry.pdf</a>.</p> <p>Barossa is very different from Montara. Barossa is a gas and condensate field rather than oil. The well design and type of drilling rig for the Barossa field are different to those used at the Montara field. For example, the Barossa wells will not be suspended for the rig to depart the field and return at a later date (as occurred at Montara). Further, the aspects of well design and operations at Montara which were significant contributors to the Montara spill are not permitted under the current regulatory regime and Santos' drilling standards and procedures.</p> <p>The likelihood of a gas and condensate spill event during Barossa drilling is remote. The drilling at Barossa is subject to strict regulation, including in respect of the design of the wells and safety shutdown systems, regular inspection and maintenance schedules and operation by well-trained and</p>

Question	Answer
	<p>highly competent staff. Well blowout events during development drilling, that could result in a spill, have been reported at a frequency of approximately one event for every 29,000 wells drilled.</p> <p>The Australian Government, along with PTTEP Australasia (operator of the Montara oil field), developed a long-term environmental monitoring program to understand the longer-term impacts of the Montara oil spill on the marine environment. There were seven scientific monitoring studies under the environmental monitoring program. Santos understands the key findings include:</p> <ul style="list-style-type: none"> <li>○ no confirmed reports of impacts to marine wildlife in the vicinity of the oil spill</li> <li>○ presence of hydrocarbons in submerged marine banks in the region of the spill but the levels identified were very low and significantly lower than would be expected to cause biological effects</li> <li>○ no evidence of hydrocarbon residue on beaches, coral reefs or seagrass beds at any of the study sites</li> <li>○ no evidence of the Montara spill having long-term impacts on seas snakes or marine turtles in the region.</li> </ul> <p>More detail as to the scientific monitoring following the Montara oil spill can be found at: <a href="https://www.dcceew.gov.au/environment/marine/marine-pollution/montara-oil-spill/scientific-monitoring-studies">https://www.dcceew.gov.au/environment/marine/marine-pollution/montara-oil-spill/scientific-monitoring-studies</a>.</p>
How do you plan to clean up a spill?	<p>Barossa is a gas and condensate field.</p> <p>Condensate is a very low viscosity (thin) and low density (light weight) liquid that evaporates quickly, particularly considering both the atmospheric and sea surface temperatures in the Arafura Sea. As such, if spilt on the sea surface, condensate would be expected to rapidly spread out, with a large proportion evaporating. Condensate spills are usually left to evaporate and dissipate at sea rather than using containment or dispersants.</p> <p>The International Tanker Owners Pollution Federation (ITOPF), which advises industry and governments worldwide about marine hydrocarbon spill cleanup, states: "<i>Condensates typically break up naturally in wind and waves with the majority evaporating within a matter of days. Traditional containment and recovery operations are not typically recommended. Any attempt to concentrate the condensate would reduce the rate of evaporation and, if the concentration of vapour becomes high, could cause the oil to ignite.</i>" ITOPF goes on to say: "<i>Dispersants are ineffective on condensate spills</i></p>

Question	Answer
	<p><i>as they will 'herd' the sheen rather than promote the formation of droplets in the water column. Spills of condensate in the marine environment are best left to evaporate and dissipate at sea."</i></p> <p>In the event of a spill, up to 57% of the condensate is expected to evaporate over the first few hours/days and up to 79% after a few days, depending on weather conditions, sea state and time of year.</p> <p>Santos is required to prepare an Oil Pollution Emergency Plan (<b>OPEP</b>) for each drilling activity, which forms part of the Environment Plan (<b>EP</b>) and is assessed by the offshore regulator (<b>NOPSEMA</b>). The OPEP sets out the process to manage a spill. The OPEP identifies and prioritises spill response strategies for all potential spill events and describes how Santos prepares to respond in the remote event of a spill. The response strategies in the OPEP are based on spill modelling, which is used to forecast the potential extent of a range of spill scenarios for each drilling activity.</p> <p>The first priority under the OPEP when responding to a spill event is to employ source control strategies, which include shutting in the well at the Blow Out Preventers to prevent loss of gas and condensate from the well into the environment.</p> <p>For condensate that has already been released to the environment the recommended primary response strategy under the OPEP is to monitor and evaluate the situation. Numerous resources are used to monitor the behaviour and direction of any released condensate, such as real-time, updated spill trajectory modelling, tracking buoys, vessel surveillance, aerial surveillance, satellite imagery and water quality monitoring to determine the effectiveness of the source control methods which may be required.</p> <p>Because of the low viscosity (thin nature) of condensate, natural weathering processes are most effective and have the highest net environmental benefit when compared to other recovery strategies which require human intervention.</p> <p>It is unlikely that condensate from a spill at Barossa associated with drilling and completions activity would reach any shoreline. The closest distance from the edge of the predicted movement of a spill to the edge of the Tiwi Islands (Seagull Island) is 54km.</p>

Question	Answer
<p>Can you provide insurance to cover all costs to clean up a spill and rehabilitate the sea and coastline affected? And compensate us for our loss of food?</p>	<p>Santos and its Barossa joint venture partners are required to demonstrate a minimum level of financial assurance to be able to cover costs when responding to a spill event. The offshore regulator, NOPSEMA, will not accept the Drilling and Completions Environment Plan without Santos first demonstrating a minimum level of financial assurance for a spill response.</p> <p>Santos relies on a combination of its own financial resources and insurance to meet its financial assurance requirements, including third party liability insurance for its activities.</p> <p>For each OPEP there is a comprehensive scientific monitoring program to measure impacts to the physical/biological environment and socio-economic receptors. The results of monitoring inform the extent of impacts.</p> <p>Whether any claim or any compensation may be available will depend on the specific circumstances. Any claim would be determined based on the evidence (as with any claim).</p>
<p>Who will receive the insurance and the compensation?</p>	<p>Whether any claim or any compensation may be available will depend on the specific circumstances. Any claim would be determined based on the evidence (as with any claim).</p>
<p>Will you provide training to local communities on the coastline to be able to respond immediately? And will you provide us with the equipment needed to clean up the spill. Who decides where this equipment will be located and stored? We understand that in your Environment Plan you've said that the equipment will be stored in Darwin – how long will it take for you to get this equipment to the spill site which is 260km from Darwin?</p>	<p>Santos has access to a wide network of spill response equipment across Australia and internationally to support its primary and secondary response strategies, which are outlined in the Barossa OPEPs, to monitor and evaluate any spill. Depending on the spill response resources required, Santos would be able to mobilise these resources rapidly, relying on its established logistics networks.</p> <p>Due to natural weathering and based on conservative modelling, it is unlikely that condensate from a spill at Barossa would reach any shoreline.</p> <p>Santos will make rapid assessment kits available on the Tiwi Islands, to perform sampling and monitoring (in the unlikely event a D&amp;C spill occurs that has the potential to reach the Tiwi Islands).</p> <p>The kits will contain:</p> <ol style="list-style-type: none"> <li>1. Rapid Assessment Team Document Holder – Containing all the relevant documentation and 'How to Guides'</li> <li>2. Rapid Oil Sampling Kit – Used to take samples of possible hydrocarbons for lab analysis</li> <li>3. Wildlife Sampling Kit – Used to take samples of deceased wildlife for lab analysis</li> <li>4. PPE Kit – To protect team members when collecting samples</li> </ol> <p>Currently we are in discussions with Tiwi Resources and the TLC about inviting the Tiwi Rangers to meet about what's involved in the Rapid Assessment Testing activities and the training that's involved.</p>

Question	Answer
<p>How will you tell us when something goes wrong? Where does it say in the Environment Plan how many days after an oil spill that you are required to tell us that the spill has happened and who will you notify?</p>	<p>Santos is required to notify NOPSEMA, the offshore regulator, and a number of other government agencies, as soon as practicable if a spill was to occur.</p> <p>Santos is aware that Tiwi Island communities will want to know about any spill event. Santos therefore proposes to include Tiwi Island community organisations in its first round of notifications if a spill was to occur.</p>
<p>What is condensate?</p>	<p>Condensate is a very low viscosity (thin) and low density (light weight) liquid, which is referred to as a light "hydrocarbon". It is straw-coloured, flammable and is similar to cigarette lighter fluid. Condensate evaporates quickly when it is spilled into the sea, especially in environments such as those surrounding the Barossa field.</p>
<p>How does a spill of condensate impact marine life?</p>	<p>Condensate has the potential to impact marine life in the event of an unplanned release of condensate from a well during well construction.</p> <p>Many factors affect the extent of condensate impact on marine life, including the spill location, volume, duration, type, trajectory, season and atmospheric and oceanic conditions. Depending on how much condensate is released and the extent of exposure, condensate can cause stress to marine life, such as seabirds and marine mammals, including irritation of eyes/mouth and illness. In extreme situations with large volumes of condensate spill in an enclosed area, the impact could be fatal.</p> <p>Two areas are relevant to marine life impact associated with the drilling and completions activity at Barossa:</p> <ul style="list-style-type: none"> <li>• The "MEVA" is an area surrounding the drilling site of the Barossa project which is used to inform environmental assessment, identify potential environmental consequences and develop spill response plans.</li> <li>• The "EMBA" is a broader area surrounding the MEVA which represents the broadest area which could be affected by an unplanned 'worst case' spill event during drilling without any spill response actions. The EMBA is larger than the MEVA.</li> </ul> <p>A condensate release could impact on benthic organisms, fish, coral and invertebrates. Other marine life such as turtles, whales (including the pygmy blue whale) and seabirds which infrequently transit through the MEVA or EMBA may also be adversely impacted by a spill of condensate but these species are less likely to be present in the MEVA. A spill is not anticipated to impact key areas for marine turtle breeding and nesting.</p> <p>The impacts of one of Australia's largest oil spills have been assessed over a number of years. The results of scientific monitoring after the Montara oil spill can be found at: <a href="https://www.dceew.gov.au/environment/marine/marine-pollution/montara-oil-spill/scientific-monitoring-studies">https://www.dceew.gov.au/environment/marine/marine-pollution/montara-oil-spill/scientific-monitoring-studies</a>. Environmental monitoring following the Montara oil spill has found no significant long-lasting impacts.</p>

Question	Answer
<p>What happens if there is a gas leak?</p>	<p>If a gas leak from a well was to occur during well construction, any escaped gas would rapidly float to the sea and then disperse into the atmosphere. Operations would be suspended to identify and control the source of the leak.</p> <p>The greatest risk from a gas leak is the safety of the workers on the drilling rig, nearby support vessels and their crew, due to the potential ignition of gas resulting in fire or explosion. Santos has detailed emergency response and evacuation procedures designed to protect the safety of all in such a situation, including trained firefighting teams.</p>
<p><b>Marine life</b></p>	
<p>How will you stop turtles getting killed by your ship's propellers? Our turtles are already suffering from climate change – can you guarantee that the Barossa project won't make this worse? What will you do to make sure they survive this?</p>	<p>Santos must adhere to practices under relevant legislation and regulations to avoid collisions with turtles and other marine fauna. This includes reducing vessel speeds and maintaining minimum distances when marine fauna is sighted. Interactions between vessels associated with the drilling and completions activity for the Barossa project and marine fauna are considered under the current Drilling and Completions EP.</p> <p>Any unplanned interactions with marine fauna in the drilling operational area are expected to be limited to a small number of individual animals transiting through the area. The operational area does not intersect any biologically important area or habitat critical to the survival of any marine fauna species. The risk to marine turtles in the drilling operational area is very low.</p> <p>All Santos contracted vessels are required to maintain a marine fauna sighting record and record any interactions with marine fauna.</p>
<p>We don't want your choppers flying over the Tiwi Islands – we don't want to be able to hear the helicopters. We also don't want you to fly near Seagull Island so that our seagulls don't get killed.</p>	<p>Santos will not fly any helicopters directly over the Tiwi Islands* (including Seagull Island), unless there is an emergency.</p> <p>The only time a helicopter may need to fly over the Tiwi Islands is in the unlikely event of an emergency where there is a requirement for the flight time to be completed as quickly as possible (for example if someone falls into the water and Santos needs to conduct a search and rescue operation). Helicopters may also need to use one of the airports on the Tiwi Islands for an emergency landing if something happens during a flight. Like all aircraft, the helicopter will need to comply with all relevant aviation standards and regulations and will need to go to the nearest place that they can land if there is a serious issue during flight.</p> <p>* Santos, with agreement from some Tiwi people and the Environmental Defenders Officer, used helicopters recently to assist with an important cultural heritage assessment. This was used because there were no other viable transport options available at the time. The helicopter flew over the Tiwi Islands but not over Seagull Island.</p>
<p><b>Consultation</b></p>	

Question	Answer
<p>We want you to keep us updated on the whole process. We want you to come in person and host clan group meetings to share these updates. What is your plan for ongoing consultation with us?</p>	<p>Santos is committed to developing a strong, beneficial relationship with Tiwi Islands People and your feedback is important to achieving this.</p> <p>Your input during consultation is important to assist Santos to understand and evaluate environmental impacts and risks and to develop control measures to reduce these impacts and risks to as low as reasonably practicable and acceptable levels.</p> <p>At our sessions in February 2023, Tiwi Island communities told us that they would like to consult on environmental plans through clan group consultation sessions and for Santos to use videos and other visual aids to help explain the Barossa project. We have taken on board that feedback.</p> <p>We will keep you informed through, for example:</p> <ul style="list-style-type: none"> <li>• clan or community meetings (to be scheduled considering feedback as to appropriate regularity/frequency)</li> <li>• project updates/newsletters</li> <li>• notices or updates posted on Tiwi community notice boards</li> <li>• updates or articles in the Tiwi Newsletter</li> <li>• social media posts</li> <li>• the Santos website and "Barossa Hub" (<a href="https://www.santos.com/barossa/">https://www.santos.com/barossa/</a>)</li> </ul> <p>We will provide opportunities for feedback, including through:</p> <ul style="list-style-type: none"> <li>• talking to our team when they are on the Islands</li> <li>• talking to us at any scheduled Santos community meetings</li> <li>• telephoning us on 1800 267 600</li> <li>• emailing us at <a href="mailto:offshore.consultation@santos.com">offshore.consultation@santos.com</a></li> <li>• using the relevant person nomination/feedback form and portal at <a href="https://www.santos.com/barossa/">https://www.santos.com/barossa/</a></li> <li>• the Tiwi Land Council</li> </ul> <p>If you have any other suggestions, please let us know.</p>
<p>When this consultation happens, we want to have Santos, Environment Centre NT, Tiwi Land Council senior management (CEO and Chairperson), Tiwi Islands Regional Council members and we want to be able to engage any relevant expert advisors based on the information provided to us before the meeting happens.</p>	<p>The Tiwi Islands consultation sessions have been well attended with Tiwi Islanders, senior representatives from Santos, Tiwi Land Council, Tiwi Regional Council and ECNT present.</p> <p>Anyone is welcome to attend the consultation sessions (though in the case of clan meetings, with clan Trustee consent).</p> <p>Experts such as internal expert Benjamin Fischer (Drilling Superintendent), and external expert Dr Kellie Pendoley (marine turtle expert), have attended consultation sessions. Santos will continue to bring both internal and external experts to the consultation sessions to assist with explaining the detail of, and answering questions about, our proposed activities.</p>

Question	Answer
<p>If it's about turtles, we want a local expert such as professors or scientists from CDU and As Turtle. We will not accept desktop reviews from interstate.</p>	<p>Santos has engaged a world-renowned marine turtle expert Dr Kellie Pendoley, of Pendoley Environmental, to provide expert advice on marine turtle impacts and management. Dr Pendoley has more than 30 years' experience in marine conservation biology and artificial light assessment.</p> <p>Dr Pendoley has visited the Tiwi Islands on two occasions in the context of consultation and is assisting Santos with additional data and information collection and assessment to develop the understanding of marine turtle behaviours around the Tiwi Islands. Dr Pendoley is familiar with the turtle habitats in the region as a result of contributions to Barossa environmental impact assessment studies and from her extensive experience studying marine turtles around Australia and other locations globally.</p> <p>Dr Pendoley expects to complete her assessment in the coming months.</p>
<p>Will you provide an interpreter?</p>	<p>Santos has engaged a qualified interpreter referred by, and engaged through, the NT Government's Aboriginal Interpreter Service (AIS) to attend consultation sessions (including the upcoming April 2023 sessions), wherever feasible. Interpreters qualified through AIS are trained to interpret accurately and be impartial.</p> <p>We have been advised by the AIS that Tiwi culture is focused on oral storytelling and as such there is no agreed written language. The AIS has recommended that Santos provide audio translation of materials where appropriate and Santos is taking the necessary steps to do so.</p> <p>Santos welcomes feedback from the local community as to the best means of communicating in a productive manner throughout the consultations.</p>
<p>Has Santos been involved in consultation with any non-English speaking communities?</p>	<p>Yes.</p> <p>Santos has positive relationships with non-English speaking communities in the areas in which it operates throughout Australia, Papua New Guinea, Timor-Leste and North America. Santos has partnerships with a range of local, non-English speaking communities, including providing local jobs and business opportunities.</p> <p>Santos wants to build strong, positive and productive relationships with the Traditional Owners and communities of the Tiwi Islands.</p> <p>We're here to learn more and seek input and feedback on cultural values in the context of the Barossa project.</p>



Question	Answer
Did Santos prepare the Offshore Project Proposal?	<p>The Offshore Project Proposal (<b>OPP</b>) for the Barossa Development was prepared by the ConocoPhillips Australia-West Business Unit that Santos now owns. NOPSEMA, the offshore regulator, accepted the Barossa Development OPP in 2018.</p> <p>When Santos acquired ConocoPhillips' Australia-West Business Unit in 2020, all associated licences, permits and approvals were included in the acquisition (including the Barossa Development OPP) and became the responsibility of Santos following the acquisition.</p>
<b>Drilling</b>	
What happens to the wells if there is an earthquake, tsunami or other natural disasters?	<p>The wells are all designed and drilled so that they meet government regulations and international standards for well design and operations. Historical evidence shows that wells do not leak because of earthquakes (both in the area where the Barossa wells are planned, which is not near any major faults, and around the world).</p> <p>Since 1969, approximately 880 wells have been drilled in the area to the west of the Tiwi Islands and none of these have experienced issues related to earthquakes or tremors. The closest long-term producing oil and gas wells are located at the Bayu-Undan Field, where 29 wells have been in production at different times since 2004 and none have been affected by earthquakes. The Bayu-Undan field is approximately 400km from the Barossa field.</p> <p>Tsunamis do not affect drilling rigs or vessels located in deeper water such as the Barossa field, where the water depth is over 200m. Waves created by tsunamis cause damage when the wave reaches land and the shallower water causes a large wave to form above the normal level of the ocean.</p>
Can drilling cause earthquakes?	<p><a href="#">This is very unlikely based on the depth of the wells, the relatively small number of wells being drilled into the field, the location of the operations, the low level of seismic activity in the area, and on historical effects of drilling activities in Australia.</a></p>
What lubricates the drill?	<p>A drilling fluid (sometimes referred to as "drilling mud") is circulated in the borehole and provides cooling and lubrication to the drill bit and carries the rock cuttings/chips out of the well.</p>
What is in the drilling fluid?	<p>A water-based drilling fluid (or drilling mud) is planned to be used to drill the wells for the Barossa project. This mud is mainly a mixture of fresh water and salt that is then combined with other additives that make the mud thicker, heavier or control how the mud affects the natural clays in the rocks that are drilled.</p> <p>The additives are not harmful to humans nor sea life in small quantities and in diluted form (as they are used in the drilling mud). Santos relies on a recognised industry chemical classification system run by a specialist agency, the UK Government Department of the Environment Food and Rural Affairs, and uses additives in the mud which have the lowest environmental impact rating.</p> <p>Sometimes water-based drilling fluid or drilling mud is insufficient for drilling activities in deep water. In that case, Santos will use a Non-Aqueous Fluid (<b>NAF</b>). NAF uses a base fluid that is a synthetic oil.</p>

Question	Answer
	<p>The additives used in the NAF are, on the whole, the same as those used in the water-based mud. Where NAF is required to be used, equipment is used on the rig to remove the NAF from the drilled-up pieces of rock that come out of the well, so that the NAF can be reused. This equipment is similar to a clothes dryer. The drilled-up pieces of rock are returned to the sea only when the amount of NAF is below a certain amount. The process is the same as that for other wells that use NAF offshore in Australia and in many parts of the world.</p>
<p>When you are drilling, what do you hit first (before you reach the gas)?</p>	<p>The drill bit goes through a series of limestone and claystone rocks before reaching the sandstone reservoir that contains the gas. The limestone and claystone rocks above the gas reservoir are impermeable and have trapped the gas and condensate in the Barossa reservoir for tens of millions of years.</p> <p>The steel pipe (casing) is cemented into place before drilling into the gas reservoir contained within the sandstone formation. The steel pipe is cemented into place like this to seal off the shallower rock formations from the gas reservoir.</p> <p>None of the eight exploration wells drilled so far in the Barossa field have found any oil reservoirs and reviews conducted by our geologists of the area indicate that no oil exists in the Barossa field.</p>
<p>Why haven't you spoken about climate change as a risk (of the drilling and completions environment plan)?</p>	<p>Santos is very conscious of limiting the impact of its operations on the environment.</p> <p>Santos will follow industry practices and procedures to minimise greenhouse gas emissions from fuel combustion and flaring during drilling operations.</p> <p>The current Drilling and Completions Environment Plan considers the impact and risk of greenhouse gases and atmospheric emissions from drilling and completion operations. Likewise, emissions from production operations will be further considered and assessed in the Barossa Production and Operations Environment Plan.</p>
<p>How long will the drilling consultation process take? When will you start drilling and will you advise us before you start?</p>	<p>The regulations require that Santos provide a reasonable period for relevant persons to consider information provided by Santos about the proposed drilling and completions activity, environmental impacts and risks and control measures before commencing such activity.</p> <p>As advised at the March 2023 clan group consultation meetings, Santos is holding another series of meetings in late April and early May 2023 to invite input and feedback and also to provide feedback on questions and requests for information received so far. There will be another series of meetings later in May 2023 to explain how the feedback from consultation is proposed to be addressed in the revised Drilling and Completions EP to be submitted to NOPSEMA, the offshore regulator, for assessment.</p> <p>Once acceptance of the revised Drilling and Completions EP by NOPSEMA has occurred, this will be communicated.</p>

Question	Answer
	Following acceptance by NOPSEMA, Santos anticipates commencing drilling and this will be communicated in advance.
How long will it take to drill the wells?	Each well is expected to take around 90 days to drill and complete (and Santos intends to drill 6 wells, with contingency for two additional wells, if needed). We anticipate that our proposed Drilling and Completions activities will take approximately 2 years, subject to weather and operational performance.
What happened with the exploration drilling?	<p>Eight wells have already been drilled in the Barossa field as part of the initial exploration and appraisal of the field. The first well was drilled in 1973, followed by another in 1998, another in 2006, three more in 2014 and 2015 and then the two final wells in 2017. The wells were evaluated and safely decommissioned as planned.</p> <p>The exploration work confirmed that a large gas reserve exists in the area.</p> <p>After the exploration wells were drilled and safely decommissioned, equipment at the seabed was removed. The decommissioning process for most wells involved plugging the wells with cement, cutting the casing approximately 2 meters below the seafloor and removing all equipment, before inspecting the wellsite and surrounding seabed with a remotely operated vehicle (a small remote controlled submarine). In 1973, oilfield practices were somewhat different, but the well was still safely and permanently decommissioned.</p>
Will you keep drilling more wells if you can't find gas in the wells you have planned?	<p>Santos has a high degree of confidence that the wells planned for the Barossa project will successfully encounter gas. This is based on the information we have gained over a long period of time—since 1973—from different exploration processes, such as seismic acquisition and the exploration wells.</p> <p>There is provision for eight wells in the current Drilling and Completions EP for the Barossa project, but only six are planned to be drilled (with two additional wells being provisioned in case they are necessary).</p>
Will the drilling impact marine life?	<p>Environmental impacts and risks from all planned and unplanned events are assessed in the current Drilling and Completions EP and control measures will be implemented to reduce impacts and risks to as low as reasonably practicable and acceptable levels. We are consulting on these impacts and risks and proposed controls.</p> <p>While there is potential for impacts to marine life from drilling, impacts from planned events are localised and risks from unplanned events such as a condensate spill are very low.</p> <p>With consideration of proposed control measures to mitigate impacts to marine life, the impacts are considered to be reduced to as low as reasonably practicable and an acceptable level.</p>

Question	Answer
How far down do you drill?	The wells will be drilled to about 4000m below the surface of the sea.
What category was the storm in the animation? (The animation showed what would happen to the FPSO in a storm)	<p>In the area around the Barossa field, most of the storms are tropical lows or developing storms, with most of them passing to the south of the Barossa field. Fully developed storms (Australian Category 4 and 5) are not normally experienced at the location of the Floating Production Storage and Offloading (FPSO) facility.</p> <p>The FPSO is designed to survive a 10,000-year storm (involving the equivalent of wind speeds attributable to a Category 4 cyclone).</p>
How many wells are you drilling?	Six development wells are planned with contingency for two additional wells, if needed. No more than eight wells can be drilled under the current Drilling and Completions EP.
What is a Christmas Tree?	<p>A “Christmas Tree” is the slang name for the arrangement of metal pipes and valves that sit on top of the well to control the flow of gas and condensate out of the well and to allow safe access to the well for maintenance.</p> <p>Its proper name is a “Subsea Vertical Tree” and it is a piece of equipment installed on top of the well with valves and pressure and temperature gauges that is used to monitor and control the production of gas and condensate from that well.</p>
How many wells has Santos drilled, both locally and internationally?	Founded in 1954, the South Australia Northern Territory Oil Search ( <b>Santos</b> ) has been developing resources first across Australia, then the Asia Pacific and is now a global energy company. Since 1954, Santos has drilled and still operates more than 6,000 wells onshore and offshore in Australia and additional wells internationally.
Will the drilling be like Deepwater Horizon?	<p>The drilling activity for the Barossa project is different to the drilling at Deepwater Horizon. Further, Barossa is a gas and condensate field, not crude oil.</p> <p>The well design for the Barossa wells is different from the wells of the Deepwater Horizon which experienced a well blowout. For example, unlike the Deepwater Horizon well, at Barossa the drilling stops before the well is drilled into the gas zone, casing is then installed and cemented into place, then the next smaller hole is drilled into the gas zone. This enables effective barriers to prevent the flow of gas to surface.</p> <p>Further, Macondo, the well that blew out on the Deepwater Horizon, was an over-pressured oil exploration well, not normally-pressured gas and condensate like Barossa. The reservoir pressure at Macondo is approximately three times the reservoir pressure in Barossa and these higher pressure wells have a higher likelihood of well integrity issues. In the event of a loss of well control, the fluids expelled from Barossa would be gas and condensate, not crude oil. These substances have very different impacts and spill response.</p>

Question	Answer
	Santos undertakes drilling activity in a strict regulatory environment. There are numerous control measures in place to control the flow of extracted substances including well design, safety shutdown systems, regular inspection and maintenance and trained and competent personnel.
<b>Pipeline</b>	
How is the Gas Export Pipeline laid?	<p>The Gas Export Pipeline (<b>GEP</b>) is approximately 66cm in diameter and will be laid on top of the seabed, using a special vessel that lays the pipe. Onboard the pipelay vessel, single lengths (approximately 12-15m long) of steel pipe (joints) are welded, inspected and coated. As the pipelay vessel moves forward, the pipe gradually curves downward through the water until it reaches the touchdown point on the seabed.</p> <p>The vessel moves slowly, covering approximately 3km per day and will take approximately 3 months to fully install. There is no trenching or dredging required for the GEP installation.</p> <p>The pipeline route was carefully selected to minimise environmental impacts and risks.</p> <p>Independent experts are carrying out further assessment work to identify any cultural heritage places along the pipeline route.</p>
How do you know if the pipeline is damaged and will you fix it if it is?	<p>To keep the pipeline operating safely, Santos intends to carry out regular remote and on-site inspections and maintenance. Specialist equipment will monitor the pipeline's condition and integrity and provides advanced warning of potential damage.</p> <p>In the unlikely event of damage to the pipeline, Santos would immediately shut-in the wells to prevent any further gas from entering the pipeline and the pipeline would be depressurised. The nature of the damage would then be assessed and any necessary repairs completed. The pipeline would be restarted following confirmation of a successful repair and once any associated regulatory approvals to restart were secured.</p>
What holds the pipeline down?	The pipeline is not fixed to the seabed. The pipeline will be made from carbon steel, with the thickness and weight of the pipe itself assisting with keeping it stable (holding it down on the seabed). The pipeline also has an external anti-corrosion coating and concrete covering which is designed to provide extra weight and stability (holding it down on the seabed).
What is the pipeline for?	Santos is proposing to extract natural gas from the offshore Barossa field. The gas is intended to be transported via a gas export pipeline to the existing Santos Darwin Liquefied Natural Gas ( <b>DLNG</b> ) facility in Darwin, where it will be liquefied and shipped to customers.
Is this pipeline the same as the Bayu-Undan pipeline?	<p>The Bayu-Undan pipeline runs for approximately 502km from the Bayu-Undan gas fields in the Timor Sea to the DLNG plant. At its closest point, the Bayu-Undan pipeline is approximately 20km away from Bathurst Island.</p> <p>The Bayu-Undan pipeline is the same size as the proposed gas export pipeline for the Barossa project, with a diameter of approximately 66cm.</p>

Question	Answer
Will the pipeline impact the turtles and dugongs?	<p>The pipeline is not likely to significantly impact turtles and dugongs. Interactions between vessels associated with the Barossa GEP installation activity and marine fauna are considered under the Barossa GEP Installation Environment Plan.</p> <p>The Barossa pipeline installation vessels will be subject to restrictions within designated 'caution zones'. A caution zone is defined as 150m distance from turtles. When operating vessels within a caution zone, vessels are restricted to a vessel speed of less than 6 knots, must have a lookout on the vessel for turtles and must maintain a distance of at least 50m from any turtles. Reduced vessel speeds allow marine life such as turtles to dive and move away from an area where there is vessel activity.</p> <p>All Santos contracted vessels are required to maintain a marine fauna sighting record and record any interactions with marine fauna.</p>
How long will the pipeline installation vessel be located in the vicinity of turtle nesting beaches?	<p>The pipeline installation vessels may be visible from the Tiwi Islands for about one month during pipelay activities. The closest the vessels will be to the Tiwi Islands is approximately 7km (West of Cape Fourcroy).</p> <p>Santos has completed light modelling and impact assessments to better understand the risks to nesting turtles associated with lighting. While light emissions are expected to be visible at turtle nesting beaches, it is unlikely to affect the behaviour of Olive Ridley and Flatback hatchling turtles on the beach.</p>
Have you done checks for underground volcanoes?	<p>As part of our environmental assessment of the pipeline, Santos carried out marine surveys along the entire pipeline route. No underground or subsea volcanoes were detected.</p> <p>Santos has completed a review of records of seismic activity and mapping of geologic fault lines in the region so that the proposed infrastructure locations are away from high-risk areas.</p> <p>The pipeline route was carefully selected to minimise environmental impacts and risks.</p>
How far is the pipeline and Barossa field from the Tiwi islands?	<p>The Barossa field is located approximately 140 km north of Seagull Island. At its closest point, the pipeline will be approximately 7 km from the Tiwi Islands (west of Cape Fourcroy).</p>
How safe are the pipes?	<p>The pipeline to be used for Barossa is designed to international and Australian standards and subject to third party validation. This is a requirement of the Australian Safety Case regulatory regime.</p> <p>It is widely recognised and acknowledged that the regulatory regime that operates in Australia is among the strictest in the world. By designing the pipeline to the required design standard for subsea pipelines the pipeline has a very low probability of failing. For example, death by car crash is approximately 10,000 times more likely an event to occur than a pipeline failing.</p>

Question	Answer
<b>Cultural heritage assessment</b>	
<p>How are you protecting our intellectual property rights as part of the cultural heritage assessment process for the Gas Export Pipeline?</p>	<p>Santos has engaged independent experts to undertake an assessment to identify any underwater cultural heritage places along the Barossa pipeline route, also referred to as the Gas Export Pipeline or GEP route, to which people, in accordance with Indigenous tradition, may have spiritual and cultural connections that may be affected by the future activities covered by the GEP Installation Environment Plan.</p> <p>Santos has engaged Dr Brendan Corrigan as an independent anthropologist. Dr Corrigan is leading a team of other independent experts and obtaining information from Tiwi Islanders about any spiritual and cultural connections to any underwater cultural heritage places along the Barossa pipeline, or GEP, route.</p> <p>Santos is confident that, with their expertise, Dr Corrigan and his team will handle all confidential and sensitive information appropriately.</p>
<p>What process are you following for the cultural heritage assessment for the Gas Export Pipeline?</p>	<p>Santos has engaged independent experts to undertake an assessment to identify any underwater cultural heritage places along the Barossa pipeline route, also referred to as the Gas Export Pipeline or GEP route, to which people, in accordance with Indigenous tradition, may have spiritual and cultural connections that may be affected by the future activities covered by the GEP Installation Environment Plan.</p> <p>Dr Brendan Corrigan is the lead independent expert. Dr Corrigan has over 25 years of experience as an anthropologist and has worked on projects identifying and documenting culturally significant places across Australia, including the Northern Territory, Western Queensland, Cape York, Torres Strait and Kimberley regions. Dr Corrigan has an experienced team of independent experts assisting him.</p> <p>As independent experts, they will seek inputs from people who have a spiritual and cultural connection to any underwater cultural heritage place along the Barossa pipeline route which may be affected by the Barossa pipeline (or GEP) installation activities.</p> <p>Santos is confident that the experts will take care that any spiritual and cultural information is collected in a culturally appropriate, respectful and sensitive way. If any information is identified as being confidential, the experts will respect the wishes of the people providing it and keep it confidential.</p> <p>The experts also want to know if there is anyone else in your community who they should be speaking with about cultural and spiritual connections with underwater cultural heritage places along the Barossa pipeline route (or GEP).</p>

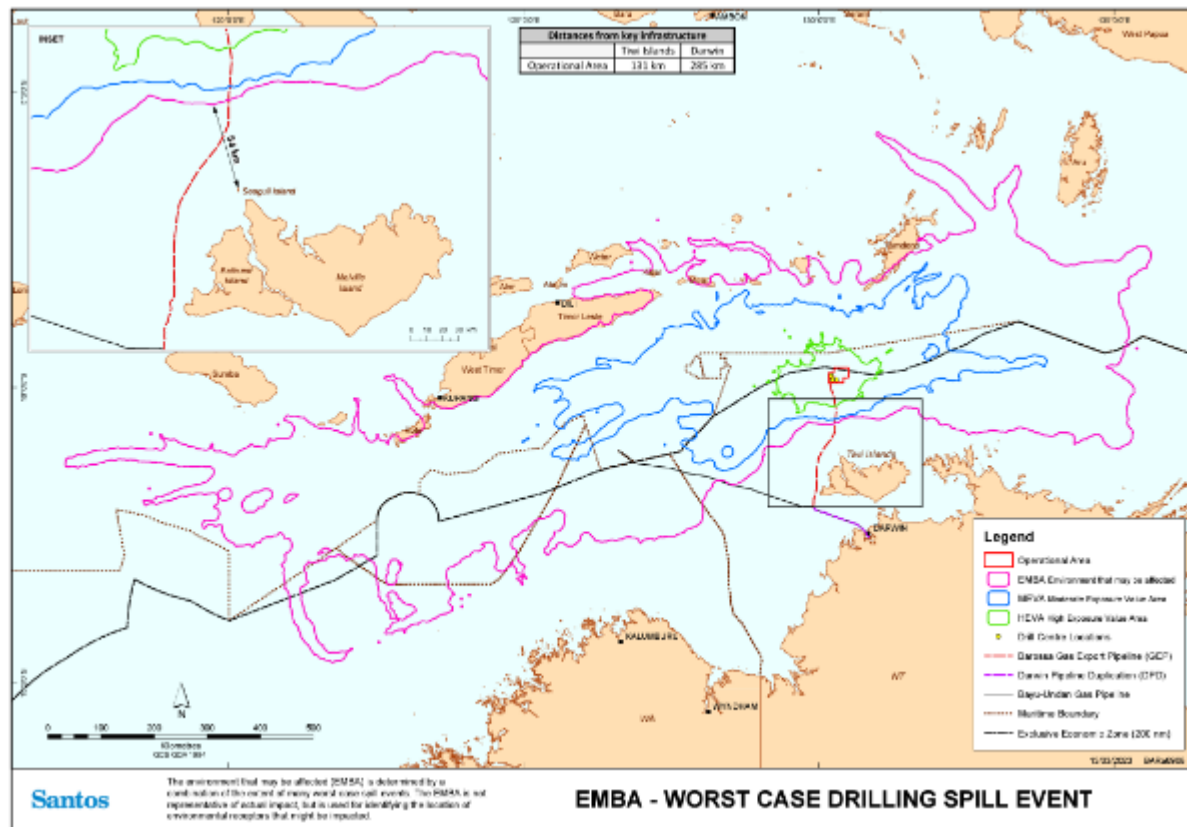
Question	Answer
<p>We would like you to engage with us before you start laying the pipeline, to map our sacred underwater cultural heritage sites with Traditional Owners so that the impacts can be avoided, especially where you say you want to build the pipeline.</p>	<p>We welcome engagement with you.</p> <p>The pipeline installation has not yet started. We are first causing an assessment to be undertaken to identify any underwater cultural heritage places along the Barossa pipeline route, also referred to as the Gas Export Pipeline or GEP, to which people, in accordance with Indigenous tradition, may have spiritual and cultural connections that may be affected by the future activities covered by the GEP Installation Environment Plan. This is being conducted by independent, appropriately qualified experts.</p> <p>If the process identifies any underwater cultural heritage places along the route that may be affected by future pipeline installation activities, Santos will consider this and will update the Environment Plan as appropriate.</p> <p>That process would involve evaluating impacts and risks to identified underwater cultural heritage places and, if appropriate, updating proposed control measures to reduce any impacts and risks to as low as reasonably practicable and acceptable levels.</p> <p>The pipelay activity will only commence after the assessment is completed and any regulatory obligations are met.</p>
<p><b>Carbon</b></p>	
<p>What is CO2?</p>	<p>CO2 is the abbreviation for carbon dioxide, which occurs naturally in most natural gas fields.</p> <p>Carbon dioxide is what we breath out and is naturally present in the atmosphere in small quantities. Barossa gas contains about 18 per cent carbon dioxide.</p> <p>When natural gas is produced or used for industry or to create energy, carbon dioxide is produced as a by-product. It is one of the greenhouse gases and companies like Santos are committed to seeking to reduce SHCO2 emissions through technology such as Carbon Capture and Storage (CCS).</p>
<p>How is the Bayu-Undan project supporting the Barossa project?</p>	<p>The Bayu-Undan field in Timor-Leste has a potential future role as a carbon capture and storage facility, following the end of natural gas production from that field. Santos proposes to repurpose the Bayu-Undan pipeline, which connects Darwin LNG to Bayu-Undan, and to transport CO2 from the Barossa project to Bayu-Undan via Darwin LNG. Front-end engineering design (FEED) commenced for the project in March 2022.</p>
<p>What are you going to do with the carbon from Barossa?</p>	<p>The CO2 from Barossa will be vented to the air via CO2 removal facilities on the FPSO and at DLNG. The CO2 emissions may be offset by Santos through purchasing carbon credits.</p> <p>Santos is also pursuing the Bayu-Undan CCS project so that the CO2 can be safely and permanently stored in depleted reservoirs at Bayu-Undan instead of being vented to the air.</p>



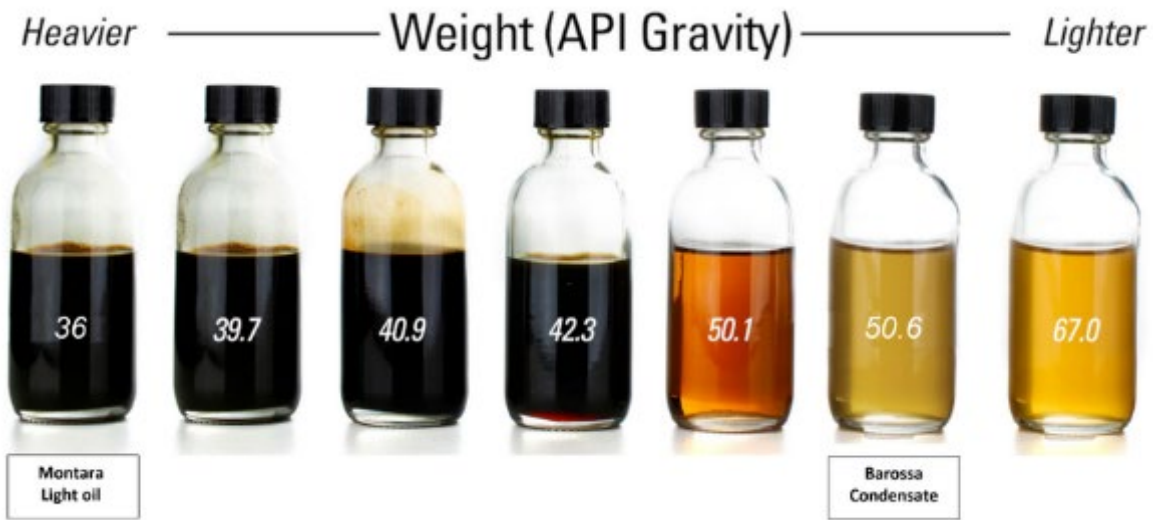
Question	Answer										
	The technical work is almost complete, and Santos is working with the governments of Australia and Timor-Leste to progress regulatory frameworks and approvals.										
What CCS projects have been done before?	Today, Santos is aware of 30 commercial CCS facilities operating around the world, with a storage capacity of over 42 million tonnes of CO2 per year. CCS is proven technology and the International Energy Agency's (IEA) Net Zero by 2050 Roadmap envisages Carbon Capture, Utilisation and Storage growing to 7.6 billion tonnes of CO2 per year by 2050. The IEA's Executive Director has said that reaching net zero goals without CCS "will become virtually impossible".										
How much CO2 will be captured by the Bayu-Undan CCS project?	The Bayu-Undan CCS project will be designed for initial injection and storage of approximately 2.3 million tonnes of CO2 per annum from Barossa.										
How will you comply with the Safeguard Mechanism to ensure that Barossa is net zero emissions on day one of gas production scheduled for 2025?	The Government is still finalising the detailed guidelines for the Safeguard Mechanism. Santos expects to comply with the Safeguard Mechanism by storing the CO2 at the Bayu-Undan CCS project once the approvals are in place and the CCS infrastructure is operational. Before then, Santos will purchase carbon credits to offset reservoir CO2 emissions.										
<b>General</b>											
When will the project be completed?	The Barossa project currently remains on target to commence production in the first half 2025. Drilling and Completions activities are planned to be completed approximately 2 years following commencement of drilling.  Following planned commencement of production in the first half of 2025, production is expected to continue for 25 years.										
Is the NT or Federal Governments part of this project?	The NT Government and Commonwealth Government regulate certain Project activities, with the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) (a Commonwealth government authority) regulating the Project's offshore activities.										
Will the Barossa project significantly increase marine vessel traffic around the Tiwi Islands?	Over the construction phase of the project, the number of associated vessels between Darwin Port and the activity area will vary depending on the project activity. This is summarised in the table below. <table border="1"> <thead> <tr> <th>Project Activity</th> <th>Drilling and Completions</th> <th>Subsea Infrastructure Installation</th> <th>Darwin Pipeline Duplication</th> <th>Gas Export Pipeline</th> </tr> </thead> <tbody> <tr> <td>Vessel Movements</td> <td>Approx. 2 per week for 24-32 months</td> <td>Approx. 5-7 per week for 8 months</td> <td>Approx. 3 per week for 12 months</td> <td>Approx. 3 per week for 6-12 months</td> </tr> </tbody> </table> <p>Once the construction is complete, approximately 2 vessels per week will service the FPSO for the duration of the project life (~25 years).</p> <p>For context, Darwin Port currently has on average 30 commercial vessel movements per week.</p>	Project Activity	Drilling and Completions	Subsea Infrastructure Installation	Darwin Pipeline Duplication	Gas Export Pipeline	Vessel Movements	Approx. 2 per week for 24-32 months	Approx. 5-7 per week for 8 months	Approx. 3 per week for 12 months	Approx. 3 per week for 6-12 months
Project Activity	Drilling and Completions	Subsea Infrastructure Installation	Darwin Pipeline Duplication	Gas Export Pipeline							
Vessel Movements	Approx. 2 per week for 24-32 months	Approx. 5-7 per week for 8 months	Approx. 3 per week for 12 months	Approx. 3 per week for 6-12 months							



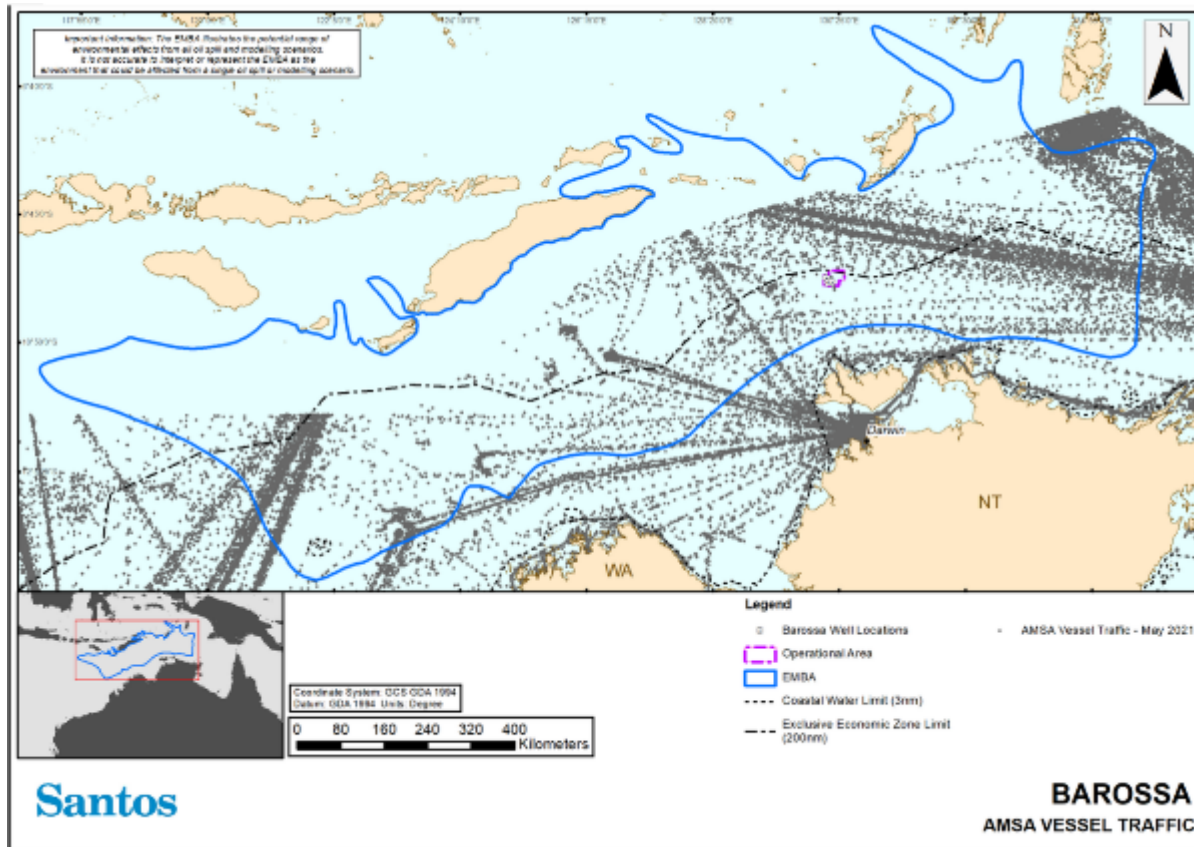
## EMBA worst case drilling spill event



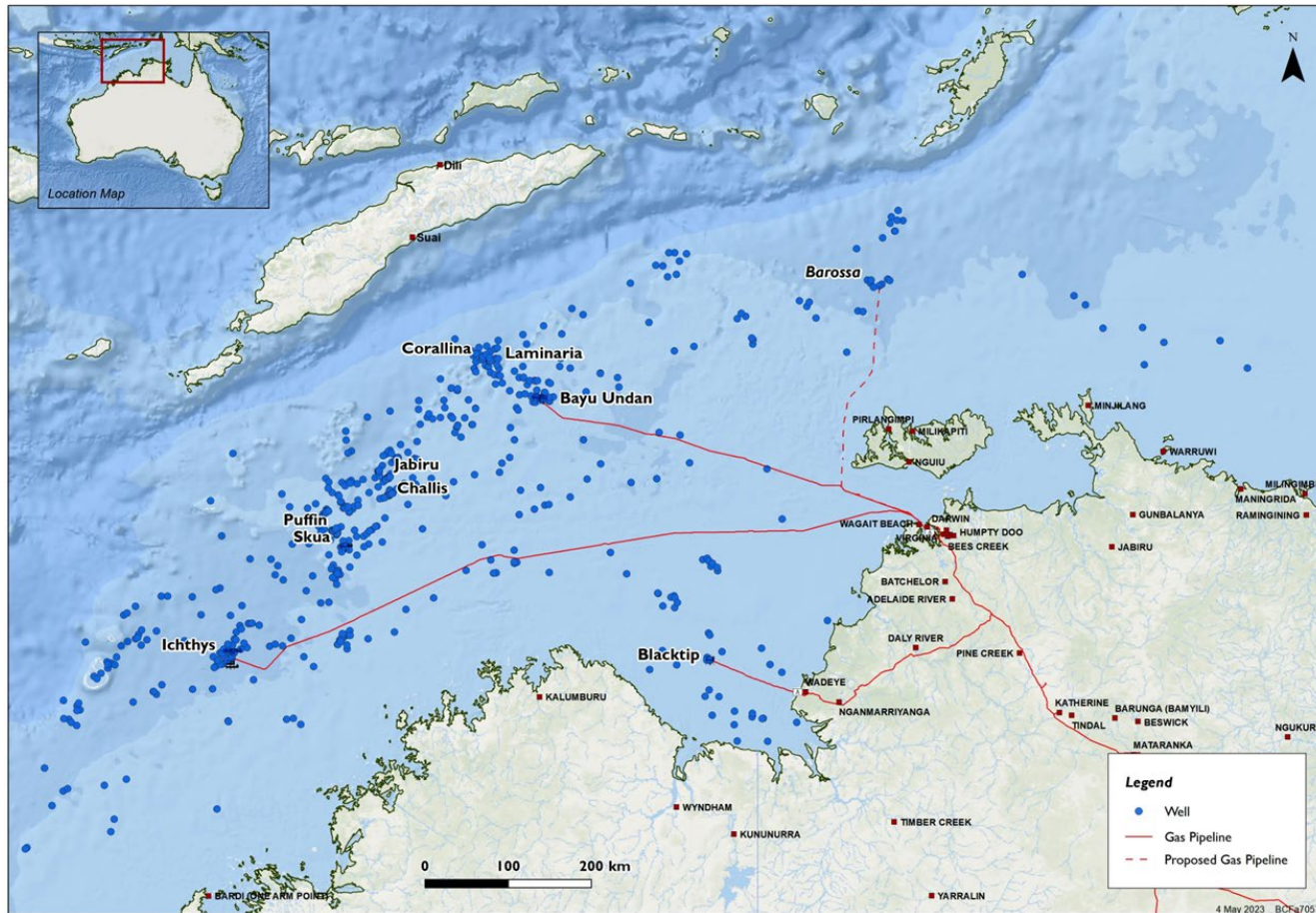
## Montara and Barossa comparison



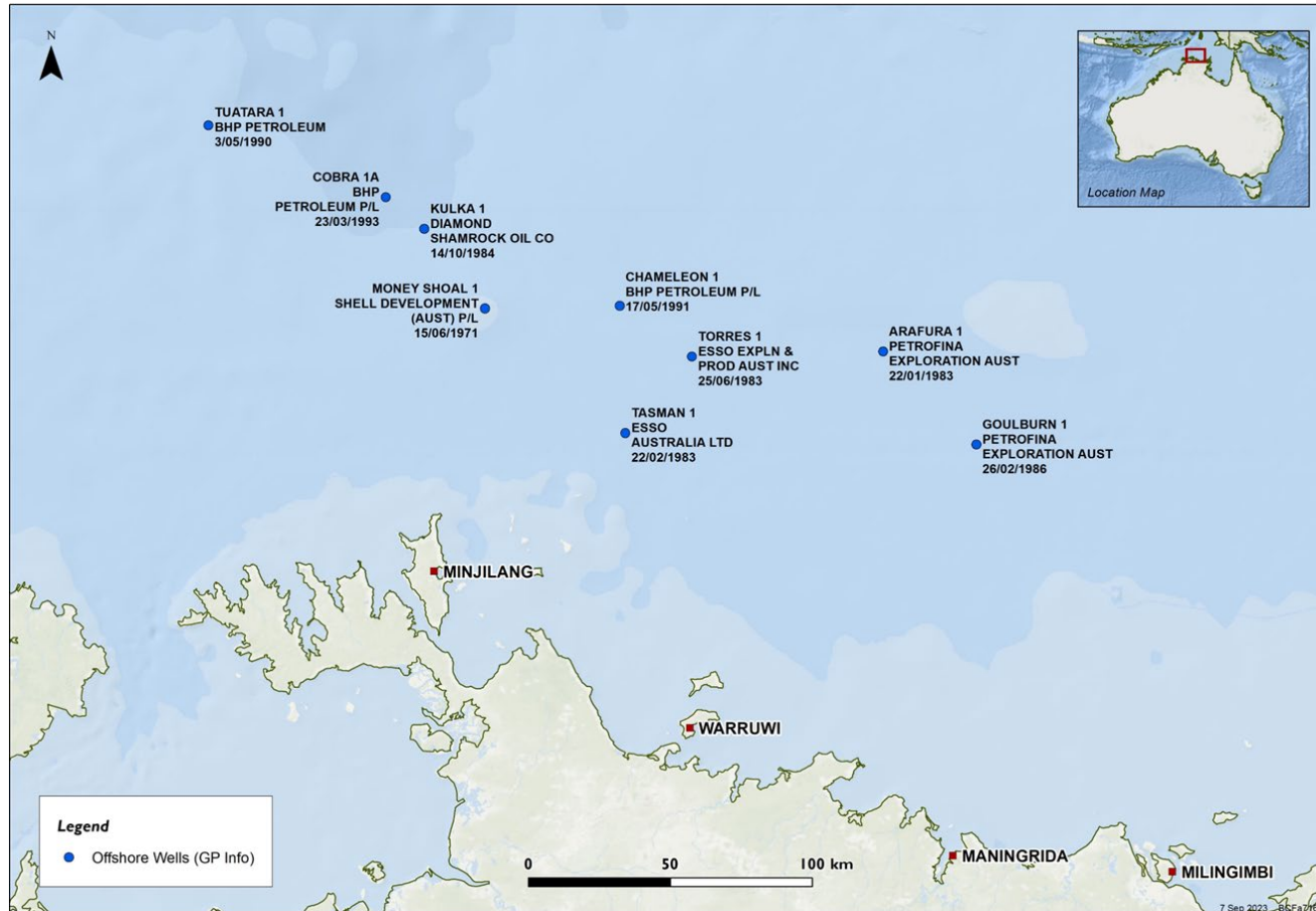
## Project overview vessel movement heat map 2021



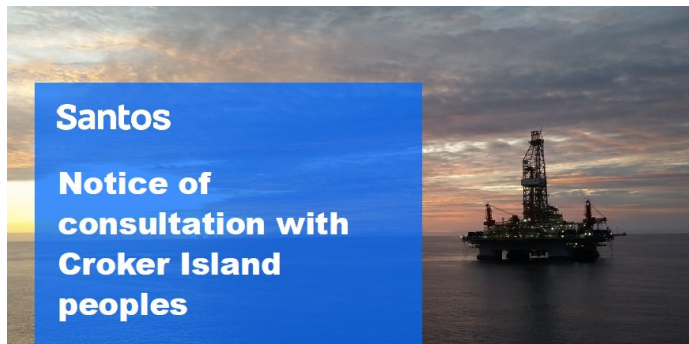
## Regional Drilled Wells Map Since 1969 (zoomed out)



## Regional Drilled Wells Map Since 1969 (zoomed in)



## 7. Notice of consultation with Croker Island Peoples



### **Barossa Gas Project Drilling and Completions Environment Plan Subsea Infrastructure Installation Environment Plan**

Your feedback is important to us.

Santos is preparing environment plans for its Barossa Gas Project, as required by legislation. We are consulting with Croker Island peoples whose functions, interests or activities may be affected by project activities proposed under the environment plans listed above.

You are invited to a Santos Consultation Session in Darwin on **Friday 15 September 2023** (Day trip) for the **Drilling and Completions Environment Plan** and the **Subsea Infrastructure Installation Environment Plan**.

The purpose of the information session is for Santos to provide information about the Barossa Gas Project and give you an opportunity to provide feedback on the projects mentioned above.

The Minjilang Council will pick you up from home at **9am (morning) on Friday 15 September** and will drive you to the Croker Island Airport, where a charter plane will take you to Darwin.

In Darwin, Santos will organise your transport and provide meals.

You will arrive back at the Croker Island Airport at **3.40pm (afternoon) on Friday 15 September**, where drivers from the Minjilang Council will take you back home.

This is a one-day trip only – no accommodation is being provided in Darwin.

To confirm your attendance or if you have any questions, please contact Angelina Anictomatis on 0413 599 453 or [enquiriesNT@santos.com](mailto:enquiriesNT@santos.com).

If you have any questions about your transport on Croker Island, please contact the Minjilang Council Office on 8970 3500.



**8. Revision 3 of the Drilling and Completions Environment Plan (publicly available on NOPSEMA's website and linked on Santos' website)**

[docs.nopsema.gov.au/A831694](https://docs.nopsema.gov.au/A831694)

## APPENDIX G – SANTOS' ENVIRONMENT CONSEQUENCE DESCRIPTORS

Excerpt from *Offshore Division environmental hazard identification and assessment guideline* (EA-91-IG-00004), Revision 5 (issued October 2020).

Consequence level		I	II	III	IV	V	VI
Acceptability		Acceptable	Acceptable	Unacceptable	Unacceptable	Unacceptable	Unacceptable
Severity description		Negligible No impact or negligible impact	Minor Detectable but insignificant change to local population, industry or ecosystem factors. Localised effect	Moderate Significant impact to local population, industry or ecosystem factors	Major Major long-term effect on local population, industry or ecosystem factors	Severe Complete loss of local population, industry or ecosystem factors AND/OR extensive regional impacts with slow recovery	Critical Irreversible impact to regional population, industry or ecosystem factors
Environmental Receptors	Fauna In particular, EPBC Act listed threatened/migratory fauna or WA Biodiversity Conservation Act 2016 specially protected fauna	Short-term behavioural impacts only to small proportion of local population and not during critical lifecycle activity. No decrease in local population size. No reduction in area of occupancy of species. No loss/disruption of habitat critical to survival of a species. No disruption to the breeding cycle of any individual. No introduction of disease likely to cause a detectable population decline.	Detectable but insignificant decrease in local population size. Insignificant reduction in area of occupancy of species. Insignificant loss/disruption of habitat critical to survival of a species. Insignificant disruption to the breeding cycle of local population.	Significant decrease in local population size but no threat to overall population viability. Significant behavioural disruption to local population. Significant disruption to the breeding cycle of a local population. Significant reduction in area of occupancy of species. Significant loss of habitat critical to survival of a species. Modify, destroy, remove, isolate or decrease availability of quality of habitat to the extent that a significant decline in local population is likely. Introduce disease likely to cause a significant population decline.	Long-term decrease in local population size and threat to local population viability. Major disruption to the breeding cycle of local population. Major reduction in area of occupancy of species. Fragmentation of existing population. Major loss of habitat critical to survival of a species. Modify, destroy, remove, isolate or decrease availability of quality of habitat to the extent that a long-term decline in local population is likely. Introduce disease likely to cause a long-term population decline.	Complete loss of local population. Complete loss of habitat critical to survival of local population. Widespread (regional) decline in population size or habitat critical to regional population.	Complete loss of regional population. Complete loss of habitat critical to survival of regional population.
	Physical Environment/Habitat Includes: air quality; water quality; benthic habitat (biotic/abiotic), particularly habitats that are rare or unique; habitat that represents a Key Ecological Feature <sup>36</sup> ; habitat within a protected area; habitats that include benthic primary producers <sup>37</sup> and/or epi-fauna <sup>38</sup>	No or negligible reduction in physical environment/habitat area/function.	Detectable but localised and insignificant loss of area/function of physical environment/habitat. Rapid recovery evident within approximately two years (two season recovery).	Significant loss of area and/or function of local physical environment/habitat. Recovery over medium term (2–10 years).	Major, large-scale loss of area and/or function of physical environment/local habitat. Slow recovery over decades.	Extensive destruction of local physical environment/habitat with no recovery. Long-term (decades) and widespread loss of area or function of primary producers on a regional scale.	Complete destruction of regional physical environment/habitat with no recovery. Complete loss of area or function of primary producers on a regional scale.
	Threatened ecological communities (EPBC Act listed ecological communities)	No decline in threatened ecological community population size, diversity or function. No reduction in area of threatened ecological community. No introduction of disease likely to cause decline in threatened ecological community population size, diversity or function.	Detectable but insignificant decline in threatened ecological community population size, diversity or function; Insignificant reduction in area of threatened ecological community.	Significant decline in threatened ecological community population size, diversity or function. Significant reduction in area of threatened ecological community. Introduction of disease likely to cause significant decline in threatened ecological community population size, diversity or function.	Major, long-term decline in threatened ecological community population size, diversity or function. Major reduction in area of threatened ecological community. Fragmentation of threatened ecological community. Introduce disease likely to cause long-term decline in threatened ecological community population size, diversity or function.	Extensive, long-term decline in threatened ecological community population size, diversity or function. Complete loss of threatened ecological community.	Complete loss of threatened ecological community with no recovery.

<sup>36</sup> As defined by the Department of Agriculture, Water and Environment

<sup>37</sup> Benthic photosynthetic organisms such as seagrass, algae, hard corals and mangroves

<sup>38</sup> Fauna attached to the substrate including sponges, soft corals and crinoids.

Consequence level		I	II	III	IV	V	VI
Acceptability		Acceptable	Acceptable	Unacceptable	Unacceptable	Unacceptable	Unacceptable
Severity description		Negligible No impact or negligible impact	Minor Detectable but insignificant change to local population, industry or ecosystem factors. Localised effect	Moderate Significant impact to local population, industry or ecosystem factors	Major Major long-term effect on local population, industry or ecosystem factors	Severe Complete loss of local population, industry or ecosystem factors AND/OR extensive regional impacts with slow recovery	Critical Irreversible impact to regional population, industry or ecosystem factors
Protected Areas Includes: World Heritage Properties; Ramsar wetlands; Commonwealth/National Heritage Areas; Land/Marine Conservation Reserves.	No or negligible impact on protected area values. No decline in species population within protected area. No or negligible alteration, modification, obscuring or diminishing of protected area values.*	Detectable but insignificant impact on one of more of protected area's values. Detectable but insignificant decline in species population within protected area. Detectable but insignificant alteration, modification, obscuring or diminishing of protected area values.*	Significant impact on one of more of protected area's values. Significant decrease in population within protected area. Significant alteration, modification, obscuring or diminishing of protected area values.	Major long-term effect on one of more of protected area's values; Long-term decrease in species population contained within protected area and threat to that population's viability. Major alteration, modification, obscuring or diminishing of protected area values.	Extensive loss of one or more of protected area's values. Extensive loss of species population contained within protected area.	Complete loss of one or more of protected area's values with no recovery. Complete loss of species population contained within protected area with no recovery.	
Socio-economic receptors Includes: fisheries (commercial and recreational); tourism; oil and gas; defence; commercial shipping.	No or negligible loss of value of the local industry. No or negligible reduction in key natural features or populations supporting the activity.	Detectable but insignificant short-term loss of value of the local industry. Detectable but insignificant reduction in key natural features or population supporting the local activity.	Significant loss of value of the local industry. Significant medium-term reduction of key natural features or populations supporting the local activity.	Major long-term loss of value of the local industry and threat to viability. Major reduction of key natural features or populations supporting the local activity.	Shutdown of local industry or widespread major damage to regional industry. Extensive loss of key natural features or populations supporting the local industry.	Permanent shutdown of local or regional industry. Permanent loss of key natural features or populations supporting the local or regional industry.	

## APPENDIX H – SPILL MODELLING RESULTS SUMMARY (MAXIMUM VALUES ACROSS ALL SEASONS AND WATER DEPTHS)

**Appendix G1: Loss of well control spill modelling results (maximum values across all seasons and water depths)**

Receptor	Receptor type	Probability of exposure (percent)					Minimum time before exposure on the sea surface (days)					Maximum dissolved hydrocarbon exposure (ppb) for a 96-hour window	Maximum entrained hydrocarbon exposure (ppb) for a 96-hour window
		Moderate exposure values			High exposure values		Moderate exposure values			High exposure values			
		Surface hydrocarbons (10 g/m <sup>2</sup> )	Dissolved hydrocarbons (50 ppb)	Entrained hydrocarbons (100 ppb)	Surface hydrocarbons (50 g/m <sup>2</sup> )	Dissolved hydrocarbons (400 ppb)	Surface hydrocarbons (10 g/m <sup>2</sup> )	Dissolved hydrocarbons (50 ppb)	Entrained hydrocarbons (100 ppb)	Surface hydrocarbons (50 g/m <sup>2</sup> )	Dissolved hydrocarbons (400 ppb)	0–10 m layer	0–10 m layer
Arafura	AMP	-	-	12	-	-	-	-	23.4	-	-	-	143
Ashmore Reef		-	-	-	-	-	-	-	-	-	-	-	13
Cartier Island		-	-	-	-	-	-	-	-	-	-	-	22
Oceanic Shoals		12	-	33	-	-	19.5	-	3.8	-	-	28	215
Carbonate bank and terrace system of the Sahul Shelf	KEF	-	-	-	-	-	-	-	-	-	-	-	45
Pinnacles of the Bonaparte Basin		-	-	6	-	-	-	-	12.3	-	-	-	126
Shelf break and slope of the Arafura Shelf		100	100	100	100	32	0.04	0.1	0.1	0.17	0.1	575	1843
Carbonate bank and terrace system of the Van Diemen Rise		39	-	42	-	-	10.2	-	2.7	-	-	23	289
Tributary canyons of the Arafura Depression		-	-	-	-	-	-	-	-	-	-	-	93
Continental slope demersal fish communities		-	-	-	-	-	-	-	-	-	-	-	22
Ashmore Reef and Cartier Island and surrounding Commonwealth waters		-	-	-	-	-	-	-	-	-	-	-	22
Barton Shoal		Shoals	-	-	-	-	-	-	-	-	-	-	-
Dillon Shoal	-		-	-	-	-	-	-	-	-	-	-	31
The Boxers	-		-	-	-	-	-	-	-	-	-	-	41
Cootamundra Shoal	-		-	-	-	-	-	-	-	-	-	-	29
Calder Shoal	-		-	-	-	-	-	-	-	-	-	-	45
Margaret Harries Banks	-		-	17	-	-	-	-	12.8	-	-	-	113
Lynedoch Bank	-		-	9	-	-	-	-	6.0	-	-	-	123
Evans Shoal	-		-	46	-	-	-	-	3.2	-	-	22	246

Receptor	Receptor type	Probability of exposure (percent)					Minimum time before exposure on the sea surface (days)					Maximum dissolved hydrocarbon exposure (ppb) for a 96-hour window	Maximum entrained hydrocarbon exposure (ppb) for a 96-hour window
		Moderate exposure values			High exposure values		Moderate exposure values			High exposure values			
		Surface hydrocarbons (10 g/m <sup>2</sup> )	Dissolved hydrocarbons (50 ppb)	Entrained hydrocarbons (100 ppb)	Surface hydrocarbons (50 g/m <sup>2</sup> )	Dissolved hydrocarbons (400 ppb)	Surface hydrocarbons (10 g/m <sup>2</sup> )	Dissolved hydrocarbons (50 ppb)	Entrained hydrocarbons (100 ppb)	Surface hydrocarbons (50 g/m <sup>2</sup> )	Dissolved hydrocarbons (400 ppb)	0–10 m layer	0–10 m layer
Franklin Shoal		-	-	17	-	-	-	-	5.6	-	-	11	149
Flinders Shoal		-	-	16	-	-	-	-	5.7	-	-	14	168
Blackwood Shoal		-	-	17	-	-	-	-	4.9	-	-	12	196
Martin Shoal		-	-	-	-	-	-	-	-	-	-	-	74
Loxton Shoal		-	-	-	-	-	-	-	-	-	-	-	74
Sunset Shoal		-	-	-	-	-	-	-	-	-	-	-	73
Troubadour Shoals		-	-	-	-	-	-	-	-	-	-	-	105
Sunrise Bank		-	-	-	-	-	-	-	-	-	-	-	59
Bellona Bank		-	-	-	-	-	-	-	-	-	-	-	81
Echo Shoals		-	-	-	-	-	-	-	-	-	-	-	72
Big Bank Shoals		-	-	-	-	-	-	-	-	-	-	-	52
Karnt Shoal		-	-	-	-	-	-	-	-	-	-	-	53
Jabiru Shoals		-	-	-	-	-	-	-	-	-	-	-	22
Pee Shoal		-	-	-	-	-	-	-	-	-	-	-	17
Mangola Shoal		-	-	-	-	-	-	-	-	-	-	-	16
Fantome Shoal		-	-	-	-	-	-	-	-	-	-	-	17
Johnson Bank		-	-	-	-	-	-	-	-	-	-	-	11
Woodbine Bank		-	-	-	-	-	-	-	-	-	-	-	18
Deep Shoal 1		-	-	-	-	-	-	-	-	-	-	-	19
Unnamed Shoal		17	-	-	-	-	12.3	-	-	-	-	-	-
Tassie Shoal		17	-	23	-	-	12.3	-	5.3	-	-	10	179

**Appendix G2: Vessel collision spill modelling results (maximum values across all seasons and water depths)**

Receptor	Receptor type	Probability of exposure					Minimum time before exposure on the sea surface (days)				
		Moderate exposure values			High exposure values		Moderate exposure values			High exposure values	
		Surface hydrocarbons (10-25 g/m <sup>2</sup> )	Dissolved hydrocarbons (50 ppb)	Entrained hydrocarbons (100 ppb)	Surface hydrocarbons (>25 g/m <sup>2</sup> )	Dissolved hydrocarbons (400 ppb)	Surface hydrocarbons (10-25 g/m <sup>2</sup> )	Dissolved hydrocarbons (50 ppb)	Entrained hydrocarbons (100 ppb)	Surface hydrocarbons (>25 g/m <sup>2</sup> )	Dissolved hydrocarbons (400 ppb)
Oceanic shoals	AMP	-	-	6	-	-	-	-	5.0	-	-
Arafura		-	-	1	-	-	-	-	15.2	-	-
Shelf break and slope of the Arafura Shelf	KEF	100	-	3	100	-	0.04	-	0.04	0.04	-
Pinnacles of the Bonaparte Basin		-	-	1	-	-	-	-	13.5	-	-
Carbonate bank and terrace system of the Van Diemen Rise		1	-	4	-	-	3.3	-	2.0-	-	-
Margaret Harries Banks	Shoals	-	-	2	-	-	-	-	7.9	-	-
Evans Shoal		-	-	6	-	-	-	-	1.6	-	-
Echo shoals		-	-	1	-	-	-	-	18.8	-	--
Franklin Shoal		-	-	2	-	-	-	-	3.2	-	-
Flinders Shoal		-	-	11	-	-	-	-	3.4	-	-
Lynedoch Bank		-	-	1	-	-	-	-	6.0	-	-
Blackwood Shoal		-	-	4	-	-	-	-	2.9	-	-
Martin Shoal		-	-	1	-	-	-	-	4.2	-	-
Sunset shoal		-	-	1	-	-	-	-	19.3	-	-
Troubadour Shoals		-	-	1	-	-	-	-	6.9	-	-
Tassie Shoal		-	-	5	-	-	-	-	3.8	-	-

## APPENDIX I – CHRONOLOGY - TIWI ISLANDS CONSULTATIONS

No.	Date	Action	Summary of Action
1.	6 October 2022	Meeting with Tiwi Land Council	Santos attended a meeting with Tiwi Land Council. Updates were provided on the Judgment and the status of the appeal, among other things.
2.	1 December 2022	Meeting with Tiwi Land Council	Santos met with Tiwi Land Council to discuss, among other things, the ruling expected the following day.
3.	2 December 2022	Meeting with Northern Land Council	Santos met with the Northern Land Council and provided an update on the Appeal Judgment ruling.
4.	5 December 2022	Meeting with Northern Land Council and Tiwi Land Council	Santos met (via video conference) with Northern Land Council and Tiwi Land Council in relation to the upcoming consultations.
5.	9 December 2022	Tiwi Resources advised of cancellation of proposed engagements	Tiwi Resources advised that meetings between Santos and Tiwi Islands clan members proposed for 12-14 December were cancelled.
6.	12 December 2022	Meeting with Tiwi Land Council	Meeting between Santos and Tiwi Land Council regarding the cancellation of the proposed consultation sessions and the approach to rescheduled consultations.
7.	20 December 2022	Meeting with Tiwi Land Council and Tiwi Resources	Meeting between Santos, Tiwi Land Council and Tiwi Resources regarding proposed consultation dates. Tiwi Resources recommended that Santos avoid scheduling in January 2023 due to a recent death in the community.
8.	5 January 2023	Distribution of notices of consultation	Santos emailed the Tiwi Regional Council, attaching a notice describing upcoming consultations scheduled for 6-8 February 2023, and requesting that the notification be posted and distributed across the Regional Council Networks.
9.	7 January 2023 (live until 4 February 2023)	Social Media Engagement	Santos social media advertisement published on Facebook, Instagram, and Messenger, with target locations of Tiwi Islands and Darwin (including within a 60km radius).  The advertisement advised of upcoming sessions between 6-8 February 2023 on the Tiwi Islands and stated that at the sessions attendees will have an opportunity to hear about the Barossa Gas Project and to tell Santos how they would like Santos to consult with them and their community.
10.	7 January 2023	Advertising	A half page advertisement was published on page 6 of the NT News seeking feedback from Relevant Persons in relation to the Drilling and Completions Environmental Plan (D&C EP) and stated that consultations would take place between 6-8 February 2023 on the Tiwi Islands.
11.	13 January 2023	Meeting with Northern Land Council regarding consultations	Santos attended a meeting with the Northern Land Council to discuss the upcoming consultation process on the Tiwi Islands.
12.	16 January 2023	Consultation meeting arrangements	Santos and a representative from the Tiwi Land Council exchanged emails arranging to meet to discuss upcoming consultations scheduled for 6-8 February 2023.
13.	21 January 2023	Advertising	A half page advertisement was published on page 6 of the NT News regarding the upcoming consultations on the Tiwi Islands scheduled for 6-8 February 2023.
14.	25 January 2023	Email notice provided to Tiwi Regional Council	Santos sent the Tiwi Regional Council an email attaching a notification of upcoming consultations scheduled for 6-8 February 2023 and asked that the notification be posted and distributed across the Regional Council Networks.



No.	Date	Action	Summary of Action
15.	25 January 2023 (live until 4 February 2023)	Social Media Engagement	Santos social media advertisement published on Facebook, Instagram, and Messenger, with target locations of Tiwi Islands, Darwin (including within a 60km radius). The advertisement advised of upcoming consultation sessions scheduled for 6-8 February 2023 on the Tiwi Islands and stated that at the sessions attendees would have an opportunity to hear about the Barossa project and to tell Santos how they would like Santos to consult with them and their community.
16.	28 January 2023	Advertising	A half page advertisement was run on page 5 of the NT News seeking feedback from Relevant Persons in relation to the D&C EP and stated that upcoming consultations would take place between 6-8 February 2023 on the Tiwi Islands.
17.	6 February 2023 ~10:30am - ~1:20pm	Pre-Consultation Information Session held at Milikapiti	A pre-consultation information session was held at Milikapiti. The session was attended by Santos and community members from different clans. Tiwi Land Council, and an expert on turtles (the founder of a leading marine conservation biology and artificial light assessment consultancy) also attended. Community members were invited to ask questions, and if uncomfortable asking in a group setting, to ask in a smaller group or one-on-one on the day or on another day. Questions were asked by community members and answered by Santos. Attendees were asked to give feedback on how they wished to be consulted. Approximately 100 individuals were estimated to have attended. Conversations were also held in small groups and one-on-one before and after the meeting. Santos utilised A1 and A3 maps demonstrating an overview of the Barossa project as a guide. Santos also utilised a hula hoop as a guide to the diameter of the pipeline for the Barossa project.
18.	7 February 2023 ~11am - ~1:15pm	Pre-Consultation Information session held at Pirlangimpi	A pre-consultation information session was held at Pirlangimpi. The session was attended by Santos and community members from different clan groups, Tiwi Land Council, and an expert on turtles (the founder of a leading marine conservation biology and artificial light assessment consultancy). Community members were invited to ask questions, and if uncomfortable asking in a group setting, to ask in a smaller group or one-on-one on the day or on another day. Questions were asked by community members and answered by Santos. Attendees were asked to give feedback on how they wished to be consulted. Approximately 70 individuals were estimated to have attended. Conversations were also held in small groups and one-on-one before and after the meeting. Santos utilised A1 and A3 maps demonstrating an overview of the Barossa project as a guide. Santos also utilised a hula hoop as a guide to the diameter of the pipeline for the Barossa project.
19.	8 February 2023	Pre-Consultation Information session held at Wurrumiyanga	A pre-consultation information session was held at Wurrumiyanga. The session was attended by Santos and community members from different clans, Tiwi Land Council and an expert on turtles (the founder of a leading marine conservation biology and artificial light assessment consultancy). Community members were invited to ask questions, and if uncomfortable asking in a group setting, to ask in a smaller group or one-on-one on the day or on another day. Questions were asked by community members and answered by Santos. Attendees were asked to give feedback on how they wished to be consulted. Approximately 280 individuals were estimated to have attended. Conversations were also held with individuals and small groups before and after the session. Santos utilised A1 and A3 maps demonstrating an overview of the Barossa project as a guide. Santos also utilised a hula hoop as a guide to the diameter of the pipeline for the Barossa project.
20.	10 February 2023	Meeting with Tiwi Land Council	Santos representatives attended a meeting with the Tiwi Land Council at Mantiyupwi Motel at Wurrumiyanga.
21.	10 February 2023	Meeting with Tiwi Enterprises	Santos representatives attended a meeting with the CEO of Tiwi Enterprises at Mantiyupwi Motel at Wurrumiyanga.
22.	17 February 2023	Meeting with Gwalwa Daraniki Association and NT Chief Minister's Office	Santos representatives meet with representatives of the Gwalwa Daraniki Association and the Northern Territory Chief Minister's Office. The representative of the Gwalwa Daraniki Association provided feedback on how community meetings should be arranged and how Santos could best engage with Tiwi Islands clans in relation to the Barossa project.
23.	18 February 2023	Advertising	A full-page advertisement was published in the NT News regarding upcoming Tiwi Islands consultation sessions in March 2023.
24.	20 February 2023 (live until 24 March 2023)	Social Media Engagement	Santos social media advertisement published on Facebook, Instagram, and Messenger, with target locations of Tiwi Islands, Darwin (including within a 60km radius). Advertisement advised of upcoming sessions between 20-24 March 2023 on the Tiwi Islands.
25.	25 February 2023	Advertising	A full-page advertisement was published in NT News regarding upcoming Tiwi Islands consultation sessions in March 2023.

No.	Date	Action	Summary of Action
26.	27 February 2023	Tiwi Community Engagement	Santos representatives and representatives from Tiwi Islands consultant Kode Blak attended Wurrumiyanga for engagement with community, to build relationships and answer questions.
27.	1-3 March 2023	Funeral on Island	Decision made by Santos not to run consultation sessions during funeral and mourning period / sorry business.
28.	4 March 2023	Advertising	A full-page advertisement was published in NT News regarding upcoming Tiwi Islands consultation sessions in March 2023.
29.	7 March 2023	Engagement with Tiwi Resources	A Santos representative met with a Tiwi Resources representative regarding preparations for upcoming boat trips and clan group meetings.
30.	9 March 2023	Tiwi community engagement	A Santos representative had discussions at Wurrumiyanga with individuals from each of the Munupi, Wurankuwu, and Jikilaruwu clans, as well as with the CEO of Tiwi Enterprises.
31.	10 March 2023	Tiwi community engagement	A Santos representative present on the Tiwi Islands had the following engagements in Wurrumiyanga: met with the Chair of Munupi Board (consultation materials were provided along with a contact number); met with a member of the Malawu clan; and met with a member of the Munupi clan.
32.	11 March 2023	Advertising	A full-page advertisement was published in the NT News regarding upcoming Tiwi Islands consultation sessions in March 2023.
33.	11 March 2023	Consultation meetings on Tiwi Islands	A Santos representative spoke to individuals from Munupi, Yimpinari, Wurankuwu and Jikilaruwu clans in Wurrumiyanga.
34.	12 March 2023	Consultation meetings on Tiwi Islands	A Santos representative spoke with an individual from each of the Jikilaruwu, Wurankuwu and Munupi clans, as well as with the CEO of Tiwi Enterprises, in Wurrumiyanga.
35.	18 March 2023	Advertising	A full-page advertisement was published in NT News regarding upcoming Tiwi Islands consultation sessions in March 2023.
36.	18 March 2023	Arafura by-election	Arafura by-election occurring on this date. Decision made by Santos not to hold consultation sessions at this time.
37.	20 March 2023 at ~10.30am	Consultation Session with clans at Milikapiti	<p>Tiwi Islands engagement and consultation regarding the D&amp;C EP with Wulirankuwu, Munupi, Mantiyupwi, Malawu clans at Milikapiti (Milikapiti Sport and Recreation Centre) (Melville Island).</p> <p>Consultation conducted pursuant to agreed script, prepared by Santos, and directed by PowerPoint presentation, prepared by Santos. Various video explanations played and discussed.</p> <p>Approximately 49 clan members attended this session (with 3 apologies due to road closures), from the following clans:</p> <ul style="list-style-type: none"> <li>• Wulirankuwu – 27</li> <li>• Munupi – 13</li> <li>• Mantiyupwi – 2</li> <li>• Malawu – 7</li> </ul> <p>No representatives from Marrikawuyanga – this is a small clan group (understood to be approximately 10 people). Three members were understood to be away (being rangers at a training course in Darwin). Another key clan member was expected to attend in the afternoon, though it was subsequently arranged for that clan member, the Traditional Owner of the clan group, to attend the session on the following day.</p> <p>Also in attendance was an expert on turtles (the founder of a leading marine conservation biology and artificial light assessment consultancy).</p>

No.	Date	Action	Summary of Action
			<p>Documents circulated at the consultation session included:</p> <ul style="list-style-type: none"> <li>• Agenda for Tiwi Islands March Consultation Sessions</li> <li>• D&amp;C EP Fact Sheet</li> <li>• Maps relating to the D&amp;C EP including: <ul style="list-style-type: none"> <li>○ D&amp;C EP EMBA</li> <li>○ Barossa Project Overview</li> <li>○ Barossa Drilling Impact and Risks</li> <li>○ Barossa Project Drilling</li> <li>○ Drilling Activity Focus with Worst Case Drilling EMBA</li> </ul> </li> <li>• Privacy notice.</li> </ul>
38.	20 March 2023 at ~1:00pm	Consultation Session with Wulirankuwu clan	<p>Tiwi Islands engagement and consultation regarding the D&amp;C EP with Wulirankuwu, Munupi, Mantiyupwi, Malawu clans at Milikapiti (Milikapiti Sport and Recreation Centre) (Melville Island).</p> <p>Consultation conducted pursuant to agreed script, prepared by Santos, and directed by PowerPoint presentation, prepared by Santos. Various video explanations played and discussed.</p> <p>Approximately 18 clan members attended this session, from the following clans:</p> <ul style="list-style-type: none"> <li>• Wulirankuwu – 10</li> <li>• Munupi – 2</li> <li>• Jikilaruwu – 1</li> <li>• Malawu – 1</li> <li>• plus approximately four additional clan members who stayed from the morning session.</li> </ul> <p>Also in attendance was an expert on turtles (the founder of a leading marine conservation biology and artificial light assessment consultancy).</p> <p>Documents circulated at the consultation session included:</p> <ul style="list-style-type: none"> <li>• Agenda for Tiwi Islands March Consultation Sessions</li> <li>• D&amp;C EP Fact Sheet</li> <li>• Maps relating to the D&amp;C EP including: <ul style="list-style-type: none"> <li>○ D&amp;C EP EMBA</li> <li>○ Barossa Project Overview</li> <li>○ Barossa Drilling Impact and Risks</li> <li>○ Barossa Project Drilling</li> <li>○ Drilling Activity Focus with Worst Case Drilling EMBA</li> </ul> </li> <li>• Privacy notice</li> </ul>
39.	20 March 2023	One-on-one discussions	<p>Santos representatives also engaged in one-on-one discussions and discussions in small groups with attendees at the Wulirankuwu and Mirrikawuyanga clan consultation sessions, which were separately noted by Santos. Santos has records of four such discussions.</p>

No.	Date	Action	Summary of Action
			<p>In one of the discussions, the following information was shared with two attendees of the sessions:</p> <ul style="list-style-type: none"> <li>- Barossa Overview video</li> <li>- Drilling video</li> <li>- Barossa overview map</li> <li>- Drilling activity map</li> <li>- Privacy notice.</li> </ul>
40.	21 March 2023 at ~10:30am	Consultation Session with Yimpinari clan	<p>Tiwi Islands engagement and consultation regarding the D&amp;C EP with Wulirankuwu, Marrikawuyanga, Yimpinari, Munupi, Mantiyupwi, Malawu clans at Milikapiti.</p> <p>Consultation conducted pursuant to agreed script, prepared by Santos, and directed by PowerPoint presentation, prepared by Santos. Various video explanations played and discussed.</p> <p>Approximately 99 clan members attended this session, from the following clans:</p> <ul style="list-style-type: none"> <li>• Wulirankuwu – 8</li> <li>• Marrikawuyanga – 2</li> <li>• Yimpinari – 52</li> <li>• Munupi – 15</li> <li>• Mantiyupwi – 14</li> <li>• Malawu – 8</li> </ul> <p>Also in attendance was an expert on turtles (the founder of a leading marine conservation biology and artificial light assessment consultancy).</p> <p>Documents circulated at the consultation session included:</p> <ul style="list-style-type: none"> <li>• Agenda for Tiwi Islands March Consultation Sessions</li> <li>• D&amp;C EP Fact Sheet</li> <li>• Maps relating to the D&amp;C EP including: <ul style="list-style-type: none"> <li>○ D&amp;C EP EMBA</li> <li>○ Barossa Project Overview</li> <li>○ Barossa Drilling Impact and Risks</li> <li>○ Barossa Project Drilling</li> <li>○ Drilling Activity Focus with Worst Case Drilling EMBA</li> </ul> </li> <li>• Privacy notice.</li> </ul>
41.	21 March 2023	One-on-one discussions	<p>Santos representatives also engaged in one-on-one discussions and discussions in small groups with attendees at the Yimpinari clan consultation session which were separately noted by Santos. Santos has records of seven such discussions.</p>
42.	22 March 2023 at ~10:30am	Consultation Session with Munupi clan	<p>Tiwi Islands engagement and consultation regarding the D&amp;C EP with Wulirankuwu, Marrikawuyanga, Yimpinari, Munupi, Mantiyupwi, Jikilaruwu, Wurankuwu, Malawu clans at Pirlangimpi Club.</p>

No.	Date	Action	Summary of Action
			<p>Consultation conducted pursuant to agreed script, prepared by Santos, and directed by PowerPoint presentation, prepared by Santos. Various video explanations played and discussed.</p> <p>Approximately 126 clan members attended this session, from the following clans:</p> <ul style="list-style-type: none"> <li>• Wulirankuwu – 4</li> <li>• Marrikawuyanga – 2</li> <li>• Yimpinari – 1</li> <li>• Munupi – 79</li> <li>• Mantiyupwi – 9</li> <li>• Jikilaruwu – 6</li> <li>• Wurankuwu – 2</li> <li>• Malawu – 23</li> </ul> <p>Also in attendance was an expert on turtles (the founder of a leading marine conservation biology and artificial light assessment consultancy).</p> <p>Documents circulated at the consultation session included:</p> <ul style="list-style-type: none"> <li>• Agenda for Tiwi Islands March Consultation Sessions</li> <li>• D&amp;C EP Fact Sheet</li> <li>• Maps relating to the D&amp;C EP including: <ul style="list-style-type: none"> <li>○ D&amp;C EP EMBA</li> <li>○ Barossa Project Overview</li> <li>○ Barossa Drilling Impact and Risks</li> <li>○ Barossa Project Drilling</li> <li>○ Drilling Activity Focus with Worst Case Drilling EMBA</li> </ul> </li> <li>• Privacy notice.</li> </ul>
43.	22 March 2023	One-on-one discussions	<p>Santos representatives also engaged in one-on-one discussions and discussions in small groups with attendees at the Munupi clan consultation session which were separately noted by Santos. Santos has records of six such discussions.</p> <p>In one of the discussions, the following information was shared by Santos with an attendee of the session:</p> <ul style="list-style-type: none"> <li>- Barossa Overview video</li> <li>- Drilling video</li> <li>- Barossa overview map</li> <li>- Drilling activity map</li> <li>- Barossa Overview fact sheet</li> <li>- Drilling fact sheet</li> <li>- Privacy notice</li> </ul>

No.	Date	Action	Summary of Action
44.	23 March 2023 at ~10.30am	Consultation Session with Mantiyupwi clan	<p>Tiwi Islands engagement and consultation regarding the D&amp;C EP with Wulirankuwu, Yimpinari, Munupi, Mantiyupwi, Malawu clans at Wurrumiyanga Nguiu Club.</p> <p>Consultation conducted pursuant to agreed script, prepared by Santos, and directed by PowerPoint presentation, prepared by Santos. Various video explanations played and discussed.</p> <p>Approximately 114 clan members attended this session, from the following clans:</p> <ul style="list-style-type: none"> <li>• Wulirankuwu – 23</li> <li>• Yimpinari – 2</li> <li>• Munupi – 3</li> <li>• Mantiyupwi – 84</li> <li>• Malawu – 2</li> </ul> <p>Also in attendance was an expert on turtles (the founder of a leading marine conservation biology and artificial light assessment consultancy).</p> <p>Documents circulated at the consultation session included:</p> <ul style="list-style-type: none"> <li>• Agenda for Tiwi Islands March Consultation Sessions</li> <li>• D&amp;C EP Fact Sheet</li> <li>• Maps relating to the D&amp;C EP including: <ul style="list-style-type: none"> <li>○ D&amp;C EP EMBA</li> <li>○ Barossa Project Overview</li> <li>○ Barossa Drilling Impact and Risks</li> <li>○ Barossa Project Drilling</li> <li>○ Drilling Activity Focus with Worst Case Drilling EMBA</li> </ul> </li> <li>• Privacy notice.</li> </ul>
45.	23 March 2023 at ~1:00pm	Consultation Session with Jikilaruwu clan	<p>Tiwi Islands engagement and consultation regarding the D&amp;C EP with Wulirankuwu, Yimpinari, Munupi, Mantiyupwi, Jikilaruwu clans at Wurrumiyanga Nguiu Club.</p> <p>Consultation conducted pursuant to agreed script, prepared by Santos, and directed by PowerPoint presentation, prepared by Santos. Various video explanations played and discussed.</p> <p>Approximately 114 clan members attended this session, from the following clans:</p> <ul style="list-style-type: none"> <li>• Wulirankuwu – 3</li> <li>• Yimpinari – 6</li> <li>• Munupi – 1</li> <li>• Mantiyupwi – 1</li> <li>• Jikilaruwu – 103</li> </ul> <p>Also in attendance was an expert on turtles (the founder of a leading marine conservation biology and artificial light assessment consultancy).</p> <p>Documents circulated at the consultation session included:</p>

No.	Date	Action	Summary of Action
			<ul style="list-style-type: none"> <li>• Agenda for Tiwi Islands March Consultation Sessions</li> <li>• D&amp;C EP Fact Sheet</li> <li>• Maps relating to the D&amp;C EP including:               <ul style="list-style-type: none"> <li>○ D&amp;C EP EMBA</li> <li>○ Barossa Project Overview</li> <li>○ Barossa Drilling Impact and Risks</li> <li>○ Barossa Project Drilling</li> <li>○ Drilling Activity Focus with Worst Case Drilling EMBA</li> </ul> </li> <li>• Privacy notice.</li> </ul>
46.	23 March 2023	One-on-one discussions	<p>Santos representatives also engaged in one-on-one discussions and discussions in small groups with attendees at the Jikilaruwu clan consultation session, which were separately noted by Santos.</p> <p>Santos has records of six such discussions, as well as records of 10 such discussions taking place between attendees and an expert on turtles (the founder of a leading marine conservation biology and artificial light assessment consultancy).</p> <p>In one of the discussions, the following information was shared by Santos with an attendee of the session:</p> <ul style="list-style-type: none"> <li>- Barossa project Overview video</li> <li>- Drilling video.</li> </ul> <p>In addition, a Santos representative also engaged in a one-on-one discussion with a Tiwi Islander in Milikapiti, outside the context of a consultation session.</p>
47.	24 March 2023 at ~10.30am	Consultation Session with Wurankuwu clan	<p>Tiwi Islands engagement and consultation regarding the D&amp;C EP with Wulirankuwu, Munupi, Jikilawuru and Wurankuwu clans at Wurrumiyanga Nguiu Club. Consultation conducted pursuant to agreed script, prepared by Santos, and directed by PowerPoint presentation, prepared by Santos. Various video explanations played and discussed.</p> <p>Approximately 78 clan members attended this session, from the following clans:</p> <ul style="list-style-type: none"> <li>• Wulirankuwu – 9</li> <li>• Yimpinari – 2</li> <li>• Munupi – 1</li> <li>• Jikilaruwu – 1</li> <li>• Wurankuwu – 65</li> </ul> <p>Also in attendance was an expert on turtles (the founder of a leading marine conservation biology and artificial light assessment consultancy).</p> <p>Documents circulated at the consultation session included:</p> <ul style="list-style-type: none"> <li>• Agenda for Tiwi Islands March Consultation Sessions</li> <li>• D&amp;C EP Fact Sheet</li> <li>• Maps relating to the D&amp;C EP including:               <ul style="list-style-type: none"> <li>○ D&amp;C EP EMBA</li> <li>○ Barossa Project Overview</li> </ul> </li> </ul>

No.	Date	Action	Summary of Action
			<ul style="list-style-type: none"> <li>○ Barossa Drilling Impact and Risks</li> <li>○ Barossa Project Drilling</li> <li>○ Drilling Activity Focus with Worst Case Drilling EMBA</li> <li>● Privacy notice.</li> </ul>
48.	24 March 2023 at 1:00pm	Consultation Session with Malawu clan	<p>Tiwi Islands engagement and consultation regarding the D&amp;C EP with Munupi and Malawu clans at Wurrumiyanga Ngiuu Club.</p> <p>Consultation conducted pursuant to agreed script, prepared by Santos, and directed by PowerPoint presentation, prepared by Santos. Various video explanations played and discussed.</p> <p>Approximately 159 clan members attended this session, from the following clans:</p> <ul style="list-style-type: none"> <li>● Munupi – 1</li> <li>● Malawu – 158</li> </ul> <p>Also in attendance was an expert on turtles (the founder of a leading marine conservation biology and artificial light assessment consultancy).</p> <p>Documents circulated at the consultation session included:</p> <ul style="list-style-type: none"> <li>● Agenda for Tiwi Islands March Consultation Sessions</li> <li>● D&amp;C EP Fact Sheet</li> <li>● Maps relating to the D&amp;C EP including: <ul style="list-style-type: none"> <li>○ D&amp;C EP EMBA</li> <li>○ Barossa Project Overview</li> <li>○ Barossa Drilling Impact and Risks</li> <li>○ Barossa Project Drilling</li> <li>○ Drilling Activity Focus with Worst Case Drilling EMBA</li> </ul> </li> <li>● Privacy notice.</li> </ul>
49.	24 March 2023	One-on-one discussions	<p>Santos representatives also engaged in one-on-one discussions and discussions in small groups with attendees at the Wurankuwu and Malawu clan consultation sessions, which were separately noted by Santos.</p> <p>Santos has records of six such discussions, as well as three such discussions taking place between an expert on turtles (the founder of a leading marine conservation biology and artificial light assessment consultancy) and attendees of the consultations.</p> <p>In one of the discussions, the following information was shared by Santos with two attendees of the sessions:</p> <ul style="list-style-type: none"> <li>- Barossa project Overview video</li> <li>- Drilling video</li> <li>- Barossa project overview map</li> <li>- Drilling fact sheet</li> </ul>
50.	25 March 2023	Upload to Santos website of information on Barossa Project and consultation process	<p>Information on the Barossa project and the consultation process regarding the D&amp;C EP was made available on Santos' website, including links to the following materials:</p> <ul style="list-style-type: none"> <li>● D&amp;C EP (Revision 3)</li> </ul>



No.	Date	Action	Summary of Action
			<ul style="list-style-type: none"> <li>• Barossa Offshore Project Proposal</li> <li>• Barossa Offshore Project proposal appendices</li> <li>• Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009</li> <li>• NOPSEMA Environment plan content requirements</li> <li>• NOPSEMA Environment plan consultation requirements</li> <li>• Santos public notices – Barossa Gas Project</li> <li>• Barossa Gas Project FAQs.</li> </ul>
51.	25 March 2023	Advertising	A full-page advertisement was published in the NT News regarding the D&C EP and seeking Relevant Persons.
52.	27 March 2023	Newspaper advertisement	A full-page notice titled “Seeking Relevant Persons – Drilling and Completions Environment Plan” was published in the Australian Newspaper.
53.	27 March 2023 (live until 22 April 2023)	Social Media Engagement	Santos social media advertisement published on Facebook, Instagram, and Messenger. The advertisement asked recipients who consider that they may be a Relevant Person to contact Santos by 22 April 2023 and provided Santos' contact information.
54.	28 March 2023 (live until 24 April 2023)	Social Media Engagement	Santos social media advertisement published on Facebook, Instagram, and Messenger, with target locations of Tiwi Islands, Darwin (including within a 60km radius). The advertisement advises of upcoming sessions between 24-28 April 2023 on the Tiwi Islands and says that at the sessions attendees will have an opportunity to hear about the project and provide feedback and Santos would also answer their questions.
55.	28 March 2023	Email notice sent to Tiwi Land Council	Santos sent an email to the Tiwi Land Council attaching a “Santos Notice of Consultation”. The Notice of Consultation included a QR code which provided access to further information on the Barossa project.
56.	28 March 2023	Advertising	A full-page advertisement was published in NT News regarding the D&C EP and seeking Relevant Persons.
57.	29 March 2023	Advertisement concerning April consultation sessions with Tiwi Islanders	A full-page advertisement regarding Tiwi Islands engagement and consultation sessions to be held in April 2023 was published in NT News.
58.	30 March 2023	Advertising	A full-page advertisement published in National Indigenous Times regarding the D&C EP and seeking Relevant Persons.
59.	31 March 2023	Advertising	A full-page advertisement published in NT News regarding the D&C EP and seeking Relevant Persons.
60.	1 April 2023	Advertising	The following advertisements were published: <ul style="list-style-type: none"> <li>• Full page advertisement in The Australian regarding the D&amp;C EP and seeking Relevant Persons</li> <li>• Full page advertisement in NT News regarding Tiwi Islands April consultation sessions</li> <li>• Public notice in NT News regarding the D&amp;C EP and seeking Relevant Persons</li> <li>• Public notice in The Australian regarding the D&amp;C EP and seeking Relevant Persons.</li> </ul>
61.	4 April 2023	Advertising	The following advertisements were published: <ul style="list-style-type: none"> <li>• Full page advertisement in the Australian Financial Review regarding the D&amp;C EP and seeking Relevant Persons</li> </ul>

No.	Date	Action	Summary of Action
			<ul style="list-style-type: none"> <li>Public notice in the Australian Financial Review regarding the D&amp;C EP and seeking Relevant Persons.</li> </ul>
62.	8 April 2023	Advertising	<p>The following advertisements were published:</p> <ul style="list-style-type: none"> <li>Full page advertisement in NT News regarding the D&amp;C EP consultations in April 2023</li> <li>Full page advertisement in The West Australian regarding the D&amp;C EP and seeking Relevant Persons</li> <li>Public notice in The Australian regarding the D&amp;C EP and seeking Relevant Persons.</li> </ul>
63.	10 April 2023	Advertising	Public notice regarding the D&C EP and seeking Relevant Persons published in The West Australian.
64.	11 April 2023	Contact via hotline phone number	Santos published a hotline phone number for D&C EP consultations. On 11 April 2023, a member of the Malawu clan called the hotline wishing to attend the consultation scheduled for 28 April 2023 in Wurrumiyanga.
65.	12 April 2023	Advertising	<p>The following advertisements were published:</p> <ul style="list-style-type: none"> <li>Public notice in the NT News regarding D&amp;C EP Relevant Persons</li> <li>Public notice in the Australian Financial Review regarding D&amp;C EP Relevant Persons.</li> </ul>
66.	13 April 2023	Email notice of consultation process provided	<p>Barossa Gas Project Drilling and Completions Information Booklet emailed from the Offshore Consultations email address to the Tiwi Land Council.</p> <p>Covering email set out the following information:</p> <ul style="list-style-type: none"> <li>the purpose of consultation;</li> <li>Santos' regulatory obligations to consult with Relevant Persons; and</li> <li>Santos' proposed approach to consulting with Relevant Persons.</li> </ul> <p>The email also sought feedback on how Santos could provide information that was appropriate and accessible to assess the possible consequences of Santos' proposed drilling and completions activity.</p>
67.	15 April 2023	Advertising	<p>The following advertisements were published:</p> <ul style="list-style-type: none"> <li>Full page advertisement in NT News regarding Tiwi Islands April 2023 consultation sessions</li> <li>Public notice in The Australian regarding the D&amp;C EP and seeking Relevant Persons.</li> </ul>
68.	17 April 2023	Advertising	<p>The following advertisements were published/broadcasted:</p> <ul style="list-style-type: none"> <li>Public notice in The Australian Financial Review regarding the D&amp;C EP and seeking Relevant Persons</li> <li>Public notice in The West Australian regarding the D&amp;C EP and seeking Relevant Persons</li> <li>National radio advertisements regarding the D&amp;C EP and seeking Relevant Persons.</li> </ul>
69.	18 April 2023	Advertising	National radio advertisements regarding the D&C EP and seeking Relevant Persons broadcasted.
70.	19 April 2023	Tiwi Islands consultation planning	Santos was advised of sorry business on the Tiwi Islands on 24 April 2023. Santos passed on its condolences to the Tiwi people and rescheduled meetings planned for Milikapiti on 24 April 2023 to 4 May 2023.
71.	19 April 2023	Advertising	<p>The following advertisements were published/broadcasted:</p> <ul style="list-style-type: none"> <li>Public notice in NT News regarding the D&amp;C EP and seeking Relevant Persons</li> </ul>

No.	Date	Action	Summary of Action
			<ul style="list-style-type: none"> <li>National radio advertisements regarding the D&amp;C EP and seeking Relevant Persons.</li> </ul>
72.	20 April 2023	Advertising	National radio advertisements regarding the D&C and seeking Relevant Persons broadcasted.
73.	20 April 2023	Email update provided to Tiwi Land Council	Quarterly update on Barossa Development emailed from the Offshore Consultations email address to the Tiwi Land Council.
74.	21 April 2023	Advertising	<p>The following advertisements were published/broadcasted:</p> <ul style="list-style-type: none"> <li>NT News half page advertisement regarding Darwin drop-in sessions</li> <li>National radio advertisements regarding the D&amp;C EP and seeking Relevant Persons.</li> </ul>
75.	21 April 2023 (live until 5 May 2023)	Social Media Engagement	<p>Santos social media advertisement published on Facebook, Instagram, and Messenger, with target locations of Tiwi Islands and Darwin (including within a 60km radius).</p> <p>The advertisement advised of upcoming sessions between 24-28 April 2023 on the Tiwi Islands and said that at the sessions attendees would have an opportunity to hear about the project, provide feedback and that Santos will also answer their questions.</p> <p>The advertisement was updated (including to add consultation sessions in May 2023).</p>
76.	21 April 2023 (live until 3 May 2023)	Social Media Engagement	<p>Santos social media advertisement published on Facebook, Instagram, and Messenger, with target locations of Tiwi Islands and Darwin (including within a 60km radius).</p> <p>The advertisement advised of upcoming community consultation drop-in sessions.</p>
77.	22 April 2023	Advertising	<p>The following advertisements were published:</p> <ul style="list-style-type: none"> <li>Full page advertisement published in the NT News regarding Tiwi Islands April consultation sessions</li> <li>Public notice published in The Australian regarding D&amp;C EP Relevant Persons.</li> </ul>
78.	24 April 2023	Santos email consultation to Tiwi Land Council	Santos emailed the Tiwi Land Council to advise of opportunities in Darwin on 27 April 2023 and 3 May 2023 to obtain information, provide feedback and ask questions on the Barossa Drilling and Completions activity as well as the Barossa subsea infrastructure installation and pre-commissioning activity.
79.	26 April 2023	Barossa Gas Project FAQs posted on Santos website	Barossa Gas Project FAQs posted to the 'Public Notices' section of Santos' website among other Barossa-related documentation.
80.	26 April 2023 at ~10.30am	Consultation Session with Munupi Clan	<p>Tiwi Islands engagement and consultation meeting regarding the D&amp;C EP and Subsea Infrastructure Installation Environment Plan (<b>SURF EP</b>) held with Santos and Munupi Clan at Pirlangimpi. Members from Wulirankuwu, Marrikawuyanga, Yimpinari, Mantiyupwi, Jikilaruwu, Wurankuwu and Malawu clans also attended. Also in attendance was an expert on turtles (the founder of a leading marine conservation biology and artificial light assessment consultancy).</p> <p>Consultation conducted pursuant to agreed script, prepared by Santos, and directed by PowerPoint presentation, prepared by Santos. Various video explanations were played and discussed. A Level 4 qualified interpreter from the Aboriginal Interpretation Services (<b>AIS</b>) was also present. Approximately 107 clan members attended this session, from the following clans:</p> <ul style="list-style-type: none"> <li>Wulirankuwu –1</li> <li>Marrikawuyanga – 3</li> <li>Yimpinari – 1</li> <li>Munupi – 90</li> </ul>

No.	Date	Action	Summary of Action
			<ul style="list-style-type: none"> <li>• Mantiyupwi – 4</li> <li>• Jikilaruwu – 3</li> <li>• Wurankuwu – 3</li> <li>• Malawu – 2</li> </ul> <p>Documents circulated at consultation included:</p> <ul style="list-style-type: none"> <li>• Agenda for Tiwi Islands April/May Consultation Sessions</li> <li>• D&amp;C EP Fact Sheet</li> <li>• Barossa Gas Project FAQs document</li> <li>• Notice of Consultation with Tiwi Islands People</li> <li>• Maps relating to the D&amp;C including:               <ul style="list-style-type: none"> <li>○ D&amp;C EP EMBA</li> <li>○ Barossa Project Overview</li> <li>○ Wells in Australia</li> </ul> </li> <li>• Privacy notice.</li> </ul>
81.	26 April 2023	One-on-one discussions	A Santos representative engaged in a one-on-one discussion with an attendee at the Munupi Clan consultation session. Santos has a record of this discussion.
82.	27 April 2023	Advertising	NT News half page advertisement published regarding Darwin drop-in sessions.
83.	27 April 2023	Darwin Community Engagement Session	Santos hosted an open drop-in consultation session at the Darwin Convention Centre. Four visitors attended.
84.	27 April 2023	Barossa Gas Project FAQ posted to Tiwi Islands Facebook Noticeboard	<p>Barossa Gas Project FAQs posted to the Tiwi Islands Facebook Noticeboard with the following wording:</p> <p><i>“We have received many great questions about the Barossa Gas Project. The answers provided in this document are intended to provide clear, summary responses to the questions we have received. This document will be updated on an ongoing basis during the development and delivery of the project as new questions are asked. We have copies of this document that we will share at the consultation sessions this week and next. You can also contact us at any time to request a copy of this document. We look forward to seeing you and answering more of your questions at the sessions.”</i></p>
85.	28 April 2023	Advertising	Half page advertisement published in NT News regarding Darwin drop-in sessions.
86.	28 April 2023 at ~10:30am	Consultation Session with Mantiyupwi Clan	<p>Tiwi Islands engagement and consultation meeting regarding the D&amp;C EP and SURF EP held with Santos and Mantiyupwi Clan at Wurrumiyanga (Nguui Club). Members from Wulirankuwu, Yimpinari, Jikilaruwu, Wurankuwu and Munupi clans also attended. In addition, an expert on turtles (the founder of a leading marine conservation biology and artificial light assessment consultancy) also attended.</p> <p>Consultation conducted pursuant to agreed script, prepared by Santos, and directed by PowerPoint presentation, prepared by Santos. Various video explanations were played and discussed.</p> <p>Approximately 105 clan members attended this session, from the following clans:</p> <ul style="list-style-type: none"> <li>• Wulirankuwu – 6</li> <li>• Yimpinari – 1</li> </ul>

No.	Date	Action	Summary of Action
			<ul style="list-style-type: none"> <li>• Munupi – 5</li> <li>• Mantiyupwi – 89</li> <li>• Jikilaruwu – 3</li> <li>• Wurankuwu – 1</li> </ul> <p>Documents circulated at consultation included:</p> <ul style="list-style-type: none"> <li>• Agenda for Tiwi Islands April/May Consultation Sessions</li> <li>• D&amp;C EP Fact Sheet</li> <li>• Notice of Consultation with Tiwi Islands People</li> <li>• Barossa Gas Project FAQs document</li> <li>• Maps relating to the D&amp;C including:               <ul style="list-style-type: none"> <li>○ D&amp;C EP EMBA</li> <li>○ Barossa Project Overview</li> <li>○ Wells in Australia</li> </ul> </li> <li>• Privacy notice.</li> </ul>
87.	28 April 2023 at ~1:00pm	Consultation Session with Jikilaruwu Clan	<p>Tiwi Islands engagement and consultation meeting regarding the D&amp;C EP and SURF EP held with Santos and Jikilaruwu Clan at Wurrumiyanga. Members from the Wulirankuwu, Yimpinari, Mantiyupwi, Wurankuwu, Munupi, and Malawu clans also attended. In addition, an expert on turtles (the founder of a leading marine conservation biology and artificial light assessment consultancy) was also present.</p> <p>Consultation conducted pursuant to agreed script, prepared by Santos, and directed by PowerPoint presentation, prepared by Santos. Various video explanations were played and discussed.</p> <p>Approximately 98 clan members attended this session, from the following clans:</p> <ul style="list-style-type: none"> <li>• Wulirankuwu – 1</li> <li>• Yimpinari – 2</li> <li>• Munupi – 4</li> <li>• Mantiyupwi – 2</li> <li>• Jikilaruwu – 83</li> <li>• Wurankuwu – 4</li> <li>• Malawu – 2</li> </ul> <p>Documents circulated at consultation included:</p> <ul style="list-style-type: none"> <li>• Agenda for Tiwi Islands April/May Consultation Sessions</li> <li>• D&amp;C EP Fact Sheet</li> <li>• Notice of Consultation with Tiwi Islands People</li> <li>• Barossa Gas Project FAQs document</li> <li>• Maps relating to the D&amp;C including:</li> </ul>

No.	Date	Action	Summary of Action
			<ul style="list-style-type: none"> <li>○ D&amp;C EP EMBA</li> <li>○ Barossa Project Overview</li> <li>○ Wells in Australia</li> <li>● Privacy notice.</li> </ul>
88.	1 May 2023	Advertising	NT News half page advertisement regarding Darwin drop-in sessions.
89.	1 May 2023	Noticeboard – re April / May consultation sessions with Tiwi Islanders	<p>Santos Notice of Consultation with respect to April / May 2023 consultations displayed on the Tiwi Islands Noticeboard, Santos’ website and at the Milikapiti shops.</p> <p>The Notice of Consultation included a QR code which provides access to further information on the Barossa project.</p>
90.	1 May 2023 (live until 5 May 2023)	Social Media Engagement	<p>Santos social media advertisement published on Facebook, Instagram, and Messenger, with target locations of Tiwi Islands and Darwin (including within a 60km radius).</p> <p>The advertisement advised of upcoming sessions on the Tiwi Islands and stated that at the sessions attendees will have an opportunity to provide feedback on the project.</p>
91.	3 May 2023	Upload to Santos website of information on Barossa Project and consultation process	Santos Barossa Drilling and Completions Information Booklet uploaded to Santos’ website.
92.	3 May 2023	Darwin Community Engagement Session	Santos hosted an open drop-in consultation session at the Darwin Convention Centre. Four visitors attended.
93.	4 May 2023 at ~10:30am	Consultation Session with Marrikawuyanga and Yimpinari Clans	<p>Tiwi Islands engagement and consultation meeting regarding the D&amp;C EP and SURF EP held with Santos and Marrikawuyanga, Yimpinari, Wulirankuwu, Malawu, Munupi, Mantiyupwi and Jikilaruwu clans at Milikapiti (Milikapiti Sport and Recreation Centre).</p> <p>Consultation conducted pursuant to agreed script, prepared by Santos, and directed by PowerPoint presentation, prepared by Santos. Various video explanations were played and discussed. A Level 4 qualified interpreter from AIS was also present.</p> <p>Approximately 161 clan members attended this session, from the following clans:</p> <ul style="list-style-type: none"> <li>● Wulirankuwu – 51</li> <li>● Marrikawuyanga – 5</li> <li>● Yimpinari – 49</li> <li>● Munupi – 32</li> <li>● Mantiyupwi – 11</li> <li>● Jikilaruwu – 3</li> <li>● Malawu – 10</li> </ul> <p>Documents circulated at consultation included:</p> <ul style="list-style-type: none"> <li>● Agenda for Tiwi Islands April Consultation Sessions</li> <li>● D&amp;C EP Fact Sheet</li> <li>● Notice of Consultation with Tiwi Islands People</li> </ul>

No.	Date	Action	Summary of Action
			<ul style="list-style-type: none"> <li>• Barossa Gas Project FAQs document</li> <li>• Maps relating to the D&amp;C including:               <ul style="list-style-type: none"> <li>○ D&amp;C EP EMBA</li> <li>○ Barossa Project Overview</li> <li>○ Wells in Australia</li> </ul> </li> <li>• Privacy notice.</li> </ul>
94.	4 May 2023 at ~1:00pm	Consultation Session with Wulirankuwu Clan	<p>Tiwi Islands engagement and consultation meeting regarding the D&amp;C EP and SURF EP held with Santos and the Wulirankuwu clan at Milikapiti (Milikapiti Sport and Recreation Centre).</p> <p>Consultation conducted pursuant to agreed script, prepared by Santos, and directed by PowerPoint presentation, prepared by Santos. Various video explanations were played and discussed. A Level 4 qualified interpreter from AIS was also present.</p> <p>Six members of the Wulirankuwu clan attended this session.</p> <p>Documents circulated at consultation included:</p> <ul style="list-style-type: none"> <li>• Agenda for Tiwi Islands April Consultation Sessions</li> <li>• D&amp;C EP Fact Sheet</li> <li>• Notice of Consultation with Tiwi Islands People</li> <li>• Barossa Gas Project FAQs document</li> <li>• Maps relating to the D&amp;C including:               <ul style="list-style-type: none"> <li>○ D&amp;C EP EMBA</li> <li>○ Barossa Project Overview</li> <li>○ Wells in Australia</li> </ul> </li> <li>• Privacy notice.</li> </ul>
95.	4 May 2023	One-on-one discussions	<p>Santos representatives also engaged in one-on-one discussions with attendees at the Marrikawuyanga, Yimpinari, and Wulirankuwu clan consultation sessions, which were separately noted by Santos. Santos has records of two such discussions.</p>
96.	5 May 2023 at ~10:30am	Consultation Session with Wurankuwu Clan	<p>Tiwi Islands engagement and consultation meeting regarding the D&amp;C EP and SURF EP held with Santos and the Wurankuwu clan at Wurrumiyanga (Nguiu Club). Yimpinari, Wulirankuwu, Malawu, Munupi, Mantiyupwi and Jikilaruwu clan members attended this session as well.</p> <p>Consultation conducted pursuant to agreed script, prepared by Santos, and directed by PowerPoint presentation, prepared by Santos. Various video explanations were played and discussed.</p> <p>Approximately 136 clan members attended this session, from the following clans:</p> <ul style="list-style-type: none"> <li>• Wulirankuwu – 12</li> <li>• Yimpinari – 9</li> <li>• Munupi – 5</li> <li>• Mantiyupwi – 6</li> <li>• Jikilaruwu – 16</li> </ul>

No.	Date	Action	Summary of Action
			<ul style="list-style-type: none"> <li>• Wurankuwu – 83</li> <li>• Malawu – 5</li> </ul> <p>Documents circulated at consultation included:</p> <ul style="list-style-type: none"> <li>• Agenda for Tiwi Islands April Consultation Sessions</li> <li>• D&amp;C EP Fact Sheet</li> <li>• Notice of Consultation with Tiwi Islands People</li> <li>• Barossa Gas Project FAQs document</li> <li>• Maps relating to the D&amp;C including:               <ul style="list-style-type: none"> <li>○ D&amp;C EP EMBA</li> <li>○ Barossa Project Overview</li> <li>○ Wells in Australia</li> </ul> </li> <li>• Privacy notice.</li> </ul>
97.	5 May 2023 at ~1:00pm	Consultation Session with Malawu Clan	<p>Tiwi Islands engagement and consultation meeting regarding the D&amp;C EP and SURF EP held with the Malawu clan at Wurrumiyanga (Nguiu Club). Marrikawuyanga, Yimpinari, Wulirankuwu, Malawu, Munupi, Mantiyupwi and Jikilaruwu clan members attended this session as well.</p> <p>Consultation conducted pursuant to agreed script, prepared by Santos, and directed by PowerPoint presentation, prepared by Santos. Various video explanations were played and discussed.</p> <p>Approximately 207 clan members attended this session, from the following clans:</p> <ul style="list-style-type: none"> <li>• Wulirankuwu – 17</li> <li>• Marrikawuyanga – 1</li> <li>• Yimpinari – 1</li> <li>• Munupi – 12</li> <li>• Mantiyupwi – 16</li> <li>• Jikilaruwu – 37</li> <li>• Malawu – 123</li> </ul> <p>Documents circulated at consultation included:</p> <ul style="list-style-type: none"> <li>• Agenda for Tiwi Islands April Consultation Sessions</li> <li>• D&amp;C EP Fact Sheet</li> <li>• Notice of Consultation with Tiwi Islands People</li> <li>• Barossa Gas Project FAQs document</li> <li>• Maps relating to the D&amp;C including:               <ul style="list-style-type: none"> <li>○ D&amp;C EP EMBA</li> <li>○ Barossa Project Overview</li> <li>○ Wells in Australia</li> </ul> </li> </ul>



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98.	5 May 2023	One-on-one discussions	Santos representatives also engaged in one-on-one discussions and discussions in small groups with attendees at the Malawu and Wulirankuwu clan consultation sessions, which were separately noted by Santos. Santos has records of four such discussions.																																													
99.	12 May 2023 (live until 16 June 2023)	Social Media Engagement	Santos social media advertisement published on Facebook, Instagram, and Messenger, with target locations of Tiwi Islands and Darwin (including within a 60km radius). Advertisement advised of upcoming sessions on 13-16 June 2023 on the Tiwi Islands.																																													
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102.	13 May 2023	Advertising	Full page advertisement in NT News regarding June Tiwi Islands consultation sessions.																																													
103.	14 May 2023	Advertising	<p>During the week commencing 14 May 2023, a 30-second advertisement publicising the consultation was played on the following stations:</p> <table border="1"> <thead> <tr> <th>Station</th> <th>Location</th> <th>Number of times played</th> </tr> </thead> <tbody> <tr> <td>Darwin   HOT100</td> <td>Darwin</td> <td>16</td> </tr> <tr> <td>BONUS HOT100</td> <td>Darwin</td> <td>3</td> </tr> <tr> <td colspan="3"> </td> </tr> <tr> <td>Darwin   MIX1049</td> <td>Darwin</td> <td>16</td> </tr> <tr> <td>BONUS MIX1049</td> <td>Darwin</td> <td>3</td> </tr> <tr> <td colspan="3"> </td> </tr> <tr> <td>Tiwi Islands Local Radio   29 local communities</td> <td>Tiwi Islands</td> <td>16</td> </tr> <tr> <td colspan="3"> </td> </tr> <tr> <td>Sydney   KIIS 1065</td> <td>Sydney</td> <td>8</td> </tr> <tr> <td>BONUS KIIS 1065</td> <td>Sydney</td> <td>4</td> </tr> <tr> <td colspan="3"> </td> </tr> <tr> <td>Melbourne   KISS 101.1</td> <td>Melbourne</td> <td>8</td> </tr> <tr> <td>BONUS KISS 101.1</td> <td>Melbourne</td> <td>4</td> </tr> <tr> <td colspan="3"> </td> </tr> </tbody> </table>	Station	Location	Number of times played	Darwin   HOT100	Darwin	16	BONUS HOT100	Darwin	3				Darwin   MIX1049	Darwin	16	BONUS MIX1049	Darwin	3				Tiwi Islands Local Radio   29 local communities	Tiwi Islands	16				Sydney   KIIS 1065	Sydney	8	BONUS KIIS 1065	Sydney	4				Melbourne   KISS 101.1	Melbourne	8	BONUS KISS 101.1	Melbourne	4			
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104.	15 May 2023	Advertising	Half page advertisement in NT News regarding Darwin drop-in consultation sessions published.																																																																					
105.	17 May 2023	Advertising	The following advertisements were published/broadcasted:																																																																					

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106.	17 May 2023 (live until 12 June 2023)	Social Media Engagement	Santos social media advertisement published on Facebook, Instagram, and Messenger. Advertisement advised of community consultation drop-in sessions in Darwin in May and June 2023.															
107.	18 May 2023 8:30am – 11:30am	Darwin Pop Up Stand	Santos established a pop-up stand in Darwin’s Smith Street Mall. Sixteen people attended, including seven individuals from the Tiwi Islands.															
108.	18 May 2023	Advertising	The following advertisements were published/broadcasted: <ul style="list-style-type: none"> <li>Half page advertisement in NT News regarding D&amp;C EP open consultations</li> <li>Public notice in Australian Financial Review regarding D&amp;C EP open consultations.</li> </ul>															
109.	19 May 2023	Advertising	Half page advertisement in NT News regarding D&C EP open consultations.															
110.	19 May 2023	Santos email consultation	Santos emailed Tiwi Land Council providing a link to NOPSEMA’s website document: <i>Consultation in the course of preparing an Environment Plan.</i>															
111.	20 May 2023	Advertising	The following advertisements were published: <ul style="list-style-type: none"> <li>Full page advertisement in NT News regarding Tiwi Islands June consultation sessions</li> <li>Half page advertisement in The West Australian regarding D&amp;C EP open consultations</li> <li>Half page advertisement in The Australian regarding D&amp;C EP open consultations.</li> </ul>															
112.	21 May 2023	Advertising	<p>During the week commencing 22 May 2023, a 30-second advertisement publicising the consultation was played on the following stations:</p> <table border="1"> <thead> <tr> <th>Station</th> <th>Location</th> <th>Number of times played</th> </tr> </thead> <tbody> <tr> <td>Darwin   HOT100</td> <td>Darwin</td> <td>33</td> </tr> <tr> <td>Darwin   MIX1049</td> <td>Darwin</td> <td>33</td> </tr> <tr> <td>Tiwi Islands Local Radio   29 local communities</td> <td>Tiwi Islands</td> <td>28</td> </tr> <tr> <td>Sydney   KIIS 1065</td> <td>Sydney</td> <td>21</td> </tr> </tbody> </table>	Station	Location	Number of times played	Darwin   HOT100	Darwin	33	Darwin   MIX1049	Darwin	33	Tiwi Islands Local Radio   29 local communities	Tiwi Islands	28	Sydney   KIIS 1065	Sydney	21
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113.	22 May 2023	Advertising	<p>The following advertisements were published:</p> <ul style="list-style-type: none"> <li>• Half page advertisement in NT News regarding Darwin drop-in sessions</li> <li>• Half page advertisement in Australian Financial Review regarding D&amp;C EP open consultations.</li> </ul>																																																			
114.	22 May 2023	Darwin Community Engagement Session	Santos hosted an open drop-in consultation session at the Darwin Convention Centre. Two people attended.																																																			
115.	23 May 2023 (live until 15 June)	Social Media Engagement	<p>Santos social media advertisement published on Facebook, Instagram, and Messenger.</p> <p>The advertisement sought recipients who consider that they may be a Relevant Person to provide feedback about the D&amp;C EP by 15 June 2023.</p>																																																			
116.	24 May 2023	Advertising	Half page advertisement in NT News regarding Darwin drop-in sessions published.																																																			
117.	26 May 2023	Advertising	Half page advertisement published in NT News regarding D&C EP open consultations.																																																			

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118.	27 May 2023	Advertising	<p>The following advertisements were published:</p> <ul style="list-style-type: none"> <li>• NT News full page advertisement regarding Tiwi Islands June 2023 consultation sessions</li> <li>• Half page advertisement in The West Australian regarding D&amp;C EP open consultations</li> <li>• Half page advertisement in The Australian regarding D&amp;C EP open consultations.</li> </ul>																																	
119.	28 May 2023	Advertising	<p>During the week commencing 29 May 2023, a 30-second advertisement publicising the consultation was played on the following stations:</p> <table border="1"> <thead> <tr> <th>Station</th> <th>Location</th> <th>Number of times played</th> </tr> </thead> <tbody> <tr> <td>Darwin   HOT100</td> <td>Darwin</td> <td>33</td> </tr> <tr> <td>BONUS HOT100</td> <td>Darwin</td> <td></td> </tr> <tr> <td>Darwin   MIX1049</td> <td>Darwin</td> <td>33</td> </tr> <tr> <td>Tiwi Islands Local Radio   29 local communities</td> <td>Tiwi Islands</td> <td>28</td> </tr> <tr> <td>Sydney   KIIS 1065</td> <td>Sydney</td> <td>21</td> </tr> <tr> <td>Melbourne   KIIS 101.1</td> <td>Melbourne</td> <td>21</td> </tr> <tr> <td>Brisbane   97.3FM</td> <td>Brisbane</td> <td>21</td> </tr> <tr> <td>Adelaide   MIX 102.3</td> <td>Adelaide</td> <td>21</td> </tr> <tr> <td>Perth   96FM</td> <td>Perth</td> <td>42</td> </tr> <tr> <td>Sydney   NOVA 96.9</td> <td>Sydney</td> <td>20</td> </tr> </tbody> </table>	Station	Location	Number of times played	Darwin   HOT100	Darwin	33	BONUS HOT100	Darwin		Darwin   MIX1049	Darwin	33	Tiwi Islands Local Radio   29 local communities	Tiwi Islands	28	Sydney   KIIS 1065	Sydney	21	Melbourne   KIIS 101.1	Melbourne	21	Brisbane   97.3FM	Brisbane	21	Adelaide   MIX 102.3	Adelaide	21	Perth   96FM	Perth	42	Sydney   NOVA 96.9	Sydney	20
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120.	29 May 2023	Advertising	<p>The following advertisements were published/broadcasted:</p> <ul style="list-style-type: none"> <li>• Half page advertisement in NT News regarding Darwin Drop-in sessions</li> <li>• Half page advertisement in Australian Financial Review regarding D&amp;C EP open consultations.</li> </ul>												
121.	29 May 2023	Santos email consultation	Santos emailed Tiwi Land Council a project fact sheet.												
122.	30 May 2023	Advertising	Public notice published in NT News regarding D&C EP Relevant Persons.												
123.	31 May 2023	Darwin Community Engagement Session	Santos hosted pop-up stalls providing information at Arts in the Grass (arts market), Darwin. Approximately 30 people attended.												
124.	31 May 2023	Advertising	Half page advertisement in NT News regarding Darwin drop-in sessions.												
125.	2 June 2023	Advertising	Half page advertisement in NT News regarding D&C EP open consultations.												
126.	3 June 2023	Advertising	<p>The following advertisements were published:</p> <p>Half page advertisement in The West Australian regarding D&amp;C EP open consultations</p> <p>Half page advertisement in The Australian regarding D&amp;C EP open consultations.</p>												
127.	4 June 2023	Advertising	<p>During the week commencing 5 June 2023, a 30-second advertisement publicising the consultation was played on the following stations:</p> <table border="1"> <thead> <tr> <th>Station</th> <th>Location</th> <th>Number of times played</th> </tr> </thead> <tbody> <tr> <td>Darwin   HOT100</td> <td>Darwin</td> <td>33</td> </tr> <tr> <td>Darwin   MIX1049</td> <td>Darwin</td> <td>33</td> </tr> </tbody> </table>	Station	Location	Number of times played	Darwin   HOT100	Darwin	33	Darwin   MIX1049	Darwin	33			
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			Brisbane   NOVA 106.9	Brisbane	20
			Adelaide   NOVA 91.9	Adelaide	20
			Perth   NOVA 93.7	Perth	37
128.	5 June 2023	Advertising	<p>The following advertisements were published:</p> <ul style="list-style-type: none"> <li>• Half page advertisement in NT News regarding Darwin drop-in sessions</li> <li>• Half page advertisement in Australian Financial Review regarding the D&amp;C EP Relevant Persons feedback.</li> </ul>		

No.	Date	Action	Summary of Action																								
129.	7 June 2023	Advertising	Half page advertisement in NT News regarding Darwin drop-in sessions published.																								
130.	8 June 2023	Darwin Community Engagement Session	Santos hosted an open drop-in consultation session at the Darwin Convention Centre. Six people attended.																								
131.	9 June 2023	Darwin Community Engagement Session	Santos hosted a pop-up stand at Darwin Mall. Five people attended.																								
132.	9 June 2023	Advertising	Half page advertisement in NT News regarding D&C EP open consultations published.																								
133.	10 June 2023	Advertising	The following advertisements were published: <ul style="list-style-type: none"> <li>• Half page advertisement in The West Australian regarding D&amp;C EP open consultations</li> <li>• Half page advertisement in The Australian regarding D&amp;C EP open consultations</li> <li>• Full page advertisement in NT News regarding June 2023 consultations.</li> </ul>																								
134.	12 June 2023	Advertising	<p>During the week commencing 12 June 2023, a 30-second advertisement publicising the consultation was played on the following stations:</p> <table border="1"> <thead> <tr> <th colspan="2">Station</th> <th>Number of times played</th> </tr> </thead> <tbody> <tr> <td>Darwin   HOT100</td> <td>Darwin</td> <td>24</td> </tr> <tr> <td>Darwin   MIX1049</td> <td>Darwin</td> <td>24</td> </tr> <tr> <td>Tiwi Islands Local Radio   29 local communities</td> <td>Tiwi Islands</td> <td>28</td> </tr> <tr> <td>Sydney   KIIS 1065</td> <td>Sydney</td> <td>15</td> </tr> <tr> <td>Melbourne   KIIS 101.1</td> <td>Melbourne</td> <td>15</td> </tr> <tr> <td>Brisbane   97.3FM</td> <td>Brisbane</td> <td>15</td> </tr> <tr> <td>Adelaide   MIX 102.3</td> <td>Adelaide</td> <td>15</td> </tr> </tbody> </table>	Station		Number of times played	Darwin   HOT100	Darwin	24	Darwin   MIX1049	Darwin	24	Tiwi Islands Local Radio   29 local communities	Tiwi Islands	28	Sydney   KIIS 1065	Sydney	15	Melbourne   KIIS 101.1	Melbourne	15	Brisbane   97.3FM	Brisbane	15	Adelaide   MIX 102.3	Adelaide	15
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135.	13 June 2023	Advertising	Half page advertisement published in Australian Financial Review regarding D&C EP open consultations.																		
136.	13 June 2023 at ~10.30am	Consultation session with Marrikawuyanga and Yimpinari clans	<p>Tiwi Islands Engagement and Consultation regarding the D&amp;C EP and SURF EP with Wulirankuwu, Marrikawuyanga, Yimpinari, Munupi, Mantiyupwi, Jikilaruwu, Malawu clans at Milikapiti (Milikapiti Sport and Recreation Centre) (Melville Island).</p> <p>Consultation conducted pursuant to agreed script, prepared by Santos, and directed by PowerPoint presentation, prepared by Santos. Various video explanations were played and discussed. An independent interpreter from AIS was present.</p> <p>Approximately 193 clan members attended this session, from the following clans:</p> <ul style="list-style-type: none"> <li>• Wulirankuwu – 51</li> <li>• Marrikawuyanga – 6</li> <li>• Yimpinari – 53</li> <li>• Munupi – 36</li> <li>• Mantiyupwi – 25</li> <li>• Jikilaruwu – 8</li> <li>• Malawu – 14</li> </ul> <p>Documents circulated at the consultation session included:</p> <ul style="list-style-type: none"> <li>• Agenda for Tiwi Islands June Consultation Meetings</li> <li>• Barossa Gas Project Frequently Asked Questions</li> <li>• D&amp;C EP Fact Sheet</li> </ul>																		

No.	Date	Action	Summary of Action
			<ul style="list-style-type: none"> <li>• NOPSEMA Consultation on Offshore Petroleum Environment Plans: Information for the Community</li> <li>• Notice of Consultation with Tiwi Islands People</li> <li>• Tiwi Resources Attendance Form</li> <li>• Maps relating to the D&amp;C EP including:               <ul style="list-style-type: none"> <li>○ D&amp;C EP EMBA</li> <li>○ Vessel tracking</li> </ul> </li> <li>• Privacy notice.</li> </ul>
137.	13 June 2023 at ~1.00pm	Consultation session with Wulirankuwu clan	<p>Tiwi Islands Engagement and Consultation regarding the D&amp;C EP and SURF EP with Wulirankuwu, Marrikawuyanga, Yimpinari, Wurankuwu and Malawu clans at Milikapiti (Milikapiti Sport and Recreation Centre) (Melville Island).</p> <p>Consultation conducted pursuant to agreed script, prepared by Santos, and directed by PowerPoint presentation, prepared by Santos. Various video explanations were played and discussed. An independent interpreter from AIS was present.</p> <p>Seventeen clan members attended this session, from the following clans:</p> <ul style="list-style-type: none"> <li>• Wulirankuwu – 10</li> <li>• Marrikawuyanga – 2</li> <li>• Yimpinari – 1</li> <li>• Wurankuwu – 1</li> <li>• Malawu – 3</li> </ul> <p>Documents circulated at the consultation session included:</p> <ul style="list-style-type: none"> <li>• Agenda for Tiwi Islands June Consultation Meetings</li> <li>• Barossa Gas Project Frequently Asked Questions</li> <li>• D&amp;C EP Fact Sheet</li> <li>• NOPSEMA Consultation on Offshore Petroleum Environment Plans: Information for the Community</li> <li>• Notice of Consultation with Tiwi Islands People</li> <li>• Tiwi Resources Attendance Form</li> <li>• Maps relating to the D&amp;C EP including:               <ul style="list-style-type: none"> <li>○ D&amp;C EP EMBA</li> <li>○ Vessel tracking</li> </ul> </li> <li>• Privacy notice.</li> </ul>
138.	13 June 2023	One on one discussion at consultation session on Tiwi Islands	<p>A representative from Santos had a conversation with two individuals from the Tiwi Islands regarding the potential impacts to marine fauna from Barossa activities, in particular, from a hydrocarbon spill. The Santos representative explained the controls that were intended to be put in place to prevent these impacts. One of the individuals commented that the materials that Santos had provided were understood and that they had no residual concerns about Santos' proposed activity.</p>

No.	Date	Action	Summary of Action
139.	13 June 2023	One on one discussion at consultation session on Tiwi Islands	A representative from Santos had a conversation with an individual from the Tiwi Islands who was interested in how far away the Barossa Project was from the Tiwi Islands. The individual expressed surprise at how far away it was at 140km north. A further discussion occurred regarding some of the environmental risks of the Barossa Project including risks to marine fauna from a hydrocarbon spill. The Santos representative explained the controls which Santos intended to put in place to manage these risks and how the regulator will assess these controls and will only approve the D&C EP if it considers the controls appropriate.
140.	13 June 2023 at 9:35pm	One-on-one discussion at consultation session on Tiwi Islands	A Santos representative had a conversation with a person from the Yimpinari clan regarding the potential impacts of the Barossa Project, following the community consultation session held on the same day. The discussion focused on the possible effects of a vessel collision which may result in the release of marine diesel oil, and how this could impact the marine fauna, along with the controls in place under the D&C EP to prevent such a situation.
141.	14 June 2023 at ~10.30am	Consultation session with Mantiyupwi clan	<p>Tiwi Islands Engagement and Consultation regarding the D&amp;C EP and SURF EP with Wulirankuwu, Yimpinari, Munupi, Mantiyupwi, Jikilaruwu, Wurankuwu, Malawu clans at Wurrumiyanga (Mantiyupwi Motel, Bathurst Island).</p> <p>Consultation conducted pursuant to agreed script, prepared by Santos, and directed by PowerPoint presentation, prepared by Santos. Various video explanations were played and discussed. An independent interpreter from AIS was present.</p> <p>Approximately 42 clan members attended this session, from the following clans:</p> <ul style="list-style-type: none"> <li>• Wulirankuwu – 2</li> <li>• Yimpinari –6</li> <li>• Munupi – 4</li> <li>• Mantiyupwi – 20</li> <li>• Jikilaruwu – 2</li> <li>• Wurankuwu – 2</li> <li>• Malawu – 6</li> </ul> <p>Documents circulated at consultation included:</p> <ul style="list-style-type: none"> <li>• Agenda for Tiwi Islands June Consultation Meetings</li> <li>• Barossa Gas Project Frequently Asked Questions</li> <li>• D&amp;C EP Fact Sheet</li> <li>• NOPSEMA Consultation on Offshore Petroleum Environment Plans: Information for the Community</li> <li>• Notice of Consultation with Tiwi Islands People</li> <li>• Tiwi Resources Attendance Form</li> <li>• Maps relating to the D&amp;C EP including: <ul style="list-style-type: none"> <li>○ D&amp;C EP EMBA</li> <li>○ Vessel tracking</li> </ul> </li> <li>• Privacy notice.</li> </ul>
142.	14 June 2023 at ~1.00pm	Consultation session with Jikilaruwu clan	<p>Tiwi Islands Engagement and Consultation regarding the D&amp;C EP and SURF EP with Wulirankuwu, Yimpinari, Munupi, Mantiyupwi, Jikilaruwu, Wurankuwu and Malawu clans at Wurrumiyanga (Mantiyupwi Motel) (Bathurst Island).</p> <p>Consultation conducted pursuant to agreed script, prepared by Santos, and directed by PowerPoint presentation, prepared by Santos. Various video explanations were played and discussed. An independent interpreter from AIS was present.</p>

No.	Date	Action	Summary of Action
			<p>Approximately 126 clan members attended this session, from the following clans:</p> <ul style="list-style-type: none"> <li>• Wulirankuwu – 8</li> <li>• Yimpinari – 5</li> <li>• Munupi – 6</li> <li>• Mantiyupwi – 7</li> <li>• Jikilaruwu – 80</li> <li>• Wurankuwu – 3</li> <li>• Malawu – 17</li> </ul> <p>Documents circulated at consultation included:</p> <ul style="list-style-type: none"> <li>• Agenda for Tiwi Islands June Consultation Meetings</li> <li>• Barossa Gas Project Frequently Asked Questions</li> <li>• D&amp;C EP Fact Sheet</li> <li>• NOPSEMA Consultation on Offshore Petroleum Environment Plans: Information for the Community</li> <li>• Notice of Consultation with Tiwi Islands People</li> <li>• Tiwi Resources Attendance Form</li> <li>• Maps relating to the D&amp;C EP including: <ul style="list-style-type: none"> <li>○ D&amp;C EP EMBA</li> <li>○ Vessel tracking</li> </ul> </li> <li>• Privacy notice.</li> </ul>
143.	14 June 2023	One on one discussion at consultation session on Tiwi Islands	<p>A representative from Santos had a discussion with a representative from the Tiwi Rangers who asked how far below the sea surface Santos intended to drill. The Santos representative confirmed that the drill goes down to a depth of 4km below the sea surface. The representative from the Tiwi Rangers was interested in understanding whether the wells could cause tremors (seismic activity). The Santos representative confirmed that there is no record of oil and gas wells causing seismic activity.</p> <p>The representative from the Tiwi Rangers told the Santos representative about work the Tiwi Rangers have been undertaking to monitor marine turtles. They talked about the potential for Santos to work with the Tiwi Rangers on some conservative initiatives in relation to turtles in the future.</p>
144.	15 June 2023 at ~10.30am	Consultation session with Wurankuwu clan	<p>Tiwi Islands Engagement and Consultation regarding the D&amp;C EP and SURF EP with Wulirankuwu, Marrikawuyanga, Yimpinari, Munupi, Mantiyupwi, Jikilaruwu, Wurankuwu, Malawu clans at Wurrumiyanga (Mantiyupwi Motel) (Bathurst Island).</p> <p>Consultation conducted pursuant to agreed script, prepared by Santos, and directed by PowerPoint presentation, prepared by Santos. Various video explanations were played and discussed. An independent interpreter from AIS was present.</p> <p>Approximately 77 clan members attended this session, from the following clans:</p> <ul style="list-style-type: none"> <li>• Wulirankuwu – 3</li> <li>• Marrikawuyanga – 1</li> <li>• Yimpinari – 4</li> <li>• Munupi – 3</li> </ul>

No.	Date	Action	Summary of Action
			<ul style="list-style-type: none"> <li>• Mantiyupwi – 2</li> <li>• Jikilaruwu – 11</li> <li>• Wurankuwu – 22</li> <li>• Malawu – 31</li> </ul> <p>Documents circulated at consultation included:</p> <ul style="list-style-type: none"> <li>• Agenda for Tiwi Islands June Consultation Meetings</li> <li>• Barossa Gas Project Frequently Asked Questions</li> <li>• D&amp;C EP Fact Sheet</li> <li>• NOPSEMA Consultation on Offshore Petroleum Environment Plans: Information for the Community</li> <li>• Notice of Consultation with Tiwi Islands People</li> <li>• Tiwi Resources Attendance Form</li> <li>• Maps relating to the D&amp;C EP including:               <ul style="list-style-type: none"> <li>○ D&amp;C EP EMBA</li> <li>○ Vessel tracking</li> </ul> </li> <li>• Privacy notice.</li> </ul>
145.	15 June 2023 at ~1.00pm	Consultation session with Malawu clan	<p>Tiwi Islands Engagement and Consultation regarding the D&amp;C EP and SURF EP with Wulirankuwu, Munupi, Jikilaruwu, Wurankuwu, Malawu clans at Wurrumiyanga (Mantiyupwi Motel) (Bathurst Island).</p> <p>Consultation conducted pursuant to agreed script, prepared by Santos, and directed by PowerPoint presentation, prepared by Santos. Various video explanations were played and discussed. An independent interpreter from AIS was present.</p> <p>Approximately 84 clan members attended this session, from the following clans:</p> <ul style="list-style-type: none"> <li>• Wulirankuwu – 5</li> <li>• Munupi – 4</li> <li>• Jikilaruwu – 6</li> <li>• Wurankuwu – 11</li> <li>• Malawu – 58</li> </ul> <p>Documents circulated at consultation included:</p> <ul style="list-style-type: none"> <li>• Agenda for Tiwi Islands June Consultation Meetings</li> <li>• Barossa Gas Project Frequently Asked Questions</li> <li>• D&amp;C EP Fact Sheet</li> <li>• NOPSEMA Consultation on Offshore Petroleum Environment Plans: Information for the Community</li> <li>• Notice of Consultation with Tiwi Islands People</li> <li>• Tiwi Resources Attendance Form</li> <li>• Maps relating to the D&amp;C EP including:</li> </ul>

No.	Date	Action	Summary of Action
			<ul style="list-style-type: none"> <li>○ D&amp;C EP EMBA</li> <li>○ Vessel tracking</li> <li>● Privacy notice.</li> </ul>
146.	15 June 2023	One on one discussion at consultation session on Tiwi Islands	A representative from Santos had a discussion with two individuals from the Tiwi Islands regarding the location of the drilling site and the potential benefits for locals from the Barossa Project. The representative from Santos explained the drilling site locations by reference to a project map and explained that another Santos representative would be able to assist with a further discussion regarding the benefits and employment opportunities for locals.
147.	15 June 2023	One on one discussion at consultation session on Tiwi Islands	<p>A representative from Santos had a discussion with three individuals from the Tiwi Islands regarding concerns about environmental impact of the Barossa Project generally. The Santos representative explained that Santos plans to install wells and infrastructure about 140km from Seagull Island, discussed how the EMBA is generated from modelling and discussed the risks and controls associated with a spill of diesel into the marine environment from a vessel collision.</p> <p>The individuals from the Tiwi Islands asked whether they would be able to see the pipeline and pipelay activity. The representative from Santos explained that the Tiwi Islanders would not be able to see the pipeline due to the depth and that they would be able to see the lights from installation vessels for about a month during the pipelay activity.</p> <p>The individuals from the Tiwi Islands also asked whether they had the opportunity to provide a yes or no answer to consent to the activity or not. The representative from Santos explained that the purpose of consultation was not to seek a yes or no answer and also explained how the questions and feedback would be used to build the D&amp;C EP.</p>
148.	15 June 2023	One on one discussion at consultation session on Tiwi Islands	A representative from Santos had a discussion with an individual from the Tiwi Islands relating to a release of marine diesel to the ocean and whether that release would impact the sea country. The individual took copies of the D&C fact sheet, FAQ document and NOPSEMA consultation guideline and said that they would discuss this information with their clan group and provide feedback.
149.	15 June 2023	One on one discussion at consultation session on Tiwi Islands	A representative from Santos had a discussion with an individual from the Tiwi Islands regarding community jobs and programs. The individual suggested that Santos should have a male and female within each clan group to act as liaison. The individual suggested it might make sharing information a little bit easier if there was a male and female from each clan who could share that information and talk to the people about attending meetings and their participation in the process.
150.	16 June 2023 at ~11.00am	Consultation session with Munupi clan	<p>Tiwi Islands Engagement and Consultation regarding the D&amp;C EP and SURF EP with Wulirankuwu, Yimpinari, Munupi, Mantiyupwi, Jikilaruwu, Wurankuwu, Malawu at Pirlangimpi (Pirlangimpi Sports and Social Club, Melville Island).</p> <p>Consultation conducted pursuant to agreed script, prepared by Santos, and directed by PowerPoint presentation, prepared by Santos. Various video explanations were played and discussed. An independent interpreter from AIS was present.</p> <p>Approximately 140 clan members attended this session, from the following clans:</p> <ul style="list-style-type: none"> <li>● Wulirankuwu – 4</li> <li>● Yimpinari – 3</li> <li>● Munupi – 110</li> <li>● Mantiyupwi – 6</li> <li>● Jikilaruwu – 2</li> <li>● Wurankuwu – 6</li> <li>● Malawu – 9</li> </ul> <p>Documents circulated at consultation included:</p>

No.	Date	Action	Summary of Action
			<ul style="list-style-type: none"> <li>• Agenda for Tiwi Islands June Consultation Meetings</li> <li>• Barossa Gas Project Frequently Asked Questions</li> <li>• D&amp;C EP Fact Sheet</li> <li>• NOPSEMA Consultation on Offshore Petroleum Environment Plans: Information for the Community</li> <li>• Notice of Consultation with Tiwi Islands People</li> <li>• Tiwi Resources Attendance Form</li> <li>• Maps relating to the D&amp;C EP including:               <ul style="list-style-type: none"> <li>○ D&amp;C EP EMBA</li> <li>○ Vessel tracking</li> </ul> </li> <li>• Privacy notice.</li> </ul>
151.	16 June 2023	One on one discussion at consultation session on Tiwi Islands	<p>A representative from Santos had a discussion with two individuals from the Tiwi Islands regarding the position of the pipeline and whether that would be close enough to impact where people go fishing. The Santos representative explained the location of the pipeline off the coast of the Tiwi Islands and the depth to which that would be lowered. The representative advised that based on this it would be unlikely to impact people going fishing for example, where people may anchor to go fishing as people were more likely to fish around the reefs closer to the shore.</p> <p>The individuals from the Tiwi Islands were also interested in the consultation process. The Santos representative explained that Santos was there to provide them with information about how Santos would build and install equipment and wanted to give them information on how equipment would be installed safely according to codes and standards.</p>

**List of Materials - Tiwi Islands Consultations**

The following table sets out the materials relevant to the D&C EP provided, or shown, to Tiwi Islanders as Relevant Persons throughout the Barossa Gas Project consultation process.

Month	D&C EP materials provided or shown during consultation sessions
February 2023	February Consultation Meeting 1. Agenda 2. Barossa Project Overview Map
March 2023	March Consultation Meeting 1. Agenda 2. Santos Privacy Notice 3. API Gravity Montara and Barossa Poster 4. Consult Record Template 5. Barossa Project Poster - Drilling Specific 6. Santos Barossa March Notice of Consultation 7. Updated Barossa Project Overview poster 8. D&C EP Fact Sheet 9. Barossa Drilling Impact and Risks poster 10. Drilling Activity Focus with Worst Case Drilling EMBA poster 11. March Consultation Session PowerPoint presentation, including: <ul style="list-style-type: none"> <li>a. Introduction video</li> <li>b. Vessel tracking map/animation</li> <li>c. Storm waves animation</li> <li>d. Oil and condensate video</li> <li>e. Pipelay animation</li> <li>f. Barossa Project Overview video</li> <li>g. D&amp;C project map</li> <li>h. Drilling animation</li> <li>i. Drilling Risk and Controls video</li> </ul>
April / May 2023	April/May Consultation Meeting 1. Agenda 2. Santos Privacy Notice (reused from March consultation sessions) 3. API Gravity Montara and Barossa Poster (reused from March consultation sessions)



Month	D&C EP materials provided or shown during consultation sessions
	<ol style="list-style-type: none"> <li>4. Consult Record Template (reused from March consultation sessions)</li> <li>5. Barossa Gas Project Frequently Asked Questions (FAQs) document</li> <li>6. Barossa Project Poster - Drilling Specific Poster (reused from March consultation sessions)</li> <li>7. Santos Barossa Notice of Consultation</li> <li>8. Barossa Project Overview Poster (reused from March consultation sessions)</li> <li>9. D&amp;C EP Fact Sheet (reused from March consultation sessions)</li> <li>10. Barossa Drilling Impact and Risks Poster (reused from March consultation sessions)</li> <li>11. Updated Drilling and Completions (D&amp;C) EMBA poster</li> <li>12. April/May Consultation Session PowerPoint presentation, including:               <ol style="list-style-type: none"> <li>a. Introduction videos</li> <li>b. Barossa Project Overview video</li> <li>c. NOPSEMA Spill Response video</li> <li>d. Condensate vs Oil video</li> <li>e. Bonaparte offshore wells map</li> <li>f. Drilling Risk and Controls video</li> <li>g. D&amp;C EMBA Map</li> <li>h. SURF Overview video</li> <li>i. SURF Risks and Controls video</li> <li>j. SURF EMBA Map</li> </ol> </li> </ol>
<p><b>June 2023</b></p>	<p>June Consultation Meeting</p> <ol style="list-style-type: none"> <li>1. Agenda</li> <li>2. Santos Privacy Notice (reused from March and April/May consultation sessions)</li> <li>3. API Gravity Montara and Barossa Poster (reused from March and April/May consultation sessions)</li> <li>4. Consult Record Template (reused from March and April/May consultation sessions)</li> <li>5. Updated Barossa Gas Project Frequently Asked Questions (FAQs) document</li> <li>6. Barossa Project Poster - Drilling Specific Poster (reused from March and April/May consultation sessions)</li> <li>7. Updated Santos Barossa Notice of Consultation</li> <li>8. Barossa Project Overview Poster (reused from March and April/May consultation sessions)</li> <li>9. D&amp;C EP Fact Sheet (reused from March and April/May consultation sessions)</li> <li>10. Barossa Drilling Impact and Risks Poster (reused from March and April/May consultation sessions)</li> <li>11. Drilling and Completions (D&amp;C) EMBA Poster (reused from April/May consultation sessions)</li> <li>12. NOPSEMA Consultation on Offshore Petroleum Environment Plans: Information for the Community brochure (front page only)</li> </ol>

Month	D&C EP materials provided or shown during consultation sessions
	<p>13. Drilling &amp; Completions EP – Consultation Feedback Summary Table with Pictures</p> <p>14. June Consultation Session PowerPoint presentation, including:</p> <ul style="list-style-type: none"> <li>a. Introduction videos</li> <li>b. Barossa Project Overview video</li> <li>c. D&amp;C EMBA map</li> <li>d. Vessel tracking map/animation</li> <li>e. Drilling &amp; Completions EP – Consultation Feedback</li> <li>f. SURF Overview video</li> <li>g. Pipeline images</li> <li>h. SURF images</li> <li>i. SURF Risks and Controls video</li> </ul>

# List of Materials - Tiwi Island Consultations

## Santos – Barossa Gas Project

### February 2023

#### February Consultation Meeting Agenda



#### Santos Consultation Meeting Barossa Gas Development Project

##### Purpose

Santos is committed to developing strong, mutually beneficial relationships with communities where we operate. Your feedback is important to achieving this. This session will:

- provide an opportunity for you and your community to hear more about the Barossa project and ask questions
- explain the underwater cultural heritage assessment and the opportunities you will have in coming days and weeks to provide your information
- seek your feedback on how you want us to consult with you and how we work together going forward.

We want to build trust and partnerships to benefit your community.

##### Timing and venues

Monday, 6 February, 10.30am- 3.30pm – Milikapiti Sport & Recreation Centre (Melville Island)

Tuesday, 7 February, 10.30am- 3.30-pm – Pirlangimpi Club (Melville Island)

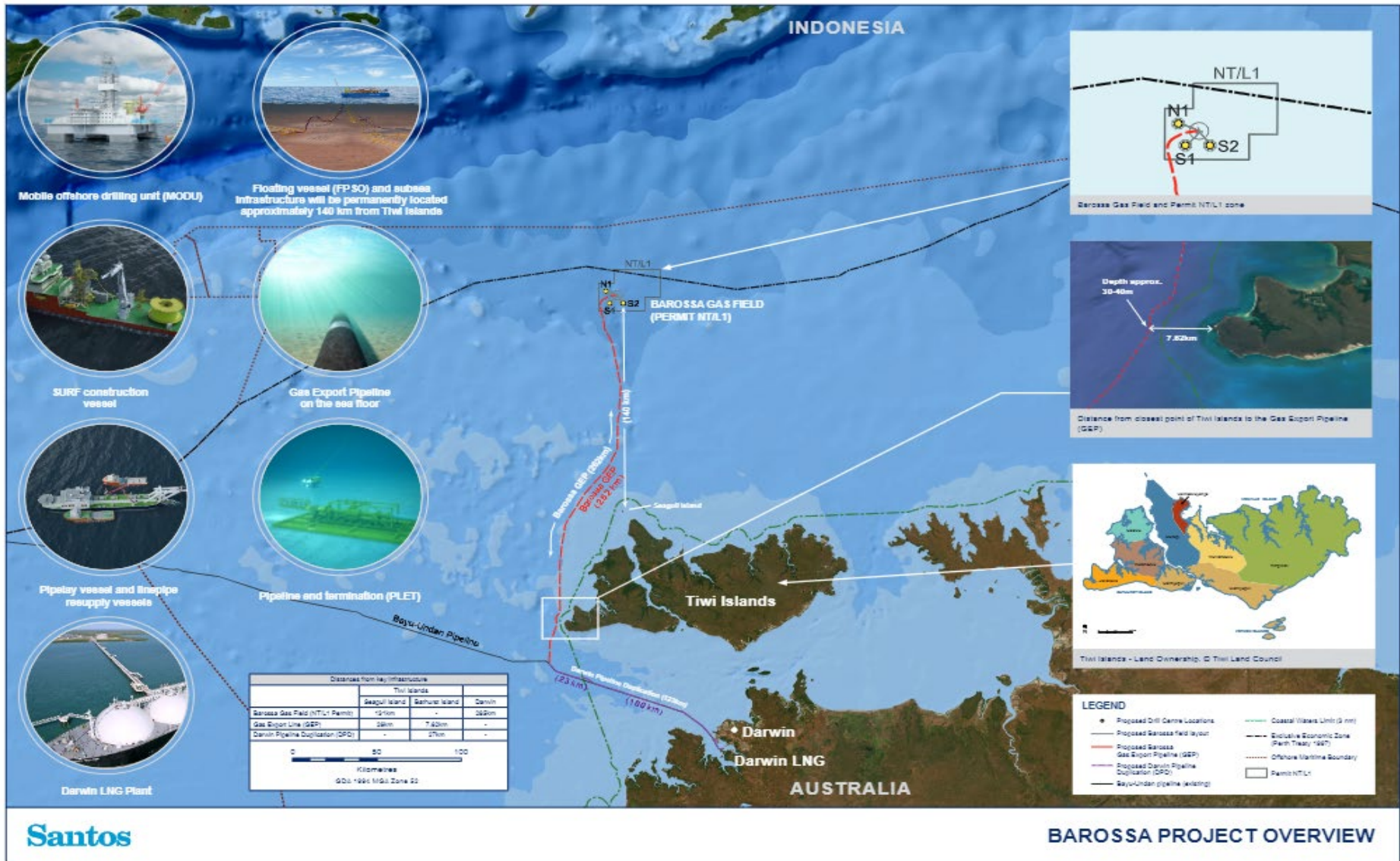
Wednesday, 8 February, 10.30am-3.30pm – Mantiyupwi Motel Meeting Room (Bathurst Island)

**Lunch to be provided**

##### Agenda

Agenda Item	Speaker
Welcome and introductions	Joe Furio, Tiwi Land Council
Overview of Santos	Brett Darley, President Upstream
Barossa Gas Project overview and update	Brett Darley
We're Listening: What questions or concerns do you have about the Project?	Kellie Pendoley, independent expert (turtles) Joe Sanderson
Update on the Cultural Heritage Assessment for the Barossa Gas Export Pipeline and how you can provide information on your cultural heritage	Haydn Kreicbergs, Manager Cultural Heritage and Aboriginal Engagement
We're Listening: We'd like your feedback on how you want to be consulted on Environment Plans	Nick Fox, Vice President Environment, Access and Aboriginal Engagement
We're Listening: Open forum	All
Thank you and next steps	Brett Darley

Barossa Project Overview Map



## March 2023

### March Consultation Meeting Agenda



### March Consultation Meeting Barossa Gas Development Project Agenda

#### Milikapiti Sport and Recreation Centre

Monday 20<sup>th</sup> March 2023

10:30am – Marrikawuyanga Clan

1:00pm – Wulirankuwu Clan

Tuesday 21<sup>st</sup> March 2023

10:30am Yimpinari Clan

#### Pirlangimpi Club

Wednesday 22<sup>nd</sup> March 2023

10:30am – Munupi Clan

#### Wurrumiyanga – Nguuu Club

Thursday 23<sup>rd</sup> March 2023

10:30am – Mantiyupwi Clan

1:00pm – Jikilaruwu Clan

Friday 24<sup>th</sup> March 2023

10:30am – Wurrankuwu Clan

1:00pm – Malawu Clan

#### Purpose

Santos is committed to developing strong, mutually beneficial relationships with communities where we operate. Your feedback is important to achieving this.

This session will:

- provide an opportunity for you and your community to hear more about the Barossa Gas Project and ask questions
- explain our proposed drilling activities, their potential impacts and proposed control measures. This will enable you to give feedback about the potentially affected environment, the impacts and risks we have identified and any others you wish to raise, our proposed control measures and any other measures you want considered
- explain the underwater cultural heritage assessment process for the gas export pipeline and how you can provide input.

#### Agenda

- Welcome and introductions
- Drilling & Completions Environment Plan – consultation
- Gas Export Pipeline – update on the cultural heritage assessment process
- Thank you and next steps
- Question and answer forum

### Santos Privacy Notice

#### Privacy Notice

Event: Tiwi Islands Clan Meetings - Consultation Session



Santos Ltd, Santos NA Barossa Pty Ltd and their related bodies corporate (*we, our, us* or *Santos*) collect personal information about you (including sensitive information about your indigenous heritage or clan group) that you provide during or after these consultation sessions. We use this information to record your attendance at this consultation session, to receive and respond to any feedback that you provide and to include relevant information in any reports that we prepare. Santos will handle any information that you provide in accordance with our Code of Conduct and our Confidentiality, IP and Privacy Procedure. You can ask us for a copy of this Privacy Notice or these other documents.

The laws that relate to holding these consultation sessions may require us to collect personal information about you if your feedback is to be included in any report we will prepare (including so a copy of that report can be provided to you if you request). If you do not provide your personal information, we may not be able to identify you as the person who provided particular feedback (including in any report relating to these consultation sessions) or discuss any feedback you have provided with you further. This information may be disclosed to companies within the Santos group, to third parties that help us run our business and to relevant government agencies and government departments that we are required to provide reports to. Your feedback may also be reflected in our environment plans (subject to any confidentiality requests).

You have a right to request a copy of any personal information that we hold about you, as well as a right to request that we correct any information that we hold about you that is inaccurate. You can also make a complaint about how we have handled your personal information. You can do any of these things by:

- posting a letter addressed to us at 60 Flinders Street, Adelaide;
- telephoning us on (08) 8116 5000 or
- sending us an email at [offshore.consultation@santos.com](mailto:offshore.consultation@santos.com)

### API Gravity Montara and Barossa poster



**Consult Record Template (front page only)**



*Consultation Record Template*

**Privacy:** By providing the details requested below, you consent to Santos Ltd, Santos NA Barossa Pty Ltd and their related bodies corporate (**Santos**) collecting, using, storing and disclosing the information you provide in accordance with the Privacy Notice at the base of this form. You can ask us for a copy of the Privacy Notice. The Privacy Notice sets out Important Information about how your personal information will be collected, used, stored and disclosed. It also explains how our use of your feedback will be limited in cases where you choose not to provide us with your personal information.

If you want your information to remain confidential, you can request that Santos provides your inputs to NOPSEMA as part of the Sensitive Information Report for the relevant Activity Environment Plan. If you make this request, the information will not be published and it will be treated as confidential.

If you do not wish for Santos to collect your information, please tell us and we will not complete the 'contact details' section of this feedback register, and we will keep this feedback anonymous. You can also leave some sections (such as the 'organisation/clan group' section) blank if you would prefer not to provide this information.

Barossa Project Activity (EP)	Drilling <input type="checkbox"/> SURF <input type="checkbox"/> DPD <input type="checkbox"/> Operations <input type="checkbox"/>
Santos representative/s recording this oral record [Names]	

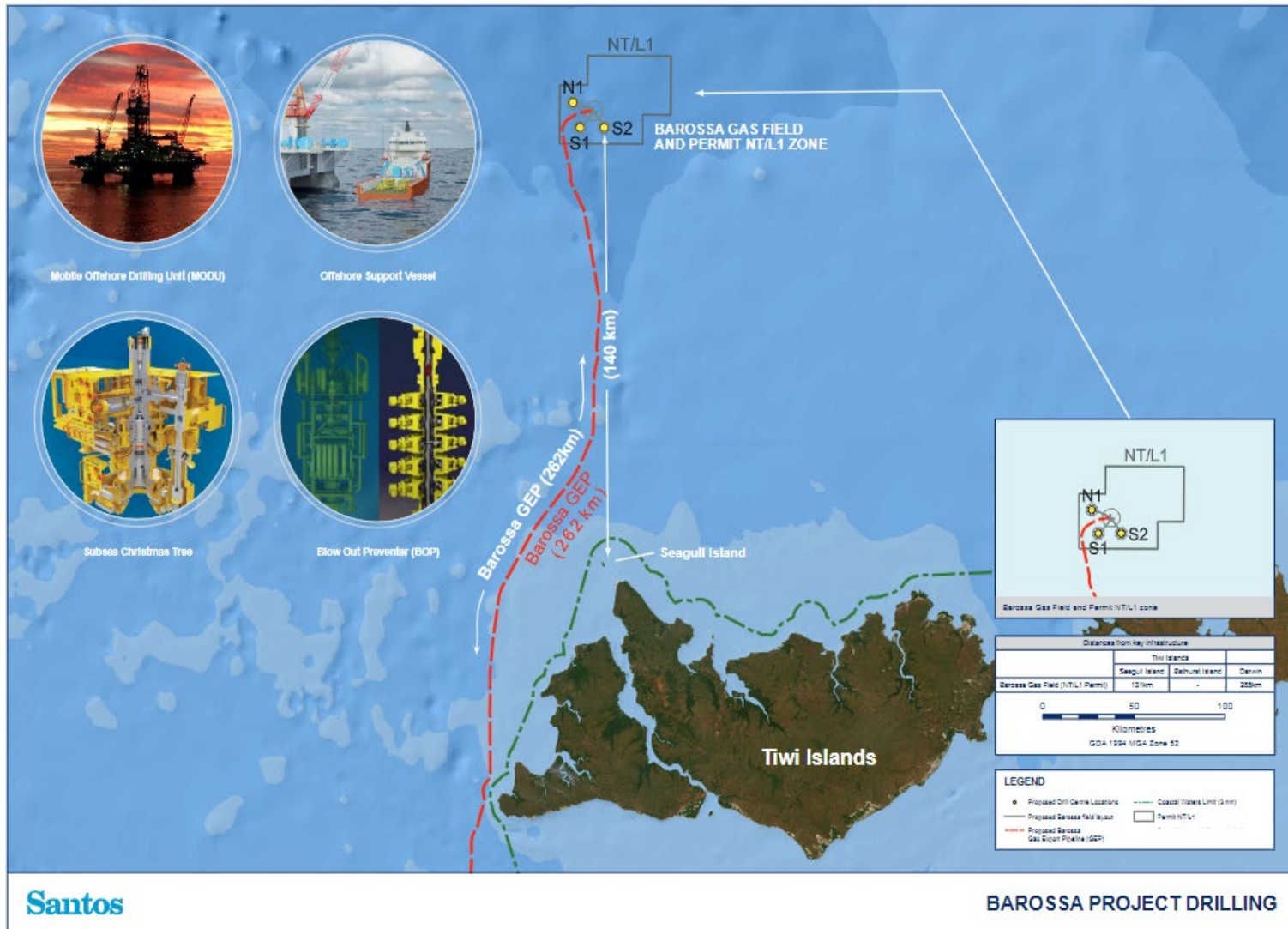
**Contact Details**

Name	
Date	
Location	
Organisation / Clan group	[Optional]
Phone	
Email	
Register for email updates?	Y/N
Address	
Remain confidential? if yes, the inputs will be included in the Sensitive Information Report and will not be published	<input type="checkbox"/>
Other information	

**Information Resources Shared**

Barossa Overview Video	<input type="checkbox"/>
Drilling Video	<input type="checkbox"/>
Other Video [add topic]	<input type="checkbox"/>
Barossa Overview Map	<input type="checkbox"/>
Drilling Activity Map	<input type="checkbox"/>
Other Map [add topic]	<input type="checkbox"/>
Barossa Overview Fact Sheet	<input type="checkbox"/>
Drilling Fact Sheet (detailed)	<input type="checkbox"/>
Drilling Fact Sheet (simple)	<input type="checkbox"/>
Other Fact Sheet	<input type="checkbox"/>
QR Code or information about the website / feedback options	<input type="checkbox"/>
Confirm Privacy Notice shown	<input type="checkbox"/>

Barossa Project Poster - Drilling Specific





**Notice of Consultation with Tiwi Island People**



Santos is committed to developing strong, mutually beneficial relationships with communities where we operate. Your feedback is important to us achieving this.

Santos is preparing environmental plans as required by legislation. We are consulting with Tiwi people whose functions, interests or activities may be affected by the Barossa Gas Project – a project located approximately 300 kilometres offshore from Darwin, transporting natural gas to the existing Darwin liquefied natural gas (DLNG) plant.

At our recent community sessions, Tiwi communities told us that they would like to consult on environmental plans through clan group consultation sessions and for us to use videos and other visual aids to help explain our Project.

At these sessions we will:

- + provide more information about the project and our planned drilling activities, including systems and controls to prevent and mitigate impacts and risks
- + invite relevant persons to provide feedback about possible consequences of the activity on their functions, interests or activities or to tell us if more time or more information is needed to give feedback
- + continue to ask for feedback on how we consult
- + answer your questions.

The feedback we receive will inform the environment plans we prepare.

We will also be back on the Islands over coming weeks to keep listening - with the aid of experts - to learn more about any spiritual and cultural connections to sea country.

You can find more information at [www.santos.com/barossa](http://www.santos.com/barossa) or by using this QR code.

**TIMING AND VENUES**

**MILIKAPITI**

Milikapiti Sport & Recreation Centre

Monday, 20 March  
 10.30am: Marrikawuyanga Clan  
 1.00pm: Wulrankuwu Clan (please note earlier session time)

Tuesday, 21 March  
 10.30am: Yimpinari Clan

**PIRLANGIMPI**

Pirlangimpi Club

Wednesday, 22 March  
 10.30am: Munupi Clan

**WURRUMIYANGA**

Nguiu Club

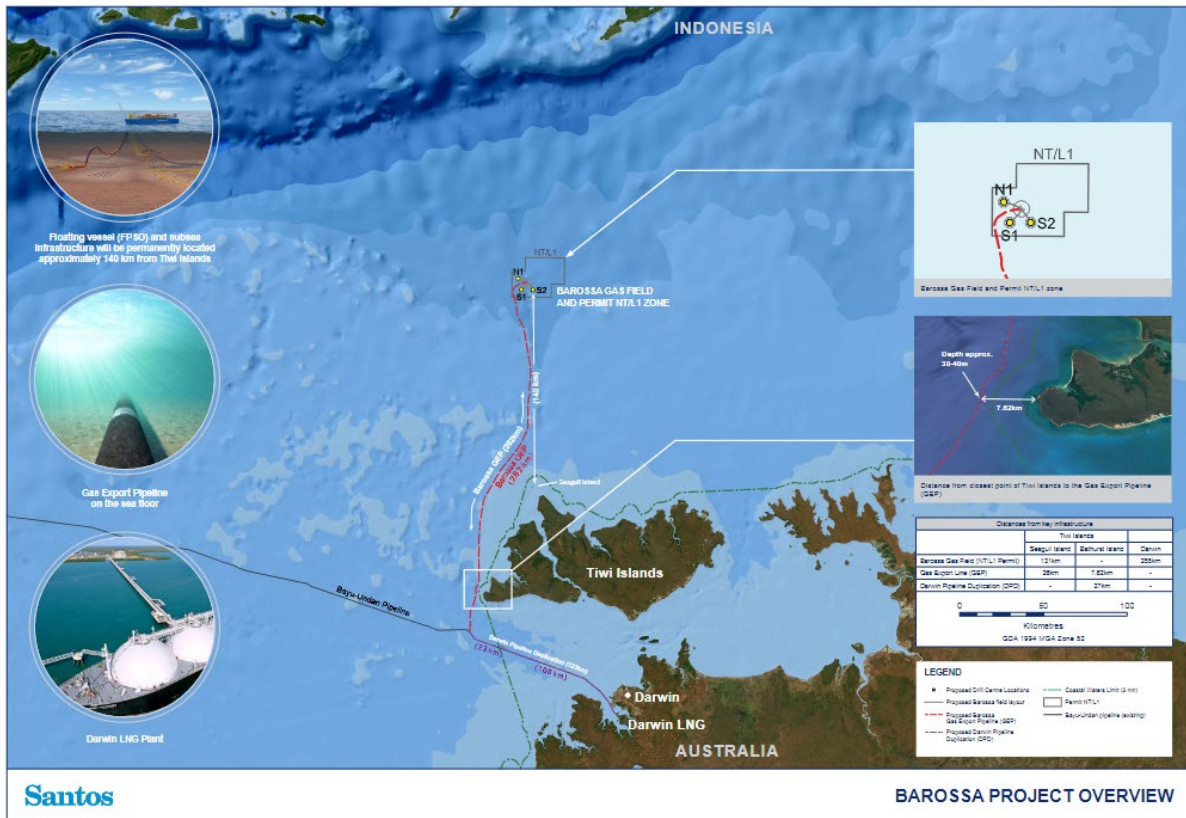
Thursday, 23 March  
 10.30am: Mantiyupwi Clan  
 1.00pm: Jikilaruwu Clan (please note earlier session time)

Friday, 24 March  
 10.30am: Wurrankuwu Clan  
 1.00pm: Malawu Clan (please note earlier session time)

**Scan the QR code**  
 to find out more information about the project.

**i** You can also contact us on  
 T 1800 267 600 or via email at  
 E [offshore.consultation@santos.com](mailto:offshore.consultation@santos.com)

Updated Barossa Project Overview Poster



D&C EP Fact Sheet (front page only)



# The Barossa Gas Project

## PROPOSED DRILLING AND COMPLETIONS ENVIRONMENT PLAN

Santos' proposed Barossa Gas Project will be located approximately 300 kilometres north northwest of Darwin in the Arafura Sea and will comprise a Floating Production Storage and Offloading (FPSO) facility, a subsea production system, supporting in-field subsea infrastructure and a Gas Export Pipeline (GEP).

### OVERVIEW OF PROPOSED DRILLING AND COMPLETIONS ACTIVITIES

Santos plans to drill up to eight subsea wells. The drilling area is located approximately 140 kilometres north of Saigul Island. The way we drill a well is to use a drill on a ship that is like a telescope, extending further and further into the seabed until it reaches the gas. The hole that the drill creates is the well. Each well is lined by steel casings held in place with cement. This is designed to keep the well safe for the life of the project. At the top of the well on the seabed, a structure called a Christmas Tree will be installed that acts like a tap, so Santos can control the flow of gas. The installation of the casings and Christmas Trees is known as completion of the well. Each well is expected to take around 90 days to drill and complete. We anticipate that our proposed Drilling and

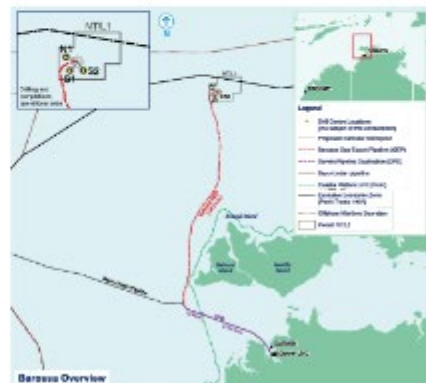
Completions activities will take approximately 2 years, subject to weather and operational performance.

### EQUIPMENT AND VESSELS

A moored semi-submersible mobile offshore drilling unit (MDOU) will be supported by up to four support vessels which will transit between the drilling area and the onshore supply base in Darwin harbour. The MDOU or similar will be used to install the structure called the Christmas Tree on each well.

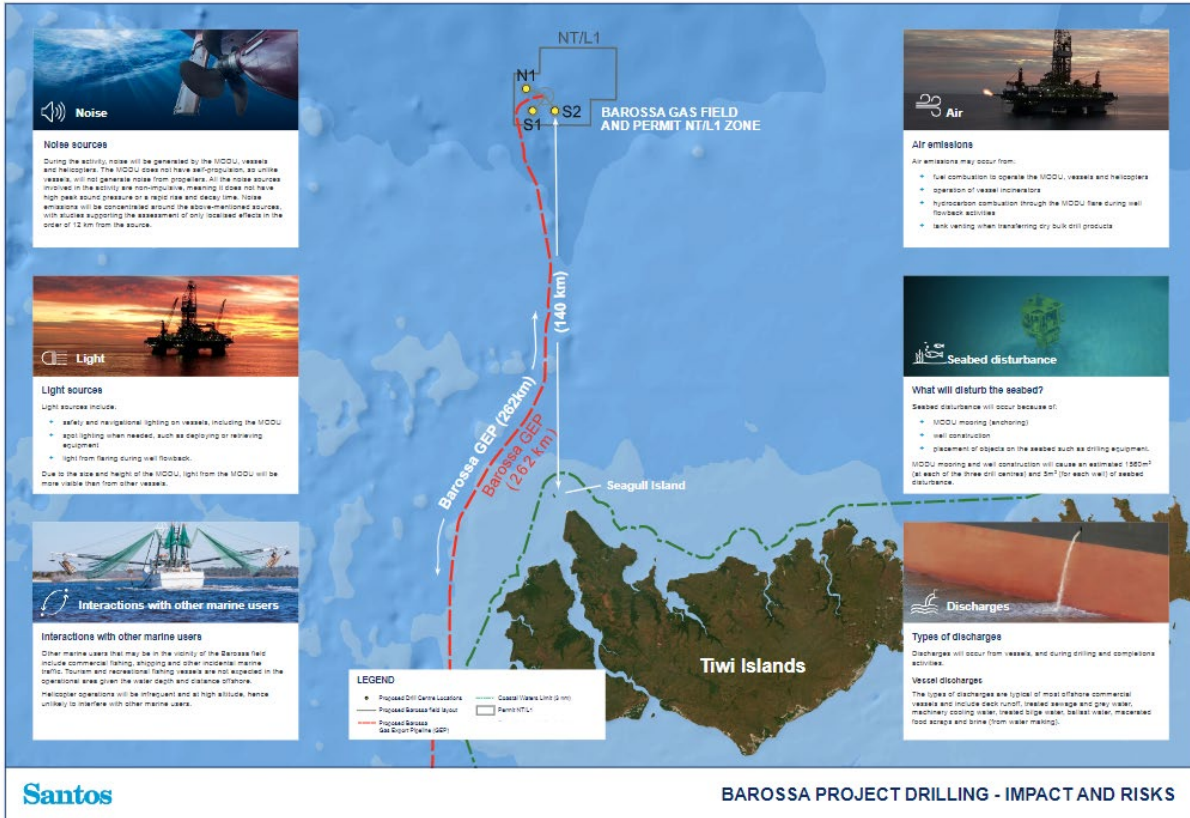
### KEY ACTIVITIES INCLUDE:

- + MDOU towing and mooring
- + MDOU drilling and completions activities
- + Use of drilling fluids to lubricate the drill and maintain well pressure
- + Discharge of inert drilled solids, water-based drilling fluids, completions fluids and residual cement
- + Flowback of gas and liquids from the well for testing
- + Installation of subsea equipment
- + Use of helicopters to support activities.

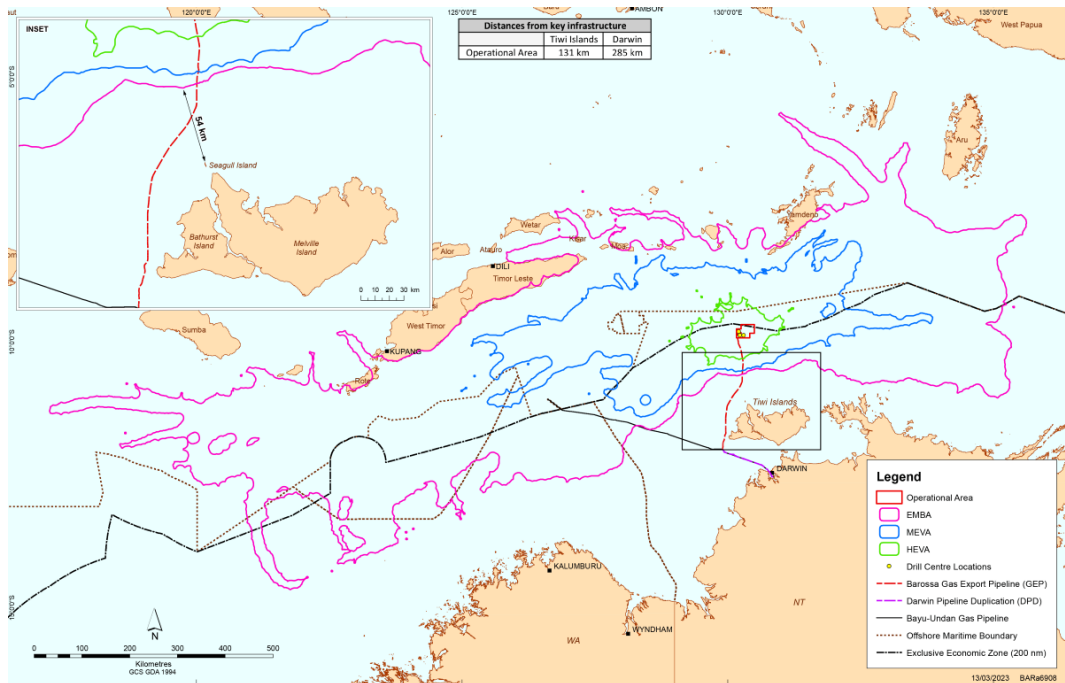


We're Listening Santos

### Barossa Drilling Impact and Risks Poster



### Drilling Activity Focus with Worst Case Drilling EMBA Poster



**March Consultation Session PowerPoint presentation:  
Introductory video**

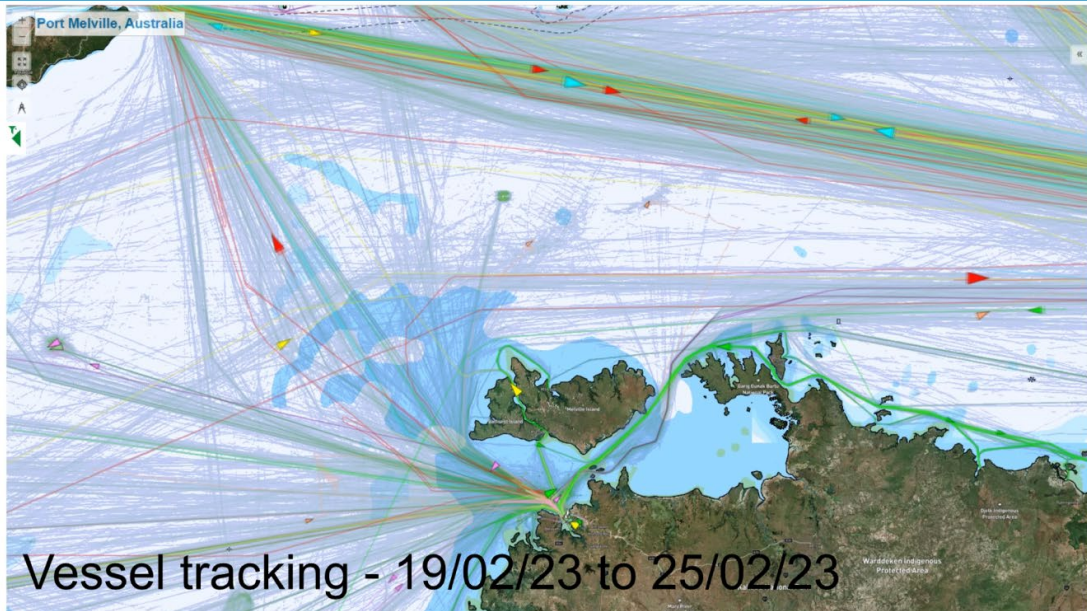
Barossa Gas Development Project



3

**Vessel tracking map/animation**

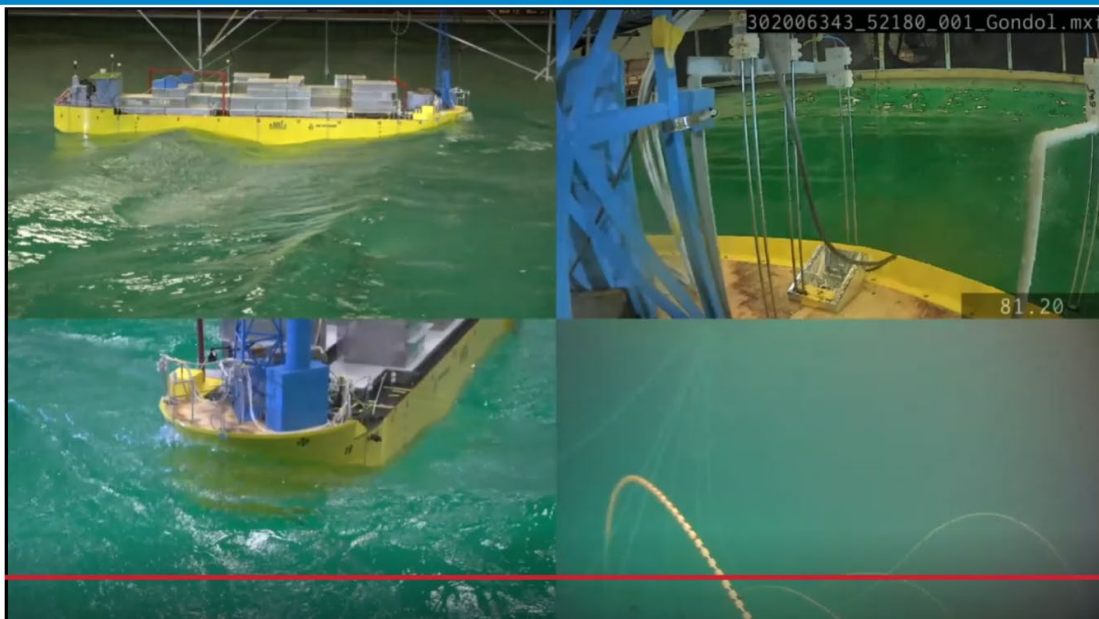
Vessel tracking



5

Storm waves animation

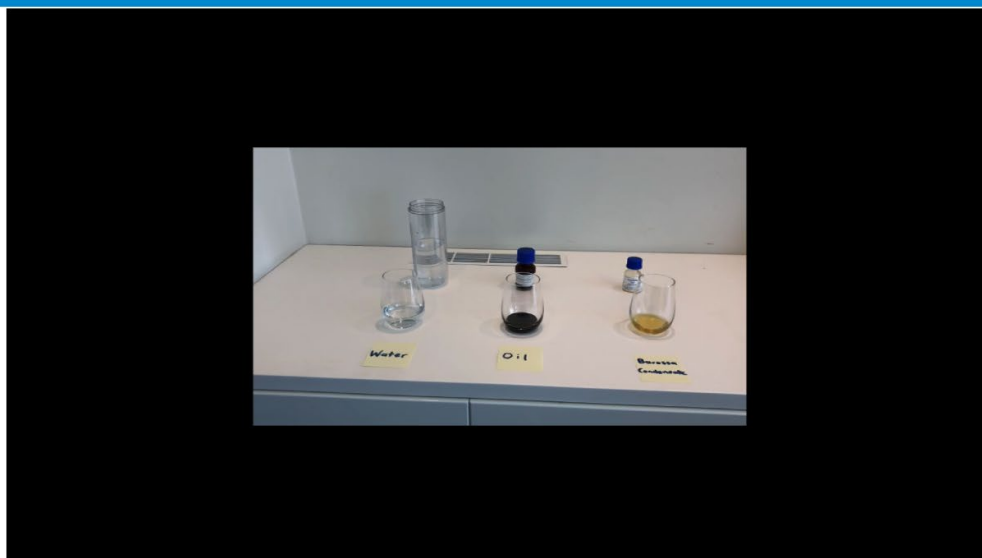
Barossa Gas Development Project



6

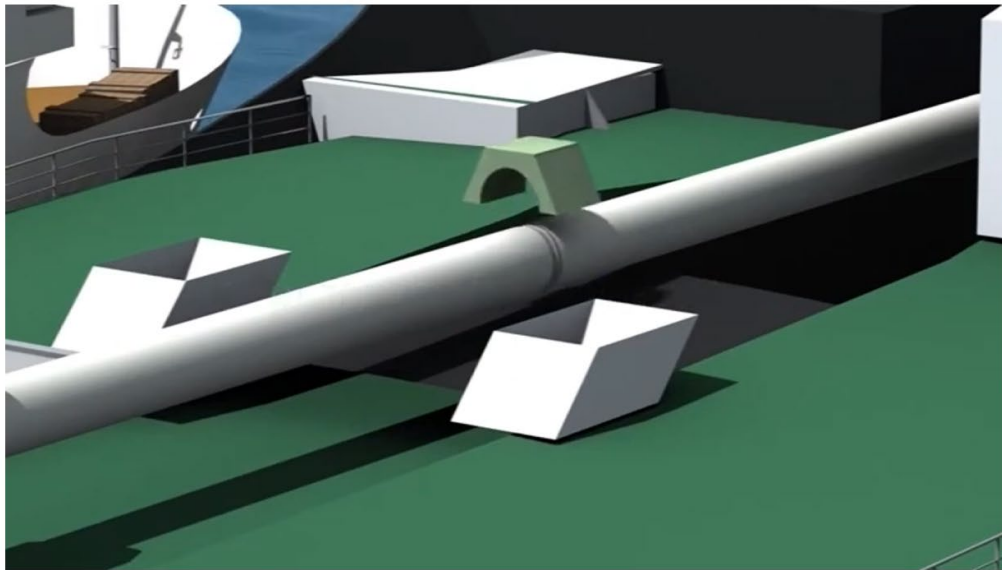
Oil and condensate video

Barossa Gas Development Project



Pipeline animation

Barossa Gas Development Project



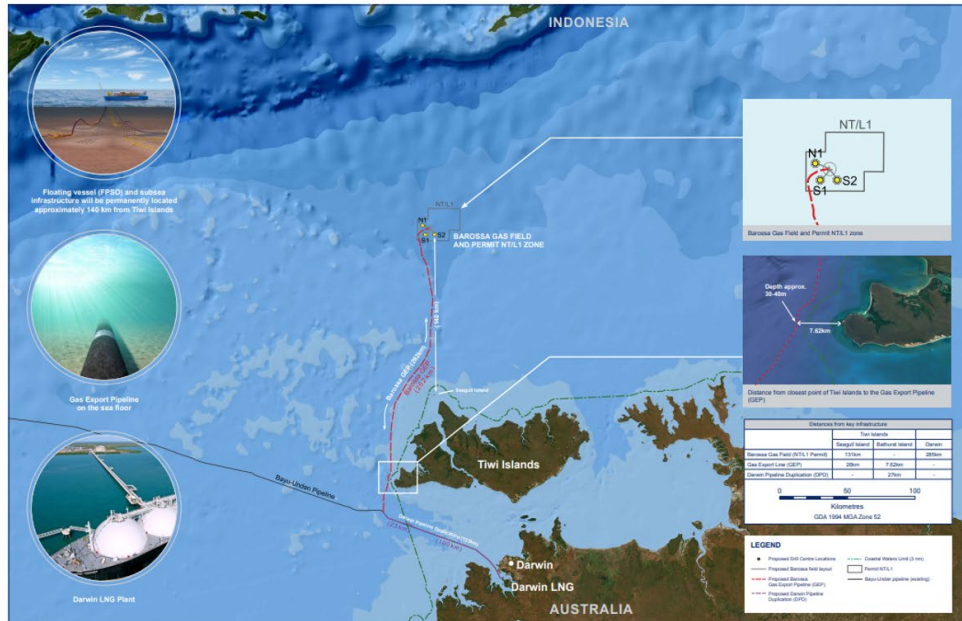
8

Barossa Project Overview video



D&C project map

Barossa Gas Development Project D & C



Drilling animation

Barossa Gas Development Project D & C



**Drilling Risk and Controls video**

Barossa Gas Development Project





## April/May 2023

### Agenda



### April/May Consultation Meeting Barossa Gas Development Project Agenda

#### Pirlangimpi Club

Wednesday 26<sup>th</sup> April 2023

10:30am – Munupi Clan

#### Wurrumiyanga – Nguu Club

Friday 28<sup>th</sup> April 2023

10.30am - Mantiyupwi Clan

1.00pm - Jikilaruwu Clan

#### Milikapiti Sport and Recreation Centre

Thursday 4<sup>th</sup> May 2023

10:30am – Marrikawuyanga & Yimpinari Clans

1.00pm – Wulirankuwu Clan

#### Wurrumiyanga – Nguu Club

Friday 5<sup>th</sup> May 2023

10:30am – Wurankuwu Clan

1:00pm – Malawu Clan

#### Purpose

Santos is committed to developing strong, mutually beneficial relationships with communities where we operate. Your feedback is important to achieving this. This consultation session will:

- provide an opportunity for you and your community to hear more about the Barossa Gas Project and ask questions
- provide our responses to your feedback following the March clan meetings and seek final feedback (where possible) from you on potential consequences of the proposed drilling and completions activity and any measures you would like us to consider to reduce impacts and risks to as low as reasonably practicable and acceptable levels
- provide information about our proposed Subsea Infrastructure Installation activities, including potential environmental impacts and risks that we have identified and how we propose to suitably reduce these. You will be invited to give feedback about the potentially affected environment, potential impacts and risks and proposed control measures, if you wish

Separately, Santos will address questions previously raised about how Santos has worked with communities and introduce the independent expert leading the cultural heritage assessment for the Gas Export Pipeline.

#### Agenda

- Welcome and introductions
- Drilling & Completions Environment Plan – Regulation 11A consultation
- Subsea Infrastructure Installation Environment Plan – Regulation 11A consultation
- Next steps and housekeeping for consultation and close of consultation section of meeting
- Santos' community partnership activities (in response to questions on this)
- Gas Export Pipeline Cultural Heritage Assessment – introduction to lead independent anthropologist
- Thank you and meeting close
- Question and answer forum

### Santos Privacy Notice

#### Privacy Notice

Event: Tiwi Islands Clan Meetings - Consultation Session



Santos Ltd, Santos NA Barossa Pty Ltd and their related bodies corporate (*we, our, us or Santos*) collect personal information about you (including sensitive information about your indigenous heritage or clan group) that you provide during or after these consultation sessions. We use this information to record your attendance at this consultation session, to receive and respond to any feedback that you provide and to include relevant information in any reports that we prepare. Santos will handle any information that you provide in accordance with our Code of Conduct and our Confidentiality, IP and Privacy Procedure. You can ask us for a copy of this Privacy Notice or these other documents.

The laws that relate to holding these consultation sessions may require us to collect personal information about you if your feedback is to be included in any report we will prepare (including so a copy of that report can be provided to you if you request). If you do not provide your personal information, we may not be able to identify you as the person who provided particular feedback (including in any report relating to these consultation sessions) or discuss any feedback you have provided with you further. This information may be disclosed to companies within the Santos group, to third parties that help us run our business and to relevant government agencies and government departments that we are required to provide reports to. Your feedback may also be reflected in our environment plans (subject to any confidentiality requests).

You have a right to request a copy of any personal information that we hold about you, as well as a right to request that we correct any information that we hold about you that is inaccurate. You can also make a complaint about how we have handled your personal information. You can do any of these things by:

- posting a letter addressed to us at 60 Flinders Street, Adelaide;
- telephoning us on (08) 8116 5000 or
- sending us an email at [offshore.consultation@santos.com](mailto:offshore.consultation@santos.com)

### API Gravity Montara and Barossa poster



**Consult Record Template (front page only)**



*Consultation Record Template*

**Privacy:** By providing the details requested below, you consent to Santos Ltd, Santos NA Barossa Pty Ltd and their related bodies corporate (**Santos**) collecting, using, storing and disclosing the information you provide in accordance with the Privacy Notice at the base of this form. You can ask us for a copy of the Privacy Notice. The Privacy Notice sets out important information about how your personal information will be collected, used, stored and disclosed. It also explains how our use of your feedback will be limited in cases where you choose not to provide us with your personal information.

If you want your information to remain confidential, you can request that Santos provides your inputs to NOPSEMA as part of the Sensitive Information Report for the relevant Activity Environment Plan. If you make this request, the information will not be published and it will be treated as confidential.

If you do not wish for Santos to collect your information, please tell us and we will not complete the 'contact details' section of this feedback register, and we will keep this feedback anonymous. You can also leave some sections (such as the 'organisation/clan group' section) blank if you would prefer not to provide this information.

Barossa Project Activity (EP)	Drilling <input type="checkbox"/> SURF <input type="checkbox"/> DPD <input type="checkbox"/> Operations <input type="checkbox"/>
Santos representative/s recording this oral record [Names]	

**Contact Details**

Name	
Date	
Location	
Organisation / Clan group	[Optional]
Phone	
Email	
Register for email updates?	Y/N
Address	
Remain confidential? If yes, the inputs will be included in the Sensitive Information Report and will not be published	<input type="checkbox"/>
Other information	

**Information Resources Shared**

Barossa Overview Video	<input type="checkbox"/>
Drilling Video	<input type="checkbox"/>
Other Video [add topic]	<input type="checkbox"/>
Barossa Overview Map	<input type="checkbox"/>
Drilling Activity Map	<input type="checkbox"/>
Other Map [add topic]	<input type="checkbox"/>
Barossa Overview Fact Sheet	<input type="checkbox"/>
Drilling Fact Sheet (detailed)	<input type="checkbox"/>
Drilling Fact Sheet (simple)	<input type="checkbox"/>
Other Fact Sheet	<input type="checkbox"/>
QR Code or information about the website / feedback options	<input type="checkbox"/>
Confirm Privacy Notice shown	<input type="checkbox"/>

Barossa Gas Project Frequently Asked Questions document (front page only)

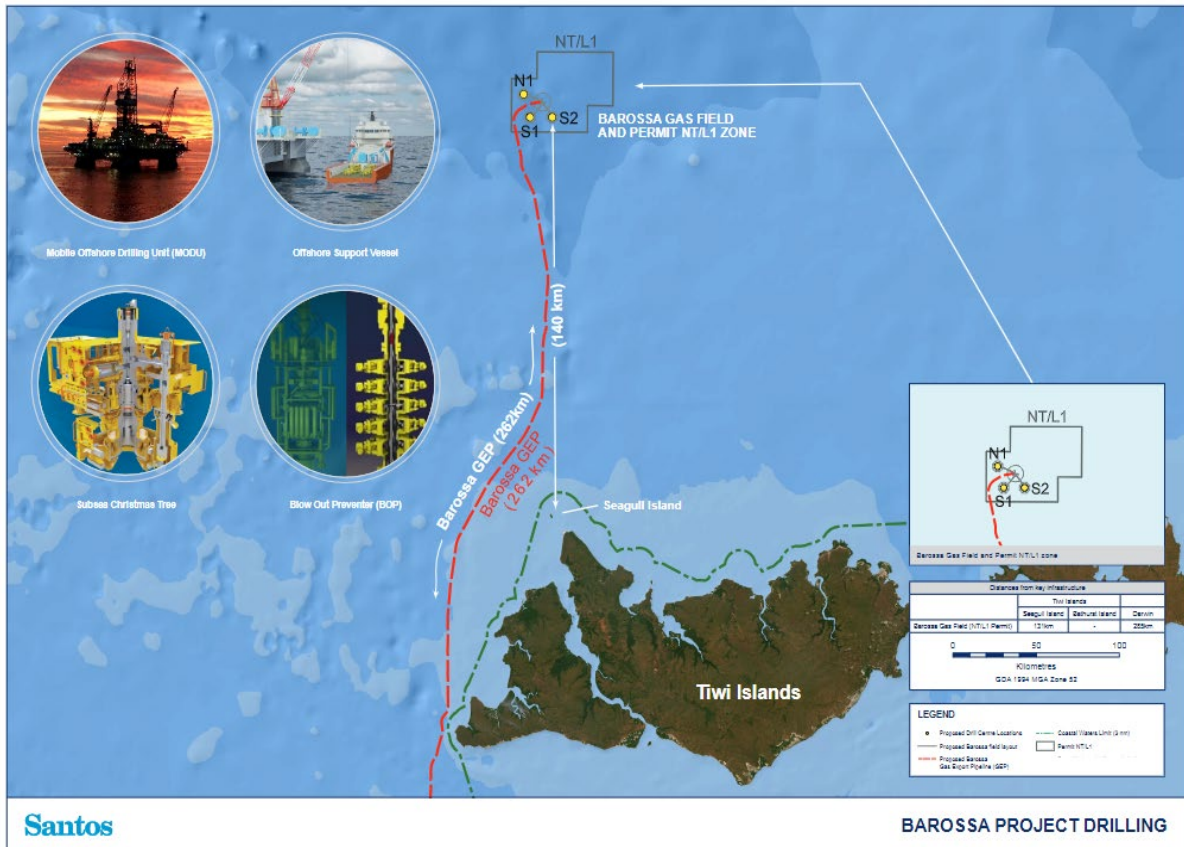


### Barossa Gas Project Frequently Asked Questions

Santos is committed to providing all Relevant Persons access to information about the Barossa Gas Project in a timely and consistent manner. The following list of Frequently Asked Questions (FAQs) has been developed based on questions provided to Santos. This document will be updated on an ongoing basis during the development and delivery of the project as new information becomes available. The answers provided in this document are intended to provide clear, summary responses to the questions. Should you require more detailed information, further explanation or have any other questions, please ask one of the Santos team, contact us via telephone on 1800 267 600 or via email at [offshore.consultation@santos.com](mailto:offshore.consultation@santos.com).

Question	Answer
<b>Spill (oil, gas, condensate)</b>	
We've already seen the impacts of the Montara oil spill. Is there a chance of an oil spill for this project?	<p>Santos was not involved in the Montara oil spill in August 2009. It resulted from a series of operator and regulatory failures which have now been comprehensively addressed through improved practices across the industry and improved regulatory regimes, now administered by NOPSEMA.</p> <p>More detail as to the initiatives undertaken by governments, regulators and industry following the Montara oil spill are available in the Australian Government Report on the implementation of the recommendations from the Montara Commission of Inquiry (September 2017): <a href="https://www.industry.gov.au/sites/default/files/2022-09/australian-government-report-on-the-implementation-of-the-recommendations-from-the-montara-commission-of-inquiry.pdf">https://www.industry.gov.au/sites/default/files/2022-09/australian-government-report-on-the-implementation-of-the-recommendations-from-the-montara-commission-of-inquiry.pdf</a>.</p> <p>Barossa is very different from Montara. Barossa is a gas and condensate field rather than oil. The well design and type of drilling rig for the Barossa field are different to those used at the Montara field. For example, the Barossa wells will not be suspended for the rig to depart the field and return at a later date (as occurred at Montara). Further, the aspects of well design and operations at</p>

Barossa Project Poster - Drilling Specific



## Notice of Consultation with Tiwi Island People

We're  
Listening

Santos



## Your feedback is important to us.

Santos is preparing environment plans, as required by legislation, for its Barossa Gas Project. We are consulting with Tiwi people whose functions, interests or activities may be affected by certain project activities.

Based on feedback from Tiwi people, we will continue to consult with you through Clan group meetings using videos and visual aids to explain the project.

## TIMING AND VENUES

## WEDNESDAY

📅 26 April 2023, Pirlangimpi

10.30am - Munupi Clan

## FRIDAY

📅 28 April 2023, Wurrumiyanga

10.30am – Mantiyupwi Clan

1.00pm – Jikilaruwu Clan

## THURSDAY

📅 4 May 2023, Milikapiti

Please note new dates and times of meetings in Milikapiti

9.30am – Marrikawuyanga Clan

11.30am – Wulirankuwu Clan

1.30pm – Yimpinari Clan

## FRIDAY

📅 5 May 2023, Wurrumiyanga

Please note new dates and times of meetings in Wurrumiyanga

10.30am – Wurankuwu Clan

1.00pm – Malawu Clan

## More information

can be found at  
[www.santos.com/barossa](http://www.santos.com/barossa)  
or by using this QR code.



## At the sessions we will:

- + Continue consulting with relevant persons about our proposed activity under the Drilling and Completions Environment Plan, including:
  - + providing responses to feedback following the March clan meetings
  - + seeking your final feedback on possible consequences of the proposed drilling and completions activity and any measures you would like us to consider to reduce impacts and risks.
- + Consult with relevant persons about our proposed activity under the proposed Subsea Infrastructure and Floating Production Storage and Offloading (FPSO) Moorings Installation and Pre-Commissioning Environment Plan, including:
  - + providing information and responding to questions about the proposed activity, potential impacts and risks and how we plan to reduce these to as low as reasonably practicable and to an acceptable level
  - + inviting you to consider the information given and tell us if you seek further or different information
  - + if you are ready, listening to your feedback about the possible consequences of the activity and any measures you would like us to consider to reduce impacts and risks with further opportunities to give feedback to be provided, including at our next visit in May 2023.

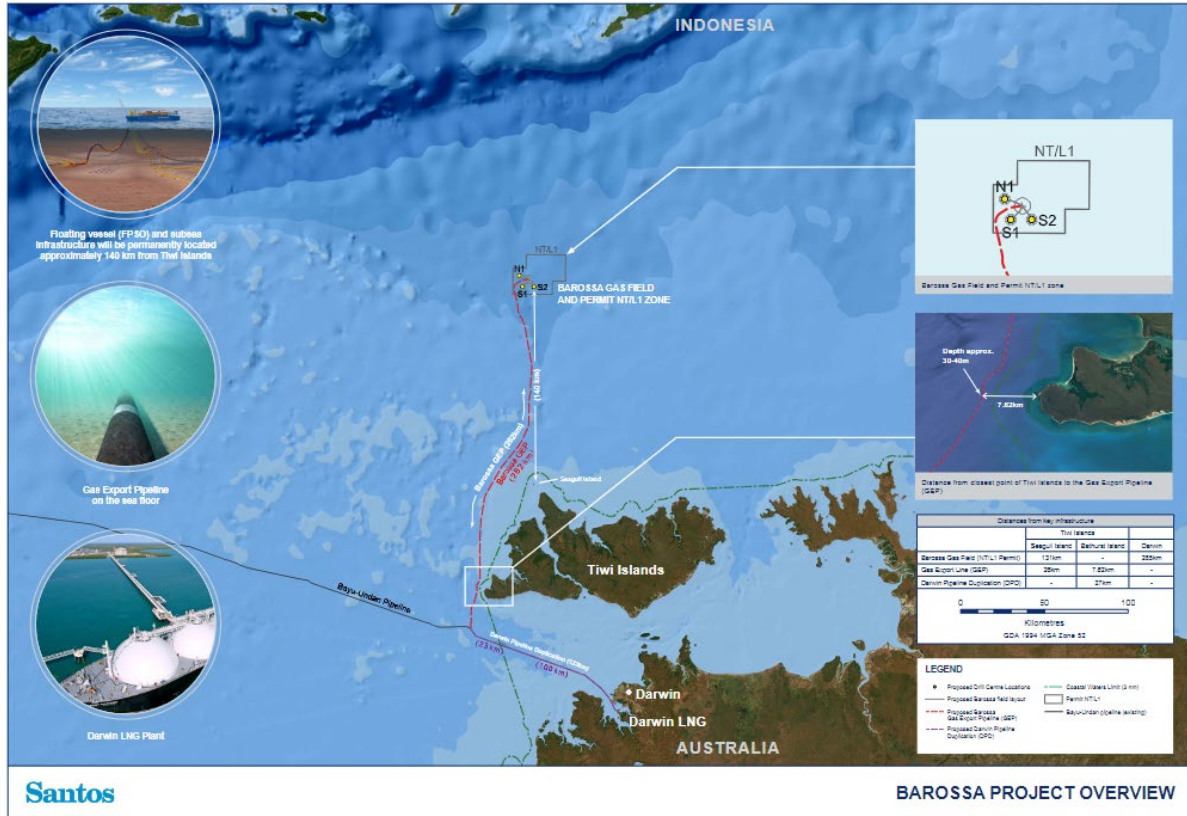
The subsea infrastructure includes a series of flowlines that would connect the wells to the FPSO, where the gas is separated from the condensate. We will explain the activity further during our visit.

- + Provide an update on the cultural heritage assessment process required for the Gas Export Pipeline.

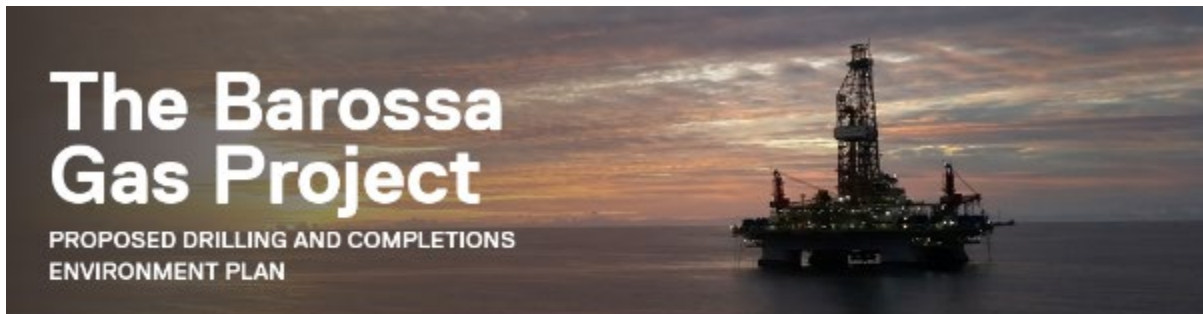


You can also contact us on  
T 1800 267 600 or via email at  
E [offshore.consultation@santos.com](mailto:offshore.consultation@santos.com)

Barossa Project Overview Poster



D&C EP Fact Sheet (front page only)



Santos' proposed Barossa Gas Project will be located approximately 300 kilometres north northwest of Darwin in the Arafura Sea and will comprise a Floating Production Storage and Offloading (FPSO) facility, a subsea production system, supporting in-field subsea infrastructure and a Gas Export Pipeline (GEP).

**OVERVIEW OF PROPOSED DRILLING AND COMPLETIONS ACTIVITIES**

Santos plans to drill up to eight subsea wells. The drilling area is located approximately 140 kilometres north of Siegel Island. The way we drill a well is to use a drill on a ship that is like a telescope, extending further and further into the seabed until it reaches the gas. The hole that the drill creates is the well. Each well is lined by steel casings held in place with cement. This is designed to keep the well safe for the life of the project. At the top of the well on the seabed, a structure called a Christmas Tree will be installed that acts like a tap, so Santos can control the flow of gas. The installation of the casings and Christmas Trees is known as completion of the well. Each well is expected to take around 90 days to drill and complete. We anticipate that our proposed Drilling and

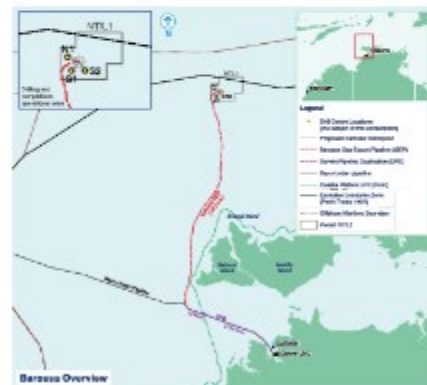
Completion activities will take approximately 2 years, subject to weather and operational performance.

**EQUIPMENT AND VESSELS**

A moored semi-submersible mobile offshore drilling unit (MODU) will be supported by up to four support vessels which will transit between the drilling area and the onshore supply base in Darwin harbour. The MODU or similar will be used to install the structure called the Christmas Tree on each well.

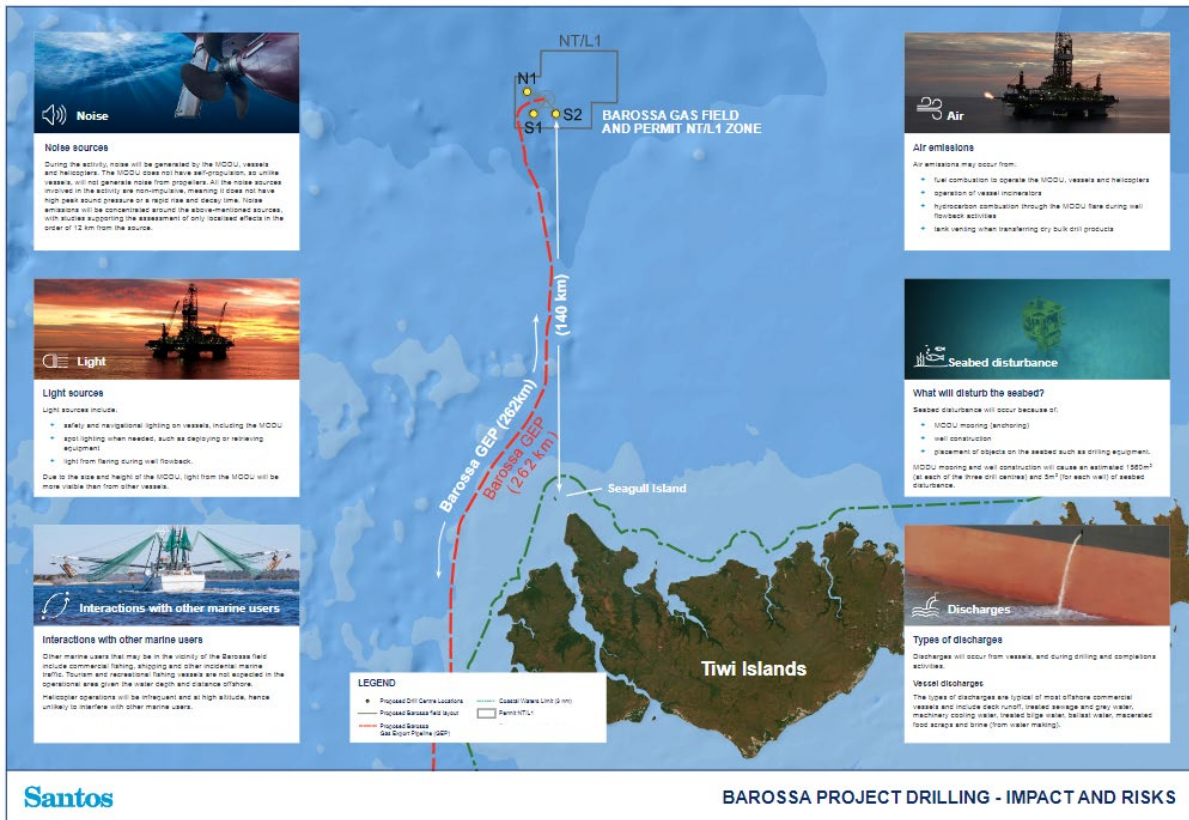
**KEY ACTIVITIES INCLUDE:**

- + MODU towing and mooring
- + MODU drilling and completions activities
- + Use of drilling fluids to lubricate the drill and maintain well pressure
- + Discharge of inert drilled solids, water-based drilling fluids, completion fluids and residual cement
- + Flowback of gas and liquids from the well for testing
- + Installation of subsea equipment
- + Use of helicopters to support activities.

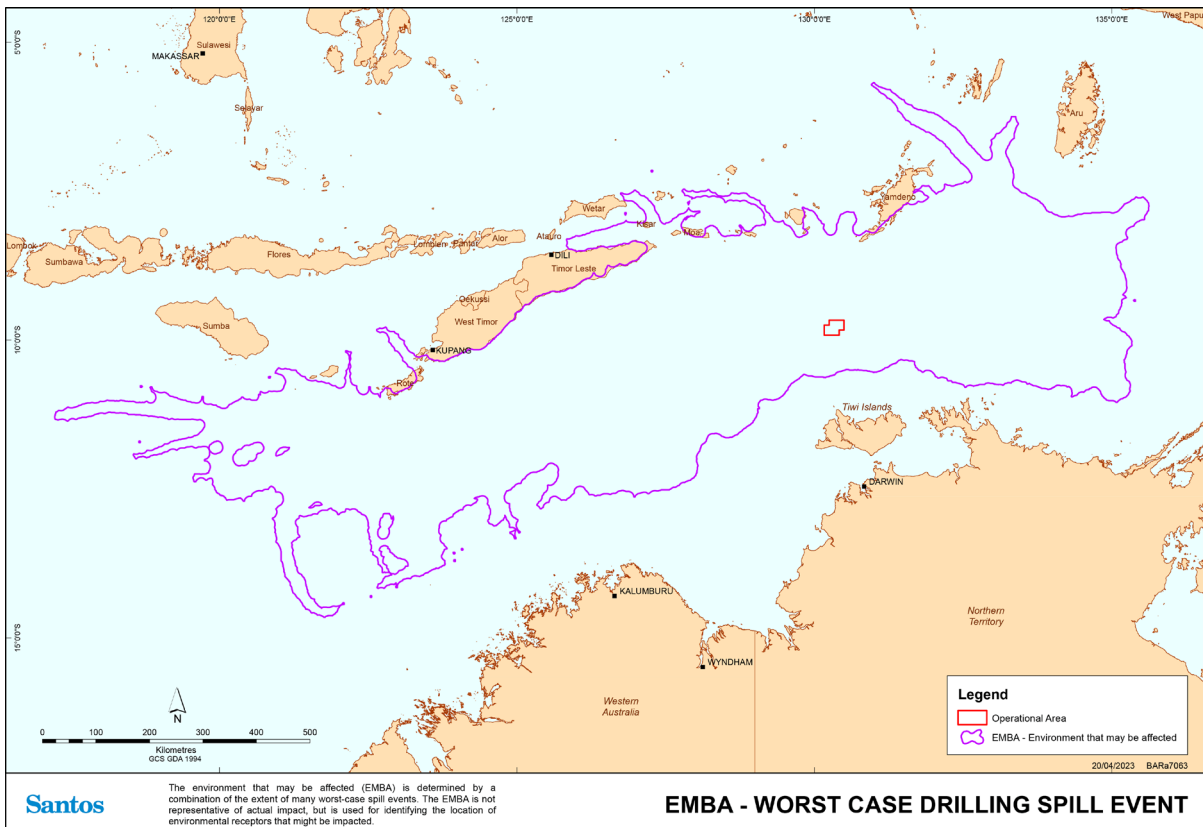


We're Listening Santos

### Barossa Drilling Impact and Risks Poster



### Updated Drilling and Completions (D&C) EMBA Poster

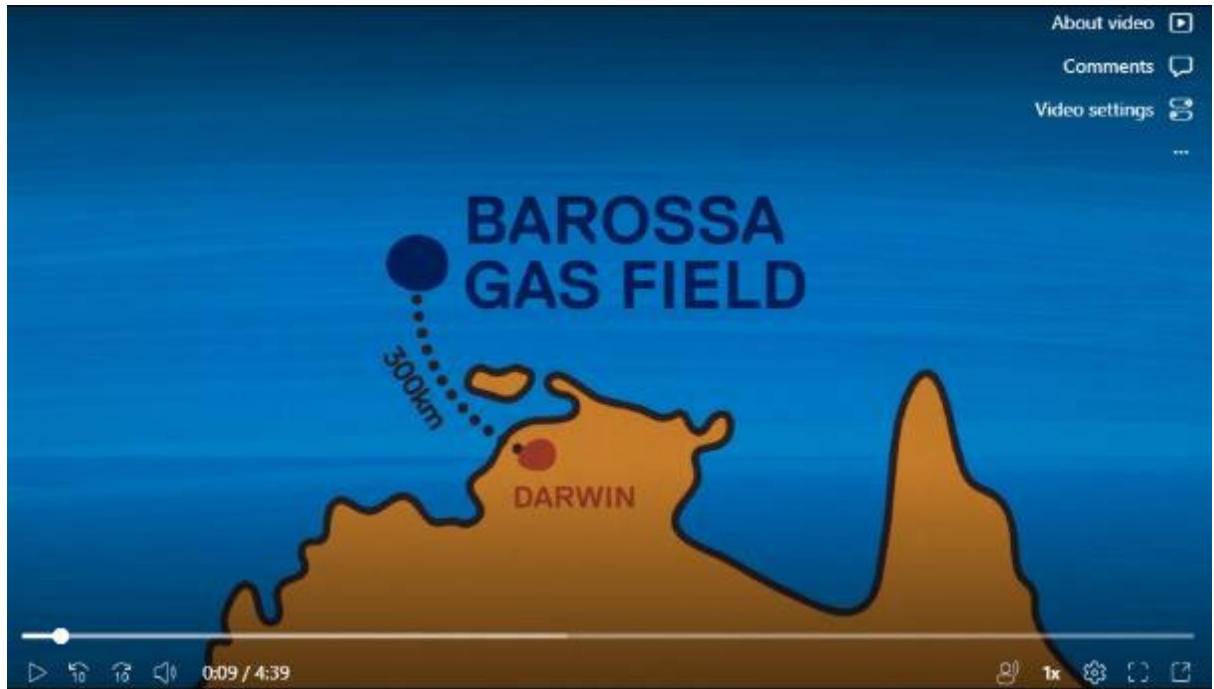


**April/May Consultation Session PowerPoint Presentation:  
Introduction videos**





**Barossa Project Overview video**

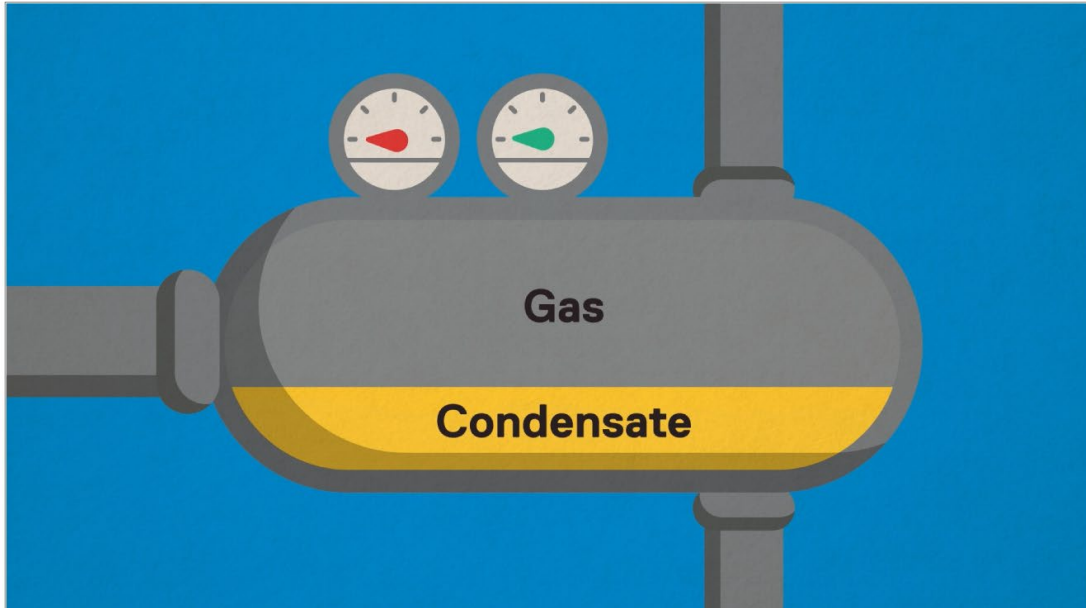


**NOPSEMA Spill Response video**



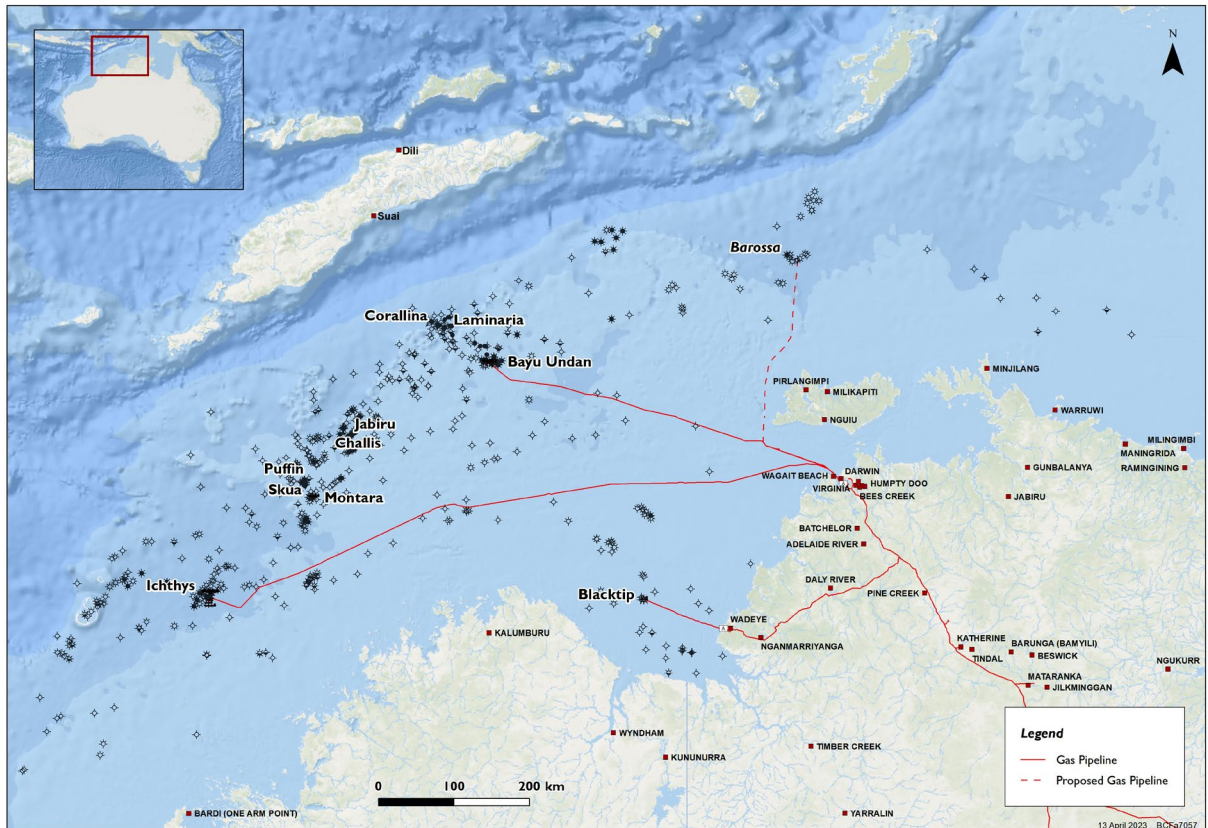
Condensate vs Oil video

Condensate vs Oil



9

Bonaparte offshore wells map

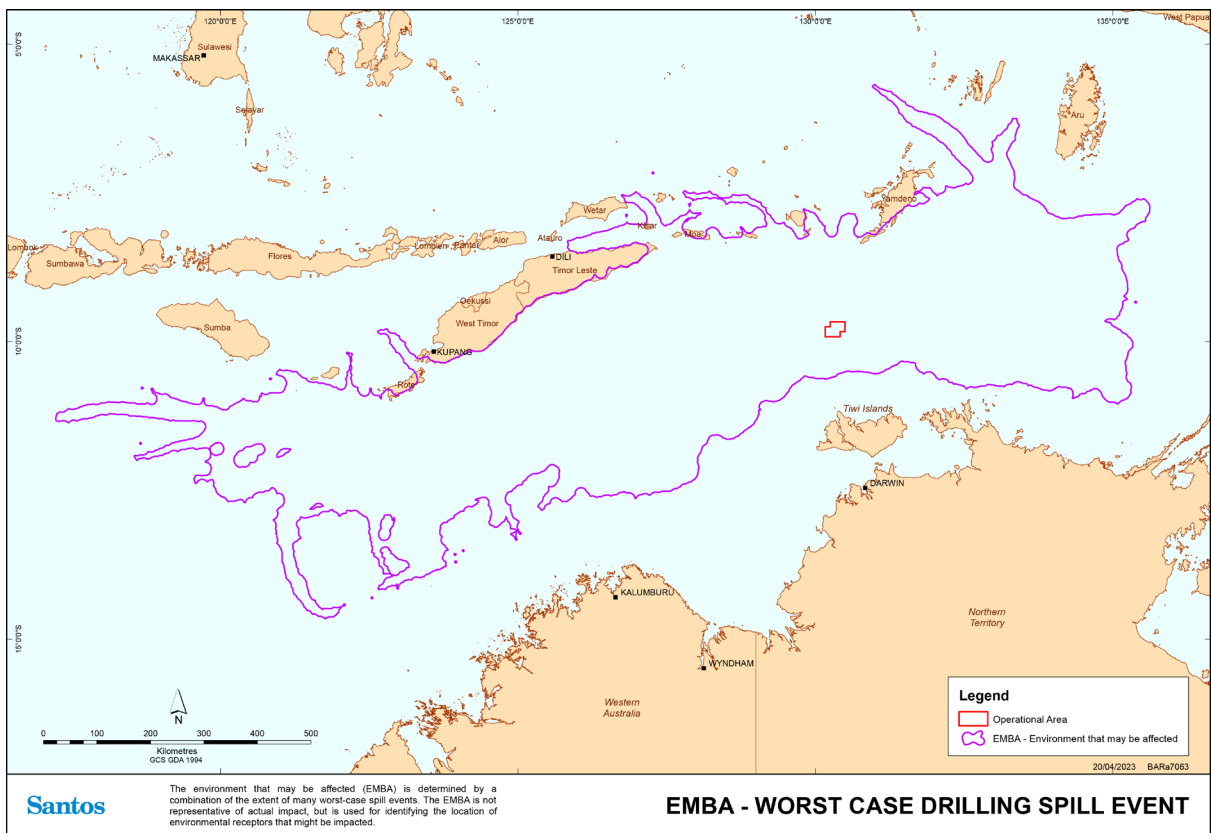


Drilling Risk and Controls video

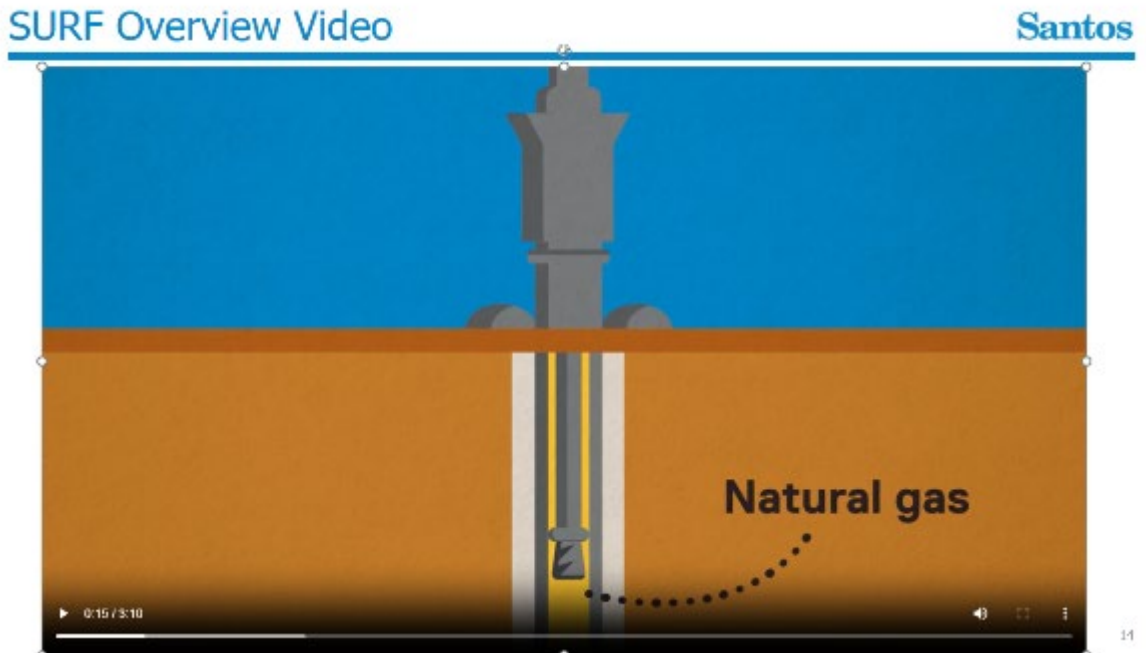
Barossa Gas Development Project



D&C EMBA Map



**SURF Overview video**



**SURF Risks and Controls video**



June 2023

## Agenda



**June Consultation Meeting  
Barossa Gas Project  
Agenda**

**Milikapiti Sport and Recreation Centre**Tuesday 13<sup>th</sup> June 202310:30am – Marrikawuyanga & Yimpinari Clans1.00pm – Wulirankuwu Clan**Mantiyupwi Motel**Wednesday 14<sup>th</sup> June 202310.30am - Mantiyupwi Clan1.00pm - Jikilaruwu Clan**Mantiyupwi Motel**Thursday 15<sup>th</sup> June 202310:30am – Wurankuwu Clan1:00pm – Malawu Clan**Pirlangimpi Sports and Social Club**Friday 16<sup>th</sup> June 202310:30am – Munupi Clan**Purpose**

Santos is committed to developing strong, mutually beneficial relationships with communities where we operate. Your feedback is important to achieving this. This consultation session will:

- provide an opportunity for you and your community to hear more about the Barossa Gas Project and ask questions
- provide our responses to your feedback following the April and May clan meetings
- seek final feedback from you on potential consequences of the proposed drilling and completions activity and subsea infrastructure installation and pre-commissioning activity, including any measures you would like us to consider to reduce impacts and risks to as low as reasonably practicable and acceptable levels

**Agenda**

- Welcome and introductions
- Feedback and responses to questions from last visit
- Drilling & Completions Environment Plan – Regulation 11A consultation
- Subsea Infrastructure Installation Environment Plan – Regulation 11A consultation
- Question and answer forum
- Thank you and meeting close

### Santos Privacy Notice

#### Privacy Notice

Event: Tiwi Islands Clan Meetings - Consultation Session



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### API Gravity Montara and Barossa poster



**Consult Record Template (front page only)**



*Consultation Record Template*

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Barossa Project Activity (EP)	Drilling <input type="checkbox"/> SURF <input type="checkbox"/> DPD <input type="checkbox"/> Operations <input type="checkbox"/>
Santos representative/s recording this oral record [Names]	

**Contact Details**

Name	
Date	
Location	
Organisation / Clan group	[Optional]
Phone	
Email	
Register for email updates?	Y/N
Address	
Remain confidential? If yes, the inputs will be included in the Sensitive Information Report and will not be published	<input type="checkbox"/>
Other information	

**Information Resources Shared**

Barossa Overview Video	<input type="checkbox"/>
Drilling Video	<input type="checkbox"/>
Other Video [add topic]	<input type="checkbox"/>
Barossa Overview Map	<input type="checkbox"/>
Drilling Activity Map	<input type="checkbox"/>
Other Map [add topic]	<input type="checkbox"/>
Barossa Overview Fact Sheet	<input type="checkbox"/>
Drilling Fact Sheet (detailed)	<input type="checkbox"/>
Drilling Fact Sheet (simple)	<input type="checkbox"/>
Other Fact Sheet	<input type="checkbox"/>
QR Code or information about the website / feedback options	<input type="checkbox"/>
Confirm Privacy Notice shown	<input type="checkbox"/>

**Updated Barossa Gas Project Frequently Asked Questions (FAQs) document (front page only)**



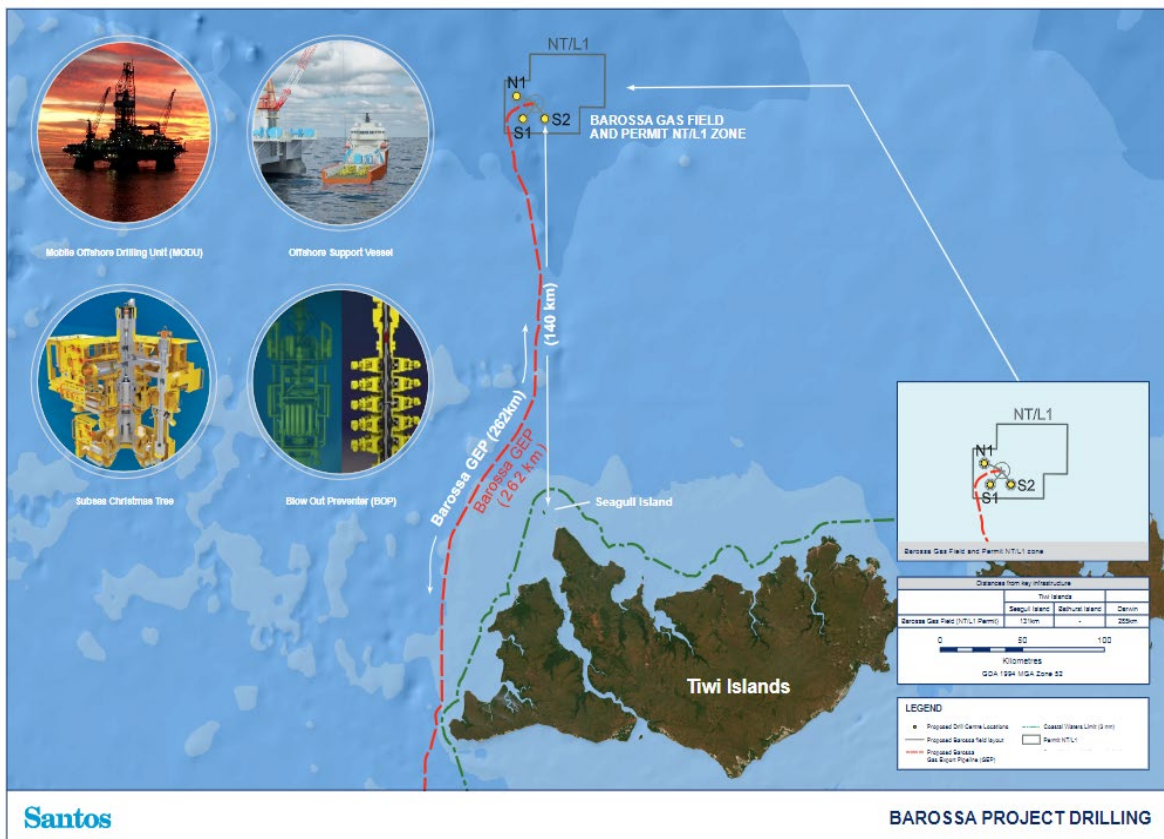
**Barossa Gas Project  
Frequently Asked Questions**

Santos is committed to providing all Relevant Persons access to information about the Barossa Gas Project in a timely and consistent manner. The following list of Frequently Asked Questions (FAQs) has been developed based on questions provided to Santos. This document will be updated on an ongoing basis during the development and delivery of the project as new information becomes available. The answers provided in this document are intended to provide clear, summary responses to the questions. Should you require more detailed information, further explanation or have any other questions, please ask one of the Santos team, contact us via telephone on 1800 267 600 or via email at [offshore.consultation@santos.com](mailto:offshore.consultation@santos.com).

This document was updated on 12 June 2023 with answers to additional questions and minor changes to questions previously asked. FAQs that have been added or changed are marked in blue text.

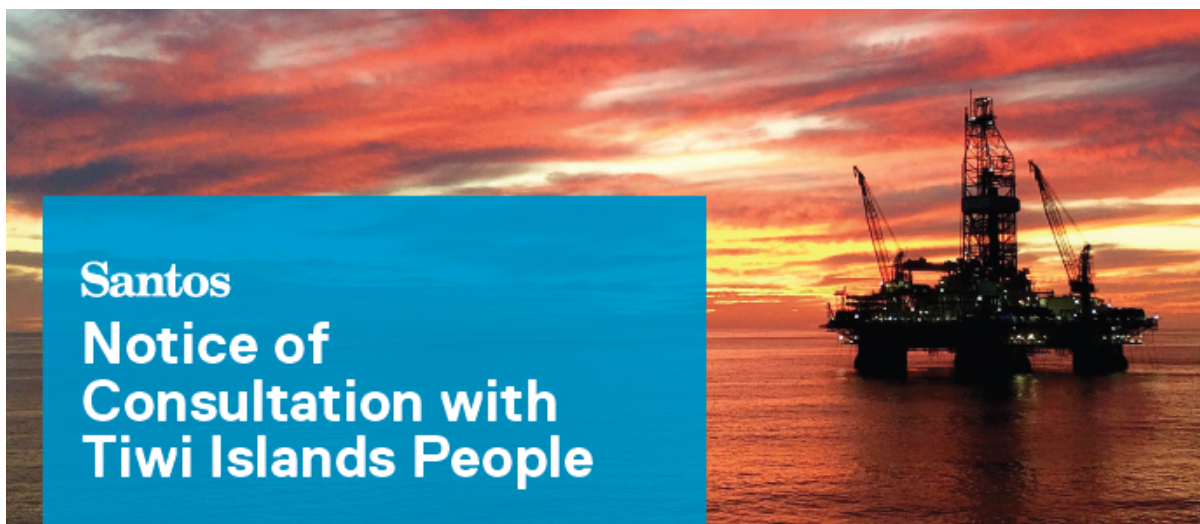
Question	Answer
<b>Spill (oil, gas, condensate)</b>	
We've already seen the impacts of the Montara oil spill. Is there a chance of an oil spill for this project?	<p>Santos was not involved in the Montara oil spill in August 2009. It resulted from a series of operator and regulatory failures which have now been comprehensively addressed through improved practices across the industry and improved regulatory regimes, now administered by NOPSEMA. More detail as to the initiatives undertaken by governments, regulators and industry following the Montara oil spill are available in the Australian Government Report on the implementation of the recommendations from the Montara Commission of Inquiry (September 2017): <a href="https://www.industry.gov.au/sites/default/files/2022-09/australian-government-report-on-the-implementation-of-the-recommendations-from-the-montara-commission-of-inquiry.pdf">https://www.industry.gov.au/sites/default/files/2022-09/australian-government-report-on-the-implementation-of-the-recommendations-from-the-montara-commission-of-inquiry.pdf</a>.</p> <p>Barossa is very different from Montara. Barossa is a gas and condensate field rather than oil. The well design and type of drilling rig for the Barossa field are different to those used at the Montara field. For example, the Barossa wells will not be suspended for the rig to depart the field and return at a later date (as occurred at Montara). Further, the aspects of well design and operations at Montara which were significant contributors to the Montara spill are not permitted under the current regulatory regime and Santos' drilling standards and procedures.</p> <p>The likelihood of a gas and condensate spill event during Barossa drilling is remote. The drilling at Barossa is subject to strict regulation, including in respect of the design of the wells and safety shutdown systems, regular inspection and maintenance schedules and operation by well-trained and</p>

**Barossa Project Poster - Drilling Specific**





**Notice of Consultation with Tiwi Island People**



BAROSSA GAS PROJECT

**Drilling and Completions Environment Plan  
Subsea Infrastructure Installation Environment Plan**

**Your feedback is important to us.**

Santos is preparing environment plans for its Barossa Gas Project, as required by legislation. We are consulting with Tiwi people whose functions, interests or activities may be affected by project activities proposed under the environment plans listed above. Based on feedback from Tiwi people, we will continue to consult with you through Clan group meetings using videos and visual aids to explain the project.

**At the sessions we will:**

- + Continue consulting with relevant persons about our proposed activity under the **Drilling and Completions Environment Plan**, including:
  - providing responses to feedback following the April and May clan meetings
  - updating you about any measures we propose to adopt in our environment plan as a result of your feedback before it is submitted to the regulator for assessment
  - if any feedback is outstanding, seeking your final feedback on possible consequences of the proposed drilling and completions activity and any further measures you would like us to consider to reduce impacts and risks.
  
- + Continue consulting with relevant persons about our proposed activity under the proposed **Subsea Infrastructure Installation Environment Plan**, including:
  - providing responses to feedback following the April and May clan meetings
  - seeking your final feedback on possible consequences of the subsea infrastructure installation and pre-commissioning activity and any measures you would like us to consider to reduce impacts and risks.

**TIMING AND VENUES**

**TUESDAY**

13 June 2023, Milikapiti

10.30am – Marrikawuyanga & Yimpinari Clans  
1.00pm – Wulrankuwu

**WEDNESDAY**

14 June 2023, Wurrumiyanga

10.30am – Mantjupwi Clan  
1.00pm – Jikilaruwu Clan

**THURSDAY**

15 June 2023, Wurrumiyanga

10.30am – Wurankuwu Clan  
1.00pm – Malawu Clan

**FRIDAY**

16 June 2023, Pirlangimpi

10.30am – Munupi Clan

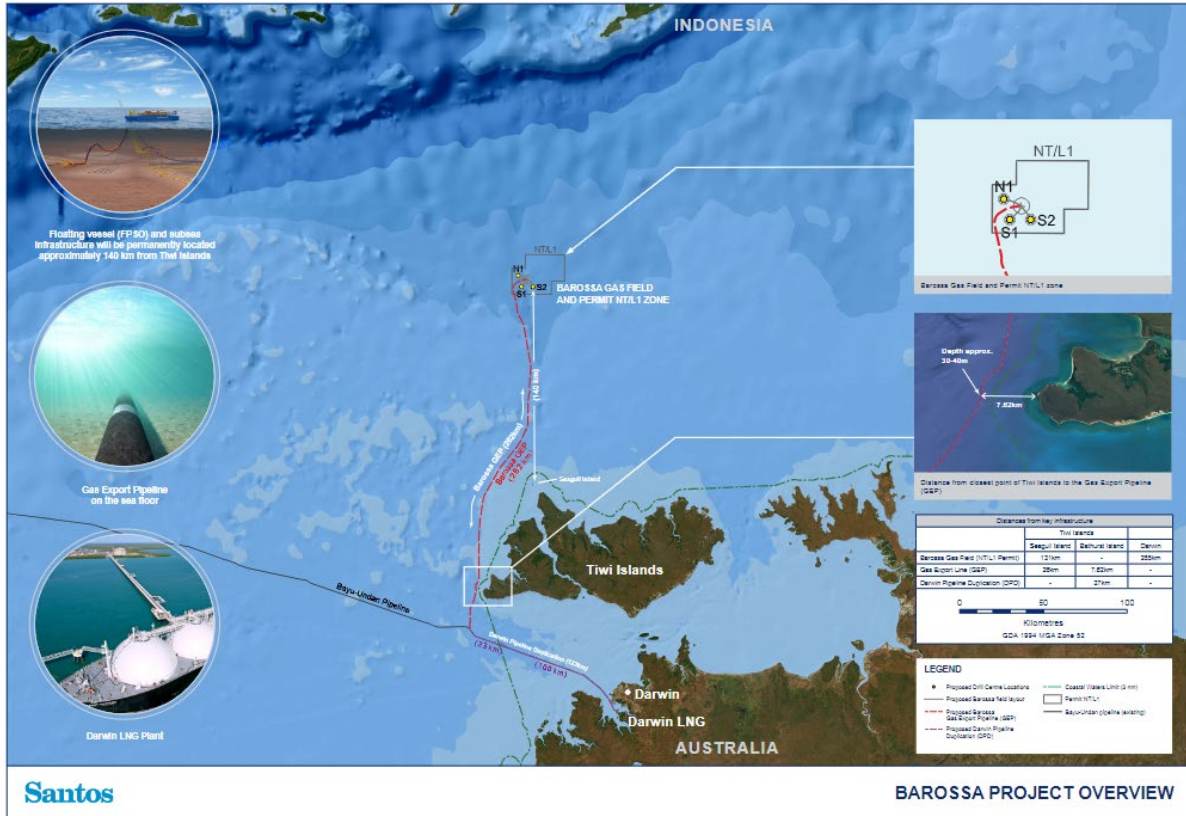
You can also contact us on  
T 1800 267 600 or via email at  
E [offshore.consultation@santos.com](mailto:offshore.consultation@santos.com)

**More information**

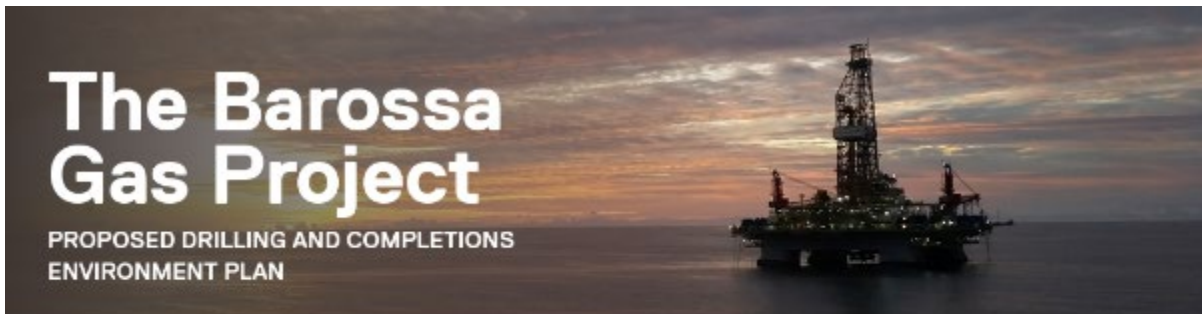
can be found at  
[www.santos.com/barossa](http://www.santos.com/barossa)  
or by using this QR code.



Barossa Project Overview Poster



D&C EP Fact Sheet (front page only)



Santos' proposed Barossa Gas Project will be located approximately 300 kilometres north northwest of Darwin in the Arafura Sea and will comprise a Floating Production Storage and Offloading (FPSO) facility, a subsea production system, supporting in-field subsea infrastructure and a Gas Export Pipeline (GEP).

**OVERVIEW OF PROPOSED DRILLING AND COMPLETIONS ACTIVITIES**

Santos plans to drill up to eight subsea wells. The drilling area is located approximately 140 kilometres north of Siegel Island. The way we drill a well is to use a drill on a ship that is like a telescope, extending further and further into the seabed until it reaches the gas. The hole that the drill creates is the well. Each well is lined by steel casings held in place with cement. This is designed to keep the well safe for the life of the project. At the top of the well on the seabed, a structure called a Christmas Tree will be installed that acts like a tap, so Santos can control the flow of gas. The installation of the casings and Christmas Trees is known as completion of the well. Each well is expected to take around 90 days to drill and complete. We anticipate that our proposed Drilling and

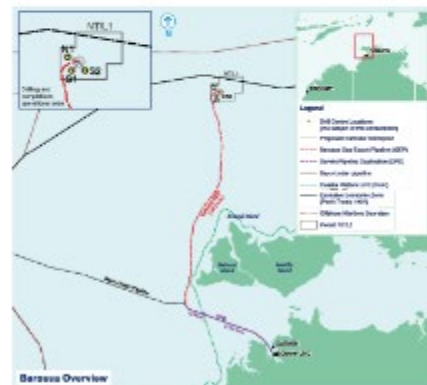
Completions activities will take approximately 2 years, subject to weather and operational performance.

**EQUIPMENT AND VESSELS**

A moored semi-submersible mobile offshore drilling unit (MODU) will be supported by up to four support vessels which will transit between the drilling area and the onshore supply base in Darwin harbour. The MODU or similar will be used to install the structure called the Christmas Tree on each well.

**KEY ACTIVITIES INCLUDE:**

- + MODU towing and mooring
- + MODU drilling and completions activities
- + Use of drilling fluids to lubricate the drill and maintain well pressure
- + Discharge of inert drilled solids, water-based drilling fluids, completion fluids and residual cement
- + Flowback of gas and liquids from the well for testing
- + Installation of subsea equipment
- + Use of helicopters to support activities.



We're Listening Santos

### Barossa Drilling Impact and Risks Poster

#### Noise

**Noise sources**

During the activity, noise will be generated by the MDOU, vessels and helicopters. The MDOU does not have self-propulsion, so unless vessels, will not generate noise from propellers. All the noise sources involved in the activity are non-point noise-making sources and have high peak sound pressure of a rapid rise and decay time. Noise emissions will be concentrated around the above-mentioned sources, with studies supporting the assessment of only localised effects in the order of 12 km from the source.

#### Light

**Light sources**

Light sources include:

- safety and navigational lighting on vessels, including the MDOU
- spot lighting when needed, such as deploying or retrieving equipment
- light from flaring during well flowback.

Due to the size and height of the MDOU, light from the MDOU will be more visible than from other vessels.

#### Interactions with other marine users

**Interactions with other marine users**

Other marine users that may be in the vicinity of the Barossa field include commercial fishing, shipping and other maritime marine traffic. Tourism and recreational fishing vessels are not expected in the operational area given the water depth and distance offshore.

Helicopter operations will be infrequent and at high altitude, hence unlikely to interfere with other marine users.

#### Air

**Air emissions**

Air emissions may occur from:

- fuel combustion to operate the MDOU, vessels and helicopters
- operation of vessel incinerators
- hydrocarbon combustion through the MDOU flare during well flowback activities
- tank venting when transferring dry bulk drill products

#### Seabed disturbance

**What will disturb the seabed?**

Seabed disturbance will occur because of:

- MDOU mooring (anchoring)
- well construction
- placement of objects on the seabed such as drilling equipment.

MDOU mooring and well construction will cause an estimated 1,850m<sup>2</sup> (at each of the three drill centres) and 5m<sup>2</sup> (for each well) of seabed disturbance.

#### Discharges

**Types of discharge**

Discharges will occur from vessels, and during drilling and completion activities.

**Vessel discharges**

The types of discharges are typical of most offshore commercial vessels and include deck runoff, treated sewage and grey water, machinery cooling water, treated bilge water, ballast water, deckwater, food scraps and brine (from water making).

### Drilling and Completions (D&C) EMBA Poster

Legend

- Operational Area
- EMBA - Environment that may be affected

20/04/2023 BARa7063

**EMBA - WORST CASE DRILLING SPILL EVENT**

**NOPSEMA Consultation on Offshore Petroleum Environment Plans: Information for the Community brochure (front page only)**



## Consultation on offshore petroleum environment plans

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Information for the community



The National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) is Australia's independent expert regulator for health and safety, structural and well integrity, and environmental management for offshore petroleum and greenhouse gas storage activities in Commonwealth waters.

**Drilling & Completions EP – Consultation Feedback Summary Table with Pictures**

**Drilling & Completions EP – Consultation Feedback Santos**

Tiwi Island feedback	Santos' response	Environment Plan (EP) Oil Pollution Emergency Plan (OPEP) Controls
Request to be notified prior to drilling recommencement	Santos will notify Tiwi Resources (Ranger Coordinator) and Tiwi Land Council at least 10 days before the re-commencement of drilling activity. Santos will provide a follow-up confirmation email.	Referenced in Section 8.9 of the Drilling and Completions EP
Request to have spill kits located on the Islands	Santos will make rapid assessment kits available on the Tiwi Islands, to perform sampling and monitoring.	Referenced in Table 5-7 of the Drilling and Completions OPEP
Request to be trained in spill response	Santos will deliver rapid assessment training in consultation with Tiwi Ranger groups prior to the commencement of the activity.	Referenced in Table 5-7 of the Drilling and Completions OPEP

**Drilling & Completions EP – Consultation Feedback Santos**

Tiwi Island feedback	Santos' response	Environment Plan (EP) Oil Pollution Emergency Plan (OPEP) Controls
Request to be notified in the event of a spill incident	Santos will notify Tiwi Resources (Ranger Coordinator) and Tiwi Land Council via phone call within eight hours of a spill incident being identified. Santos will provide a follow-up email.	Referenced in Table 5-7 of the Drilling and Completions OPEP
Raised concerns about potential impacts to marine life	Santos acknowledges feedback received with respect to concerns about potential impacts to marine life in the event of a hydrocarbon spill. Santos has provided information about the likelihood of an incident and the response strategies to be used in the unlikely event of a spill.	Prevention and mitigation control measures in the Drilling and Completions EP (Section 7.6.3) are considered sufficient to reduce risks and impacts to as low as reasonably practicable and to an acceptable level
Raised concerns about impacts of natural disasters on drilling activity	Santos acknowledges feedback received regarding natural disasters. The Barossa wells are designed and will be drilled to reduce the risk of impacts to as low as reasonably practicable.	Wells engineering design safeguards and drilling safety control measures are considered sufficient to reduce the risks and impacts to as low as reasonably practicable and to an acceptable level

## Rapid Assessment Kits

Santos

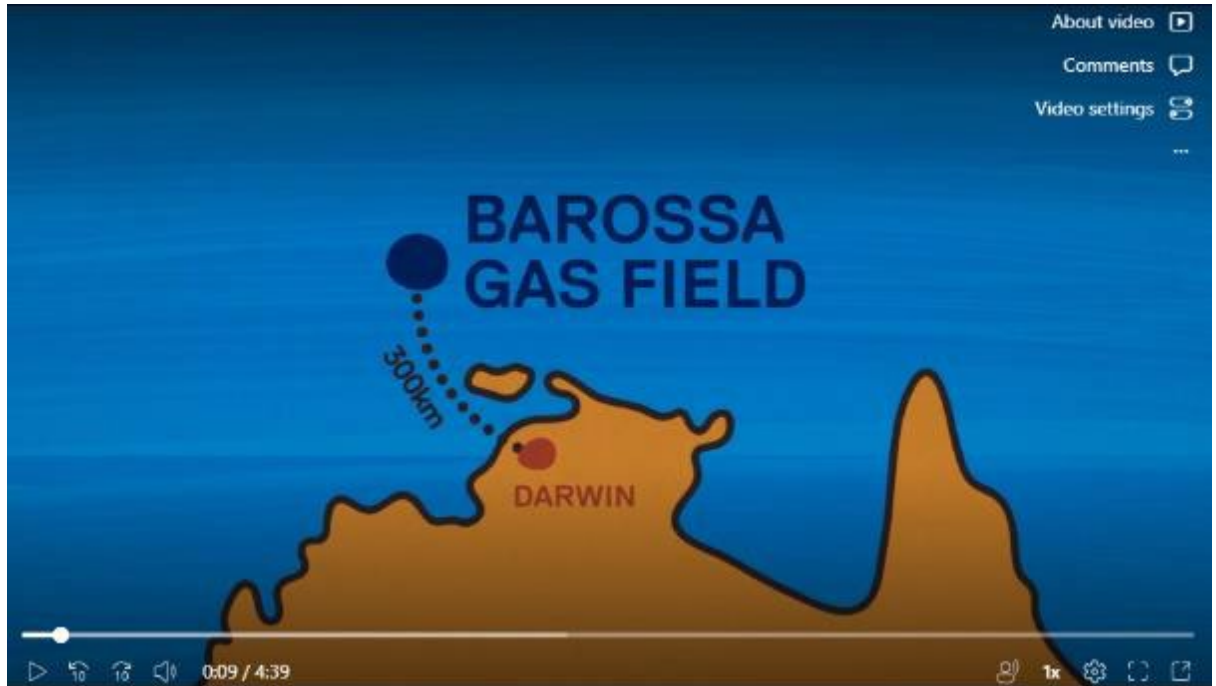


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**June Consultation Session PowerPoint presentation:  
Introduction videos**



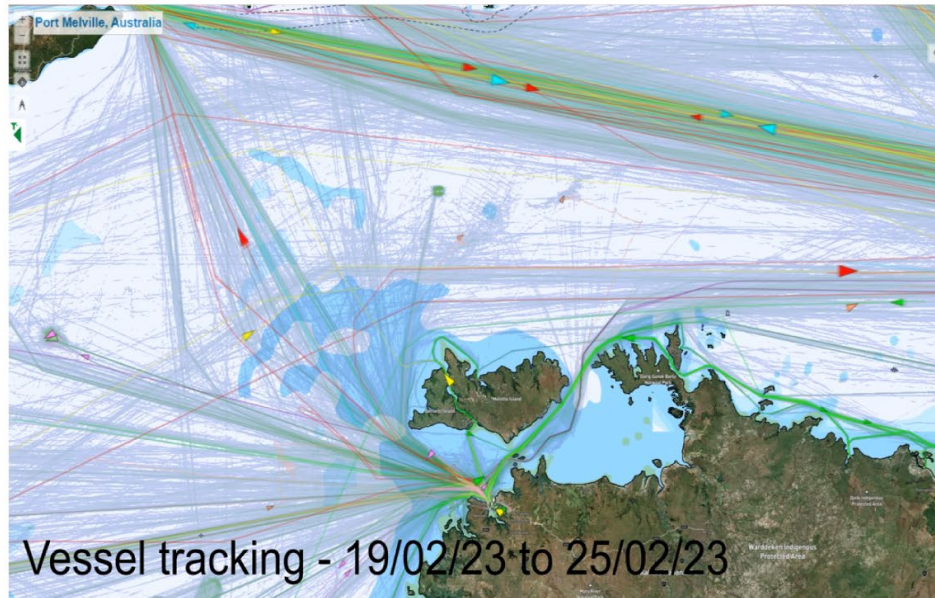
Barossa Project Overview video





**Vessel movements animation**

Vessel Movements (2 week period)



7

**Drilling & Completions EP – Consultation Feedback**

Drilling & Completions EP – Consultation Feedback

Tiwi Island feedback	Santos' response	Environment Plan (EP) Oil Pollution Emergency Plan (OPEP) Controls
Request to be notified prior to drilling commencement	Santos will notify Tiwi Resources (Ranger Coordinator) and Tiwi Land Council at least 10 days before the re-commencement of drilling activity. Santos will provide a follow-up confirmation email.	Referenced in Section 8.9 of the Drilling and Completions EP
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Request to be trained in spill response	Santos will deliver rapid assessment training in consultation with Tiwi Ranger groups prior to the commencement of the activity.	Referenced in Table 5-7 of the Drilling and Completions OPEP

Drilling & Completions EP – Consultation Feedback

Santos

Tiwi Island feedback	Santos' response	Environment Plan (EP) Oil Pollution Emergency Plan (OPEP) Controls
Request to be notified in the event of a spill incident	Santos will notify Tiwi Resources (Ranger Coordinator) and Tiwi Land Council via phone call within eight hours of a spill incident being identified. Santos will provide a follow-up email.	Referenced in Table 5-7 of the Drilling and Completions OPEP
Raised concerns about potential impacts to marine life	Santos acknowledges feedback received with respect to concerns about potential impacts to marine life in the event of a hydrocarbon spill. Santos has provided information about the likelihood of an incident and the response strategies to be used in the unlikely event of a spill.	Prevention and mitigation control measures in the Drilling and Completions EP (Section 7.6.3) are considered sufficient to reduce risks and impacts to as low as reasonably practicable and to an acceptable level
Raised concerns about impacts of natural disasters on drilling activity	Santos acknowledges feedback received regarding natural disasters. The Barossa wells are designed and will be drilled to reduce the risk of impacts to as low as reasonably practicable.	Wells engineering design safeguards and drilling safety control measures are considered sufficient to reduce the risks and impacts to as low as reasonably practicable and to an acceptable level

Rapid Assessment Kits

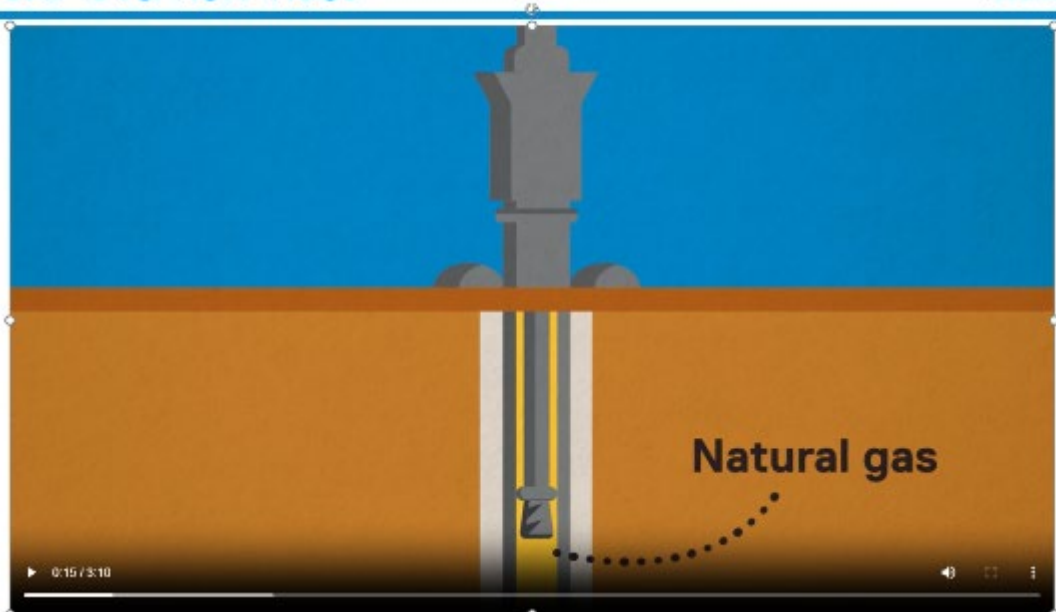
Santos



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**SURF Overview video**

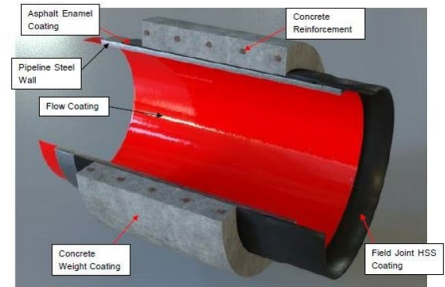
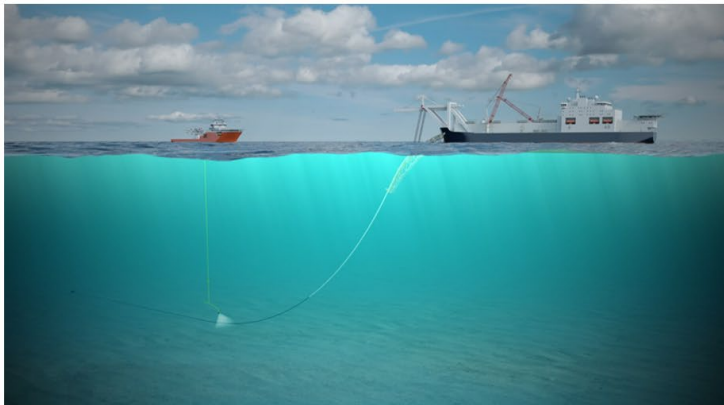
SURF Overview Video



**Pipeline Images**

Imagery and Explanation of Offshore Construction

Pipeline Images



**SURF Images**

Imagery and Explanation of Offshore Construction

SURF Images

Subsea Xmas Tree



Production Manifold Module



**SURF Risks and Controls Video**

SURF Risks and Controls Video



**APPENDIX J - RELEVANT PERSON  
ADVERTISEMENTS**

# Table 4.7 Advertising Phase 1 –Seeking Relevant Persons (March-April 2023)

## Full page advertisement

- 2 x The Australian
- 3 x Northern Territory News
- 1 x Australian Financial Review
- 1 x The West Australian
- 1 x National Indigenous News



**Santos is seeking to identify and consult with relevant persons whose functions, interests or activities may be affected by our proposed Drilling and Completions activity for the Barossa Gas Project.**

#### Barossa Gas Project

Santos' proposed Drilling and Completions activity for the Barossa Gas Project will be located in the Project's production licence area (the 'operational area'). The operational area is located within Commonwealth waters approximately 263 kilometres north-northwest of Darwin, NT. The Project will comprise a Floating Production Storage and Offloading (FPSO) facility, a subsea production system, supporting in-field subsea infrastructure and a Gas Export Pipeline (GEP).

Once complete, natural gas will be transported from the offshore Barossa field to the existing Darwin liquefied natural gas (DUNG) plant at Wickham Point, south of Darwin city.

An Offshore Project Proposal for the Barossa Gas Project was accepted by Australia's offshore energy regulator, the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA), in March 2018.

Santos is planning the Drilling and Completions activity as part of the Project and will submit an environment plan to NOPSEMA for acceptance.

In March 2020, NOPSEMA accepted an environment plan for the installation of a GEP for the Barossa Gas Project. Santos is currently undertaking further work to assess the potential presence of underwater cultural heritage places along the pipeline route.

Santos intends to submit further environment plans to NOPSEMA for acceptance in relation to other aspects of the Barossa Gas Project during 2023. We will provide further information and advertise about this at a later date.

#### Proposed Drilling and Completions Activity

Santos plans to drill up to eight subsea development wells in the operational area, with a moored semi-submersible mobile offshore drilling unit (MODU). The MODU will be supported by up to four support vessels which will transit between the operational area and the onshore supply base in Darwin Harbour.

#### The environment that may be affected (EMBA) by the proposed activities

Santos is assessing the planned impacts and unplanned risks from our proposed activity on the environment, including on ecosystems (including people and communities), natural and physical resources, the qualities and characteristics of locations, places and areas and the heritage value of places. This will include assessment of the social, economic and cultural features of the environment.

The map below depicts the operational area for the activity to be carried out (located within the Barossa field shown on the map below) and the broader environment that may be affected by the proposed activity, referred to as the 'EMBA'. The 'EMBA' represents the greatest spatial extent that could be affected by unplanned 'worst case' spill scenarios.

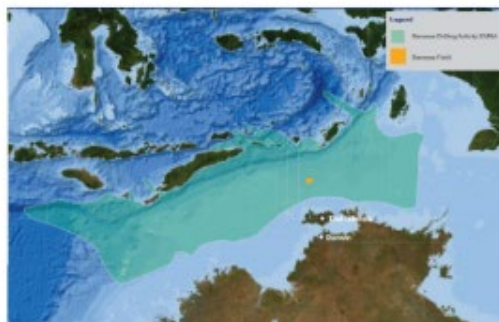
Santos is proposing to implement measures to reduce the impacts and risks of the activity. It is a requirement under relevant environmental legislation that these impacts and risks are reduced to as low as reasonably practicable and to an acceptable level. This must be considered by NOPSEMA in determining whether to accept the environment plan.

#### Seeking Relevant Persons for Environment Plans

In preparing its environment plans, Santos must consult with relevant persons for each of its proposed activities for the Project. A relevant person includes a person or an organisation whose functions, interests or activities may be affected by an activity proposed to be carried out under an environment plan. Such functions, interests or activities may include those arising in relation to spiritual or cultural connections to land and sea country in accordance with Indigenous tradition; tourism; recreational and commercial fishing; other commercial or recreational activities and local communities that might be affected by our proposed activity (these are examples and not an exhaustive list).

Santos is seeking to identify relevant persons for the purpose of preparing the Drilling and Completions Environment Plan for the Barossa Gas Project.

If you think your functions, interests or activities may be affected by this activity, you may be a relevant person with whom Santos must consult.



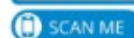
Barossa Gas Project – Drilling and Completions EMBA

#### We welcome your feedback

If you consider you may be a relevant person, please contact us by 22 April 2023 to allow Santos to initiate consultation with you in relation to the proposed activity and so you can tell us how you would like to be consulted throughout this process.

Santos is committed to undertaking genuine and meaningful consultation. We want to provide information for people to make informed assessments of the possible consequences of the proposed activity on them. Your feedback and input is important to us and input will be considered in the development of our environment plan.

Visit [santos.com/barossa](https://santos.com/barossa), phone 1800 287 800, email [offshore\\_consultation@santos.com](mailto:offshore_consultation@santos.com) or use the QR code for more information, to self-identify as a relevant person or to provide feedback.



## Public notice

- 2 x Northern Territory News
- 4 x The Australian
- 3 x Australian Financial Review
- 2 x The West Australian

# Barossa Gas Project

Seeking Relevant Persons

## DRILLING AND COMPLETIONS ENVIRONMENT PLAN

Santos is seeking to identify and consult with relevant persons whose functions, interests or activities may be affected by our proposed Drilling and Completions activity for the Barossa Gas Project.

If you consider you may be a relevant person, please contact us by 22 April 2023 to allow Santos to initiate consultation with you in relation to the proposed activity and so you can tell us how you would like to be consulted throughout this process.

For more information:

Visit [santos.com/barossa](https://santos.com/barossa)

Phone **1800 267 600**

Email [offshore.consultation@santos.com](mailto:offshore.consultation@santos.com)

or scan the QR code.



# Santos

## Social media

- 27 March 2023 – 22 April 2023 Geotargeted Northern Territory (Facebook, Instagram, Messenger)
- 27 March 2023 – 1 May 2023 Geotargeted Australia, Indonesia, Timor-Leste (Facebook, Instagram, Messenger)

 **Santos: Proudly Australian** ... X  
Sponsored · 🌐

Santos is seeking to identify and consult with relevant persons whose functions, interests or activities may be affected by our proposed Drilling and Completions activity for the Barossa Gas Project.

If you consider you may be a relevant person, please contact us by 22 April 2023 to allow Santos to initiate consultation with you in relation to the proposed activity and so you can tell us how you would like to be consulted throughout this process.

For more information, visit [santos.com/barossa](https://santos.com/barossa), phone 1800 267 600, or email [offshore.consultation@santos.com](mailto:offshore.consultation@santos.com).

Santos is seeking to identify and consult with relevant persons whose functions, interests or activities may be affected by our proposed Drilling and Completions activity for the Barossa Gas Project.

If you consider you may be a relevant person, please contact us by 22 April 2023 to allow Santos to initiate consultation with you in relation to the proposed activity and so you can tell us how you would like to be consulted throughout this process.

For more information, visit [santos.com/barossa](https://santos.com/barossa), phone **1800 267 600** or email [offshore.consultation@santos.com](mailto:offshore.consultation@santos.com)

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[Learn more](#)



## **Radio**

- 15 April 2023 – 21 April 2023 National radio advertising across metro stations in Sydney, Melbourne, Brisbane, Adelaide and Perth
- 15 April 2023 – 21 April 2023 Radio advertising across Darwin

### *Script:*

*Santos is seeking to identify and consult with relevant persons whose functions, interests or activities may be affected by our proposed Drilling and Completions activity for the Barossa Gas Project.*

*If you consider you may be a relevant person, please contact us by 22 April 2023 to allow Santos to initiate consultation with you in relation to the proposed activity and so you can tell us how you would like to be consulted throughout this process.*

*For more information, visit [santos.com/barossa](https://santos.com/barossa), phone 1800 267 600, or email [offshore.consultation@santos.com](mailto:offshore.consultation@santos.com).*

## **Table 4.8 Phase 2 – Further advertising seeking potential relevant persons and seeking feedback (May – June 2023)**

### **Half page advertisement**

- 5 x The Australian
- 5 x Northern Territory News
- 5 x Australian Financial Review
- 5 x The West Australian
- 1 x National Indigenous Times
- Social media
- Radio advertising

# The Barossa Gas Project

DRILLING AND COMPLETIONS  
ENVIRONMENT PLAN CONSULTATION

# Santos



**Santos is now consulting with relevant persons for its Drilling and Completions Environment Plan. The Plan proposes activity that involves drilling up to 8 subsea development wells in the Barossa natural gas and condensate field, located in Commonwealth waters approximately 285 kilometres offshore north-north west from Darwin.**

More information is available at [santos.com/barossa](https://santos.com/barossa) about who is a relevant person to be consulted, the proposed activity, the environment that may be affected by the proposed activity, potential environmental impacts and risks, and proposed control measures to seek to reduce any impacts and risks to as low as reasonably practicable and an acceptable level.

We are asking relevant persons to provide feedback by 15 June.

Please contact us via any of the below channels to discuss consultation or to provide feedback.

**For more information:**

Visit [santos.com/barossa](https://santos.com/barossa)

Phone **1800 267 600**



Email [offshore.consultation@santos.com](mailto:offshore.consultation@santos.com)

or scan the QR code



## Social media

- 23 May 2023 – 15 June 2023 Geotargeted NT & WA (Facebook, Instagram, Messenger)

 **Santos: Proudly Australian** ... ✕  
Sponsored · 

### Barossa Gas Project

#### Drilling and Completions Environment Plan Consultation

Santos is now consulting with relevant persons for its Barossa Gas Project, Drilling and Completions Environment Plan. The Plan proposes activity that involves drilling up to 8 subsea development wells in the Barossa natural gas and condensate field, located in Commonwealth waters north-north west from Darwin.

If you are a relevant person who may be affected by this activity, Santos is seeking your feedback by 15 June.

For more information, visit [santos.com/barossa](https://santos.com/barossa)

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## The Barossa Gas Project

### DRILLING AND COMPLETIONS ENVIRONMENT PLAN CONSULTATION

Santos is now consulting with relevant persons for its Drilling and Completions Environment Plan. The Plan proposes activity that involves drilling up to 8 subsea development wells in the Barossa natural gas and condensate field, located in Commonwealth waters approximately 285 kilometres offshore north-north west from Darwin.

More information is available at [santos.com/barossa](https://santos.com/barossa) about who is a relevant person to be consulted, the proposed activity, the environment that may be affected by the proposed activity, potential environmental impacts and risks, and proposed control measures to seek to reduce any impacts and risks to as low as reasonably practicable and an acceptable level.

We are asking relevant persons to provide feedback by 15 June. Please contact us via any of the below channels to discuss consultation or to provide feedback.




**For more information:**  
Visit [santos.com/barossa](https://santos.com/barossa)  
Phone 1800 267 600  
Email [offshore.consultation@santos.com](mailto:offshore.consultation@santos.com)  
or scan the QR code

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 Like  Comment  Share

## **Radio**

- 17 May 2023 – 15 June 2023 National metro stations Sydney, Melbourne, Brisbane, Adelaide and Perth
- 17 May 2023 – 15 June 2023 Darwin radio
- 17 May 2023 – 15 June 2023 Top End Aboriginal Bush Broadcasting Association (TEABBA) 29 remote communities across top end of Australia, including Tiwi Islands

### *Script:*

*Santos is now consulting with relevant persons for its Barossa Gas Project, Drilling and Completions Environment Plan. The Plan proposes activity that involves drilling up to 8 subsea development wells in the Barossa natural gas and condensate field, located in Commonwealth waters north-north west from Darwin.*

*If you are a relevant person who may be affected by this activity, Santos is seeking your feedback by 15 June. For more information, visit [santos.com/barossa](https://santos.com/barossa), phone 1800 267 600, or email [offshore.consultation@santos.com](mailto:offshore.consultation@santos.com).*

# Table 4.9 Phase 3 – Promoting Darwin drop in sessions (April - May 2023)

## First round press advertisement

- 4 x Northern Territory News



We're  
**Listening**

**Santos**

## Community consultation drop-in session

### BAROSSA GAS PROJECT

Santos is preparing environment plans, as required by legislation, regarding activities for the Barossa Gas Project – a project that involves extracting natural gas from the Barossa field, located in Commonwealth waters approximately 295 kilometres offshore north-north west from Darwin, and transporting it to the existing Darwin liquefied natural gas (DLNG) plant.

We are currently consulting with relevant persons whose functions, interests or activities may be affected by the following project activities:

- + Drilling and completions activity
- + Subsea infrastructure installation and pre-commissioning activity.

Detailed information about these proposed activities is available at [santos.com/barossa](https://santos.com/barossa) or by scanning the QR code below.

Santos will hold community consultation drop-in sessions for relevant persons to obtain information about these proposed activities, provide feedback and ask any questions.

#### THURSDAY: 27 April 2023

Rooms 2 & 3  
Darwin Convention Centre  
10 Stokes Hill Rd,  
Darwin City  
9.00am – 5.00pm

#### WEDNESDAY: 3 May 2023

Rooms 2 & 3  
Darwin Convention Centre  
10 Stokes Hill Rd,  
Darwin City  
9.00am – 5.00pm

Further drop-in sessions in relation to Barossa Gas Project activities will be held in coming weeks.

For more information:  
Visit [santos.com/barossa](https://santos.com/barossa)  
Phone 1800 267 600  
Email [offshore.consultation@santos.com](mailto:offshore.consultation@santos.com)  
or scan the QR code.



## Social media

- 21 April 2023 – 3 May 2023 Geotargeted Darwin (Facebook, Instagram, Messenger)

The image shows a Facebook advertisement for Santos. At the top, it says "Santos: Proudly Australian" and "Sponsored". The main headline is "BAROSSA GAS PROJECT" followed by "Community consultation drop-in session". Below that is a link: "More: santos.com/barossa". The ad features a large image of an offshore oil rig at sea. To the right of the image, there is text under the heading "Listening" and "Community consultation drop-in session". The text describes the project and the purpose of the sessions. It lists two dates: "THURSDAY 27 April 2023" and "WEDNESDAY 3 May 2023". For each date, it provides the location: "Room 2.6.5 Darwin Convention Centre, 10 Stokes Hill Rd, Darwin City, Northern Territory". A QR code is visible in the bottom right corner of the text area. At the bottom of the ad, there is a "Learn more" button and the Santos logo with the text "The Santos-operated Ba...". Below the ad, there are social media interaction icons for "Like", "Comment", and "Share".

## Radio

- 27 April 2023 – 3 May 2023 Darwin radio

### Script:

*Santos is holding Barossa Gas Project consultation drop-in sessions on April 27 and May 3 at the Darwin Convention Centre about proposed activities for the project. Relevant persons can nominate for consultation, give feedback and ask questions.*

*For more information, including who is a relevant person and proposed project activities, visit [santos.com slash barossa](https://santos.com/slash/barossa), phone 1800 267 600, or email [offshore.consultation@santos.com](mailto:offshore.consultation@santos.com)*

## Second round press advertisement

- 9 x Northern Territory News



We're  
**Listening**

**Santos**

## Community consultation drop-in session

### BAROSSA GAS PROJECT

Santos is preparing environment plans, as required by legislation, regarding activities for the Barossa Gas Project – a project that involves extracting natural gas from the Barossa field, located in Commonwealth waters approximately 285 kilometres offshore north-north west from Darwin, and transporting it to the existing Darwin liquefied natural gas (DLNG) plant.

We are currently consulting with relevant persons whose functions, interests or activities may be affected by the following project activities:

- + Drilling and completions activity
- + Subsea infrastructure installation and pre-commissioning activity.

Detailed information about these proposed activities is available at [santos.com/barossa](https://santos.com/barossa) or by scanning the QR code below.

Santos will hold community consultation drop-in sessions for relevant persons to obtain information about these proposed activities, provide feedback and ask any questions.

#### MONDAY: 22 May 2023

Darwin Convention Centre,  
10 Stokes Hill Rd,  
Darwin City  
9.00am – 5.00pm

#### THURSDAY: 8 June 2023

Darwin Convention Centre,  
10 Stokes Hill Rd,  
Darwin City  
9.00am – 5.00pm

For more information:  
Visit [santos.com/barossa](https://santos.com/barossa)  
Phone 1800 267 600  
Email [offshore.consultation@santos.com](mailto:offshore.consultation@santos.com)  
or scan the QR code.



## Social media

- 17 May 2023 – 12 June 2023 Geotargeted Darwin (Facebook, Instagram, Messenger)

**Santos: Proudly Australian** Sponsored

Community consultation drop-in session

Santos is preparing environment plans, as required by legislation, regarding activities for the Barossa Gas Project – a project that involves extracting natural gas from the Barossa field, located in Commonwealth waters approximately 285 kilometres offshore north-northwest from Darwin, and transporting it to the existing Darwin liquefied natural gas (DLNG) plant.

We are currently consulting with relevant persons whose functions, interests or activities may be affected by the following project activities:

- Drilling and completions activity
- Subsea infrastructure installation and pre-commissioning activity.

Detailed information about these proposed activities is available at <https://www.santos.com/barossa/> or by scanning the QR code below.

Santos will hold community consultation drop-in sessions for relevant persons to obtain information about these proposed activities, provide feedback and ask any questions.

**Listening** Santos  
**Community consultation drop-in session**  
**BAROSSA GAS PROJECT**

Santos is preparing environment plans, as required by legislation, regarding activities for the Barossa Gas Project – a project that involves extracting natural gas from the Barossa field, located in Commonwealth waters approximately 285 kilometres offshore north-northwest from Darwin, and transporting it to the existing Darwin liquefied natural gas (DLNG) plant.

We are currently consulting with relevant persons whose functions, interests or activities may be affected by the following project activities:

- Drilling and completions activity
- Subsea infrastructure installation and pre-commissioning activity.

Detailed information about these proposed activities is available at <https://www.santos.com/barossa/> or by scanning the QR code below.

Santos will hold community consultation drop-in sessions for relevant persons to obtain information about these proposed activities, provide feedback and ask any questions.

**SESSIONS IN THE WET** **SESSIONS IN THE DRY**

Thursday 22 May 2023 10:00am - 12:00pm Darwin Convention Centre, Darwin City Indulgence, Darwin	Thursday 8 June 2023 10:00am - 12:00pm Darwin Convention Centre, Darwin City Indulgence, Darwin
--	--

For more information visit [www.santos.com/barossa/](https://www.santos.com/barossa/) or scan the QR code.

santos.com  
**Santos**  
The Santos-operated Ba... **Learn more**

Example 1 of 5

Like Comment Share

## Radio

- 22 May 2023 – 7 June 2023 Darwin radio

### Script:

*Santos is holding Barossa Gas Project consultation drop-in sessions on 22 May and 8 June in Darwin. Relevant persons can nominate for consultation, give feedback and ask questions.*

*For more information, including who is a relevant person and proposed project activities, visit [santos.com/barossa](https://www.santos.com/barossa/), phone 1800 267 600, or email [offshore.consultation@santos.com](mailto:offshore.consultation@santos.com)*



## Table 4.10 Targeted international phase

### Social media

- 22 May 2023 – 15 June 2023 Geotargeted Timor-Leste in Tetum (Facebook, Instagram and Messenger)
- 23 May 2023 – 15 June 2023 Geotargeted Indonesia in Bahasa (Facebook, Instagram and Messenger)
- 30 May 2023 – 15 June 2023 Geotargeted Indonesia and Timor-Leste (Facebook, Instagram and Messenger)

### Proyek Gas Barossa

Mencari orang-orang yang relevan untuk berkonsultasi

#### **DRILLING & COMPLETIONS DAN PERENCANAAN- PERENCANAAN PENGINSTALASIAN SUBSEA INFRASTRUKTUR LINGKUNGAN HIDUP**

Proyek Gas Barossa yang dioperasikan oleh Santos ini adalah sebuah proyek gas dan kondensat yang mana melibatkan proses ekstraksi gas alam dari area gas Barossa, yang berlokasi di perairan Commonwealth, kurang lebih 285 kilo meter lepas pantai utara barat laut dari Darwin. Gas alam ini kemudian ditransportasikan melalui pipa-pipa gas ke fasilitas Darwin liquefied natural gas (DLNG) yang sudah ada.

Perbatasan dari area produksi berijin ini kira-kira 520 kilometer timur tenggara dari Dili dan kurang lebih 2,605 kilometer dari timur Jakarta di laut Arafura.

Sebagai bagian dari proyek, Santos akan menyiapkan perencanaan-perencanaan lingkungan hidup untuk diajukan kepada the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA). Berkonsultasi dengan orang-orang relevan merupakan bagian penting dari proses persiapan perencanaan-perencanaan ini.

Santos sedang mencari untuk mengidentifikasi dan berkonsultasi dengan orang-orang yang relevan yang fungsi-fungsinya, kepentingan-kepentingan atau aktivitas-aktivitasnya mungkin terdampak oleh aktivitas-aktivitas yang diajukan dibawah Perencanaan Drilling & Completions Environment dan Perencanaan Penginstalasian Subsea infrastruktur Environment.

Jika anda merasa bahwa anda mungkin salah satu orang yang relevan dan ingin berkonsultasi mengenai aktivitas-aktivitas yang di rencanakan tersebut diatas, silahkan menghubungi kami untuk memberikan masukan, kritik atau saran anda pada tanggal 15 Juni 2023. Informasi lebih lanjut tersedia pada [santos.com/Barossa](https://santos.com/Barossa) tentang siapa itu relevan person, aktivitas-aktivitas yang direncanakan, lingkungan hidup yang mungkin terdampak dari aktivitas-aktivitas yang direncanakan, potensi dari dampak dan resiko terhadap lingkungan hidup, dan perencanaan-perencanaan terukur untuk mengontrol dan meminimalkan dampak-dampak dan resiko-resiko serta perencanaan-perencanaan terukur untuk mengontrol dan meminimalkan dampak-dampak dan resiko-resiko sejauh yang dapat dilakukan dan pada level yang dapat diterima.

Untuk informasi lebih jauh:

Kunjungi [santos.com/barossa](https://santos.com/barossa)

Phone +61 1800 267 600

Email [offshore.consultation@santos.com](mailto:offshore.consultation@santos.com)



## Projetu Gas Barossa

Buka hela ema apropriadu sira hodi halo konsultasaun

### **PERFURASAUN & KONKLUSAUN NO PLANU AMBIENTAL BA INSTALASAUN INFRASTRUTURA SUBMARINUP**

Projetu Gas Barossa, operadu husi kompanhia Santos sai hanesan projetu ida ba gas no kondensadu ne'ebe sei involve dada sai gas natural husi kampo gas Barossa, lokalizadu iha area tasi Commonwealth, aproximadamente kilometru 285 husi kosta norte noroeste husi Darwin. Depois sei halo transportasaun ba gas natural liu husi kadoras gas ninian ba iha facilidade Darwin liquified natural gas (DLNG) ne'ebe existe hela.

Baliza husi area lisensa ba produsaun maka aproximadamente kilometru 520 leste sudeste husi Dili no aproximadamente kilometru 2,605 leste husi Jakarta, iha tasi Arafura.

Hanesan parte husi projetu, kompanhia Santos sei prepara planu ambiental hodi hatama ba National Offshore Petroleum Safety and Environmental Management Authority (NOSPEMA).

Konsultasaun ho ema relevante sira sai hanesan parte importante ida hodi prepara plano sira ne.

Santos buka hela atu identifika no konsulta ho ema relevante sira ne'ebe maka ninia kna'ar, interesse ou aktividade sira bele hetan afetadu husi proposta ba actividades sira husi ami nia proposta ba Planu Ambiental ba Perfurasaun no Konklusaun nomos Planu Ambiental ba Instalasaun Infrastrutura Submarinu.

Karik ita bo'ot konsidera ita nia aan nudar ema ne'ebe relevante no hakarak simu konsultasaun relasiona ho atividade proposta mensiona iha leten, halo favor kontaktu mai ami hodi fornese ita bo'ot nia feedback ou hanoin tarde liu iha data 15 Junho 2023.

Informasaun klean liu tan konaba se mak sai hanesan ema apropriadu, proposta ba actividades sira, ambiente ne'ebe bele sai afeitadu husi proposta ba actividades sira, potencia sira ba impaktu no risku ambiental, nomos proposta ba sasukat kontrolu sira hodi reduz impaktu no risku sira to'o nivel ida razoavelmente praktikavel no aseitavel kiik liu, bele hetan iha [santos.com/barossa](https://santos.com/barossa).

Ba informasaun klean liu tan:

Visita [santos.com/barossa](https://santos.com/barossa)

Telefone **+61 1800 267 600**

Email [offshore.consultation@santos.com](mailto:offshore.consultation@santos.com)

The Santos logo is displayed in a bold, blue, sans-serif font.

Santos

**Santos: Proudly Australian**

Sponsored · 



## Barossa Gas Project

### Drilling and Completions Environment Plan Consultation

Santos is now consulting with relevant persons for its Barossa Gas Project, Drilling and Completions Environment Plan. The Plan proposes activity that involves drilling up to 8 subsea development wells in the Barossa natural gas and condensate field, located in Commonwealth waters north-north west from Darwin.

If you are a relevant person who may be affected by this activity, Santos is seeking your feedback by 15 June.

For more information, visit [santos.com/barossa](https://santos.com/barossa)

# The Barossa Gas Project

**Santos**

## DRILLING AND COMPLETIONS ENVIRONMENT PLAN CONSULTATION

Santos is now consulting with relevant persons for its Drilling and Completions Environment Plan. The Plan proposes activity that involves drilling up to 8 subsea development wells in the Barossa natural gas and condensate field, located in Commonwealth waters approximately 285 kilometres offshore north-north west from Darwin.

More information is available at [santos.com/barossa](https://santos.com/barossa) about who is a relevant person to be consulted, the proposed activity, the environment that may be affected by the proposed activity, potential environmental impacts and risks, and proposed control measures to seek to reduce any impacts and risks to as low as reasonably practicable and an acceptable level.

We are asking relevant persons to provide feedback by 15 June. Please contact us via any of the below channels to discuss consultation or to provide feedback.

**For more information:**

Visit [santos.com/barossa](https://santos.com/barossa)

Phone 1800 267 600

Email [offshore.consultation@santos.com](mailto:offshore.consultation@santos.com)

or scan the QR code

[santos.com](https://santos.com)

**Santos**

The Santos-operated Ba...

[Learn more](#)



Like



Comment



Share

# Table 4-12: Notification and advertising of consultation sessions

## Tiwi consultation sessions February

### Advertising

- 3 x Northern Territory News

### Social media

- January 2023 – 4 February 2023 Geotargeted Tiwi Islands (Facebook, Instagram and Messenger)



**We're Listening** **Santos**

### Santos Consultation Meeting

**BAROSSA GAS DEVELOPMENT PROJECT**

Santos is a global low-cost producer of oil and gas committed to ever-cleaner energy and fuels production with operations across Australia, Papua New Guinea, Timor-Leste and North America. Our Barossa Gas Development project, located approximately 300 kilometres offshore from Darwin, will transport natural gas to the existing Darwin Liquefied natural gas (DLNG) plant. It has the potential to create and sustain hundreds of jobs in the Northern Territory (NT) and inject significant money into the NT economy through the purchase of local goods and services during both construction and operations.

We believe in developing strong, mutually beneficial relationships with communities where we operate, and your feedback is important to us achieving this. We want a productive working relationship with the Tiwi people and to hear from you what is important to your country and community. To achieve this, Santos will hold regular community consultation sessions. Our next session will be held with the below communities on the Tiwi Islands:

<b>MONDAY,</b> <b>6 February, 10.30am</b>	<b>TUESDAY,</b> <b>7 February, 10.30am</b>	<b>WEDNESDAY,</b> <b>8 February, 10.30am</b>
<b>Milikapiti Sport &amp; Recreation Centre</b>	<b>Pirlangimpi Club</b>	<b>Martiyupwi Motel Meeting Room</b>

At this session we will provide you with an opportunity to:

- hear about the project including the pipelaying and drilling programs and plans
- tell us how you want us to consult with you and your community on this important project
- have your questions answered.

There will be regular consultation and engagement sessions where you and your community can learn more about the project and we can listen to your feedback and input. This will help us to understand your concerns and issues and to hear from you on how you want us to consult. We will carefully assess all your feedback and consider this in the way we consult with you on our upcoming plans and when developing the content of these plans. Further information – including fact sheets, maps and reports – will be provided at the consultation session.

**i** If you require further information or would like to speak to us, please do not hesitate to contact us on 1800 267 600 or via email at [Offshore.Consultation@santos.com](mailto:Offshore.Consultation@santos.com)

# Tiwi consultation sessions March

## Advertisement

- 5 x Northern Territory News

We're  
**Listening**

**Santos**



Santos is committed to developing strong, mutually beneficial relationships with communities where we operate. Your feedback is important to us achieving this.

Santos is preparing environmental plans as required by legislation. We are consulting with Tiwi people whose functions, interests or activities may be affected by the Barossa Gas Project – a project located approximately 300 kilometres offshore from Darwin, transporting natural gas to the existing Darwin liquefied natural gas (DLNG) plant.

### TIMING AND VENUES

#### MILIKAPITI

[Milikapiti Sport & Recreation Centre](#)

Monday, 20 March  
10.30am – Marrikawuyanga Clan  
2.30pm – Wulirankuwu Clan

Tuesday, 21 March  
10.30am – Yimpinari Clan

#### PIRLANGIMPI

[Pirlangimpi Club](#)

Wednesday, 22 March  
10.30am – Munupi Clan

#### WURRUMIYANGA

[Nguiu Club](#)

Thursday, 23 March  
10.30am – Mantiyupwi Clan  
2.30pm – Jikilaruwu Clan

Friday, 24 March  
10.30am – Wurrankuwu Clan  
2.30pm – Malawu Clan

At our recent community sessions, Tiwi communities told us that they would like to consult on environmental plans through clan group consultation sessions and for us to use videos and other visual aids to help explain our Project.

At these sessions we will:

- + provide more information about the project and our planned drilling activities, including systems and controls to prevent and mitigate impacts and risks
- + invite relevant persons to provide feedback about possible consequences of the activity on their functions, interests or activities or to tell us if more time or more information is needed to give feedback
- + continue to ask for feedback on how we consult
- + answer your questions.

The feedback we receive will inform the environment plans we prepare.

We will also be back on the Islands over coming weeks to keep listening - with the aid of experts - to learn more about any spiritual and cultural connections to sea country.

You can find more information at [www.santos.com/barossa](http://www.santos.com/barossa) or by using this QR code.

## Scan the QR code

to find out more information about the project.



You can also contact us on  
T 1800 267 600 or via email at  
E [offshore.consultation@santos.com](mailto:offshore.consultation@santos.com)



Santos is committed to developing strong, mutually beneficial relationships with communities where we operate. Your feedback is important to us achieving this.

Santos is preparing environmental plans as required by legislation. We are consulting with Tiwi people whose functions, interests or activities may be affected by the Barossa Gas Project– a project located approximately 300 kilometres offshore from Darwin, transporting natural gas to the existing Darwin liquefied natural gas (DLNG) plant.

#### TIMING AND VENUES

##### MILIKAPITI

[Milikapiti Sport & Recreation Centre](#)

Monday, 20 March  
10.30am: Marrikawuyanga Clan  
**1.00pm:** Wulirankuwu Clan (please note earlier session time)

Tuesday, 21 March  
10.30am: Yimpinari Clan

##### PIRLANGIMPI

[Pirlangimpi Club](#)

Wednesday, 22 March  
10.30am: Munupi Clan

##### WURRUMIYANGA

[Nguiu Club](#)

Thursday, 23 March  
10.30am: Mantiyupwi Clan  
**1.00pm:** Jikilaruwu Clan (please note earlier session time)

Friday, 24 March  
10.30am: Wurrankuwu Clan  
**1.00pm:** Malawu Clan (please note earlier session time)

At our recent community sessions, Tiwi communities told us that they would like to consult on environmental plans through clan group consultation sessions and for us to use videos and other visual aids to help explain our Project.

At these sessions we will:

- + provide more information about the project and our planned drilling activities, including systems and controls to prevent and mitigate impacts and risks
- + invite relevant persons to provide feedback about possible consequences of the activity on their functions, interests or activities or to tell us if more time or more information is needed to give feedback
- + continue to ask for feedback on how we consult
- + answer your questions.

The feedback we receive will inform the environment plans we prepare.

We will also be back on the Islands over coming weeks to keep listening - with the aid of experts - to learn more about any spiritual and cultural connections to sea country.

You can find more information at [www.santos.com/barossa](http://www.santos.com/barossa) or by using this QR code.

### Scan the QR code

to find out more information about the project.



You can also contact us on  
T 1800 267 600 or via email at  
E [offshore.consultation@santos.com](mailto:offshore.consultation@santos.com)

#### Social media

- 20 February 2023 – 24 March 2023 Geotargeted Tiwi Islands (Facebook, Instagram and Messenger)

# Tiwi consultation sessions April

## Advertisement

- 5 x Northern Territory News

We're  
**Listening**

**Santos**



### Your feedback is important to us.

Santos is preparing environment plans, as required by legislation, for its Barossa Gas Project. We are consulting with Tiwi people whose functions, interests or activities may be affected by certain project activities.

Based on feedback from Tiwi people, we will continue to consult with you through Clan group meetings using videos and visual aids to explain the project.

### TIMING AND VENUES

#### MONDAY

📅 24 April 2023, Milikapiti

10.30am – Marrikawuyanga Clan

12.30pm – Wullrankuwu Clan

2.30pm – Yimpinari Clan

#### WEDNESDAY

📅 26 April 2023, Pirlangimpi

10.30am – Munupi Clan

#### THURSDAY

📅 27 April 2023, Wurrumiyanga

10.30am – Mantiyupwi Clan

1.00pm – Jikilaruwu Clan

#### FRIDAY

📅 28 April 2023, Wurrumiyanga

10.30am – Wurankuwu Clan

1.00pm – Malawu Clan

### More information

can be found at  
[www.santos.com/barossa](http://www.santos.com/barossa)  
or by using this QR code.



At the April sessions we will:

- + Continue consulting with relevant persons about our proposed activity under the Drilling and Completions Environment Plan, including:
    - + providing responses to feedback following the March clan meetings
    - + seeking your final feedback on possible consequences of the proposed drilling and completions activity and any measures you would like us to consider to reduce impacts and risks.
  - + Consult with relevant persons about our proposed activity under the proposed Subsea Infrastructure and Floating Production Storage and Offloading (FPSO) Moorings Installation and Pre-Commissioning Environment Plan, including:
    - + providing information and responding to questions about the proposed activity, potential impacts and risks and how we plan to reduce these to as low as reasonably practicable and to an acceptable level
    - + inviting you to consider the information given and tell us if you seek further or different information
    - + if you are ready, listening to your feedback about the possible consequences of the activity and any measures you would like us to consider to reduce impacts and risks with further opportunities to give feedback to be provided, including at our next visit in May 2023.
- The subsea infrastructure includes a series of flowlines that would connect the wells to the FPSO, where the gas is separated from the condensate. We will explain the activity further during our visit.
- + Provide an update on the cultural heritage assessment process required for the Gas Export Pipeline.



You can also contact us on  
**T 1800 267 600** or via email at  
**E [offshore.consultation@santos.com](mailto:offshore.consultation@santos.com)**

## Advertisement updated



### Your feedback is important to us.

Santos is preparing environment plans, as required by legislation, for its Barossa Gas Project. We are consulting with Tiwi people whose functions, interests or activities may be affected by certain project activities.

Based on feedback from Tiwi people, we will continue to consult with you through Clan group meetings using videos and visual aids to explain the project.

#### TIMING AND VENUES

##### WEDNESDAY

📅 26 April 2023, Pirlangimpi

10.30am – Munupi Clan

##### THURSDAY

📅 27 April 2023, Wurrumiyanga

10.30am – Mantiyupwi Clan  
1.00pm – Jikilaruwu Clan

##### FRIDAY

📅 28 April 2023, Wurrumiyanga

10.30am – Wurankuwu Clan  
1.00pm – Malawu Clan

##### THURSDAY

📅 4 May 2023, Milikapiti

**Please note new dates of meetings in Milikapiti**

10.30am – Marrikawuyanga Clan  
12.30pm – Wulirankuwu Clan  
2.30pm – Yimpinari Clan

### More information

can be found at  
[www.santos.com/barossa](http://www.santos.com/barossa)  
or by using this QR code.



#### At the sessions we will:

- + Continue consulting with relevant persons about our proposed activity under the Drilling and Completions Environment Plan, including:
  - + providing responses to feedback following the March clan meetings
  - + seeking your final feedback on possible consequences of the proposed drilling and completions activity and any measures you would like us to consider to reduce impacts and risks.
- + Consult with relevant persons about our proposed activity under the proposed Subsea Infrastructure and Floating Production Storage and Offloading (FPSO) Moorings Installation and Pre-Commissioning Environment Plan, including:
  - + providing information and responding to questions about the proposed activity, potential impacts and risks and how we plan to reduce these to as low as reasonably practicable and to an acceptable level
  - + inviting you to consider the information given and tell us if you seek further or different information
  - + if you are ready, listening to your feedback about the possible consequences of the activity and any measures you would like us to consider to reduce impacts and risks with further opportunities to give feedback to be provided, including at our next visit in May 2023.

The subsea infrastructure includes a series of flowlines that would connect the wells to the FPSO, where the gas is separated from the condensate. We will explain the activity further during our visit.

- + Provide an update on the cultural heritage assessment process required for the Gas Export Pipeline.



You can also contact us on  
T 1800 267 600 or via email at  
E [offshore.consultation@santos.com](mailto:offshore.consultation@santos.com)

## Social media

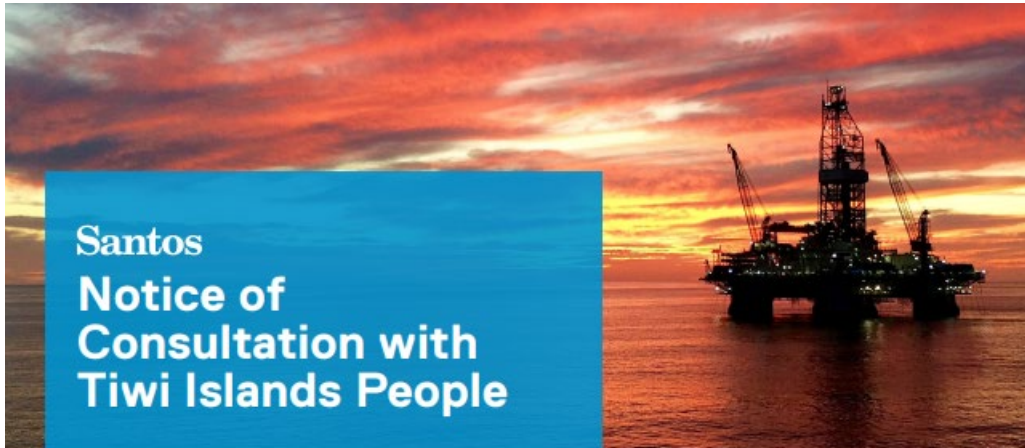
- 28 March 2023 – 5 May 2023 Geotargeted Tiwi Islands (Facebook, Instagram and Messenger)



# Tiwi consultation sessions June

## Advertisement

- 3 x Northern Territory News



BAROSSA GAS PROJECT

## Drilling and Completions Environment Plan Subsea Infrastructure Installation Environment Plan

### Your feedback is important to us.

Santos is preparing environment plans for its Barossa Gas Project, as required by legislation. We are consulting with Tiwi people whose functions, interests or activities may be affected by project activities proposed under the environment plans listed above. Based on feedback from Tiwi people, we will continue to consult with you through Clan group meetings using videos and visual aids to explain the project.

### At the sessions we will:

- + Continue consulting with relevant persons about our proposed activity under the **Drilling and Completions Environment Plan**, including:
  - providing responses to feedback following the April and May clan meetings
  - updating you about any measures we propose to adopt in our environment plan as a result of your feedback before it is submitted to the regulator for assessment
  - if any feedback is outstanding, seeking your final feedback on possible consequences of the proposed drilling and completions activity and any further measures you would like us to consider to reduce impacts and risks.
- + Continue consulting with relevant persons about our proposed activity under the proposed **Subsea Infrastructure Installation Environment Plan**, including:
  - providing responses to feedback following the April and May clan meetings
  - seeking your final feedback on possible consequences of the subsea infrastructure installation and pre-commissioning activity and any measures you would like us to consider to reduce impacts and risks.

### TIMING AND VENUES

#### TUESDAY

📅 13 June 2023, Milikapiti

10.30am – Marrikawuyanga & Yimpinari Clans  
1.00pm – Wulirankuwu

#### WEDNESDAY

📅 14 June 2023, Wurrumiyanga

10.30am – Mantiyupwi Clan  
1.00pm – Jikilaruwu Clan

#### THURSDAY

📅 15 June 2023, Wurrumiyanga

10.30am – Wurankuwu Clan  
1.00pm – Malawu Clan

#### FRIDAY

📅 16 June 2023, Pirlangimpi

10.30am – Munupi Clan



You can also contact us on  
T 1800 267 600 or via email at  
E [offshore.consultation@santos.com](mailto:offshore.consultation@santos.com)

### More information

can be found at  
[www.santos.com/barossa](http://www.santos.com/barossa)  
or by using this QR code.



SCAN ME

## Social media

- 12 May 2023 – 16 June 2023 Geotargeted Tiwi Islands (Facebook, Instagram and Messenger)