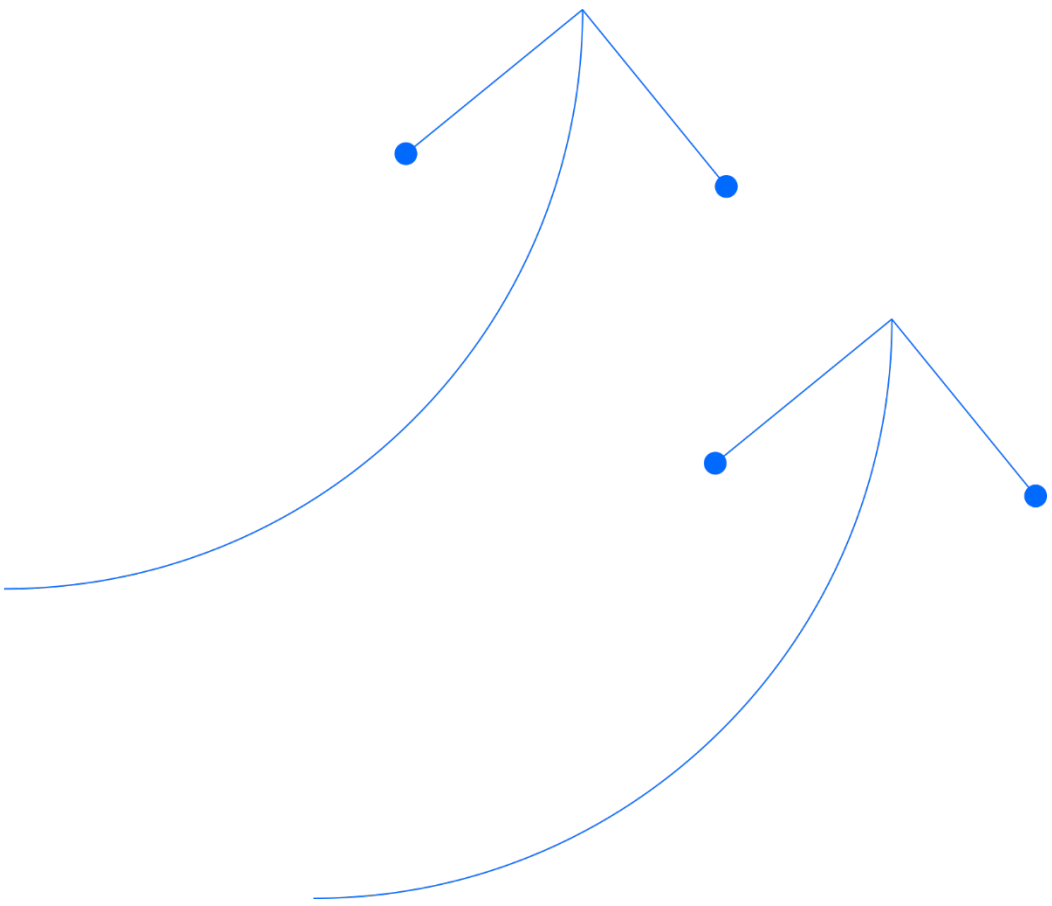
Santos

Barossa Darwin Pipeline Duplication Project

Barossa DPD Project Coastal Waters CEMP Summary



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1. Introduction

1.1 Coastal Waters CEMP summary

This summary of the Barossa Darwin Pipeline Duplication (DPD) Project Coastal Waters Construction Environmental Management Plan (Coastal Waters CEMP) (BAS-210 0025 Revision 1) has been prepared in accordance with section 35(7) of the *Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023* (OPGGS(E)R), for submission to the Northern Territory (NT) Department of Mining and Energy (DME).

Table 1-1 shows where the EP summary requirements have been met within this summary document and what sections of the Coastal Waters CEMP and/or DPD Project (NT Waters) Oil Pollution Emergency Plan (OPEP) (BAS-210 0026 Revision 2) this information has been drawn from.

Table 1-1: EP summary content requirements concordance table

EP summary material requirement as per Section 35(7) of the OPGGS(E)R	Relevant section within this summary	Relevant section from the Coastal Waters CEMP and/or OPEP
The location of the activity	Figure 1-1, Sections 2.2 and 2.3	Section 2
A description of the receiving environment	Section 3	Section 3 and Appendix D
A description of the activity	Sections 1.2 and 2	Section 2
Details of the environmental impacts and risks	Sections 5 and 6	Sections 6 and 7
The control measures for the activity	Section 6	Sections 6 and 7
The arrangements for ongoing monitoring of the titleholder's environmental performance	Section 8	Section 8
Response arrangements in the oil pollution emergency plan	Section 9	Section 8.5 and DPD Project (NT Waters) Oil Pollution Emergency Plan (OPEP) (BAS-210 0026).
Consultation already undertaken and plans for ongoing consultation	Section 4 and 10	Sections 4 and 8
Details of the titleholders nominated liaison person for the activity	Section 1.3	Section 1.5.1

1.2 Activity overview

Santos NA Barossa Pty Ltd (Santos) proposes to install ~123 km of pipeline in Commonwealth, NT Coastal and NT Internal Waters, as part of the Darwin Pipeline Duplication (DPD) Project. The activity relevant to the Coastal Waters CEMP is the pipeline installation, pre-commissioning and related activities in NT Coastal Waters only.

The DPD Project forms part of the Barossa Gas Project. The proposed Barossa Gas Project amalgamates both the infrastructure of the Barossa Development and the DPD Project to extract and process natural gas from the Barossa field.

The Barossa Development includes a Floating Production Storage and Offloading (FPSO) facility, subsea production system and supporting in-field subsea infrastructure within the Barossa Permit in Commonwealth waters and a gas export pipeline (GEP) within Commonwealth waters (Figure 1-1). The Barossa Development is further 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.

The DPD Project will extend the Barossa GEP to the Santos-operated Darwin Liquified Natural Gas (DLNG) facility and allow for the repurposing of the existing Bayu-Undan pipeline to facilitate carbon capture and storage (CCS) options. It will effectively be a 'duplication' of a portion of the Bayu-Undan pipeline to allow gas from the Barossa field to be transported to, and processed at, the existing DLNG facility.

The DPD Project includes the installation of:

+ a ~23 km pipeline segment in Commonwealth waters (Pipeline Licence NT/PL6) (regulated under the *Offshore Petroleum and Greenhouse Gas Storage Act 2006* (OPGGS Act)).

- an ~ 8.26 km segment of pipeline in Northern Territory (NT) coastal waters (Pipeline Licence NTC/PL5) (being waters between the territorial sea baseline (TSB) and the boundary of NT and Commonwealth waters). This activity is regulated under the *Petroleum (Submerged Lands) Act 1981* (NT) (PSL Act), which applies the (OPGGS(E)R.
- a ~91.74 km segment of pipeline in NT Internal Waters and on land (Pipeline Licence NTC/PL37), inshore of the TSB. This activity is regulated under the Energy Pipelines Act 1981 (NT).

The installation and pre-commissioning of the ~23 km of DPD pipeline in Commonwealth waters is covered under the Barossa DPD Environment Plan (BAS-210 0074) (Commonwealth Waters DPD EP).

The Coastal Waters CEMP covers the installation and pre-commissioning activities of the ~8.26 km of pipeline in NT Coastal Waters, referred to herein as the 'Activity'.

The Activity proposed is within the boundaries of an NT Coastal Waters Operational Area (OA) (Figure 1-1), approximately 80 km north-west of Darwin, Northern Territory (NT) and approximately 30 km south of the Tiwi Islands, NT.

The installation and pre-commissioning of the ~91.74 km of pipeline in NT Internal Waters and land is covered under separate documents; the Barossa DPD Project Offshore Construction Environmental Management Plan (Offshore CEMP) (BAS-210 0024) and the Barossa DPD Project Onshore CEMP (BAS-210 0025). These documents provide for the environmental management of the DPD Project construction activities regulated under the *Energy Pipelines Act 1981* (NT).

The DPD Project (in both Commonwealth and NT waters and land) was referred to the Department of Climate Change, Energy, the Environment and Water (DCCEEW) under the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act) (EPBC 2022/09372) and determined to be a controlled action. The DPD Project was approved by a delegate of the Minister for Climate Change, Energy, the Environment and Water under the EPBC Act on 15 March 2024.

The DPD Project within NT jurisdiction was also referred to the NT Environment Protection Authority (EPA) under the Environment Protection Act 2019 (NT) (NT EP Act) and approved on 22 December 2023 by the NT Minister for Environment, Climate Change and Water Security (EP2022/022-001), on the recommendation of the NT EPA

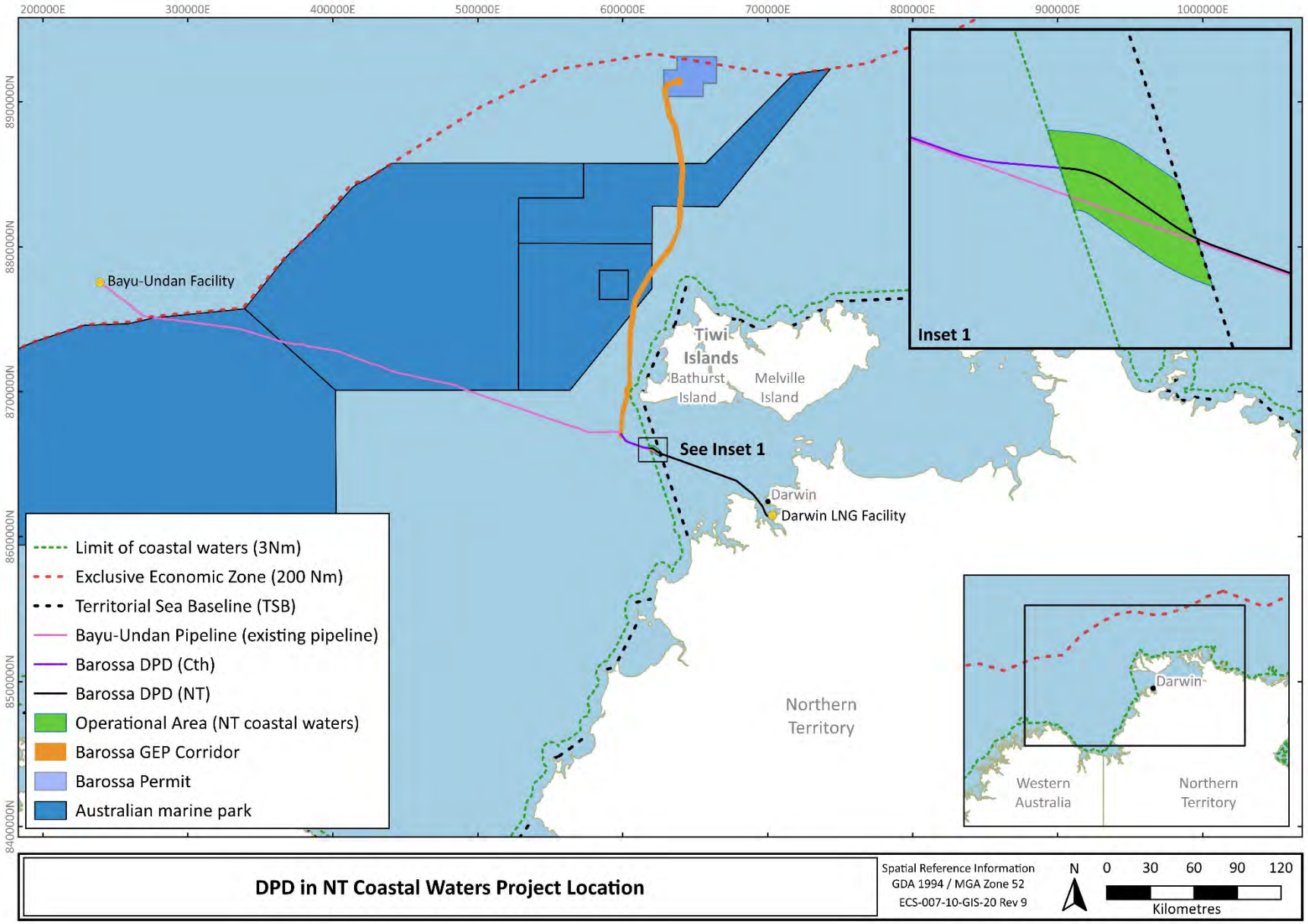

Figure 1-1: Location of proposed Activity (NT Coastal Waters Operational Area)

1.3 Details for nominated liaison person

Details for Santos' nominated liaison person for the Activity are:

Name:	Michael Marren
Business address:	Level 7, 100 St Georges Terrace, Perth WA 6000
Phone:	(08) 6218 7100
Email:	offshore.consultation@santos.com
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2. Activity description

2.1 Activity summary

The DPD Project pipeline (DPD pipeline) has been designed to connect to the existing Barossa GEP (refer to Figure 1-1). The DPD pipeline is ~123 km long, including ~23 km of pipeline in Commonwealth waters and ~100 km of pipeline in NT waters and on land. The ~100 km of pipeline in NT waters and on land comprises ~8.26 km of pipeline in NT Coastal Waters and ~91.74 km of pipeline in NT Internal Waters and land.

The Coastal Waters CEMP covers only those activities associated with the installation and pre-commissioning of the ~8.26 km of pipeline in NT Coastal Waters.

The installation and pre-commissioning of the ~23 km of pipeline in Commonwealth waters (outside the scope of the Coastal Waters CEMP) is covered under the Commonwealth Waters DPD EP and the installation and pre-commissioning of the ~91.74 km of pipeline in NT Internal Waters and land (outside the scope of the Coastal Waters CEMP) is covered under the DPD Project Offshore CEMP (BAS-210 0024) and the DPD Project Onshore CEMP (BAS-210 0025).

The following infrastructure and associated activities are excluded from the scope of the Coastal Waters CEMP:

- Installation and pre-commissioning of the DPD pipeline outside NT Coastal Waters (i.e. in NT Internal Waters and land and Commonwealth waters)
- Commissioning and operations activities associated with the pipeline in NT Coastal Waters (to be covered under the future Coastal Waters Operations EMP)
- end-of-life decommissioning activities, which will be covered under a future decommissioning plan (see Section 2.10 of the Coastal Waters CEMP).

Table 2-1: Summary of key infrastructure and activities

Description
Infrastructure and supporting structures
Infrastructure: • DPD pipeline in NT Coastal Waters: ~8.26 km of 26-inch outer diameter carbon steel, concrete coated pipeline Supporting structures: • scour protection and span rectification structures (i.e. mattresses and grout bags), if required (not expected based on existing surveys) Temporary installation aids and equipment: • underwater acoustic positioning equipment (USBL transponders, which will have no additional footprint, as they will be attached to other equipment/ROVs), internal lifting tools, installation rigging, Remotely Operated Vehicle [ROV] baskets.
Key activities
Vessel activities include: • surveys (pre-lay, as-laid and post-lay; magnetometer, post cyclone and cathodic protection, if required) • delivering and transferring linepipe (sections of pipe) to the pipelay vessel • supporting structures installation for scour protection structures and span rectification (i.e. mattresses and grout bags) (not expected based on existing surveys) • DPD pipeline installation in NT Coastal Waters • unplanned and non-routine inspection, maintenance and repairs (IMR) [1] • bunkering The section of the DPD pipeline in NT Coastal Waters will be pre-commissioned. It is important to note that there will be no vessel activities in NT Coastal Waters associated with this pre-commissioning activity, and there will be no planned pre-commissioning discharges in NT Coastal Waters (planned discharges in Commonwealth waters only). Pre-commissioning will include: • flood, clean, gauge and pressure testing (FCGT) • preconditioning • nitrogen packing

[1] *Provision also includes the preservation period.*

Description
For each of the above activities, it is planned that fluids or nitrogen will pass through the portion of the DPD pipeline in NT Coastal Waters but will not be discharged in NT Coastal Waters. Following pre-commissioning, the DPD pipeline will remain in a preserved state (non-production) until commissioning activities commence (not covered under the Coastal Waters CEMP)
Activity vessels
• pipelay vessel [2] • construction vessels[2] (if required) • survey vessels[2] • support and supply vessels (such as pipe supply, barges, tugs, IMR[2] and general cargo) These are collectively referred to as 'Activity vessels' throughout the Coastal Waters CEMP.
Other support
• helicopters • remotely operated vehicles (ROVs)

2.2 Location and tenure

The Activity will be undertaken within the NT Coastal Waters operational area (OA), approximately 80 km north-west of Darwin, NT. The OA, and DPD pipeline route within the OA, are approximately 30 km and 32 km south of the Tiwi Islands (Cape Fourcroy), NT respectively, at their closest points, and approximately 66.5 km south-east of the Oceanic Shoals Marine Park (Figure 1-1).

Within the OA, the DPD pipeline will be located to the north of the existing Bayu-Undan pipeline at a distance of approximately 140m at its closest point and over 1.5 km at its furthest point (Figure 1-1).

2.3 Operational Area (OA), tenure, and timing

The OA (presented in Figure 1-1) is defined as a 2,000 m buffer either side of the DPD pipeline route between the TSB (where NT Coastal Waters commence) and the outer limit of NT Coastal Waters (i.e. the boundary of NT and Commonwealth waters). The distance between the TSB and the boundary of NT Coastal Waters and Commonwealth waters is approximately 5.5 km (3 Nm); the reason the distance of DPD pipeline to be laid in NT Coastal Waters is greater than this is because the pipeline is proposed to be laid diagonally through NT Coastal Waters. To allow for localised re-routing, there is a 250 m allowance on either side of the DPD pipeline route, if required. The OA encompasses the installation of the DPD pipeline and supporting infrastructure (if required) in NT Coastal Waters, as well as the Activity vessel movements. The locations for activities along the DPD pipeline are described using 'kilometre points' (KP), where KP0 is the beginning of the pipeline from the end of the pipeline (pipeline end termination point; PLET) in Commonwealth waters. KPs increase shoreward along the DPD pipeline route. The DPD pipeline KPs end at KP122.687 at the beach valve at the DLNG Facility (in NT jurisdiction). The section of the DPD pipeline to be installed in NT Coastal Waters will be installed within the boundaries of Coastal and Territorial Waters Licence (NTC/PL5).

Table 2-2 lists the coordinates and KPs of the limits of the DPD pipeline route within the NT Coastal Waters.

[2] *Vessel typically equipped with ROVs.*

Table 2-2: DPD pipeline coordinates in NT Coastal Waters

Location	Description	Easting	Northing	Latitude	Longitude	Water depth (m)
DPD pipeline ~KP23	Intersection of DPD pipeline with limit of NT Coastal Waters (i.e. Commonwealth/NT boundary)	618796	8661045	12° 06′ 36″ S	130° 05′ 30″ E	48 m
DPD pipeline ~KP31	Intersection of DPD pipeline with the TSB (start of NT Coastal Waters)	625836	8657503	12° 08′ 30″ S	130° 09′ 23″ E	47 m

Source: Datum GDA94

The cumulative duration of the Activity, excluding the preservation period, is estimated to be approximately 1 week, subject to vessel availability, supply chain issues, operational efficiencies and weather conditions. The Activity is estimated to commence between Q3 2024 and Q2 2025, subject to obtaining regulatory and business approvals and pipelay vessel availability. The Activity is planned to occur 24 hours per day, 7 days a week.

The total duration of the preservation period is estimated to be approximately 6 months, subject to obtaining regulatory and business approvals and the commencement of activities under the future Coastal Waters OEMP.

2.4 Summary of discharges and emissions

Table 2-3 lists the non-vessel discharge types, and volumes, for the Activity within the OA. These are contingency discharges (contingency treated seawater discharge and grout downline flushing) and are not expected to occur. Section 2.6 of the Coastal Waters CEMP details the chemicals, composition dosage rates and dilution ranges for the treated sea water (hydrotest mixture) that would apply following a wet buckle event should the pipeline need to be preserved. The chemicals selected were assessed using a risk-based approach described in Section 2.11 of the Coastal Waters CEMP.

Table 2-4 summarises typical routine vessel, equipment and helicopter emissions and discharges that may or will occur within the OA.

Table 2-3: Summary of contingency Activity (non-vessel) discharges in the OA

Activity	Discharge type	Approximate volume (m^3)
Flooding and dewatering (wet buckle contingency)	Treated sea water	43,332.5
Grout downline flushing (contingency)	Grout	4

Table 2-4: Summary of typical vessel, equipment and helicopter emissions and discharges in the OA

Type	Description
Emissions	
Atmospheric emissions (hydrocarbon combustion)	• activity vessel engines and associated equipment engines and helicopters • operation of vessel incinerators
Noise emissions	• vessel activities (e.g. vessel engines, DP thrusters and other machinery) • acoustic positioning systems (USBL) • acoustic survey equipment (e.g. SBES, MBES, SSS) • ROV activities • helicopter activities
Light emissions	• vessel navigation and safety lighting • spot lighting as needed • ROV underwater lighting
Discharges	
Ballast water	Ballast water could potentially be discharged to the marine environment from vessel ballast tanks.

Type	Description
Treated sewage effluent and greywater	The volume of treated sewage effluent and greywater discharged directly relates to the POB number. Up to 30–40 L of treated sewage effluent/greywater may be generated per person per day. For the pipelay vessel, the estimated number of POB is approximately 270. For a construction vessel, the estimated number of POB is approximately 250 while for a supply vessel the estimated number of POB is approximately 16.
Deck drainage/run-off	Drainage water from activity vessels includes rainwater, sea water and washdown water. Such discharge may potentially contain small residual quantities of oil, grease and detergents if present or used on the decks. During an unplanned fire event, firefighting foam may also be present.
Cooling water	Excess heat in the cooling water will be carried away from vessel and equipment components using sea water and returned to the sea with residual sodium hypochlorite.
Bilge water	Any bilge water to be discharged will be treated via an oily water filter system to achieve no more than 15 mg/L oil in water after treatment prior to discharge.
Brine (if a reverse osmosis unit is used for water treatment)	Brine generated from the water supply systems on the vessels will be discharged to the ocean at a salinity of approximately 10% higher than sea water.

3. Description of the environment

3.1 Environment that may be affected (EMBA)

This section describes the key physical, biological, socioeconomic and cultural features (values and sensitivities) of the existing environment that may be affected by the Activity. The description of the environment applies to the OA (Section 2.3), and any areas surrounding the OA that may be affected by the Activity. In the Coastal Waters CEMP 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) and moderate exposure value area (MEVA). The low and moderate exposure values are listed in Table 3-1 and shown in Figure 3-1.

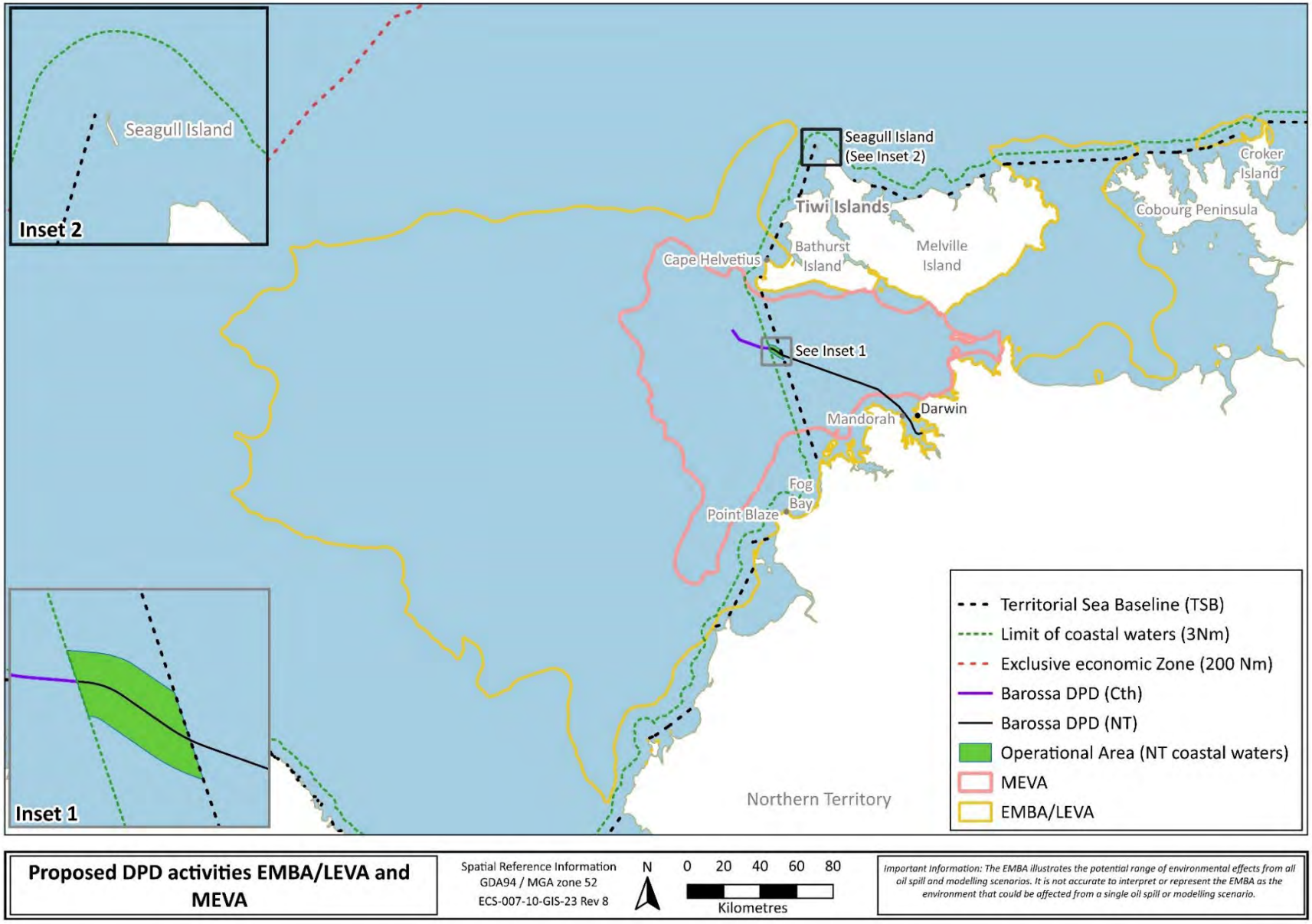


Figure 3-1: Location and extent of the EMBA/LEVA and MEVA

3.1.1 Determining the EMBA

Stochastic hydrocarbon dispersion and fate modelling is applied to the worst-case spill scenario for the Activity to inform the EMBA (in this case also the LEVA) and the MEVA. Areas potentially contacted by hydrocarbons were determined using stochastic modelling which overlayed 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.

Modelling considers 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 MEVA and the LEVA. The MEVA represents an area wherein contact with hydrocarbons may result in harmful impacts to biota, 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 socioeconomic 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 is also referred to where relevant in the Coastal Waters CEMP.

The worst-case release scenario identified as relevant to the Activity (see Section 6.6) is considered to be a release of up to 559 m^3 of MDO caused by a vessel collision [3] rupturing a vessel fuel tank, as this represented the largest spatial extent of potential changes to ambient environment conditions. The MEVA and EMBA are shown in Figure 3-1 and exposure values are provided in Table 3-1. 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 6-15, Table 6-16 and Section 6.6.

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 6.6.2.2 and applied in the risk assessment where relevant.

Table 3-1: Hydrocarbon exposure values (NOPSEMA, 2019)

Hydrocarbon phase	Exposure value		
	Low	Moderate	High
Surface (g/m^2)	1	10	50
Shoreline accumulation (g/m^2)	10	100	1,000
Dissolved aromatics (ppb)	10	50	400
Entrained (ppb)	10	n/a	100

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. A detailed description of the values and sensitivities of the Coastal Waters CEMP was informed by EPBC Act protected matters reports (Appendix D of the Coastal waters CEMP), 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 3.2.1.2), publicly available information (such as scientific literature, studies and government databases) and information obtained through consultation. Marine and coastal species identified in the protected matters report are described, with a focus on protected species that are threatened and migratory. It is important to note that the Coastal Waters CEMP describes the environmental values and sensitivities that occur within the boundaries of the EMBA, whereas the PMST incorporates an in-built buffer and hence may report on matters that are outside the EMBA.

[3] The maximum credible spill volume is 559 m^3 of MDO from a vessel collision resulting in a fuel tank rupture. Santos had previously modelled a 700 m^3 spill volume. Instead of re-modelling the smaller spill volume of 559 m^3, the Coastal Waters CEMP will present modelling data based on a 700 m^3 spill volume for the spill collision analysis. This approach is considered conservative.

Review of the available information identified a range of environmental receptors, values and sensitivities within the OA and the wider EMBA that have been further researched and are described within this section.

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 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 6-15, Table 6-16 and Section 6.6.

3.2.1 Geographical extent

The OA is located within NT coastal waters, approximately 80 km north-west of Darwin, NT, approximately 30 km south of the Tiwi Islands, NT and approximately 66.5 km south-east of the Oceanic Shoals Marine Park. The OA is located within the NMR, which encompasses approximately 625,689 km^2 of Commonwealth waters from west Cape York Peninsula (Queensland) to the NT/Western Australian (WA) border (CoA, 2008; CoA, 2012a) (Figure 3-2).

The EMBA (based on low exposure values) intersects Commonwealth waters—including the NMR (CoA, 2012a) and the NWMR (CoA, 2012b)—and NT waters. The MEVA intersects Commonwealth waters—including the NMR—and NT waters.

A summary of 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, a monsoonal climate and complex weather patterns
- limestone pinnacles, which forms part of a key ecological feature (KEF)—Pinnacles of the Bonaparte Basin (Section 3.2.11.4), valued for hard substrate in an otherwise soft sediment environment and so are important for sessile species
- banks, ridges and terraces of the Van Diemen rise, which forms part of a KEF—Carbonate bank and terrace system of the Van Diemen Rise, valued for enhancing biodiversity and local productivity relative to its surrounds and for supporting relatively high species diversity
- cultural features including sea country (Section 3.2.14).

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
- a chain of carbonate banks and shoals, which forms part of a KEF—Carbonate bank and terrace system of the Sahul Shelf (Section 3.2.11.4), valued for enhancing biodiversity and local productivity relative to their surrounds
- limestone pinnacles, which forms part of a KEF—Pinnacles of the Bonaparte Basin (Section 3.2.11.4), valued for hard substrate in an otherwise soft sediment environment and so are important for sessile species
- cultural features including sea country (Section 3.2.14).

3.2.1.1 Provincial Bioregions

Based on the Integrated Marine and Coastal Regionalisation of Australia (IMCRA; Department of the Environment and Heritage [DoEH], 2006), the bioregions relevant to the OA and the EMBA (LEVA) are listed in Table 3-2 and shown in Figure 3-2. The Northern Shelf Province is characterised as a gently sloping shelf, topped with a number of pinnacles at depths ranging from 5 m to 30 m and tidal eddies (CoA, 2012a). Northwest Shelf Transition is characterised by a shelf break and continental slope (CoA, 2012b).

Table 3-2: IMCRA provincial bioregions within the OA, MEVA and EMBA

Bioregion	OA	MEVA	EMBA
Northern Shelf Province	✗	✗	✓
Northwest Shelf Transition	✓	✓	✓

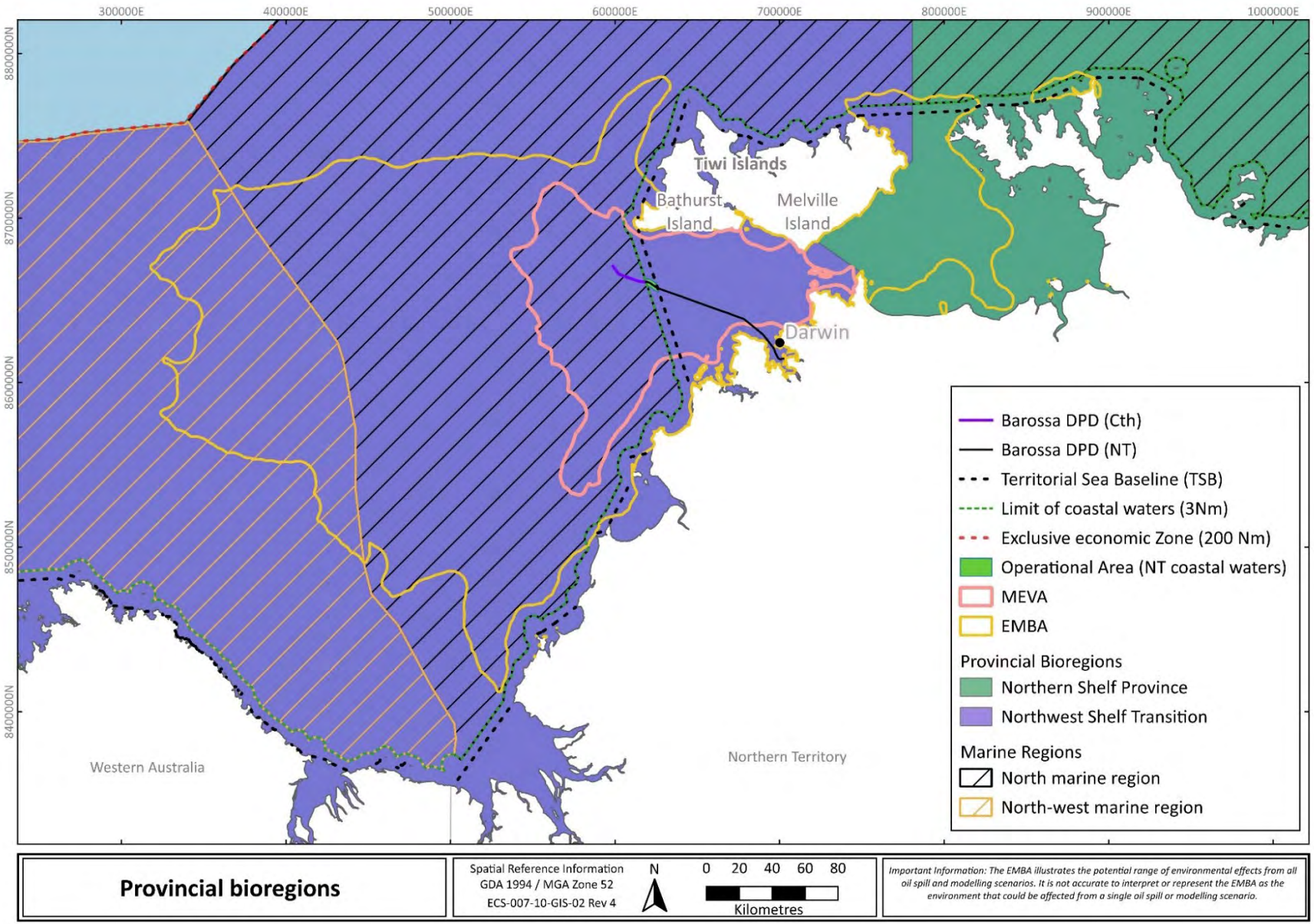


Figure 3-2: IMCRA provincial bioregions in relation to the EMBA

3.2.1.2 Barossa marine studies program and additional studies

Extensive environmental and socioeconomic studies have been undertaken to characterise the existing environment. Table 3-3 summarises the Barossa marine studies program which involved the collection of detailed baseline data from July 2014 to July 2015 to capture seasonal variability in the region, as well as supplementary surveys and desktop modelling studies to contribute to the understanding of the baseline environment. Santos refers to this description as information previously given under section 56(1) of the OPGGS(E) Regulations. Further detail and copies of the earlier studies are provided in Section 5, Appendix C and Appendix D of the OPP (ConocoPhillips, 2018) as information previously given under section 56(1) of the OPGGS(E) Regulations.

Table 3-4 summarises the additional relevant Barossa initiated environmental, socioeconomic and cultural features studies undertaken to inform the understanding of the environment (including socioeconomic and cultural features) after the initial Barossa marine studies program, including those done specifically for the DPD Project to inform the Coastal Waters CEMP.

Table 3-3: Summary of the Barossa marine studies

Study type	Description of study	Reference
Field-based studies		
Metocean data collection	Collection of metocean data on the surface and through the water column from July 2014 to March 2015, within and near the Barossa field, e.g., current, conductivity, wave and wind data.	Fugro, 2015
Water quality survey	Collection of baseline data on physical and chemical components of water quality near the Barossa field. The surveys were completed in June 2014, January 2015 and April 2015.	Jacobs, 2015a, 2015b, 2015c, 2016a
Sediment quality and infauna survey	Collection of baseline data on sediment quality and infauna communities near the Barossa Development.	Jacobs, 2015c
Underwater noise survey	Collection of baseline data on ambient underwater noise (physical, biological and anthropogenic sources) at 3 locations from July 2014 to July 2015 near the Barossa Development and surrounding areas.	JASCO, 2015
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 ROV.	Jacobs, 2016
Desktop or modelling studies		
Environmental literature review and gap analysis	Collection and collation of publicly available information about the marine environment near the Barossa field, and gap analysis were performed to determine if sufficient information was available 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 both the metocean study and deployment of drifter buoys near the Barossa field and surrounding areas were used to validate the underlying hydrodynamic model utilised to develop the spill and discharge models.	RPS APASA, 2017

Table 3-4: Summary of Barossa additional studies

Study type	Description of study	Reference
Geophysical survey	This was a preliminary geophysical survey of potential pipeline routes within the pipeline route corridor presented in the OPP (ConocoPhillips, 2019).	Fugro, 2016
Shoals and shelf survey 2015: benthic habitats and fish communities	A seabed biodiversity survey of 3 shoals to the west of the Barossa field (Evans Shoal, Tassie Shoal and Blackwood Shoal) and 2 mid-continental shelf regions relevant to the pipeline route corridor. The Australian Institute of Marine Science (AIMS) performed the survey in September/October 2015, which involved characterisation of the seabed habitats, associated biota and fish communities (shoals only).	Heyward et al., 2017
Oceanic Shoals Marine Park benthic habitat and fish diversity assessment	An AIMS seabed and fish biodiversity survey conducted in September and October 2017. The survey focused on 6 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 statistically compare the proportion and spatial diversity of habitats within and outside the Oceanic Shoals Marine Park.	Radford et al., 2019

Study type	Description of study	Reference
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
Maritime heritage assessment	A maritime archaeological assessment along the DPD route to identify potential maritime archaeological sites which are defined as wrecks (ship or aircraft) and associated material, dumped material, maritime infrastructure, and associated deposits on or under the seabed below the highest astronomical tide.	Cosmos Archaeology, 2022
Barossa pipelay light modelling	Light modelling assessment of the proposed pipelay and construction vessels, including cumulative impacts to predict the potential light impacts to turtle nesting habitat on the Tiwi Islands and hatchling behaviours.	Pendoley, 2022a
Barossa pipelay Darwin Harbour lighting technical note	Desktop assessment of presence and significance of marine turtle nesting activity on beaches surrounding Darwin Harbour and likely level of impact from activity vessel lighting to flatback turtles.	Pendoley, 2022b
Treated seawater and MEG dispersion modelling	Treated seawater and MEG dispersion modelling for representative FCGT pipeline dewatering scenarios at the DPD pipeline PLET in Commonwealth waters	RPS, 2021a
Hydrocarbon spill modelling for Barossa GEP spill scenarios	Hydrocarbon spill scenario modelling for spill scenarios along the Barossa GEP route, including a spill scenario at the DPD pipeline intersection of the NT/Commonwealth waters boundary	RPS, 2021b
Benthic survey for Barossa DPD route	Collection of baseline information on the benthic habitats, sediment composition (including contaminant concentrations), macroinvertebrate (infaunal) assemblages, and water quality along the DPD route.	RPS, 2023a
Desktop study Tiwi turtle programs	This desktop report reviewed publicly available literature and research relating to marine turtle activity occurring on, and around, the Tiwi Islands. A total of 19 satellite telemetry studies between 1994-2023 tracked turtles passing through or foraging in waters near the Tiwi Islands.	Pendoley, 2023
First Nations UCH places along the GEP route	Assessment to identify any First Nations UCH places along the GEP route.	Corrigan, 2023
First Nations spiritual and cultural values in relation to the Darwin Pipeline Duplication Project	This report reviewed available ethnographic, linguistic, and historical materials and consultations and interviews held with key First Nations persons and others identified as having cultural and spiritual knowledge and authority associated with the study area. The report identified and mapped First Nations spiritual and cultural values relevant to the DPD Project. The document is available on the Santos website: https://www.santos.com/wp-content/uploads/2024/09/First-Nations-spiritual-and-cultural-values-in-relation-to-the-Darwin-Pipeline-Duplication-Project.pdf.	Corrigan, 2024
First Nations archaeological desktop assessment summary report	This study was a First Nations archaeological assessment for the submerged DPD Project Area based on a detailed geomorphological assessment. This study focused on the likelihood for deposits associated with the Last Glacial Maximum (LGM) to be impacted by the DPD Project. A summary report for Darwin Pipeline Duplication Project for KP0 to KP31 (the section of the pipeline specific to this Activity and is KP23 to KP31) has been prepared for the Coastal Waters CEMP and is available on the Santos website: https://www.santos.com/wp-content/uploads/2024/09/Desktop-First-Nations-Archaeological-Assessment-Summary-Report-Darwin-Pipeline-Duplication-Project-KP0-31.pdf.	OzArk, 2024
Treated seawater discharge dispersion modelling	Treated seawater dispersion modelling report including contingency pipeline dewatering within NT Coastal Waters following an unplanned wet-buckle event.	RPS, 2024

3.2.2 Physical environment

3.2.2.1 Geomorphology

3.2.2.1.1 Formation history

Around 550 to 160 million years ago, the northern and western parts of Australia formed part of the northern margin of Gondwana. Around 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.

3.2.2.1.2 Bathymetry and seabed

Generally, the EMBA consists of a wide continental shelf with several KEFs present (Section 3.2.11.4). Water depths within the majority (~80%) of the EMBA range between 0 and 100 m, with a trench approximately 100 km wide in the north-western corner ranging between 100 and 190 m deep (Figure 3-3). The seabed is generally flat or gently sloping, with an average depth change of 1 m over a distance of 10 m in waters less than 50 m deep, increasing to a depth change of 1 m over a distance of 20 m in waters over 50 m deep. Within the EMBA there are several submerged and emergent shoals and banks (Section 3.2.5).

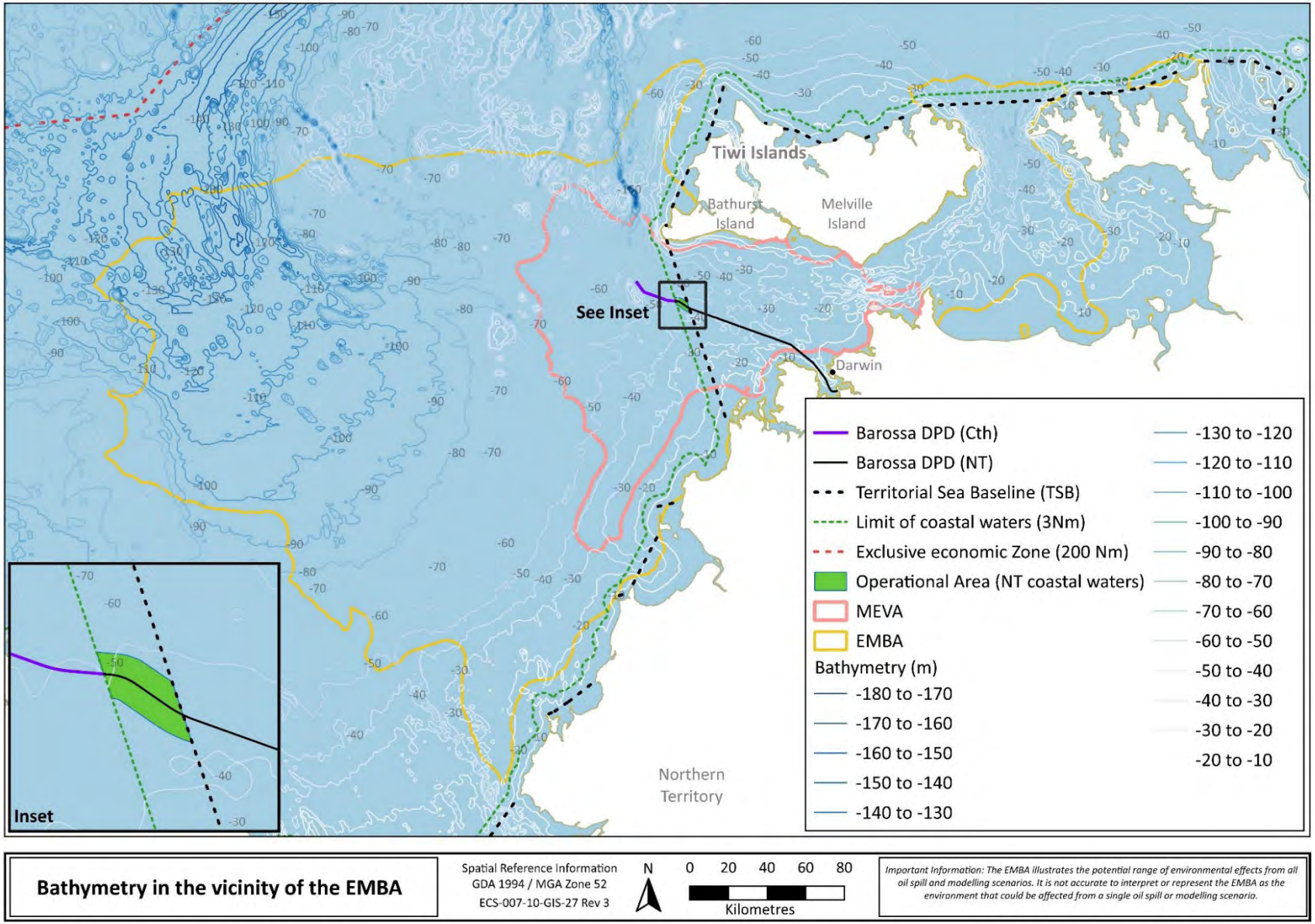


Figure 3-3: Bathymetry overlapping or proximal to the EMBA

3.2.3 Climate

The climate within the EMBA is predominantly 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 weather station at Melville Island (the closest metrological station to the EMBA), shows small seasonal variation in air temperature. The mean maximum summer and winter air temperatures are 34 °C and 31 °C, respectively, with annual maximum temperature of 33 °C and minimum of 22 °C. The Timor and Arafura seas region averages one tropical cyclone annually, usually occurring between November and April (BoM, 2023; 2017).

3.2.4 Oceanography

3.2.4.1 Regional current system

Large-scale currents of the Timor and Arafura seas are dominated by the Indonesian Throughflow current system (Figure 3-4). The Indonesian Throughflow 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 system fluctuates seasonally, reaching maximum strength during the south-east monsoon, and weakening during the north-west monsoon.

The Holloway Current (Figure 3-4), 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).

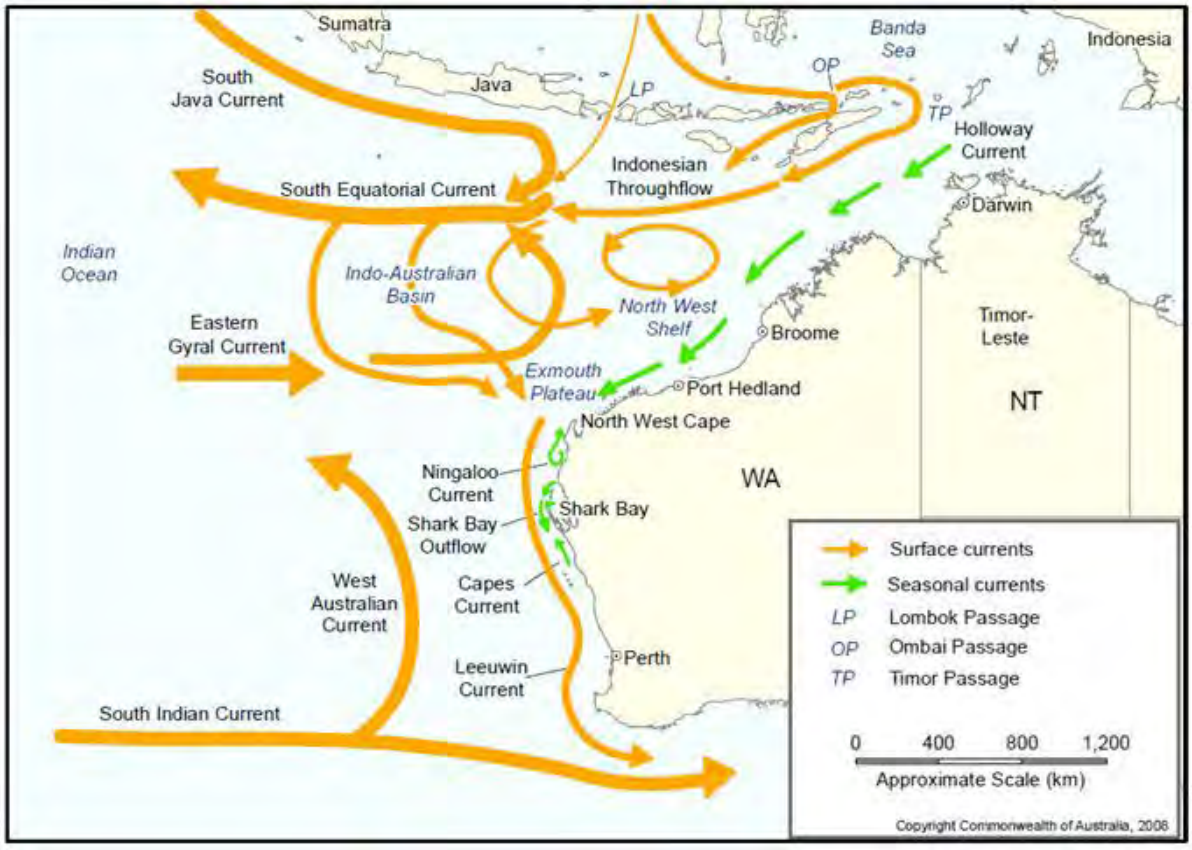


Figure 3-4: Regional surface currents proximal to the EMBA

3.2.4.2 Currents and tides

Water movement within 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).

Predicted average monthly surface current speeds are approximately 0.4 m/s within Beagle Bay Gulf just outside of Darwin Harbour (outside the Darwin Harbour Marine Management Area) and slightly less within Darwin Harbour (0.33 to 0.36 m/s in the mid-harbour) (RPS, 2023b). Predicted monthly maximum current speeds in these areas exceed 1 m/s (RPS, 2023b).

Tidal activity is typically dominated by semi-diurnal tides, with 2 daily high tides and 2 daily low tides. Tidal amplitude varies with location and distance offshore; in the Tiwi region it varies from 2 m offshore to 4 m inshore, 4–6 m in Van Diemen Gulf, while in the Beagle and Bonaparte Gulf regions the tidal range is ~6–8 m and 2–4 m respectively (IMCRATG, 1998).

3.2.4.3 Waves

Wave movements within 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.

3.2.4.4 Temperature

Surface water temperatures in the Barossa offshore development area were recorded as generally ranging between 27 °C and 30 °C, while temperatures in the upper water column of the Barossa offshore development area were recorded as reaching a maximum of 30.9 °C in summer and a minimum of 24.7 °C in spring (Fugro 2015). 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 development area.

3.2.5 Shoals and banks

A number of shoals and banks occur within the EMBA (for details of named shoals and banks see Table 3-5 noting that there are also numerous unnamed shoals and banks within the EMBA including one approximately 6 km from the OA). Few historic studies of these features exist, with most of the understanding of shoals and banks in the region derived from the ‘big bank shoals’ study (Heyward et al. 1997), PTTEP surveys initiated in response to the Montara incident (Heyward et al., 2010; Heyward et al., 2011) and studies undertaken by AIMS for the Barossa Development (Heyward et al., 2017; Radford et al., 2019).

The biological communities of the shoals and banks within the EMBA are well represented in the broader region (Heyward et al., 2017). AIMS’ analysis of survey data showed that the most influential determinants of benthic community composition include depth and light intensity, substrate type and complexity, hydrodynamic environment and position on the continental shelf. ‘Mid-shelf’ locations, such as those within the EMBA, typically exhibit higher turbidity, resulting in greater light attenuation and the transition between primary producer dominated habitats (such as corals) to those featuring sessile filter feeders (e.g. sponges) is often observed at shallower depths. Consequently, coral reef communities are expected to only be associated with the shallower reefs, shoals and banks, particularly further away from the turbid coastal fringe where sponges, sea fans and to a lesser extent gorgonian soft corals are the dominant contributors to benthic communities (Heyward et al., 2017).

The shoals and banks within the EMBA are expected to support many common species, but to show variation in the abundance and diversity of substrate types and dominant benthic species, with subsets of species featuring more prominently on some shoals and banks than others (Heyward et al., 2017). Shepparton Shoal, west of the OA, is dominated by filter feeder communities (Radford et al., 2019). Other shoals and banks within the EMBA (e.g. Flat Top Bank) that were surveyed by AIMS for the Barossa marine studies program show a very high degree of similarity (>90%) to other banks located regionally (e.g. Goodrich Bank, located approximately 153 km from the OA and outside of the EMBA). Table 3-6 summarises the survey results within the EMBA.

Table 3-5: Distances to the nearest named shoals and banks from OA

Geomorphic feature	MEVA	EMBA	Water depth (~m)[4]	Approximate distance/direction from OA
Shepparton Shoal	✓	✓	30–50	16.3 km W
Afghan Shoal	✓	✓	30–50	19 km N
Flat Top Bank	✓	✓	60–70	62 km W
Jones Bank	✓	✓	10	22 km SW
Skottowe Shoal	✓	✓	20–30	24.4 km NE
Moresby Shoals	✓	✓	20	33.4 km NE
Lowry Shoal	✓	✓	20	29.2 km NE
Newby Shoal	✓	✓	30–70	100 km WNW
Parsons Bank	✓	✓	10–20	44 km NE
Hancox Shoal	✓	✓	10–30	38.8 km NE
Foelsche Bank	✓	✓	10	31.3 km NE
Marsh Shoal	✓	✓	10–20	36.7 km NE
Beagle Shoals	×	✓	20–30	89.2 km NE
Taiyun Shoal	×	✓	20–30	89.4 km NE
Bill Shoal	×	✓	20	92 km NE
Abbott Shoal	×	✓	20	101 km NE
The Boxers	×	✓	40–100	180 km NW
Renard Shoals	×	✓	20	112 km NE
Ommaney Shoals	×	✓	20	120 km NE
Wells Shoal	×	✓	20–30	115.2 km NE
Barbara Shoal	×	✓	20	118 km NE
Giles Shoal	×	✓	20–30	130 km NE
Mataram Shoal	×	✓	20–40	148 km ENE
Fitzpatrick Shoal	×	✓	30–40	160 km NE
Howland Shoals	×	✓	10	213 km SW
Deep Shoal 2	×	✓	110–130	280 km W

[4] *Note: water depth range provided applies to the entire feature and is not limited to the EMBA.*

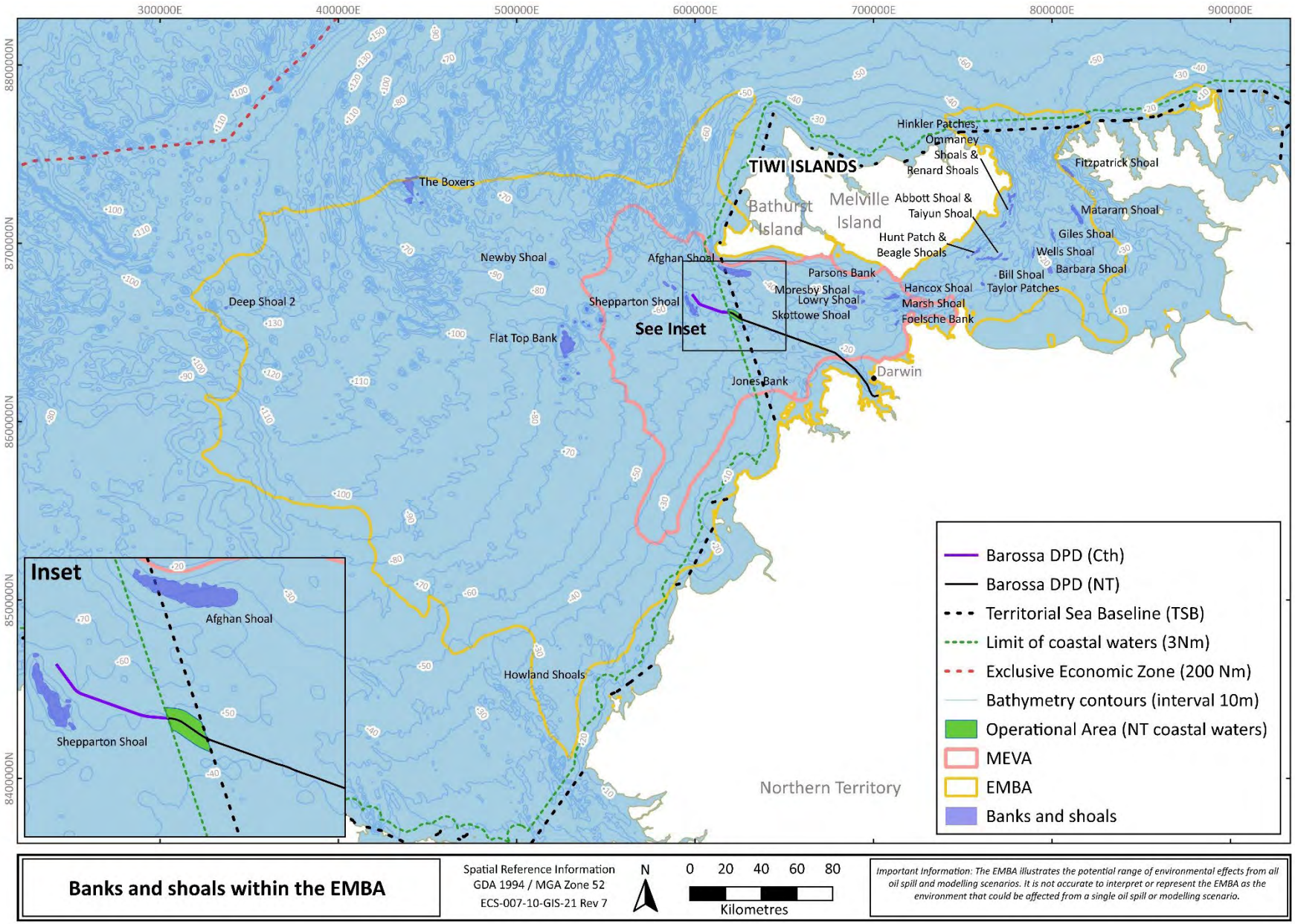
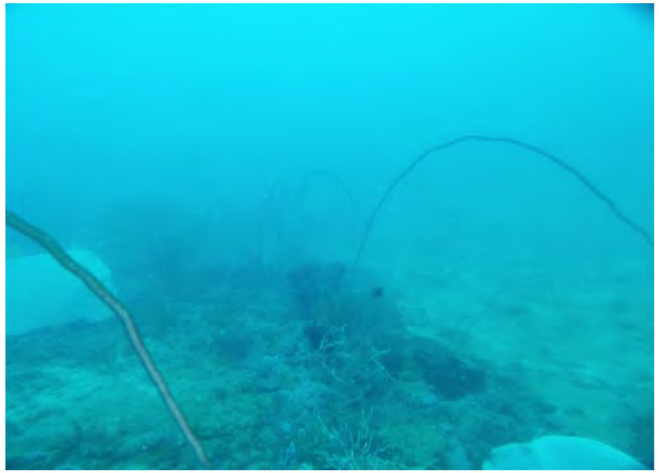


Figure 3-5: Named banks, reefs and shoals overlapping or proximal to the OA and EMBA

Table 3-6: Summary of the results of the marine studies program

Feature	Description
Oceanic Shoals AMP (within and proximal)	Surveys of benthic habitats and fish communities were undertaken by AIMS within and adjacent to the Oceanic Shoals AMP, in the proximity of the Bayu Undan pipeline, in 2017 (Radford et al., 2019). The benthic survey included six sites between Goodrich Bank and Bathurst Island as well as Shepparton Shoal (see below). Fish communities were surveyed at five of the sites. Benthic habitats at the six sites were dominated by extensive areas of seabed covered in unconsolidated sediments such as coarse sand and mud (see photo for example of habitat type). Epibenthic fauna were present at low densities, attached to areas of consolidated pavement covered in fine sediment, or on low relief rock outcropping, most commonly present around ridges or drop-offs. Light-dependent communities were absent from most sites and where present were typically sparse. Corals were very rare and outside of bare areas, non-photic filter-feeder communities (notably sponges) were the key habitat. However, these filter feeder communities were frequently sparse, with decreasing density with depth, and very little occurrence beyond 50 m water depth (Radford et al., 2019).  Fish species richness recorded at the sites surveyed was low compared to other shoals on the north-west shelf of Australia, reflecting the greater proportions of bare biotic cover and sandy substrate. Fish communities were dominated by bony fish, with sharks and to a lesser extent rays also common. Relative abundances were less than half those recorded at shoals further offshore, such as Tassie and Evans Shoals (both outside the EMBA). Richness, abundance and structure of fish communities across sites were strongly correlated with habitat characteristics, with greatest numbers linked to increased epibenthic cover (Radford et al., 2019).
Shepparton Shoal	 Shepparton Shoal is relatively shallow (~30 m) and differed from most other sites surveyed by having up to medium density filter-feeder communities (see photo for example of habitat type) predicted over most (86%) of the shoal (Radford et al., 2019). No hard or soft corals, or Halimeda communities were recorded and areas not supporting non-photic filter feeders were expected to comprise bare substrates (Radford et al., 2019). Fish were not surveyed at this site, but given the depths and habitat types present can be expected to be dominated by bony fishes, likely including stripey snapper (*Lutjanus carponotatus*), rockcod (*Epinephelus* spp), sandperch (*Parapercis* spp), threadfin bream (*Pentapodus emeryii*) surgeonfish (*Acanthurus* spp) and angelfish (*Chaetodontoplus duboulayi*).

3.2.6 Offshore reefs and islands

The EMBA does not overlap any of the key offshore reefs and islands in Commonwealth waters of the region.

Several nearshore islands fall within the EMBA, most notably the Tiwi Islands where the EMBA approaches and/or intersects parts of the south-west, south and east coastlines.

The Tiwi Islands are situated about 30 km north of the OA, 80 km north of Darwin and are comprised of Melville Island, Bathurst Island and nine smaller uninhabited islands off the northern and southern shores. The islands cover an area of about 8,320 km^2 and support a number of important habitats, including extensive stands of mangroves, tidal mudflats, sandy beaches, seagrass meadows and fringing reef habitats (INPEX, 2010). Many species found on the islands are not recorded anywhere else in the NT, primarily due to their isolation and climatic extremes (high rainfall) (NRETAS, 2009a). The Tiwi Islands are Aboriginal freehold land owned by the Tiwi Aboriginal Land Trust (ALT) (NRETAS, 2009a). A mapping exercise has been undertaken with the Tiwi Land Council (TLC) to identify environmental and socioeconomic values along the Tiwi Islands coastline (Jacobs, 2019).

The Tiwi Islands, and the small islands nearby, provide important nesting sites for marine turtles, internationally significant seabird rookeries, and some major aggregations of migratory shorebirds (DLRM, 2009). A number of BIAs for turtles are found along the coastlines of the Tiwi Islands (see Section 3.2.12.3.1). The sandy beaches on the Tiwi Islands, specifically the west coast of Bathurst Island and the north coast of Melville Island, are particularly important for marine turtle nesting. Nesting is dominated by flatback and olive ridley turtles (Chatto & Baker, 2008). However, green and hawksbill turtles also nest on the Tiwi Islands. Significant numbers of olive ridley turtles are known to nest on the beaches of Seagull Island and the north-west coast of Melville Island (Chatto & Baker, 2008), but these areas are not within the EMBA.

Five seabird breeding colonies have been reported on small offshore islands surrounding Melville and Bathurst islands (Chatto, 2001) that range in size from 2 to more than 30,000 birds (Chatto 2001). The colony on Seagull Island, off the north-west tip of Melville Island and outside the EMBA, supports a breeding BIA of about 60,000 crested terns (Woinarski et al., 2003). This is thought to be the largest breeding colony of this species and is considered an internationally significant colony (>1% global population) (NRETAS, 2009a). A 20 km buffer has been designated around the BIA as a foraging zone for crested terns (see Section 3.2.12.5). The breeding period for the crested tern is from March to July, with most eggs being laid between from late April to early June (Chatto, 2001). In general, colonial seabird breeding in the NT occurs throughout most of the year, though mostly between May and November (Chatto, 2001). The extensive areas of tidal flats, particularly on the south-east of Melville Island, have also been noted as providing important wading and feeding habitats for shorebirds. The highest total count at this site was 40,000 shorebirds in 1993 with the most common species being great knots (Chatto, 2003). Other species recorded in high numbers include red-necked stints, greater and lesser sand plovers and bar-tailed godwits (Chatto, 2003).

3.2.7 Other seabed features of interest

3.2.7.1 Seamounts

Seamounts have been identified ~230 km north of the OA and may be present sporadically within the EMBA. The Barossa environmental baseline studies program (Jacobs, 2016c) included sampling sites at seamounts to the west of the field. 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, 2016). 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). 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.

3.2.7.2 Scarps

The Barossa environmental baseline studies program (Jacobs, 2016c) included sampling sites at 2 scarps 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 may be observed sporadically within the EMBA, if present likely supporting epibenthic communities, such as sponges and filter feeders and schools of fish.

3.2.8 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 (hard) corals.

The mean sea level water depths within the EMBA range from 0 m to 180 m while depths within the OA range from approximately 40 m to 50 m and it is situated wholly within the continental inner shelf. The continental inner shelf typically has variable sediment types, including sub aerially exposed cemented materials and significant terrestrial sediments especially in shallower water depths. The seabed from KP0 to KP65, including within the OA, is characterised as silty, shelly sand with very sparse (<1%) epibiota (mainly soft corals and crinoids) (refer to Figure 3-6 for an example of this seabed and Figure 3-7 for its distribution) (RPS, 2023a). Sampling site OP7 (Figure 3-7) lies approximately halfway between Commonwealth and NT Internal Waters. Biota commonly associated with this habitat type included:

- soft corals, including gorgonians, sea whips (*Junceella spp*.), Neptheidae and Alcyoniidae
- echinoderms including sea urchins, sea stars, sea cucumbers and crinoids
- molluscs, including squid
- crustaceans including shrimp and the painted pebble crab (*Leucosia anatum*)
- burrows and polychaete tubes.

Santos is not aware of any information indicating that the OA contains any sensitive habitat or any benthic habitats that are not represented across other areas and/or regions. Research undertaken as part of the Barossa marine studies program confirmed offshore fishing sites were commonly associated with known shoals and were not identified along the DPD route (RPS, 2023a).

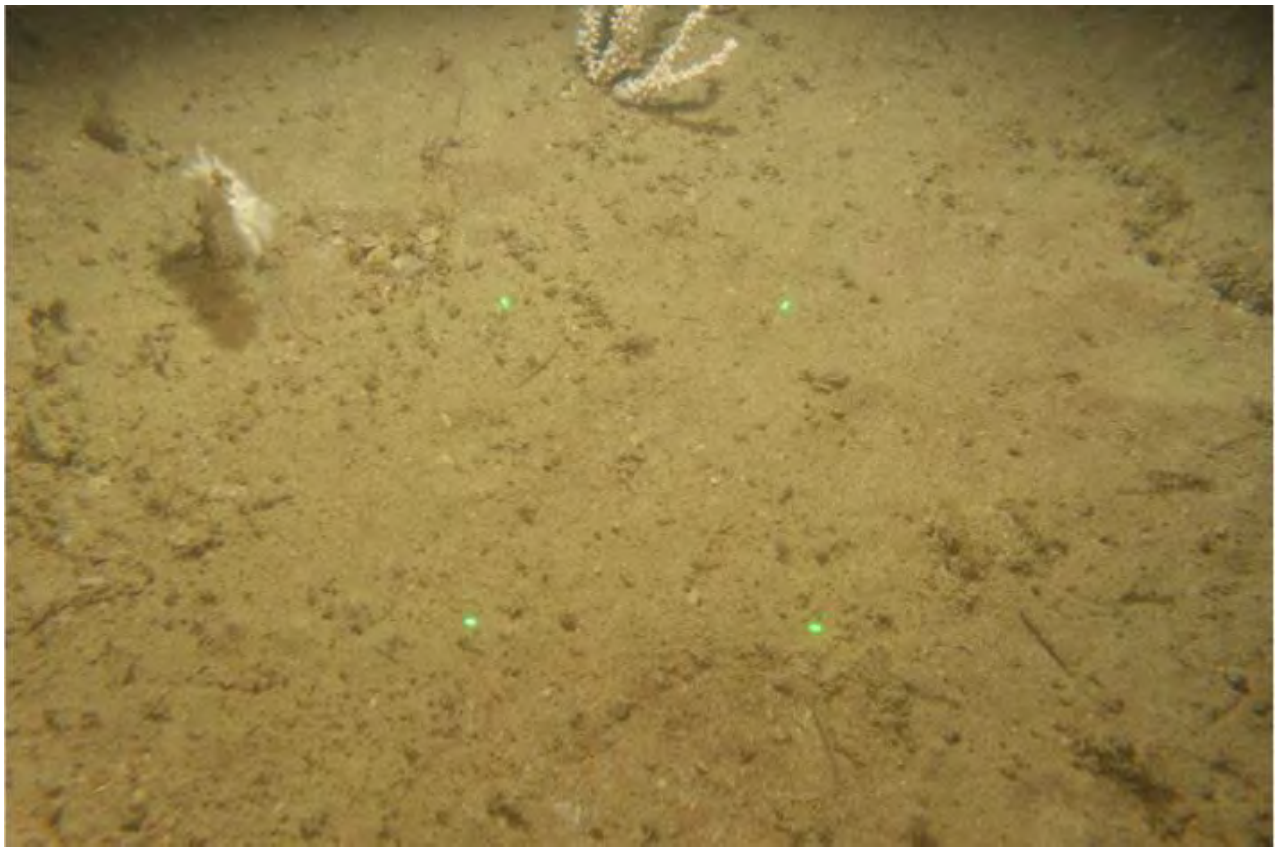
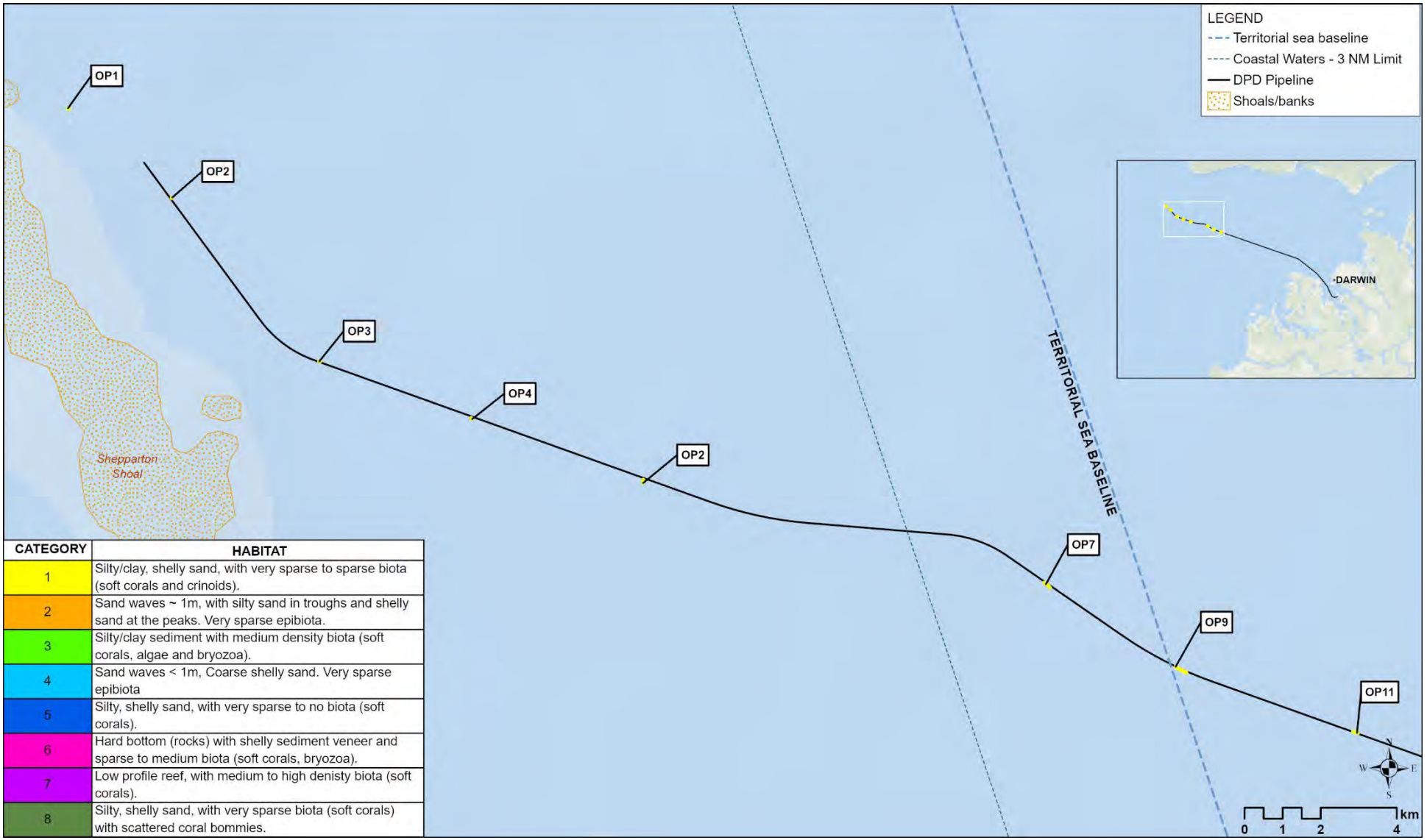


Figure 3-6: Silty, shelly sand with very sparse soft corals (Alcyoniidae)



CATEGORY	HABITAT
1	Silty/clay, shelly sand, with very sparse to sparse biota (soft corals and crinoids).
2	Sand waves ~ 1m, with silty sand in troughs and shelly sand at the peaks. Very sparse epibiota.
3	Silty/clay sediment with medium density biota (soft corals, algae and bryozoa).
4	Sand waves < 1m, Coarse shelly sand. Very sparse epibiota
5	Silty, shelly sand, with very sparse to no biota (soft corals).
6	Hard bottom (rocks) with shelly sediment veneer and sparse to medium biota (soft corals, bryozoa).
7	Low profile reef, with medium to high denisty biota (soft corals).
8	Silty, shelly sand, with very sparse biota (soft corals) with scattered coral bommies.

Figure 3-7: Benthic habitat types identified along the most offshore part of the DPD pipeline route (including the OA) (RPS, 2023a).

The distribution of benthic habitats and communities in the EMBA has been found to be primarily driven by depth and seabed characteristics, notably the presence of hard substrates and benthic rugosity (RPS, 2023a; Heyward et al., 2017; Radford et al., 2019).

A feature of the coastal and mid-shelf areas is a complex array of rises, depressions, banks, terraces and channels, giving rise to turbulence associated with tidal flows and resuspension of fine sediments causing elevated turbidity (Prezlawski et al., 2011; Radford et al., 2019). As a result, epibenthic biota are generally sparse and the dominant species present are consistent with what has been observed during other surveys of similarly turbid waters in the region (Radford et al., 2019). The benthic habitats over part of the EMBA in offshore waters have been mapped by AIMS based on data collected for the Barossa marine studies program (Heyward et al., 2017; Radford et al., 2019). Similarly, habitat mapping, most recently reviewed and revised in 2021, has been undertaken in Darwin Harbour by AIMS (Udyawer et al., 2021).

Surveys in and adjacent to the EMBA indicate that the benthos consists mostly of soft, easily re-suspended sediments interspersed with areas of hard substrate (Heyward et al., 2017; Radford et al., 2019; RPS, 2023a; Smit et al., 2000; Prezlawski et al., 2011). In general, the soft sediment habitats support very sparse to sparse epibiota, and the consolidated substrates support sparse to medium density filter-feeder communities. Overall, the diversity and coverage of epibenthos is low and organisms present are predominantly sponges, gorgonians and soft corals (Heyward et al., 2017; Radford et al., 2019; RPS, 2023a; Kelly & Prezlawski, 2012)

Areas of soft sediment support infauna communities, with infauna species richness tending to decrease with distance offshore (Prezlawski et al., 2011). Sampling of nearshore sediments in the Beagle Gulf found the infauna to be dominated by crustaceans, molluscs and echinoderms (Smit et al., 2000), with crustaceans and annelids (polychaete worms) the predominant taxa in sediments (RPS, 2023a).

Table 3-7 summarises and Sections 3.2.8.1 and 3.2.8.2 describe the benthic habitats and communities within the OA and EMBA.

Within the EMBA there are several submerged and emergent shoals and banks. Figure 3-5 illustrates and Table 3-5 lists the distances to the nearest shoals and banks (within the EMBA) from the OA. These are discussed in more detail in Section 3.2.5The OA does not overlap any KEF. The EMBA overlaps several KEFs, which include values relating to their seabed features (CoA, 2012a; CoA, 2012b). These are discussed in more detail in Section 3.2.11.4.

3.2.8.1 Coral reefs

Hard corals within the EMBA are likely restricted to shallower areas of raised hard substrate, particularly offshore where the turbidity is reduced. Surveys of mid-shelf benthic habitats of the EMBA indicate that corals are generally rare, predominantly in <30 m water depths and more likely to develop in areas of steeper bathymetry (Heyward et al., 2017; Radford et al., 2019). Assessment of habitats in/around the Oceanic Shoals AMP suggested that the vertical depth range increases by >50 m over a 300 m horizontal distance (Radford et al., 2019).

Scattered areas of coral have been reported in Beagle Gulf and Darwin Harbour (Udyawer et al., 2021), Van Diemen Gulf/Cobourg Peninsula (NT Government, 2011) and some islands, reefs and other raised features in the inner Joseph Bonaparte Gulf may support isolated corals (Prezlawski et al., 2011). Corals in turbid waters are likely dominated by members of the genus *Turbinaria* (IMCRATG, 1998), while *Acropora* and *Montipora* species are reported to occur in clearer waters at the Vernon Islands (Smit et al., 2000; Calnan, 2006; IMCRATG, 1998). However, in general extensive hard coral reefs are unlikely to be present within the EMBA.

3.2.8.2 Seagrass

Within the coastal and shelf areas of the Northwest Shelf Transition, seagrass communities are confined to the intertidal area, with high turbidity restricting light penetration in the coastal shelf areas to waters of depths up to 20 m (DEWHA, 2008c). No seagrasses were recorded during benthic surveys at mid-shelf locations in the EMBA (Heyward et al., 2017; Radford et al., 2019) or at Shepparton Shoal, more than 16 km west of the OA.

Seagrasses within NT waters are not well described (Butler and Jernakoff, 1999), but seagrass distribution in the region is disjointed, not common in large open bays and typically found in and around inshore islands, small bays and inlets (Roelof et al., 2005). As a result of the large tidal range and high turbidity, seagrass communities west of Nhulunbuy are considered most likely to occur in the intertidal–subtidal interface or in very shallow subtidal areas up to 5 m deep (Smit et al., 2000). Species from the genera *Halophila*, *Enhalus*, *Halodule* and *Thalassia* are likely to dominate intertidal communities (Roelof et al., 2005).

Seagrasses have been mapped in Darwin Harbour (Udyawer et al., 2021) and eastern Van Diemen Gulf, notably around Field Island (Roelof et al., 2005), with patchy seagrasses also reported from Shoal Bay, south of Shoal Bay, Bynoe Harbour and north of North Perron Island (IMCRATG, 1998; Smit et al., 2000). Areas along the east coast of Cobourg Peninsula (NT Government, 2011; PWSNT, 2003) and the northern coast of the Tiwi Islands (PWSNT, 2003) are also reported to support seagrass communities important to dugongs, although these areas may be mostly or entirely outside the EMBA.

3.2.9 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 EMBA intersects shorelines on the NT mainland, notably between south of Point Blaze to Cape Hotham (and including Darwin Harbour), at some coastal islands, including the south, south-east and south-western coasts of the Tiwi Islands, and other scattered locations in the NT, including the western tip of Cobourg Peninsula and the north of Croker Island (Figure 3-2). Table 3-7 summarises and Sections 3.2.9.1 to 3.2.9.4 describe the shoreline habitats within the EMBA.

3.2.9.1 Mangroves

Mangroves are common and widely distributed along coastlines of the NT (Chatto & Baker, 2008), and extensive mangals occur at many, if not most, of the tidal flats, estuaries and tidal creeks along the mainland coast and on islands that fall within the EMBA.

Coastal habitat surveying undertaken following the Montara spill (Duke et al., 2010) estimated mangroves to cover ~90% of the shorelines in Darwin Harbour and ~73% between Darwin Harbour (Mandorah) and Point Blaze. Mangroves also occur less extensively in areas of the EMBA east of Darwin, including Cobourg Peninsula. At the Tiwi Islands, the southern shorelines within the EMBA do not support the more extensive mangroves that occur within tidal creeks that open to the north coast and in Apsley Strait.

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 complex root systems (Kathiresan & 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).

The muddy sediments that occur in mangrove forests are home to a variety of epibenthic, infaunal and meiofaunal invertebrates (Kathiresan & 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).

3.2.9.2 Intertidal mud/sand flats

Intertidal mud/sand flats form when fine sediment carried by rivers and/or the ocean is deposited in a low-energy environment. Due to the large tidal ranges, intertidal flats are common along NT coastlines and often extensive at low tide, frequently occurring adjacent to, or in conjunction with, mangrove communities in the EMBA. Duke et al (2010) indicates that intertidal mud/sand flats occur along >75% of the shore within the Darwin Harbour region and >66% of the coast between Mandorah and Point Blaze. The south-eastern coast of Melville Island also contains reasonably large areas of mud and sand flats that are exposed at low tides (Chatto & Baker, 2008). There is a large amount of intertidal mudflat, backed by extensive mangroves and open saline wetlands, in Fog Bay (southern section) and around parts of the Perron Islands (AMOSC, 2019), with this area of Fog Bay and Darwin Harbour both listed as Nationally Important Wetlands. Section 3.2.11.3 describe the wetlands of international and national importance that intersect the EMBA.

Intertidal flats 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 providing a more constant food supply. Intertidal sand and mudflats support a wide range of benthic infauna and epifauna which graze on microscopic algae and bivalves, molluscs, polycheate worms and crustaceans (Zell, 2007).

The high abundance of invertebrates found in intertidal sand and mudflats provides an important food source for finfish and rays which swim over the area at high tide. Mudflats have also been shown to be nursery areas for flatfish. During low tide, these intertidal areas are important foraging areas for resident and migratory shorebirds (see Section 3.2.12.5).

3.2.9.3 Sandy beaches

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 habitats are important for both resident and migratory seabirds and shorebirds (see Section 3.2.12.5). 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*) are commonly associated with sandy beaches (Garnet & Crowley, 2000). Sandy beaches can also provide important habitat for turtle nesting (see Section 3.2.12.3.1), with female turtles traversing the intertidal beach to lay eggs in the supra-tidal zone (outside the EMBA).

Sandy beaches intersected by the EMBA include part of the extensive stretches along northern Fog Bay up to Point Paterson, at Point Blaze and on many of the islands, including the Tiwi Islands. Turtle nesting on Fog Bay and Tiwi Islands beaches within the EMBA is dominated by flatback and to a lesser extent olive ridley turtles, with the southern beaches of the Tiwi Islands supporting less activity than south-west and northern beaches (Chatto & Baker, 2008).

3.2.9.4 Rocky shorelines

Rocky shores can include pebble/cobble, boulders and rocky cliffs (often at the landward edge of reef platforms). Within the EMBA, rocky shores occur along ~12% of the coastline in the Darwin Harbour and ~30% of the mainland coast between Mandorah and Point Blaze (Duke et al., 2010), as well as a number of islands. Rocky shorelines can vary from habitats where there is bedrock protruding from soft sediments to cliff–like structures that form headlands. The Cobourg Peninsula coastlines include numerous rocky headlands and there are intermittent scattered low lateritic cliffs in the Anson-Beagle bioregion (IMCRATG, 1998).

Rocky shorelines are an important foraging area for seabirds and habitat for invertebrates found in the intertidal splash zone.

3.2.10 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.

In northern Australia, nutrients and detritus (debris) carried by large river outflows combine with sediments and particulate organic matter resuspended by the tides and generally remain trapped within coastal areas to depths of up to ~20 m (or up to 45 nautical miles [Nm] offshore). The coastal waters within this zone generally do not mix with adjacent offshore waters, and as a result support distinctly different and more productive phytoplanktonic communities (made up of small, often microscopic, free-floating plants) than offshore waters, where nutrients are derived primarily from the ocean and atmosphere (DEWHA, 2008d).

Within the EMBA, plankton communities are likely to reflect this regional pattern, varying with depth and distance offshore. Communities of phytoplankton in coastal waters bloom and decay in response to seasonal changes in water flows, resuspension of sediments by cyclones, strong tidal currents, monsoon winds and wind-generated waves (DEWHA, 2008d). In deeper offshore areas, productivity is likely to be more dependent on internal nutrient cycling and upwellings of productive oceanic waters, such as around the shoals and pinnacles associated with KEFs of the region (see Section 3.2.11.4).

Table 3-7: Habitats within the OA and EMBA (IMCRA provincial bioregions)

Category	Receptor	OA presence	MEVA presence	EMBA presence	
				Northern Shelf Province	Northwest Shelf Transition
Benthic habitats	Coral reefs	✗	✓	✓	✓
	Seagrass	✗	✓	✓	✓
	Macroalgae	✗	✓	✓	✓
	Non-coral benthic invertebrates	✓	✓	✓	✓
Shoreline habitats	Mangroves	✗	✓	✓	✓
	Intertidal platforms	✗	✓	✓	✓
	Sandy beaches	✗	✓	✓	✓
	Rocky shorelines	✗	✓	✓	✓

3.2.11 Protected and significant areas

Protected and significant areas identified in the OA, MEVA and EMBA are listed in Table 3-8 and are illustrated in Figure 3-8 to Figure 3-10. After examination, any protected or significant area listed within EPBC Act Protected Matters Reports (Appendix D of the Coastal Waters CEMP) that was either outside the extent of the EMBA or a terrestrial feature has not been described within the Coastal Waters CEMP.

Table 3-8: Presence of protected areas and KEFs within the OA, MEVA and EMBA, including the distance to the OA

Value/sensitivity name	Within OA	Within MEVA	Within EMBA	Distance to OA (~km)
National heritage place and world heritage property				
Kakadu National Park	✗	✗	✓	207
Australian marine parks				
Oceanic Shoals Marine Park	✗	✓	✓	66.5
Joseph Bonaparte Gulf	✗	✗	✓	180
Marine national parks				
Garig Gunak Barlu	✗	✗	✓	220
Wetlands of international importance (Ramsar site)				
Cobourg Peninsula	✗	✗	✓	220
Kakadu Ramsar site	✗	✗	✓	207
Nationally important wetlands				
Adelaide River Floodplain System	✗	✗	✓	118
Cobourg Peninsula System	✗	✗	✓	220
Finniss Floodplain and Fog Bay Systems	✗	✗	✓	74
Kakadu National Park	✗	✗	✓	202
Mary Floodplain System	✗	✗	✓	140
Port of Darwin	✗	✗	✓	73
Key ecological features				
North Marine Region				
Carbonate bank and terrace system of the Van Diemen Rise	✗	✓	✓	7
Pinnacles of the Bonaparte Basin	✗	✗	✓	173
North-West Marine Region				
Carbonate bank and terrace system of the Sahul Shelf	✗	✗	✓	221
Pinnacles of the Bonaparte Basin	✗	✗	✓	191

3.2.11.1 National heritage place and world heritage property

The OA does not intersect any national heritage place or world heritage property; however, the EMBA intersects the outer boundary of Kakadu National Park (see Figure 3-8, with the distances from the OA provided in Table 3-8). The majority of the Kakadu National Park encompasses the NT mainland, however, includes the mangrove-fringed coast from Wildman River to East Alligator River and offshore islands of Barron Island (Djidbordu) and Field Island (Gardangarl) in the Van Diemen Gulf. Kakadu National Park is both a listed national heritage place and world heritage property. Kakadu is managed in accordance with the Kakadu National Park Management Plan 2016–2026 (KNPMP) (DNP, 2016). The EPBC Regulations (Schedule 8) prescribe the Australian International Union for Conservation of Nature [IUCN] management principles for each IUCN category. The Australian management principles for IUCN protected area category II require taking account of the needs and aspirations of traditional owners and other Indigenous people in the park, specifically:

- the needs of Indigenous people, including subsistence resource use, to the extent that they do not conflict with the Australian IUCN management principles
- The aspirations of traditional owners of land within the reserve or zone, their continuing land management practices, the protection and maintenance of cultural heritage and the benefit the traditional owners derive from enterprises, established in the reserve or zone, consistent with Australian IUCN management principles should be recognised and taken into account (DNP, 2016).

The Park is inscribed on the world heritage list for both cultural and natural universal values (DCCEEW, 2023c) as follows:

- criterion (I) - masterpiece of human creative genius
- criterion (VI) - directly associated with events or living traditions
- criterion (VII) - contains superlative natural phenomena
- criterion (IX) - outstanding examples of on-going evolution
- criterion (X) - important habitats for conservation of biological diversity.

The listed values within the KNPMP and protected matters reports for Kakadu National Park that overlap the EMBA are summarised in Table 3-9.

Table 3-9: Kakadu National Park values overlapping the EMBA

Management Zone(s)	Values overlapping the EMBA
National Park (IUCN II)	• biologically important areas (BIAs) for dolphins and turtles • habitat critical to the survival of flatback and olive ridley turtles • tidally influenced mudflats and mangroves provides important habitat and refuge for birds • important habitat for sawfish, river sharks, crocodiles and dugongs • Bininj are the traditional custodians of the land in the northern section of Kakadu National Park which represents a long-standing cultural interaction with landscape and culturally significant as a source of food

3.2.11.2 Marine parks

The OA does not intersect any Australian Marine Parks (AMPs) or marine national parks; however, the EMBA overlaps 2 AMPs—Oceanic Shoals Marine Park and Joseph Bonaparte Gulf Marine Park and one national marine park—Garig Gunak Barlu (Figure 3-9, with the distances from the OA provided in Table 3-8). The AMPs are divided into management zones (Figure 3-9) and managed in accordance with the North MPNMP (DNP, 2018a); the values for these AMPs that overlap the EMBA are summarised in Table 3-10. Section 3.2.14 provides information on cultural features and sea country within the AMPs and the surrounds.

In agreement with the states and NT governments, the Australian Government has committed to establish AMPs 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. Commonwealth marine reserves were renamed as Australian Marine Parks in October 2017 and there are six marine regions in the Australian Marine Parks Network, namely the Coral Sea, South-west, Temperate East, South-east, North and North-west.

Management plans for AMPs were developed and enacted on 1 July 2018. Under these plans, AMPs are allocated conservation objectives (International Union for Conservation of Nature [IUCN] Protected Area Category) based on the Australian IUCN Reserve Management Principles in Schedule 8 of the EPBC Regulations 2000. These principles determine what activities are acceptable within the different zones of the AMP network.

Garig Gunak Barlu is managed by the NT Parks and Wildlife Commission and declared under the *Cobourg Peninsula Aboriginal Land, Sanctuary and Marine Park Act 1981* (NT). The Cobourg Marine Park Plan of Management (NT Government, 2011) expired in 2021.

Table 3-10: Marine park values overlapping the EMBA

Value Sensitivity	Management Zone(s)	Values overlapping the EMBA
AMP		
Joseph Bonaparte Gulf	• Multiple Use Zone (IUCN VI) • Special Purpose Zone (IUCN VI)	The Joseph Bonaparte Gulf Marine Park values (DNP, 2018a): • ecosystems representative of the Northwest Shelf Transition—dynamic environment influenced by strong tidal currents, monsoonal winds, cyclones and wind-generated waves • a range of species, including species listed as threatened, migratory, marine or cetacean under the EPBC Act • sea country, which is valued for Indigenous cultural identity, health and wellbeing • commercial fishing, tourism, mining and recreation, including fishing, are important activities in the Marine Park.
Oceanic Shoals	• Special Purpose Zone (Trawl) (IUCN VI) • Multiple Use Zone (IUCN VI) • National Park Zone (IUCN II) • Habitat Protection Zone (IUCN IV)	The Oceanic Shoals Marine Park values (DNP, 2018a): • ecosystems representative of the Northwest Shelf Transition (which includes the Bonaparte, Oceanic Shoals and Tiwi meso-scale bioregions) • 2 KEFs: – carbonate bank and terrace systems of the Sahul Shelf – pinnacles of the Bonaparte Basin • a range of species, including species listed as threatened, migratory, marine or cetacean under the EPBC Act • BIAs that include foraging and internesting habitat for marine turtles • sea country, which is valued for Indigenous cultural identity, health and wellbeing • commercial fishing, tourism, and recreation, including fishing, are important activities.
Marine National Park		
Garig Gunak Barlu	• Multiple Use A Zone • Multiple Use B Zone	• Multiple Use A and B zones provide for multiple use of the park's resources, including commercial fishing activities. Multiple Use A zone has more intensive fishing, such as prawn trawling and netting. These zones also provide protection of important conservation and scientific values • provides BIAs for dolphins, seabirds and marine turtles • habitat critical to the survival of flatback, green and olive ridley turtles • habitats, feeding areas, dispersal and migratory pathways, and spawning sites for numerous fish and crustacean species of fisheries significance *Note: The EMBA intersects the perimeter of the marine park with no predicted shoreline or surface oil contact at or above low threshold values.*

3.2.11.3 Wetlands of international and national importance

The Ramsar Convention on Wetlands is an intergovernmental treaty that aims to conserve wetlands of international importance. Ramsar wetlands are recognised as MNES under the EPBC Act (DSEWPaC, 2010). No Ramsar or nationally important wetlands occur within the OA. The EMBA intersects with one Ramsar wetland—Kakadu National Park and the EMBA is adjacent to a second Ramsar wetland—Cobourg Peninsula (Figure 3-10; Table 3-11). The Cobourg Peninsula Ramsar site does not include the surrounding marine waters, and modelling predicts no shoreline contact should occur at this site. The values of the Kakadu National Park Ramsar site that overlap the EMBA are summarised in Table 3-11.

Table 3-8 lists the nationally important wetlands within the EMBA, together with their distance from the OA; the values for these nationally important wetlands are summarised in Table 3-11.

Table 3-11: Wetland values overlapping the EMBA

Value Sensitivity	Description	Values that overlap the EMBA
Wetlands of international importance		
Cobourg Peninsula Ramsar site	Declared a Ramsar site in 1974. The Cobourg Peninsula system comprise of coastal and inland wetlands. It consists of intertidal forested wetlands and mudflats, seasonal freshwater marshes and permanent freshwater pools. Garig Gunak Barlu National Park includes the marine waters surrounding the peninsula, but these are not included in the Ramsar site (BMT WBM, 2011).	• N/A. This Ramsar site does not include marine waters as a value and modelling predicts no shoreline or surface oil contact at or above low threshold values.
Kakadu Ramsar site	In 2010, 2 Ramsar sites were combined to form a single Ramsar site encompassing the entire National Park, covering 19,810 km^2. The park meets all 9 criteria for identifying wetlands of international importance under the Ramsar Convention.	• BIAs for dolphins and turtles • habitat critical to the survival of flatback and olive ridley turtles • tidally influenced mudflats and mangroves provide important habitat and refuge for birds supporting more than 1% of the East Asian-Australasian Flyway population • important habitat for sawfish, river sharks, crocodiles and dugongs.
Nationally important wetlands		
Adelaide River Floodplain System	Adelaide River Floodplain System is an irregular floodplain and tidal wetland system consisting of several swamps, lakes, lagoons, mudflats, rivers and dams, covering 1350 km^2 (Jaensch, 1993).	• nationally significant mangrove habitats • significant migration stop-over area for shorebirds.
Cobourg Peninsula System	The Cobourg Peninsula system is comprised of intertidal forested wetlands and mudflats, seasonal freshwater marshes and permanent freshwater pools. The site covers 2,207 km^2 (BMT WBM, 2011).	• BIAs for dolphins, seabirds and marine turtles such as habitats, feeding areas, dispersal and migratory pathways, and spawning sites for numerous fish and crustacean species of fisheries significance.
Finniss Floodplain and Fog Bay Systems	Finniss Floodplain and Fog Bay Systems consist of a beach-fringed bay with intertidal mudflats and a floodplain with paperbark swamps. The wetland supports the breeding and migration of various bird species and significant populations of marine turtles and mammals, such as the dugong and Indo-Pacific humpback dolphin. The site covers 813 km^2 (Jaensch, 1993).	• N/A: the EMBA does not overlap the wetland (adjacent); however, the EMBA overlaps nesting and foraging BIAs for marine turtles.
Mary Floodplain System	Mary Floodplain System consists of the entire floodplain of the Mary River, covering 1276 km^2. There are 3 principal plant formations and the largest wooded swamp areas in the NT. The wetland supports a major breeding area for the magpie goose, a refuge for waterbirds and saltwater crocodiles during the dry season, and supports at least several thousand migrant shorebirds at a time.	• N/A: the EMBA does not overlap the wetland (adjacent).
Port of Darwin	Entirely tidal, with mangrove forests present, covering 488 km^2. One of the NT's largest areas of mangrove swamps and features a shallow branching embayment (Jaensch, 1993).	• major nursery area for estuarine and offshore fish and crustaceans • mangrove communities are the most extensive and species–rich of any NT embayment • provides BIAs for dolphins (Australian snubfin, Indo-Pacific humpback and spotted bottlenose) and turtles (flatback).

3.2.11.4 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 OA does not overlap any KEF. The closest KEF is approximately 7.5 km from the OA—Carbonate bank and terrace system of the Van Diemen Rise (Figure 3-9). Table 3-8 lists the KEFs within the EMBA, together with their distance from the OA.

3.2.11.5 Carbonate bank and terrace system of the Sahul Shelf

The EMBA overlaps approximately 3.5% of the Carbonate Bank and Terrace System of the Sahul Shelf KEF (Figure 3-9). The Carbonate Bank and Terrace System of the Sahul Shelf is located in the western Joseph Bonaparte Gulf, north of Cape Bougainville and Cape Londonderry. The banks consist of a hard substrate with flat tops at depths of 150 to 300 m. Each bank occupies an area generally less than 10 km^2 and is separated from the next bank by narrow sinuous channels up to 150 m deep. The area contains predictably high levels of productivity especially when compared to the generally low productivity of the region (COA, 2012a).

The banks are foraging areas for loggerhead, olive ridley and flatback turtles and provide habitat for humpback whales, as well as green and largetooth 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 along with associated reef fish and elasmobranchs (Brewer et al., 2007). Cetaceans, green and freshwater 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 (CoA, 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. Although little is known about the banks, terraces and associated channels, 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).

3.2.11.6 Carbonate bank and terrace system of the Van Diemen Rise

The EMBA overlaps approximately 15.7% of the Carbonate Bank and Terrace System of the Van Diemen Rise KEF (Figure 3-9). The Carbonate Bank and Terrace System of the Van Diemen Rise covers about 31,278 km^2 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’ (CoA, 2012a) and it is considered important both for its role in enhancing biodiversity and local productivity relative to its surrounds and for supporting relatively high species diversity. The KEF is characterised by carbonate terrace, banks, channels and valleys, with variability in water depth and substrate composition contributing to 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 NMR. The carbonate banks and shoals rise from depths of 100 to 200 m to within 10 m of the surface (Anderson et al., 2011).

A 2010 survey by Geoscience Australia and AIMS mapped the seabed environments of the Van Diemen Rise (Anderson et al., 2011). The study surveyed 784 km² towed video transects at 77 sites including banks, terraces, valleys and plains within the Van Diemen Rise. The shallow banks sampled 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 from depths of 11 to 54 m (mean depth of 34 m). The sites were characterised by mostly low-lying rock outcrops with hard corals and octocorals (18% and 99% occurrence, respectively) along with smaller colonies of bryozoa and ascidians. The rocky outcrops were interspersed by small areas of relatively barren coarse-grained soft sediments (Anderson et al., 2011).

The KEF provides habitat for a high diversity of sponges, soft corals and other sessile filter feeders, epifauna and infauna, along with 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.

3.2.11.7 Pinnacles of the Bonaparte Basin

The EMBA overlaps approximately 36.4% of the Pinnacles of the Bonaparte Basin KEF (Figure 3-9). 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 (EEZ) (Baker et al., 2008). The pinnacles are found in waters 30 to 80 m deep and provide hard substrate 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 supporting greater diversity and communities than the surrounding seafloor (NERP MBH, 2014).

The Pinnacles of the Bonaparte Basin are defined as a KEF as they are a unique seafloor feature with ecological properties of regional significance. Their biodiversity value relates to both the benthic and pelagic habitats (CoA, 2012a). 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.

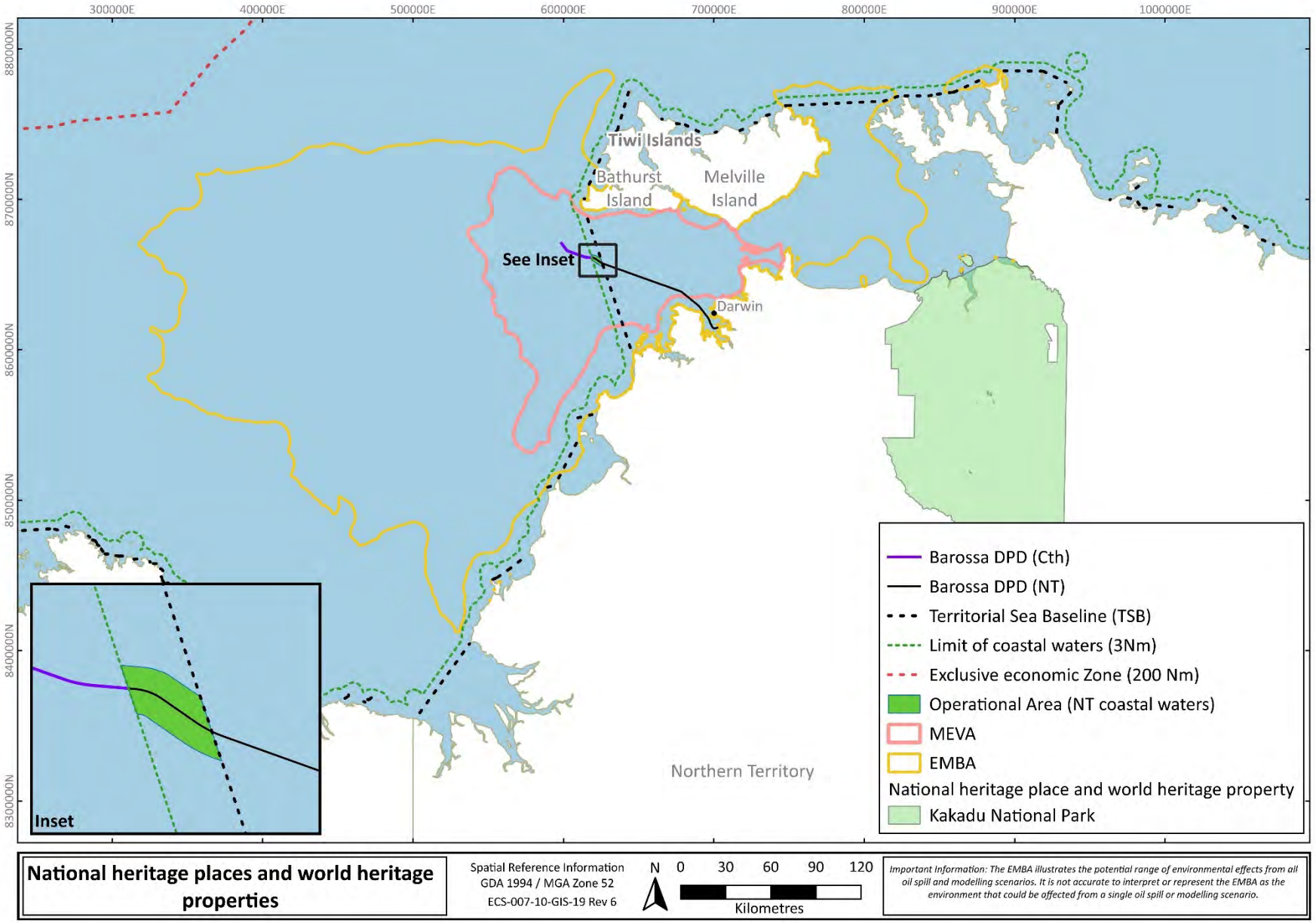


Figure 3-8: National heritage place and world heritage property proximal to the EMBA

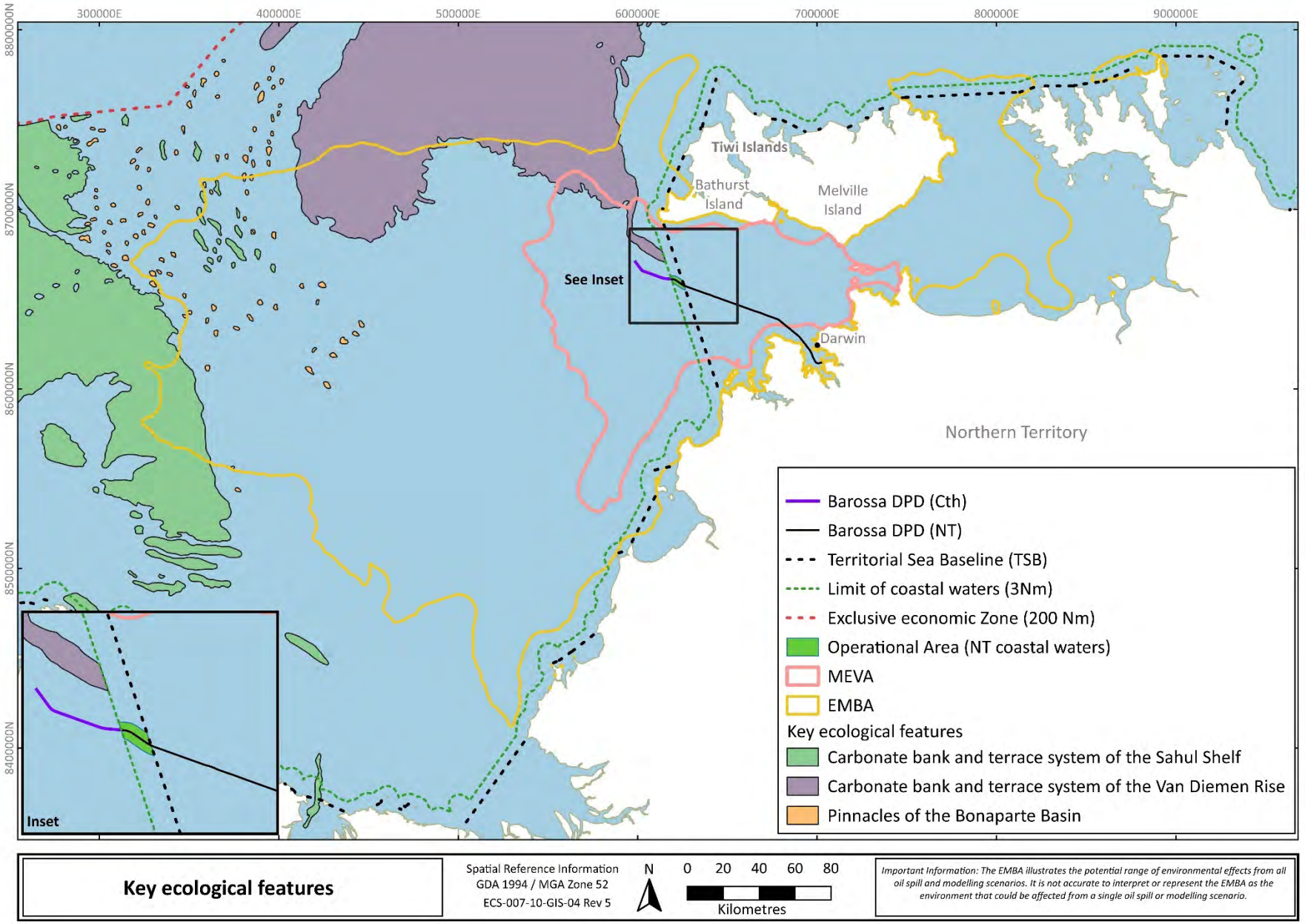


Figure 3-9: Key ecological features within or proximal to the EMBA

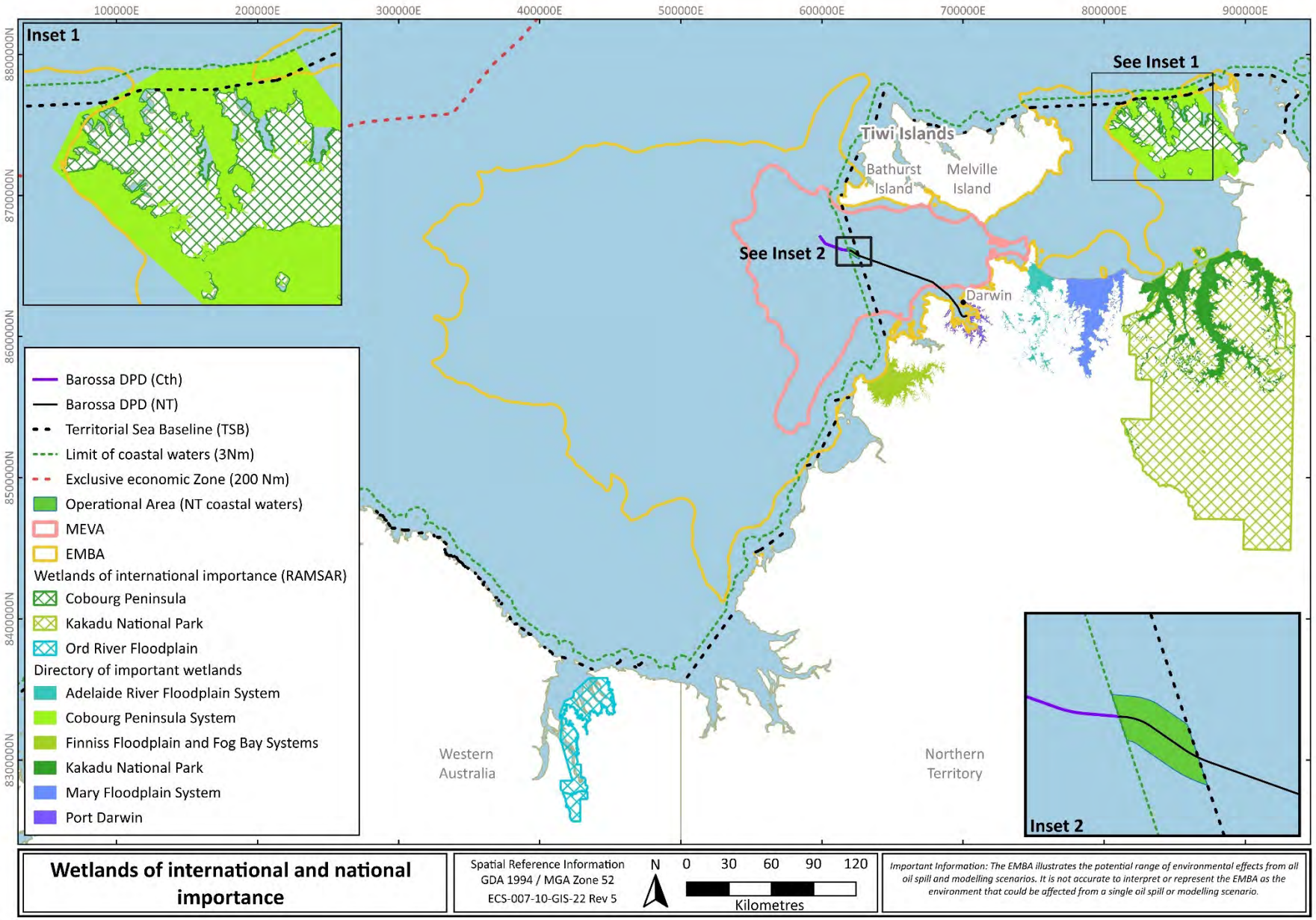


Figure 3-10: Wetlands of international and national importance within or proximal to the EMBA

3.2.12 Threatened and migratory fauna

Table 3-12 lists the environmental values and sensitivities (threatened and migratory species) within the OA and EMBA as identified from the EPBC Act protected matters reports (Appendix D of the Coastal Waters CEMP). Threatened and migratory species are Matters of National Environmental Significance (MNES) protected under the EPBC Act. The EPBC Act protected matters reports (Appendix D of the Coastal Waters CEMP) also provide a list of identified marine and cetacean species, including excluded terrestrial species (other matters protected under the EPBC Act). Table 3-12 also lists the threatened species protected under the *Territory Parks and Wildlife Conservation Act 1976* (NT) (TPWC Act) that have the potential to occur within the EMBA.

For each species identified, the extent of the likely presence is listed in Table 3-12 and described in Sections 3.2.12.1 to 3.2.12.5.

The scalloped hammerhead is EPBC Act listed as conservation dependent under the threatened listing assessment. As a result, this species has been included for assessment as the listing status could be revised to a threatened species listing status during the Activity. One additional species—the grey nurse shark (*Carcharias taurus*; EPBC Act listed 'vulnerable')—is included in the following sections as they were reported as occurring within or near the OA as part of the Barossa marine studies program.

Relevant conservation advice, recovery plans and management plans for marine fauna identified in the EPBC Act Protected Matters Reports are listed in Table 3-14.

Note that terrestrial species (such as terrestrial mammals, reptiles and bird species) that appear in the EPBC Act protected matters report for the EMBA and do not have habitats along shorelines, are not relevant to the activity impacts and risks have been excluded from Table 3-12.

3.2.12.1 Marine Mammals

3.2.12.1.1 Whales

Blue whale

The blue whale (*Balaenoptera musculus*; Endangered under the EPBC Act, Migratory) has 4 distinct sub-species, 2 are found in the southern hemisphere—the pygmy blue whale (*Balaenoptera musculus brevicauda*; Indo-Australian and Tasman-Pacific populations) and Antarctic blue whale (*Balaenoptera musculus intermedia*; CoA, 2015a). As southern blue whales occur in waters south of 60°S and pygmy blue whales north of 55°S (CoA, 2015a), only pygmy blue whales are discussed below.

The pygmy blue whale is known to migrate along the WA shelf edge at depths between the 500 m and 1,000 m depth contours from the NW Cape south to Geographe Bay (CoA, 2015a). A biologically important migration corridor is recognised in the deep offshore waters off WA (IUCN-MMPATF, 2023a). The northerly migration toward the calving grounds near the equator occurs in March/April to June (Thums et al., 2021; CoA, 2015a). Noise monitoring as part of assessment studies detected the presence of blue whales over 400 km north-east of the migration BIA for the species in the months of May to August during their north-bound seasonal migration. No detections of the species were made during the period of their southward migration (McPherson et al., 2016). The southerly migration to the feeding grounds in the high latitudes of the southern hemisphere occurs in September to December (CoA, 2015a). Pygmy blue whales appear to travel as individuals or in small groups when making their migrations (Woodside, 2014).

Generally, this species travels alone or in small groups based on acoustic data. Pygmy blue whale calls from noise loggers deployed around Scott Reef from 2006 to 2009 for the Woodside Browse project found 78% of calls to be from single whales, 18% from whale pairs and 4% from 3 or more whales (Woodside, 2014).

There are no BIAs for pygmy blue whales identified within the EMBA and, if present, are likely to be transient and in low numbers.

Bryde's whale

Bryde's whales (*Balaenoptera edeni*; Migratory) are distributed across tropical and warm temperate waters with individuals recorded in all Australian states, except the NT (Ceccarelli et al., 2011). The species typically moves between 40 °N and 40 °S, with these movements seeming to be primarily linked to prey availability (Kato, 2002). Bryde's whales are thought to be divided into offshore and onshore forms with the distinction between the 2 based on prey preference (Ceccarelli et al., 2011). The offshore form is found in deeper waters (500 to 1,000 m) and is thought to migrate seasonally in favour of warmer waters in winter months. The onshore form generally inhabits waters over 200 m and displays no distinct migratory movements (Jenner et at., 2001). Noise monitoring as part of assessment studies detected Bryde's whales almost year-round from January to October (McPherson et al., 2016) and this species has been encountered off Browse Island (Ceccarelli et al., 2011). Bryde's whales may occasionally transit through the EMBA in small numbers.

Fin whale

Fin whales (*Balaenoptera physalus*; Vulnerable under the EPBC Act, Migratory) are widely distributed from polar to tropical waters and have been recorded in all Australian states, other than NSW and the NT (Bannister et al., 1996). Fin whales feed on planktonic crustacea, such as Antarctic krill, and primarily forage in high latitudes.

The species rarely occupies inshore waters and displays well defined migratory movements (essentially north south) between polar, temperate and tropical waters (Ceccarelli et al 2011; Bannister et al. 1996). Research by Aulich et al. (2022; 2019) found that fin whales travel up the WA coast as far north as Dampier (19°S). After arriving at Cape Leeuwin in April, the species migrates north along the coast to feed in Perth Canyon from May to October. This is thought to be a migratory pathway from Antarctica, and it has been suggested that there are separate fin whale sub-populations on the east and west coasts of Australia (Aulich et al., 2022; 2019). Within Australian waters, the Bonney Upwelling is thought to be an important foraging ground for this species (TSSC, 2015c; Bannister et al., 1996).

The Australian fin whale distribution is unclear due to limited observations, but the species is thought to be present from Exmouth along the southern coastline to Queensland. There are no known mating or calving areas in Australian waters and no BIAs have been developed for fin whales (TSSC, 2015c). Given their distribution and movements, fin whales are considered unlikely to occur in the EMBA.

Humpback whale

The humpback whale (*Megaptera novaeangliae*; Migratory) has a wide distribution with recordings throughout Australian Antarctic waters and offshore from all Australian states (IUCN-MMPATF, 2023b; Bannister et al., 1996). These whales migrate between summer feeding grounds in Antarctica and winter breeding and calving grounds in the sub-tropical and tropical inshore waters of north-west Australia (Jenner et al., 2001). Although the exact timing of migration varies annually due to a number of factors including water temperature, the northbound migration peaks between late July and early August, and the southbound migration peaks between late August and early September (Jenner et al., 2001).

There has been a steady recovery in the humpback whale population that migrates along the WA coast since the closure of commercial whaling, and as a result the species was removed from the EPBC Act threatened species list in 2022 (TSSC, 2022).

Humpback whales breed and calve in the NWMR between Broome and the northern end of Camden Sound in the months of June to September each year (DCCEEW, 2024j) and a breeding and calving BIA for humpback whales is recognised in nearshore waters adjacent to the northern half of the Dampier Peninsula and encompasses Camden Sound (DCCEEW, 2024j).

Relatively few humpback whales have been known to travel north of Camden Sound (Jenner et al., 2001) and Barossa Development baseline studies did not detect any humpback whale calls in the Timor Sea (McPherson et al., 2016).

There are no BIAs for this species within the EMBA and given the available information on its distribution, it is considered unlikely to occur within the EMBA.

Sei whale

Sei whales (*Balaenoptera borealis*; Vulnerable under the EPBC Act, Migratory) are thought to have a wide distribution, but their distribution limits are unclear as this species is often confused with Bryde's whales. Sightings are rare, but the species may be seen in coastal and offshore waters throughout Australia (DCCEEW, 2024j; Bannister et al., 1996). The species is able to utilise a diverse range of marine habitats, which has been attributed to a combination of dynamic physical and prey processes (DCCEEW, 2024j).

Sei whale migratory movements are well defined with distinct north-south movements as the species migrates between polar, temperate and tropical waters for foraging and breeding. The species feeds intensively between the Antarctic and sub-tropical convergences on planktonic crustacea (Ceccarelli et al., 2011; Bannister et al., 1996). There are no known mating or calving areas in Australian waters and the species is thought to infrequently occur in the NW region (Ceccarelli et al., 2011).

There are no BIAs for this species in Australian waters. However, it is possible that individual sei whales may occasionally occur within the EMBA.

3.2.12.1.2 Dolphins

Australian humpback dolphin

The Australian humpback dolphin (*Sousa sahulensis*; Migratory, previously/also known as the Indo-pacific humpback dolphin, *Sousa chinensis*) occurs in waters of the Sahul Shelf, from northern Australia to the Kikori Delta in Papua New Guinea, and Bird's Head Seascape in West Papua (Jefferson & Rosenbaum, 2014). Although distribution, life history and habitat preferences of this species are poorly understood, the Australian humpback

dolphin is thought to be associated with shallow coastal, estuarine and tidal river waters less than 20 m in depth (Hanf et al., 2022).

In Australia, humpback dolphins occur along the northern Australian coastline from Shark Bay in WA to southern Queensland (Raudino et al., 2018; Hanf et al., 2022). In the NWMR, this species is thought to inhabit coastal waters up to the 30 m isobath (Hanf et al., 2022), but Australian humpback dolphins have been recorded up to 60 km offshore near Barrow Island, the Montebello Islands (approximately 80 km from the mainland coast and 20 km from Barrow Island), and the western Lowendal Islands (Raudino et al., 2018). Available abundance estimates indicate that this species occurs in small populations with an average of up to 89 individuals and a maximum of 0.19 individuals per km² (Parra & Cagnazzi, 2016).

There are breeding BIAs for Australian humpback dolphins in Darwin Harbour and at Kakadu National Park that overlap the EMBA (Figure 3-11).

Australian snubfin dolphin

The Australian snubfin dolphin (*Orcaella heinsohni*; Migratory), previously known and only recently differentiated from the closely related Irrawaddy dolphin (*Orcaella brevirostris*), is a poorly known species inhabiting shallow coastal and estuarine waters and tidal rivers. The species typically occurs in water depths of less than 20 m in the vicinity of freshwater outflows, but has been recorded up to 23 km offshore (Bouchet et al., 2021). The Australian snubfin dolphin is likely to occur in higher densities in areas of complex habitat type which provide a variety of prey types (Palmer et al., 2014).

In Australia, this species occurs in coastal waters of Queensland, NT and north-western Australia. The population in Australian waters is thought to be continuous with the Papua New Guinea species but separate from populations in Asia. Breeding is thought to occur throughout the year for this species and there are breeding BIAs in Darwin Harbour and at Cobourg Peninsula that overlap the EMBA.

Killer whale

The largest member of the dolphin family, killer whales or orca (*Orcinus orca*; Migratory) are a cosmopolitan species with a vast global distribution across a wide range of habitats. However, they appear to be primarily concentrated in coastal waters and cooler regions of high productivity as they are carnivores with a diet that varies seasonally and regionally (DCCEEW, 2024j; Bannister et al., 1996).

Globally, killer whales are known to migrate; however, specific routes and seasonal movement patterns are not known in detail and are thought to relate to prey availability (Bannister et al., 1996).

Killer whales are distributed throughout Australian waters, typically observed moving along the continental slope and shelf, and near seal colonies (Bannister et al., 1996). Migration movements within Australian waters include a summer migration from subantarctic islands to Macquarie Island (DCCEEW, 2024j). While killer whales are known to undertake seasonal migrations and follow regular migratory routes, little is known about these movements (DCCEEW, 2024j).

Killer whales are often observed around seal colonies and may be associated with humpback whale migrations, neither of which occur in the vicinity of the EMBA. No BIAs or migration routes have been identified for this species within the EMBA, although they may occur in low numbers.

Spotted bottlenose dolphin (Indo-pacific bottlenose dolphin)

The spotted bottlenose dolphin (Arafura/Timor Sea populations; *Tursiops aduncus*; Migratory) is primarily found in nearshore continental shelf waters less than 200 m deep, with rocky or coral reefs, sandy, soft sediments, or seagrass beds (DSEWPaC, 2012a). Small populations also occur in the inshore waters of some oceanic islands (Ceccarelli et al., 2011).

In Australia, migration patterns for the species are variable, including year-round residency in small areas, long-range movements and migration (DCCEEW, 2024j). The species occurs in NT open coastal waters, primarily within the continental shelf and around oceanic islands. Spotted bottlenose dolphins forage in a wide range of habitats and in deeper waters than most dolphins. Groups are resident at Browse Island, Rowley Shoals and other island and reef complexes in offshore waters (Ceccarelli et al., 2011).

There is a breeding/calving BIA located in Darwin Harbour for the Indo-Pacific bottlenose dolphin that overlaps the EMBA (Figure 3-11). Given spotted bottlenose dolphin use relatively deeper waters and potentially travel large distances, it is likely this species will also transit through other parts of the EMBA.

3.2.12.1.3 Dugong

Dugongs (*Dugong dugon*; Migratory) occur in tropical and sub-tropical coastal and island waters. They are commonly found in shallow areas to 25 m depth but have been observed in waters up to 37 m deep (Marsh, n.d.). Dugong feeding aggregations tend to occur in large seagrass meadows within wide shallow protected bays, shallow mangrove channels and in the lee of large inshore islands. Although the movements of most individuals

are limited to tens of kilometres in the vicinity of seagrass beds some individuals travel up to 1,000 km (Hobbs & Willshaw, 2015; Whiting, 2008).

Dugongs in the Torres Strait have large home-range sizes compared to other regions, likely due to the vast areas of seagrass, including over 13,000 km^2 of deep-water seagrass, the largest continuous area in Australia (Deutsch et al., 2022). This, along with large seagrass beds in shallow water around reefs, enables dugongs to travel long distances while staying relatively close to accessible food sources (Deutsch et al., 2022).

In northern Australia, the Darwin region supports a dugong population travelling over 300 km between rocky reef habitats (Whiting, 2008), and key sites for dugong conservation have been identified around Cobourg Peninsula, Croker Island and the north coast of the Tiwi Islands (PWSNT, 2003) which all partly overlap the EMBA. Aggregations at these sites rank in the top eight dugong populations in Australia (PWSNT, 2003). Dugongs tracked in the INPEX Ichthys Project baseline surveys were recorded around the Vernon Islands, south of Melville Island, and spent time in Darwin Harbour and around the Tiwi Islands (INPEX, 2010).

There are no BIAs for dugong within the EMBA, but the species are known to occur in suitable habitats (e.g. seagrass meadows) within the EMBA.

3.2.12.2 Water mouse

The water mouse (*Xeromys myoides;* Vulnerable under the EPBC Act) is a small rodent and occurs in and near coastal Queensland and NT. In NT, the water mouse habitat spans several areas, including floodplains along Glyde and Tomkinson Rivers in Arnhem Land, South Alligator and Daly Rivers in Kakadu National Park, and Melville Island. Based on the habitat preferences, it is considered unlikely to occur within the EMBA. The main threats identified for the water mouse include:

- land use change.
- increasing human presence.
- invasive predators like foxes and cats (DAWE, 2021).

3.2.12.3 Marine Reptiles

3.2.12.3.1 Marine Turtles

Flatback turtle

Flatback turtles (*Natator depressus*; Vulnerable under the EPBC Act; Migratory) are known to occur along the WA, NT and Queensland coastlines, and forage widely across the Australian continental shelf and into the continental waters off Indonesia and Papua New Guinea (CoA, 2017b). Flatback turtles are primarily carnivorous, predominantly feeding on soft-bodied invertebrates. This species breeds in the region, with the highest density rookeries found to be winter at Cape Domett and summer at Eighty Mile Beach, while moderate to lesser density nesting in winter occurred in the North Kimberley offshore islands (Tucker et al., 2021). Flatback turtles that nest within the Pilbara region typically migrate along the continental shelf to foraging grounds as far north as Darwin at the end of the nesting season, returning to breed at varying intervals of a year or more (Thums et al., 2020; CoA, 2017b). Tracking studies have shown individuals migrating from northern WA into Queensland waters and (conversely) from Deliverance Island in Queensland to Kimberley waters, with the waters around the Tiwi Island supporting migrating and foraging flatbacks (Pendoley, 2023).

Flatback turtles nesting within the NT are from the Arafura Sea breeding and genetic stock, with unknown long-term trends for this stock (CoA, 2017b). Nesting has been recorded on the Tiwi Islands, with flatback turtles the predominant nesting species on the southern and south-western beaches that fall within the EMBA (Pendoley, 2023). The greatest proportion of activity occurs on the west coast of Bathurst Island (Chatto & Baker, 2008) with nesting females numbering around 11 to 100 per year, which is comparable to or smaller than other nesting sites of the Arafura Sea genetic stock. Nesting and internesting occurs year-round with a peak during June to September, and hatchling emergence peaking between July and September (CoA, 2017b).

The Recovery Plan for Marine Turtles in Australia defines a 60 km internesting buffer around the Tiwi Islands (CoA, 2017b). Whittock et al. (2016) defined suitable internesting habitat as waters up to 16 m deep within 5 to 10 km of the coastline, and unsuitable internesting habitat as waters over 25 m deep and more than 27 km from the coastline. They also tracked internesting flatback turtles from 5 different mainland and island rookeries and found that these turtles not only stayed in waters less than 44 m deep, but were associated with a mean depth of under 10 m (Whittock et al., 2016). To date there is no evidence indicating flatback turtles in deep offshore waters during the internesting period (Pendoley, 2019). There are BIAs for flatback turtle foraging and internesting within the EMBA (see Figure 3-15).

Green turtle

Green turtles (*Chelonia mydas*; Vulnerable under the EPBC Act; Migratory) are predominately found off the WA, NT and Queensland coastlines (CoA, 2017b). The green turtle is the most common marine turtle breeding in the NWMR, with WA supporting one of the largest remaining populations worldwide (DSEWPaC, 2012e). Green turtles travel up to 3,100 km between nesting and feeding areas (Ferreira et al., 2021; DSEWPaC, 2012e) and forage on algae, seagrass and mangroves, including on offshore coral reefs across north-western Australia (Ferreira et al., 2021; CoA, 2017b).

In the NT, nesting sites occur mostly from the western end of Melville Island to near the Queensland border (NT Government, n.d). The Cobourg Peninsula green turtle genetic stock is the closest to those on the Tiwi Islands and they nest between October and April, with peak nesting period between December and January. Nesting in the Tiwi Islands includes the beaches within the EMBA on the south-west of Bathurst Island (Chatto & Baker, 2008; Pendoley, 2023). Nesting sites for the species in the Bonaparte or Van Diemen bioregions are Black/Smith Point and Lawson Island, east of the Tiwi Islands near Cobourg Peninsula (Chatto & Baker, 2008).

Green turtles are likely to be encountered within the EMBA, mainly within reef areas, and internesting is expected between October and April (CoA, 2017b). There are BIAs for green turtle foraging and internesting within the EMBA and critical habitat for green turtles are located in the waters of the EMBA (Figure 3-14).

Hawksbill turtle

Hawksbill turtles (*Eretmochelys imbricata*, Vulnerable under the EPBC Act and TPWC Act; Migratory) predominantly occur along northern Australian coastlines (WA, NT and Queensland), with 3 recognised stocks: north Queensland stock located in the north Great Barrier Reef and Torres Strait; north-east Arnhem Land stock in the NT; and WA stock located on the North West Shelf. Hawksbill turtles are omnivorous and feed on algae, sponges, soft corals and soft bodied invertebrates foraging in waters ranging from 1.5 to 84 m deep (Fossette et al., 2021). This species is typically associated with rocky and coral reef habitats, often returning to a small foraging area, and is expected to be found within these habitats along the WA coastline, from Shark Bay to the northern extent of the NWMR, migrating over 4,600 km from their nesting site (Crommenacker et al., 2022; Barr et al., 2021; CoA, 2017b). Unlike green turtles, there is little evidence that hawksbill turtles nesting elsewhere in WA, NT, or Queensland migrate to the Tiwi Islands to forage (Pendoley, 2023) and the islands are not listed as an important nesting, foraging, or internesting site for this species (CoA, 2017b).

In the NT, nesting occurs on islands concentrated around north-eastern Arnhem land and Groote Eylandt (NT Government, n.d) and is reported to occur from July to December (DSEWPaC, 2012e). Nesting on the Tiwi Islands has been recorded at Seagull Island and northern Melville Island (Chatto & Baker, 2008), outside the EMBA.

Hawksbill turtles may forage on banks and shoals within the EMBA, and BIAs for hawksbill turtle internesting overlap the waters of the EMBA (Figure 3-16).

Leatherback turtle

Leatherback turtles (*Dermochelys coriacea*; Endangered under the EPBC Act; Critically endangered under the TPWC Act; Migratory) are known to forage and migrate throughout the open offshore waters of Australia, with foraging more common along the east coast and Bass Strait. Leatherback turtles are pelagic throughout their life and feed almost exclusively on jellyfish. Records of leatherback turtles nesting in Australia are sparse, and limited to Queensland, NSW and NT (DCCEEW, 2024j; CoA, 2017b), with scattered isolated nesting (one to 3 nests per year) in Qld and the NT (Limpus & McLachlin, 1994). Due to the lack of significant nesting sites in Australian waters, leatherback turtles are likely migrants from neighbouring countries foraging in Australia (Limpus, 2009b). Habitat critical to the survival of the leatherback turtle (nesting) and leatherback turtle BIA for internesting intersects the EMBA near the Cobourg Peninsula (Figure 3-13).

Loggerhead turtle

Loggerhead turtles (*Caretta caretta*; Endangered under the EPBC Act; Vulnerable under the TPWC Act; Migratory) range along most of the Australian coastline and throughout the NWMR (CoA, 2017b). This species is carnivorous and mainly feeds on benthic invertebrates in a wide range of habitats from nearshore to waters 55 m deep (CoA, 2017b). Breeding aggregations occur on Australia's east (Queensland, NSW) and west coasts. Loggerhead turtles have one genetic breeding stock within WA, with approximately 3,000 females supporting the third-largest population in the world (CoA, 2017b; Limpus, 2008a; Baldwin et al., 2003).

Capable of large migrations, individual loggerhead turtles from both WA and eastern Australian have been recorded foraging in the NT, and further afield in Indonesia and Papua New Guinea (Perez et al., 2022; Pendoley, 2023). In the Kimberley region, loggerhead turtles are thought to be transient or end-of-migration foragers with no documented nesting sites in the area (Tucker et al., 2021). Although loggerhead turtles forage in the Oceanic Shoals Marine Park, the Arafura Sea and the Gulf of Carpentaria, they are not known to breed in the region. Loggerheads found within the EMBA most likely come from the WA population, nesting outside the EMBA (CoA, 2017b). A BIA for loggerhead turtle foraging intersects the EMBA (Figure 3-17).

Olive ridley turtle

Olive ridley turtles (*Lepidochelys olivacea*; Endangered under the EPBC Act; Vulnerable under the TPWC Act; Migratory) are known to nest in the NT and on western Cape York (Queensland), with low density nesting recorded on the Kimberley coast, in the Dampier Peninsula and along Camden Sound (Tucker et al., 2021; CoA, 2017b). This species is primarily carnivorous and feeds on soft-bodied invertebrates in waters between 15 m and 200 m in depth. Olive ridley turtles migrate through oceanic waters, travelling up to 1,130 km between their nesting and foraging grounds (Cáceres-Farias et al., 2022; CoA, 2017b; Whiting et al., 2005). All reported olive ridley movements were largely restricted to within the 100 m depth contour (Pendoley, 2023).

Olive ridley turtles are known to nest on the Tiwi Islands on the west coast of Bathurst Island and the north coast of Melville Island. These turtles are part of the NT genetic stock, significant at both a national and international level (CoA, 2017b). The NT genetic stock nests throughout the year, with peaks between April and June, and most hatchlings emerge between June and August (CoA, 2017b).

Internesting habitat for this species encompasses nearshore waters along the north, west and east coasts of the Tiwi Islands. Tracking studies showed these turtles remain close to shore in waters less than 55 m deep within 37 km of the nesting beach during the internesting interval (Whiting et al., 2007; 2005). Migrating olive ridley turtles tracked from the Tiwi Islands typically moved in a north-east and west/south-westerly direction, to foraging grounds ~300–400 km to the west in the Joseph Bonaparte Gulf or up to 1,200 km away in the Arafura Sea and Gulf of Carpentaria (Pendoley, 2023). Olive ridley turtles may be encountered in the shallow waters of the Tiwi Islands, with BIAs for foraging, nesting and internesting intersecting the EMBA (Figure 3-12).

3.2.12.3.2 Crocodiles

The salt-water crocodile (*Crocodylus porosus*; Migratory) was listed under the EPBC Act to regulate commercial hunting which caused a significant decline in the population (DCCEEW, 2024j). Salt-water crocodiles are found across northern Australia and occur within the nearshore marine and estuarine waters of the Kimberley coast (DCCEEW, 2024j). Larger populations within the major river systems of the Kimberley occur in the rivers draining into the Cambridge Gulf, the Prince Regent and Roe River systems of the east and north-west Kimberley (DCCEEW, 2024j). The nesting habitat for this species predominantly occurs within the Ord, King and Roe River systems (DCCEEW, 2024j). There are no BIAs for the salt-water crocodile within the EMBA, but given their widespread distribution, they are likely to be present within the EMBA.

3.2.12.4 Sharks, rays and other fish

3.2.12.4.1 Sharks

Grey nurse shark

The grey nurse shark (*Carcharias taurus*; Vulnerable under the EPBC Act) has a wide but patchy tropical and temperate distribution in the Indo-West Pacific and Atlantic oceans. There are 2 distinct subpopulations in Australia on the east and west coast. The west coast population inhabits coastal and continental shelf waters from south-west WA (Albany) up to the North West Shelf (FRDC, 2019) and although one aggregation site has been documented, data on their distribution along the WA and NT coastline is lacking (Hoschke et al., 2023). Grey nurse sharks undertake large-scale movements to potentially capitalise on seasonal prey aggregations, with individuals migrating 1,294 km along the WA coast from SW WA to Ningaloo, and 1,500 km on the east coast (Dwyer et al., 2023; DCCEEW, 2024j; Jakobs et al., 2019). Grey nurse sharks are thought to move further north along the coast during May to December. Individuals have been caught near Browse Island and off Bali, Indonesia (Hoschke et al., 2023; Momigliano & Jaiteh, 2015). During the Barossa marine studies program, 4 grey nurse sharks were observed at seamounts in waters 130 m deep, one possibly pregnant (Jacobs, 2016). This was considered unusual as neither of the subpopulations are known to extend that far north and are generally associated with shallower, more coastal waters (DCCEEW, 2024j). Given grey nurse sharks have been observed at seamounts and oceanic coral reefs in the Timor Sea, the species may be present around reefs, banks and seamounts in the EMBA.

Mako sharks

Shortfin mako (*Isurus oxyrinchus*; Migratory) and longfin mako (*Isurus paucus*; Migratory) sharks are both highly migratory epipelagic species. The shortfin mako is a common shark in tropical and temperate waters above 16 °C (Groeneveld et al., 2014), and as such widespread throughout Australian waters except for the Torres Strait, Arafura Sea and Gulf of Carpentaria (FRDC 2019; Birkmanis et al., 2020; Kyne et al., 2021a). Shortfin mako sharks exhibit sexual and developmental segregation; juveniles spend 90% of their time near the surface whereas adults dive much deeper (Groeneveld et al., 2014). In contrast, the wide but patchy distribution and biology of the rarely encountered longfin mako is less well documented (Kyne et al., 2021a). This epipelagic shark also inhabits tropical and warm-temperature waters. In Australia, longfin mako sharks are found from Geraldton in WA across the NT and Queensland down to Port Stevens in NSW (FRDC, 2019; Rigby et al., 2019). These species may be rarely encountered within the EMBA.

Oceanic whitetip shark

The oceanic whitetip shark (*Carcharhinus longimanus*; Migratory) is a highly mobile globally widespread species found in tropical and warm temperate waters between 18 to 28°C from the surface to at least 180 m, venturing close to shore where the continental shelf is narrow (Kyne et al., 2021a). Within Australian waters, this rarely encountered species is found in warmer waters from Cape Leeuwin in WA across northern Australia down to Sydney (Kyne et al., 2021a). Oceanic whitetip sharks have been globally assessed as Critically Endangered by the IUCN, Overfished by SAFS and listed on CITES Appendix II (FRDC, 2019). It is possible that individuals of this species may be encountered within the EMBA.

Northern river shark

Northern river sharks (*Glyphis garricki*; Endangered under the EPBC Act and TPWC Act) are rare and although their distribution is uncertain, they are known to occur in the Ord and King Rivers, King Sound and Joseph Bonaparte Gulf in WA, along with the South and East Alligator Rivers and the Wessel islands in NT (Udyawer et al., 2021; FRDC, 2019; DSEWPaC, 2010a). These sharks are thought to segregate during various life stages, occupying rivers, estuarine systems, macrotidal embayments as well as inshore marine habitats (Kyne et al., 2021a; FRDC, 2019; DSEWPaC, 2010a). Although the northern river shark has been recorded in offshore waters, the frequency of this occurrence is unknown.

The Sawfish and River Shark Multispecies Recovery Plan (CoA, 2015b) recorded observations of adults and juveniles in marine waters north of Derby, WA while pupping and juveniles occur in King Sound and Cambridge Gulf. Under the recovery plan, all aggregations and areas of biologically important behaviours such as breeding, foraging, resting or migrating are considered critical to the survival of the species. Individuals may be encountered in low numbers within the EMBA.

Speartooth shark

The speartooth shark (*Glyphis glyphis*; Critically endangered under the EPBC Act; Vulnerable under the TPWC Act) has been recorded as occurring in macrotidal rivers and estuary environments, with juveniles and sub-adults utilising large tropical river systems as their primary habitat (Kyne et al., 2021b; DSEWPaC, 2010b, Stevens et al., 2005). It is thought that their marine distribution may be limited to the coastal marine environment outside of rivers (Udyawer et al., 2021; FRDC, 2019; DSEWPaC, 2010b). While the speartooth shark is known to inhabit the Wenlock/Ducie/Port Musgrave river system in Qld and various rivers of the Van Diemen Gulf in the NT, new populations of this species were recently discovered in the Daly River, NT and the Ord River, WA (Kyne et al., 2021b). 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). Individuals may be encountered in low numbers within the EMBA.

Scalloped hammerhead shark

The scalloped hammerhead shark (*Sphyrna lewini*; conservation dependent under the EPBC Act) is a coastal and semi-oceanic species globally distributed in tropical and warm-temperate waters from the intertidal zone to at least 275 m in depth, with newborns found in coastal zones (Kyne et al., 2021a; FRDC, 2019). Recent studies suggest that the Indo-Pacific population (including Australia) is genetically distinct from the Atlantic and Caribbean populations. There is likely to be 2 subpopulations in Australian waters (WA and the rest of Australia), with the non-WA subpopulation connected to Papua New Guinea and Indonesia by shallow water habitats along northern Australia (Green et al., 2022). Across northern Australia, the pupping season peaks from October to January (TSSC, 2018). This mobile species has a broad Australian range from NSW and Qld across the NT to WA (Bartes et al., 2021; Kyne et al., 2021a; FRDC, 2019). Scalloped hammerhead sharks are known to occur within the EMBA.

White shark

The white shark (*Carcharodon carcharias*; Vulnerable under the EPBC Act, Migratory) is a rare, primarily temperate species with a wide Australian range and 2 subpopulations; eastern Australasia (from Papua New Guinea along Australia's east coast and Macquarie Island to the south-western Pacific, including waters off New Caledonia, Vanuatu and Tonga) and a southern-western population (from western Victoria across southern Australia and up the WA coast; DSEWPaC, 2013; FRDC, 2019; Kyne et al., 2021a). Although the species has been recorded south from central Queensland to up to Ningaloo Reef and may occur further north on both coasts, white sharks are not known to aggregate within the NWMR or NMR and are most likely to be found south of North West Cape (DSEWPaC, 2012a; 2012d). The reasons for movements to north-western WA are unknown and little information is available on their reproduction in Australian waters (McAuley et al., 2016; DSEWPaC, 2012d). White sharks are unlikely to be seen in the EMBA.

Whale shark

The whale shark (*Rhincodon typus*; Vulnerable under the EPBC Act, Migratory) is globally distributed in tropical and warm temperate seas, except the Mediterranean. There are 2 distinct subpopulations, with approximately 75% of the global population in the Indo-Pacific, and the remaining 25% in the Atlantic Ocean (Vignaud et al., 2014 in FRDC, 2019). Ningaloo Reef in WA is a known aggregation site, and whale sharks congregate off Christmas Island

from December to January. These aggregations are thought to be linked to seasonal prey fluctuations (TSSC, 2015g). The species is an epipelagic filter feeder with a diet of planktonic and nektonic species, including small crustaceans and smaller schooling fish species (DCCEEW, 2024j). Whale sharks are known to be highly migratory with migrations of over 20,000 km recorded (Guzman et al., 2018). Migration along the northern WA coastline broadly follows the 200 m isobath and typically occurs between July and November (TSSC, 2015g).

Wilson et al. (2006) recorded 6 whale sharks departing Ningaloo Reef and traveling north-east into the Indian Ocean. Meekan and Radford (2010) showed that whale sharks migrated up the coast from Ningaloo Reef and individually dispersed over a broad area; either north-west into the open Indian Ocean, northward towards Sumatra and Java, or north-east towards the Timor Sea; and Thomson et al., (2021) more recently recorded whale sharks tagged in Ningaloo Reef traveling to the North West Shelf. Due to their widespread distribution, highly migratory whale sharks may occur within the EMBA.

3.2.12.4.2 Rays

Manta ray

The giant manta ray (*Mobula birostris*; Migratory) and reef manta ray (*Mobula alfredi*; Migratory) are globally distributed in both tropical and temperate waters. Giant manta rays are considered to be the more migratory and oceanic species of the 2, and individuals of this highly mobile species are not expected to be resident in Australian waters (Kyne et al., 2021a; Couturier et al., 2015). While considered more solitary and less frequently sighted than reef manta rays, giant manta rays can be found in large numbers engaging in foraging, mating or cleaning activities and exhibit seasonal habitat preferences frequenting offshore seamounts and islands (Marshall et al., 2022a).

The reef manta ray typically utilises productive nearshore habitats, including island groups, atolls and continental coastlines (Marshall et al., 2022b), and is coastally distributed across the north of Australia to approximately 30°S on both coasts (Armstrong et al., 2020). While reef manta rays demonstrate a high degree of site fidelity in tropical and subtropical waters, this species has also been shown to travel up to 700 km, undertake seasonal migrations and traverse international waters (Couturier et al., 2015). Reef manta rays are often sighted in high numbers, predominantly when undertaking foraging activities or migrating. There are no known foraging or breeding aggregation areas for these species within the EMBA. Based on the habitat preferences of these rays, it is unlikely that either species would occur in large numbers within the EMBA although individuals may transit through the area.

3.2.12.4.3 Sawfish

The 3 EPBC Act and TPWC Act listed threatened (Vulnerable) sawfish species that may occur in the EMBA, dwarf sawfish *(Pristis clavata)*, green sawfish *(Pristis zijsron)* and largetooth sawfish *(Pristis pristis),* occur mainly in inshore coastal waters and riverine environments in northern Australia. Adults of both green and largetooth sawfish are thought to use deepwater habitats, but this has not been confirmed for dwarf sawfish (DoE, 2015c). Considering the declining global populations of these sawfishes, northern and north-west Australia may contain the last significant populations of these species (Yan et al., 2021; DoE, 2015c; DSEWPaC, 2012d). Sawfishes feed on a variety of teleost fishes and benthic invertebrates, including cephalopods, crustaceans and molluscs (Lear et al., 2023; Thorburn et al., 2007; 2008; Pogonoski et al., 2002). Based on their habitat preferences, it is considered highly unlikely that these sawfish would occur within the deeper offshore waters of the EMBA. A fourth species, the narrow sawfish (*Anoxypristis cuspidata*; Migratory), is currently being assessed for EPBC threatened species listing (DoE, 2023g), and may be found within the EMBA.

Dwarf sawfish

The dwarf sawfish (*Pristis clavata*; Vulnerable under the EPBC Act and TPWC Act; Migratory) is primarily found in shallow coastal and estuarine areas, from Cairns in Queensland around the north of Australia to the Pilbara coastline in WA, with juveniles thought to remain in estuarine waters (FRDC, 2019; DEWHA, 2009).

Green sawfish

The green sawfish (*Pristis zijsron*; Vulnerable under the EPBC Act and TPWC Act; Migratory) is most common in shallow coastal and estuarine areas, but this species has been recorded in water depths of up to 70 m from Cairns, Queensland across to Broome, WA (FRDC, 2019; DEWHA, 2008a). Green sawfish appear to have limited tidally influenced movements, occupying only a few square kilometres within the coastal fringe, and strongly associated with mangroves and adjacent mudflats (Lear et al., 2023). Although their spatial and temporal distribution in these creeks is variable with changing tidal and environmental conditions, they typically return to inshore waters to breed and pup (Chevron, 2011).

Largetooth sawfish

The largetooth sawfish (*Pristis pristis*; Vulnerable under the EPBC Act; Migratory) inhabits the sandy or muddy bottoms of river, estuarine and marine environments within north-west Australia and has a patchy distribution including the Fitzroy, Durack, Robinson and Ord rivers in WA. Newborns and juveniles occur primarily in the

freshwater areas of rivers and in estuaries, while adults mostly occupy marine and estuarine environments (FRDC, 2019; DSEWPaC, 2012d).

Narrow sawfish

The narrow sawfish (*Anoxypristis cuspidata*; Migratory), is currently being assessed for EPBC threatened species listing (DCCEEW, 2024j). Narrow sawfish are bentho-pelagic species found throughout the Indo-West Pacific and are still found throughout much of their historic range, albeit in substantially reduced numbers (FRDC, 2019). Narrow sawfish occur across northern Australia from the Pilbara Coast in WA to Broad Sound in Queensland in waters up to 40 m deep on the continental shelf and in estuaries (Kyne et al., 2021a; FRDC, 2019). Juveniles and pupping females require inshore and estuarine habitats, while adults predominantly occur offshore (FRDC, 2019).

3.2.12.4.4 Other fish

The southern bluefin tuna (*Thunnus maccoyii*; conservation dependent – under threatened listing assessment, Migratory). Southern bluefin tuna are a highly migratory teleost fish species mainly found in the eastern Indian ocean and in the south-west Pacific ocean. With a varied diet including crustaceans, cephalopods, fishes and other marine animals, these fish can be found to depths of 500 m (Caton, 1991). Breeding takes place in tropical waters between Java, Indonesia, and northern WA (7 to 20°S) from September to April, and the young move down the WA coast from the spawning grounds (CCBST, 2023). Southern bluefin tuna school by size, with juveniles under two years of age found in WA and SA inshore waters (Honda et al., 2010). Adults inhabit offshore waters from northern WA across southern Australian, including Tasmania, to northern New South Wales

3.2.12.5 Birds

3.2.12.5.1 Threatened species

Alligator Rivers yellow chat

The Alligator Rivers yellow chat (*Epthianura crocea tunneyi;* Endangered under the EPBC Act and TPWC Act) is a small insectivorous bird that occurs mostly within the Kakadu National Park. The species' range and numbers are thought to have declined after habitat loss from cattle grazing, and habitat degradation caused by feral pigs and water buffalo. Its total population size is now very small, only around 100 individuals. (National Environmental Science Program Threatened Species Research Hub, 2019). Historically this species inhabits coastal grassy floodplains, however sightings have become rare and anecdotal. It is thought likely that there are small, undiscovered groups of chats, but that the overall population is still likely to be very small and to have suffered decline over time (National Environmental Science Program Threatened Species Research Hub, 2019). Given the areas historically observed to be inhabited by this species are terrestrial, it is unlikely to occur within the EMBA.

Asian dowitcher

The Asian dowitcher (*Limnodromus semipalmatus*; Vulnerable under the EPBC Act, Migratory) is a large, distinctive wader with a long neck, long legs, and a long, straight, snipe-like bill (DCCEEW, 2024j). In Australia, this bird is only a regular visitor to coastal areas between Broome and Port Hedland and the Port McArthur tidal wetlands in the Gulf of Carpentaria, arriving from August (DCCEEW, 2024f). It roosts in sheltered coastal environments such as estuarine and intertidal mudflats, lagoons, creeks and saltworks, and feeds on inter-tidal mudflats (DCCEEW, 2024f). Only a small proportion of the non-breeding population arrive in Australia, occasionally recorded in the NT and rarely in western and eastern Australia (DCCEEW, 2024j). In the NT, the Asian dowitcher is found in Darwin and Arnhem Land (DCCEEW, 2024j). No sites of international significance are listed in the NT for this species (Birdlife Australia, 2020). The Asian dowitcher typically leaves north-west Australia by the end of April to return to northern hemisphere breeding grounds (DCCEEW, 2024j; DCCEEW, 2024j). Given the areas historically observed to be inhabited by this species, individuals may seasonally occur within the EMBA.

Australian painted snipe

The Australian painted snipe (*Rostratula australis*; Endangered under the EPBC Act and TPWC Act) is a wading bird that has been recorded in wetlands of all Australian states, most frequently recorded in the Murray-Darling Basin and in smaller numbers and less frequently at scattered locations in WA and NT (DCCEEW, 2024j; DEPWS, 2021a). The most northerly breeding records are from near Derby and Taylor's Lagoon, near Broome and at Tarrabool Lake on the Barkly Tablelands. Although this species is only occasionally recorded in northern Australia, it has been recorded in northern WA and NT from McMinns Lagoon near Darwin and Yellow Waters in Kakadu (DCCEEW, 2024j; DEPWS, 2021a; Trainor et al., 2017; Knuckey et al., 2013). While this species generally inhabits shallow terrestrial freshwater and occasionally brackish wetlands and other waterlogged areas, the Australian painted snipe requires shallow wetlands with areas of bare wet mud and canopy cover nearby for breeding (DCCEEW, 2022a). Given the areas historically observed to be inhabited by this species—primarily inhabits freshwater wetlands—it is unlikely to occur in the EMBA.

Bar-tailed godwit (Western Alaskan, Nunivak and Northern Siberian subspecies)

The bar-tailed godwit (*Limosa lapponica*; Endangered under the EPBC Act; Critically Endangered under the TPWC Act; Migratory) breeds in the northern hemisphere and migrates southwards for the boreal winter. The majority of breeding individuals leave south-eastern Australia by the end of the first week of April, with mostly immature individuals remaining (Bamford et al., 2008). This species has been recorded along the coastline of all Australian states and mainly occurs along Australia's north and east coasts. This species is widespread from Eyre to Derby in WA and from Darwin east to the Gulf of Carpentaria (DCCEEW, 2024j; Clarke, 2011). Bar-tailed godwits eat molluscs, worms, crustaceans and insects caught when foraging in shallow water or along the edge of water with a preference for exposed sandy or soft mud substrates on intertidal flats, banks and beaches (Chan et al., 2022; TSSC, 2016a). Given the areas historically observed to be inhabited by this species, individuals may fly over and feed in coastal zones within the EMBA.

Black-tailed godwit

Black-tailed godwits (*Limosa limosa*; Vulnerable under the EPBC Act, Migratory) are found in all states and territories of Australia during the non-breeding (austral summer) season, with coastal regions supporting the highest densities of the species. This bird usually first arrives in north-west Australia from late August and most have departed the NT by mid April (DCCEEW, 2024e). The largest populations are found on the north coast between Darwin and Weipa (DCCEEW, 2024e). Roosting usually occurs in sheltered bays, estuaries, and lagoons with large intertidal mudflats and/or sandflats. Feeding habitat includes areas of mud or soft, wet sand within sandflats, intertidal mudflats, saltmarshes, and the beaches of oceanic coastlines, bays, and estuaries (DCCEEW, 2024e). Areas of importance to the species in the NT include Darwin Harbour, North Darwin (the Beagle Gulf coastline), Legune Wetlands and Milingimbi Coast, but none of these are considered to have international significance (Birdlife Australia, 2020). Given the areas historically observed to be inhabited by this species, individuals may seasonally occur within the coastline of the EMBA.

Common greenshank

The common greenshank (*Tringa nebularia*; Endangered under the EPBC Act, Migratory) is widespread in coastal regions, occurs in all types of wetlands and has the widest distribution of any shorebird in Australia (DCCEEW, 2024h). The species is sparsely scattered through most of the NT (DCCEEW, 2024h), with important areas in the Kakadu National Park, Milingimbi coast, and the south-west coastline of the Gulf of Carpentaria, but no sites of international significance in the NT (Birdlife Australia, 2020). The common greenshank roosts around wetlands, in shallow pools and puddles, or slightly elevated on rocks, sandbanks or small muddy islets (DCCEEW, 2024h). They occur in estuaries and mudflats, mangrove swamps and lagoons (DCCEEW, 2024h). During feeding, the birds pick from the surface (DCCEEW, 2024h) while wading in shallow water along the edge of tidal estuaries, muddy claypans, saltworks and saltpans (DCCEEW, 2024h). The species arrives in Australia from August, with most leaving by March and April, but some overwintering also occurs (DCCEEW, 2024h). Given the areas historically observed to be inhabited by this species, individuals may seasonally occur within the EMBA.

Curlew sandpiper

The curlew sandpiper (*Calidris ferruginea*; Critically Endangered under the EPBC Act and TPWC Act, Migratory) has a broad distribution and has been recorded along the coasts of all Australian states and territories (DCCEEW, 2024j). In NT, curlew sandpipers mostly occur around Darwin, north to Melville Island and Cobourg Peninsula, and east and south-east to Gove Peninsula, Groote Eylandt and Sir Edward Pellew Island (TSSC, 2015e). Although the species prefers intertidal mudflats in sheltered coastal areas to forage in nearshore waters or mud at the edge of wetlands, they are also widespread inland in smaller numbers (TSSC, 2015e). The curlew sandpiper migrates along the East Asian-Australasian Flyway from their breeding grounds in Siberia to Australia, generally arriving from late August/early September and departing by mid-April. Some non-breeding individuals may stay in Australia (TSSC, 2015e). Given the areas historically observed to be inhabited by this species, it may seasonally occur within the EMBA.

Eastern curlew

The eastern curlew (*Numenius madagascariensis*; Critically Endangered under the EPBC Act and TPWC Act, Migratory) is the world's largest species of shorebird (DCCEEW, 2024j; Menkhorst et al., 2017). Eastern curlews migrate annually to breeding grounds in Russia and north-eastern China before returning to Australia in August to forage primarily on crabs in intertidal mudflats (Menkhorst et al., 2017; Bamford et al., 2008). In Australia, the species has a continuous distribution from Barrow Island and Dampier Archipelago in WA through the Kimberley and along the NT, Qld, NSW coasts including the Torres Strait islands (TSSC, 2015f). There has been an increase at 2 sites in the Darwin region between 2009 and 2015, at Lee Point numbers have increased by 9% per year and 17% per year at East Arm Wharf in Darwin Harbour (Lilleyman et al., 2016). This local increase may be due to changes in roosting behaviour and an increase in suitable high tide roosting habitat. Given the areas historically observed to be inhabited by this species, it may seasonally occur within the EMBA.

Great knot

The great knot (*Calidris tenuirostris*; Vulnerable under the EPBC Act; Critically Endangered under the TPWC Act, Migratory) is a medium-sized migratory shorebird with relatively short legs, a slender medium-length bill and a wingspan of about 58 cm (DCCEEW, 2024d). The species breeds in north-east Siberia and far north-east Russia and migrates along the East Asia-Australasian Flyway to overwinter in the southern hemisphere (DEPWS, 2021c). Most that reach Australia settle along the northern coastline between north-west WA and the Gulf of Carpentaria, but significant numbers reach eastern Queensland and there are reports of great knots from most Australian coastal areas. The species is common in the NT from Darwin to the south-west Gulf of Carpentaria (DCCEEW, 2024d) with internationally significant numbers recorded in North Darwin (Beagle Gulf coastline) and the Milingimbi Coast (Birdlife Australia, 2020). It prefers sheltered coastal habitats with extensive tidal mudflats or sandflats, including estuaries, lagoons, inlets and bays. Great knots are gregarious and frequently occur in large flocks with other shorebirds (including red knots), especially when roosting during high tides. They specialise in feeding on bivalves, but also consume other marine invertebrates. Prey are captured on or just below the surface of wet mud or sand (Garnet et al., 2011, DEPWS, 2021c). Given the areas historically observed to be inhabited by this species, individual birds may fly over and feed in coastal zones within the EMBA.

Greater sand plover

Greater sand plovers (*Charadrius leschenaultia*, Vulnerable under the EPBC Act and TPWC Act, Migratory) are shorebirds that migrate from breeding areas in Mongolia, Siberia and China to coastal areas of all Australian states with the area around Darwin an internationally important site. This species occurs in the greatest numbers in north-western Australia and is widespread between Northwest Cape and Roebuck Bay in WA, with scattered records between Roebuck Bay and Darwin. Greater sand plovers are recorded from most of the coastline of the NT, with significant areas around the Joseph Bonaparte Gulf, from Anson Bay to Murgenella Creek (including the south coast of the Tiwi Islands), the northern Arnhem coast, and the Port McArthur area (TSSC, 2016). In Australia, greater sand plovers are almost entirely coastal, inhabiting sheltered muddy, sandy or shelly beaches, large intertidal mudflats, saltmarshes, estuaries, sandbanks, coral reefs, rocky islands rock platforms, tidal lagoons and coastal dunes. Greater sand plovers feed on molluscs, worms, crustaceans and insects they find in wet sand or mud on open intertidal flats (TSSC, 2016). Given the areas historically observed to be inhabited by this species, individuals may fly over and be present within the EMBA.

Grey Falcon

Grey falcon (*Falco hypoleucos*; Vulnerable under the EPBC Act and TPWC Act; Migratory) occur throughout much of the arid and semi-arid zones of Australia, in areas of sparsely timbered lowland plains, typically on inland drainage systems. The species has been recorded across the NT, including on the Tiwi Islands (DEPWS, 2021i). Grey Falcons use nests built by other bird species and prefer those in the tallest trees along watercourses. The Grey Falcon is a specialist predator of birds, particularly parrots and pigeons (TSSC, 2020). Given the areas historically observed to be inhabited by this species, it is considered unlikely to be present within the EMBA.

Grey plover

Grey plovers (*Pluvialis squatarola;* Vulnerable under the EPBC Act; Migratory) have been recorded along the coast in all states of Australia, with small numbers regularly recorded in the NT (DCCEEW, 2024g). Migrating birds arrive in northern Australia between August and October with many continuing their migration to southern regions. Plovers which have remained along the northern coastline for the non-breeding season leave between February and April (DCCEEW, 2024g). Some non-breeding individuals may stay in Australia. The species usually roosts in sheltered, sandy areas including unvegetated sandbanks or sand-spits, or other sheltered environments such as estuaries or lagoons, and are often seen in small numbers on mangrove mudflats (DCCEEW, 2024g). Kakadu National Park, Milingimbi coast, and the south-west coastline of the Gulf of Carpentaria have been identified as areas of importance to this species in the NT, but they do not represent sites of international significance (Birdlife Australia, 2020). In Australia, grey plovers feed by pecking and probing for worms, molluscs, and crustaceans mostly in mud or soft, wet sand of sandflats, intertidal mudflats, saltmarshes, and beaches (DCCEEW, 2024g). Given the areas historically observed to be inhabited by this species, individuals may seasonally fly over and be present in coastal zones within the EMBA.

Lesser sand plover

The lesser sand plover (*Charadrius mongolus*: Endangered under the EPBC Act and TPWC Act; Migratory) is a small to medium sized shorebird with a short stout bill and short grey legs. The lesser sand plover breeds in central Asia and eastern Russia. Two subspecies occur in Australia as seasonal migrants: *Charadrius mongolus mongolus* and *Charadrius mongolus. stegmanni*. In Australia, *Charadrius mongolus stegmanni* is more common in northern Australia, while *Charadrius mongolus. mongolus* is more common in eastern Australia (DEPWS, 2021d). After breeding during the northern summer on mountain steppes and tundras of inland eastern Russia (*Charadrius mongolus. mongolus*) or sand dunes, shingle and other open habitats of eastern Siberia (*Charadrius mongolus. stegmanni*), those that overwinter in Australia migrate southwards along the East Asian-Australasian Flyway. These non-breeding birds occur almost exclusively along the coast, where they forage on sheltered intertidal

mudflats and sandflats, sandy beaches, estuaries and mangroves. Inland saline wetlands close to the coast are also used occasionally. They feed on marine worms, molluscs, crustaceans and insects, which are captured on or just below the surface of sand or mud. Given the areas historically observed to be inhabited by this species, individuals may fly over and feed in coastal zones within the EMBA.

Masked Owl (northern)

Masked owl (northern) (*Tyto novaehollandiae kimberli;* Vulnerable under the EPBC Act and TPWC Act) is distributed widely across northern Australia in tall open eucalypt forests (DEPWS, 2021e). The masked owl (northern) roosts in monsoon rainforests, and also forages in more open vegetation types, including grasslands. Individuals typically roost in tree hollows and may also roost among dense foliage (DCCEEW, 2024j). The diet of the masked owl (northern mainland) mostly comprises mammals up to the size of possums (Garnett & Crowley 2000). Due to their habitat and prey preferences, and their restriction to the Tiwi Islands, it is unlikely that they will be present within the EMBA.

Partridge pigeon (eastern)

Partridge pigeon (eastern) (*Geophaps smithii smithii;* Vulnerable under the EPBC Act and TPWC Act) occur across northern Australia in lowland eucalypt open forests and woodlands, with grassy understoreys. Their diet comprises seeds, mostly of grasses but also from Acacia and other woody plants. The species forages entirely on the ground, and flies infrequently (DEPWS, 2021i). Due to their terrestrial habitat and diet preferences, it is unlikely that they will be present within the EMBA.

Red goshawk

The red goshawk (*Erythrotriorchis radiatus*; Vulnerable under the EPBC Act and TPWC Act) occur across northern Australia, from near Broome in the south-west Kimberley to south-eastern Queensland. Within this range it generally occurs in taller forests characteristic of higher rainfall areas, but there are some isolated recent records from central Australia. It appears to be unusually common on the Tiwi Islands (DEPWS, 2021g). The preferred habitat is tall open eucalypt forest and riparian areas (including paperbark forest and gallery forests). The conspicuous basket–shaped stick nest is typically placed in large trees near watercourses (Aumann and Baker-Gabb, 1991). Red goshawks eat mostly birds, especially parrots and pigeons; rarely they also prey on mammals, reptiles, and large insects (Debus et al., 2020). Given the areas historically observed to be inhabited by this species, individuals may fly over and feed in coastal zones within the EMBA.

Red knot

The red knot (*Calidris canutus*; Vulnerable under the EPBC Act; Endangered under the TPWC Act, Migratory) is a migratory omnivorous shorebird which utilises the intertidal mudflats, sandflats and sandy beaches of sheltered coastal areas, estuaries, bays and other similar marine habitats (DCCEEW, 2024c). The red knot is present throughout coastal and offshore Australia, with large numbers regularly recorded in the north-west of Australia (Clarke, 2011; Bamford et al., 2008). The red knot breeds in Siberia and spends the non-breeding season in Australia and New Zealand, arriving in northern Australia in late August to early September and also settles in eastern Australia and New Zealand (DCCEEW, 2024c; Watkins, 1993). During the non-breeding season, the red knot occurs on tidal mudflats or sandflats feeding on invertebrates, especially shellfish (Garnet et al., 2011). Both north-western and south-eastern Australia are key areas for red knots. The Gulf of Carpentaria is an important staging area for migrating birds headed to south-eastern Australia and New Zealand. The NT region between the Daly River and Bynoe Harbour, along with the northern Arnhem Land coast from Boucaut Bay to Buckingham Bay are important areas (Chatto, 2003), with North Darwin (Beagle Gulf coastline) considered to have international significance (Birdlife Australia, 2020). Given the areas historically observed to be inhabited by this species, individuals may fly over and feed in coastal zones within the EMBA.

Ruddy turnstone

The ruddy turnstone (*Arenaria interpres*; Vulnerable under the EPBC Act, Migratory) is a migratory shorebird that leaves its breeding grounds in the northern hemisphere from mid-July to early September (DCCEEW, 2024a) and has an almost cosmopolitan non-breeding distribution, common throughout Australasia and widespread within Australia (DCCEEW, 2024a). This species tends to arrive in the NT and WA from August onwards (DCCEEW, 2024a). Ruddy turnstones typically roost along platforms and shelves of rock, shingle, or gravel beaches, but can also be found along sand, coral, or shell beaches, and along shoals, cays, and dry ridges. In north Australia, they are known to occur in a wide variety of habitats and may prefer wide mudflats (DCCEEW, 2024a). The species feeds mainly on maggots from rotting seaweed in the upper intertidal (DCCEEW, 2024a). Bynoe Harbour and Castlereagh Bay in the NT are reported to be important areas (DCCEEW, 2024a) with the Milingimbi Coast considered to have international significance for this bird (Birdlife Australia, 2020). Given the areas historically observed to be inhabited by this species, individuals may seasonally fly over and be present in coastal zones within the EMBA.

Sharp-tailed sandpiper

The sharp tailed sandpiper (*Calidris acuminata*; Vulnerable under the EPBC Act, Migratory) is a small-medium size wader that is widely distributed throughout Australia (DCCEEW, 2024j). The majority (>90%) of the non-breeding population migrates to Australia (DCCEEW, 2024b). They arrive in Australia from mid-August/early September with most birds then moving slowly south to south-east Australia (DCCEEW, 2024j). In the NT, the species mostly occurs in the northern coastal regions (DCCEEW, 2024j), with Darwin Harbour, North Darwin (Beagle Gulf coastline), Kakadu National Park, the Legune Wetlands, Milingimbi coast and Nhulunbuy (Gove Peninsula) considered to be important areas (Birdlife Australia, 2020). Internationally significant numbers have been recorded at Kakadu National Park and Milingimbi coast (Birdlife Australia, 2020). Sharp tailed sandpipers often roost at the edges of wetlands, on wet open mud or sand, in shallow water, or in short sparse grass or saltmarsh, but also occasionally on sandy beaches, stony shores or rocks (DCCEEW, 2024j). They typically feed on seeds, worms, molluscs, crustaceans and insects (DCCEEW, 2024j), foraging at the edge of the water of wetlands or intertidal mudflats, either on bare wet mud or sand, or in shallow water (DCCEEW, 2024j). Given the areas historically observed to be inhabited by this species, individuals may fly over and feed in coastal zones within the EMBA.

Terek sandpiper

The terek sandpiper (*Xenus cinereus*; Vulnerable under the EPBC Act, Migratory) is primarily a coastal species, more common in northern and eastern parts of Australia than southern regions (DCCEEW, 2024j). It is one of the commoner shorebird species in tropical mangrove-lined estuaries, often occurring in small numbers among much larger flocks of other migratory shorebirds (DCCEEW, 2024i). They feed primarily on crustaceans and insects, in the supralittoral or upper littoral zone, where a film of water covers the sand, but may also forage in the lower littoral zone on exposed rock platforms (DCCEEW, 2024i). In the NT, widespread records occur from Darwin, north to Melville Island, and east to the western section of the Gulf of Carpentaria, around Gove Peninsula, Groote Eylandt, Sir Edward Pellew Island and the mouth of the McArthur River (DCCEEW, 2024j). Important areas are considered to include Darwin Harbour, North Darwin (Beagle Gulf coastline), Kakadu National Park, the Legune Wetlands and Milingimbi Coast, with the Kakadu and Milingimbi Coast identified to have international significance (Birdlife Australia, 2020). The preferred roosting habitat for this bird is in or among mangroves (DCCEEW, 2024j). Terek sandpipers migrate south from their Arctic breeding grounds, passing through the Torres Strait and arriving around Cairns and Darwin in August. Most individuals visiting Australia seem to remain on the north coast, leaving by late April (DCCEEW, 2024i). This species is likely to seasonally occur in the EMBA.

Tiwi Islands hooded robin

The Tiwi Islands hooded robin (*Melanodryas cucullata melvillensis,* Critically Endangered under the EPBC Act and TPWC Act) distribution is restricted to the Tiwi Islands. Tiwi Islands hooded robin inhabit more open forests and woodlands and forages on ground-dwelling invertebrates in areas of thinner ground-cover (DEPWS, 2021b). The breeding season (of other subspecies) is spring–summer. The nests are typically placed in the forks of trees, mostly <3 m above ground. The typical foraging behaviour of Tiwi Islands hooded robin is by quietly perching on tree branches, or trunks, and then suddenly pouncing to take prey on the ground (Fitri & Ford 2003; Higgins & Peter 2002). Due to their habitat and prey preferences, and their restriction to the Tiwi Islands, it is unlikely that they will be present within the EMBA.

Tiwi masked owl

The Tiwi masked owl (*Tyto novaehollandiae melvillensis*; Endangered under the EPBC Act and TPWC Act) is a subspecies of the masked owl (*Tyto novaehollandiae*) that occurs only on Bathurst and Melville Islands. Tiwi masked owls occur mainly in the forests and woodlands but may roost in monsoon forests or mangroves and may forage over the treeless plains and grasslands (Ward, 2010). Individuals typically roost in tree hollows but may also roost among dense foliage. Masked Owls breed in large tree hollows, which usually form in large rainforest trees. It is likely that individual home ranges are large. The diet of the Tiwi Masked Owl mostly comprises mammals up to the size of possums (DEPWS, 2021f). Due to their habitat and prey preferences, and their restriction to the Tiwi Islands, it is unlikely that they will be present within the EMBA.

3.2.12.5.2 Migratory species

Most migrant birds are expected to fly over the regional area as part of their large-scale transitory movements and are unlikely to land on the sea for significant periods of time (ConocoPhillips, 2018). Considering this, and the general absence of landing areas at a regional offshore scale, the majority of seabird activity is likely to comprise foraging and migration pathways. While seabirds spend much of their lives at sea, migratory shorebirds overfly offshore areas during migratory periods and typically do not interact with the sea surface (ConocoPhillips, 2018; DSEWPaC, 2012g). Migratory wetland species do not interact with open offshore waters but may land on offshore infrastructure while flying between land masses (ConocoPhillips, 2018).

Shorebird migration patterns are seasonal and vary according to species (DSEWPaC, 2012h), but generally shorebirds migrate to northern Australia from August to November. The majority of birds remain in northern Australia, while others disperse southwards (Bennelongia, 2011). On northern beaches migratory shorebirds 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, 2008c). Species listed as migratory under the EPBC Act that may occur in the EMBA are outlined in Table 3-12.

Table 3-12: Environmental values and sensitivities within the EMBA and OA – threatened and migratory marine fauna PMST summary

Value/sensitivity – Marine fauna		EPBC Act status	NT-listed threatened Species	OA		MEVA		EMBA	
Common name	Scientific name			May be present	Particular values or sensitivities	May be present	Particular values or sensitivities	May be present	Particular values or sensitivities
Marine mammals									
Blue whale [5]	*Balaenoptera musculus*	Endangered, Migratory Marine	✗	✓	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
Bryde's whale	*Balaenoptera edeni*	Migratory Marine	✗	✓	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
Fin whale	*Balaenoptera physalus*	Vulnerable, Migratory 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
Humpback whale	*Megaptera novaeangliae*	Migratory Marine	✗	✓	Species or species habitat known to occur within area	✓	Species or species habitat likely to occur within area	✓	Species or species habitat likely to occur within area
Sei whale	*Balaenoptera borealis*	Vulnerable, Migratory 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
Australian humpback dolphin	*Sousa sahulensis*	Migratory Marine	✗	✓	Species or species habitat may occur within area	✓	Breeding known to occur within area	✓	Breeding known to occur within area
Australian snubfin dolphin	*Orcaella heinsohni*	Migratory Marine	✗	✓	Species or species habitat may occur within area	✓	Species or species habitat known to occur within area	✓	Breeding known to occur within area
Killer whale, orca	*Orcinus orca*	Migratory 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 bottlenose dolphin (Arafura/Timor Sea populations)	*Tursiops aduncus* (Arafura/Timor Sea populations)	Migratory Marine	✗	✓	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
Dugong [6]	*Dugong dugon*	Migratory Marine	✗	✓	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
Water Mouse	*Xeromys myoides*	Vulnerable	✗	✗	N/A	✗	N/A	✓	Species or species habitat likely to occur within area
Marine reptiles									
Flatback turtle	*Natator depressus*	Vulnerable, Migratory Marine	✗	✓	Congregation or aggregation known to occur within area	✓	Breeding known to occur within area	✓	Breeding known to occur within area
Green turtle	*Chelonia mydas*	Vulnerable, Migratory Marine	✗	✓	Congregation or aggregation known to occur within area	✓	Breeding known to occur within area	✓	Breeding known to occur within area
Hawksbill turtle	*Eretmochelys imbricata*	Vulnerable, Migratory Marine	Vulnerable	✓	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
Leatherback turtle	*Dermochelys coriacea*	Endangered, Migratory Marine	Critically endangered	✓	Species or species habitat likely to occur within area	✓	Breeding likely to occur within area	✓	Foraging, feeding or related behaviour known to occur within area
Loggerhead turtle	*Caretta caretta*	Endangered, Migratory Marine	Vulnerable	✓	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
Olive ridley turtle	*Lepidochelys olivacea*	Endangered, Migratory Marine	Vulnerable	✓	Congregation or aggregation known to occur within area	✓	Breeding known to occur within area	✓	Breeding known to occur within area
Salt-water crocodile	*Crocodylus porosus*	Migratory marine	✗	✓	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
Sharks, rays and other fish									
Dwarf sawfish[8]	*Pristis clavata*	Vulnerable, Migratory marine	Vulnerable	✓	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

[5] *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 within the EMBA.*

[6] *Species or species habitat may occur within the light / noise boundary (20 km buffer around the OA)*

Value/sensitivity – Marine fauna		EPBC Act status	NT-listed threatened Species	OA		MEVA		EMBA	
Common name	Scientific name			May be present	Particular values or sensitivities	May be present	Particular values or sensitivities	May be present	Particular values or sensitivities
Giant manta ray[8]	*Mobula birostris*	Migratory marine	✗	✓	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
Green sawfish[8]	*Pristis zijsron*	Vulnerable, Migratory marine	Vulnerable	✓	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
Grey nurse shark	*Carcharias taurus*	Vulnerable	✗	✓	Reported as occurring within or near the OA as part of the Barossa marine studies program.	✓	Reported as occurring within or near the OA as part of the Barossa marine studies program.	✓	Reported as occurring within or near the OA as part of the Barossa marine studies program.
Largetooth sawfish[8]	*Pristis pristis*	Vulnerable, Migratory marine	Vulnerable	✓	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
Longfin mako[8]	*Isurus paucus*	Migratory marine	✗	✓	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
Narrow sawfish[8]	*Anoxypristis cuspidata*	Migratory marine	✗	✓	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
Northern river shark	*Glyphis garricki*	Endangered	Endangered	✓	Species or species habitat may occur within area	✓	Breeding known to occur within area	✓	Breeding known to occur within area
Oceanic whitetip shark[8]	*Carcharhinus longimanus*	Migratory 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 manta ray[8]	*Mobula alfredi*	Migratory marine	✗	✓	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
Scalloped hammerhead	*Sphyrna lewini*	Conservation dependent	✗	✓	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
Shortfin mako[8]	*Isurus oxyrinchus*	Migratory marine	✗	✓	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
Southern Bluefin Tuna	*Thunnus maccoyii*	Conservation dependent	✗	✓	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	*Glyphis glyphis*	Critically endangered	Vulnerable	✗	N/A	✓	Species or species habitat known to occur within area	✓	Species or species habitat known to occur within area
Whale shark[8]	*Rhincodon typus*	Vulnerable, Migratory 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
White shark[8]	*Carcharodon carcharias*	Vulnerable, Migratory 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
Birds									
Alligator Rivers yellow chat	*Epthianura crocea tunneyi*	Endangered	Endangered	✗	N/A	✓	Species or species habitat may occur within area		Species or species habitat likely to occur within area
Asian dowitcher	*Limnodromus semipalmatus*	Vulnerable, Migratory Wetlands, Overfly marine	✗	✗	N/A	✓	Species or species habitat known to occur within area	✓	Species or species habitat known to occur within area
Australian painted snipe	*Rostratula australis*	Endangered, Overfly Marine	Endangered	✗	N/A	✓	Species or species habitat may occur within area	✓	Species or species habitat may occur within area
Barn swallow	*Hirundo rustica*	Migratory Terrestrial, Overfly Marine	✗	✗	N/A	✓	Species or species habitat known to occur within area	✓	Species or species habitat known to occur within area
Bar-tailed godwit	*Limosa lapponica*	Endangered, Migratory Wetlands	Critically endangered	✗	N/A	✓	Species or species habitat known to occur within area	✓	Species or species habitat known to occur within area
Black-tailed godwit	*Limosa limosa*	Vulnerable, Migratory Wetlands, Overfly marine	✗	✗	N/A	✓	Roosting known to occur within area	✓	Roosting known to occur within area
Broad-billed sandpiper	*Limicola falcinellus*	Migratory Wetlands, Overfly Marine	✗	✗	N/A	✓	Roosting known to occur within area	✓	Roosting known to occur within area
Common noddy	*Anous stolidus*	Migratory marine	✗	✓	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

Value/sensitivity – Marine fauna		EPBC Act status	NT-listed threatened Species	OA		MEVA		EMBA	
Common name	Scientific name			May be present	Particular values or sensitivities	May be present	Particular values or sensitivities	May be present	Particular values or sensitivities
Common sandpiper	*Actitis hypoleucos*	Migratory wetlands	✗	✓	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
Common greenshank	*Tringa nebularia*	Endangered, Migratory wetlands, Overfly marine	✗	✗	N/A	✓	Species or species habitat known to occur within area	✓	Species or species habitat known to occur within area
Curlew sandpiper	*Calidris ferruginea*	Critically endangered, Migratory wetlands, Overfly Marine	Critically endangered	✓	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
Eastern curlew	*Numenius madagascariensis*	Critically endangered, Migratory wetlands, Marine	Critically endangered	✓	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
Fork-tailed swift	*Apus pacificus*	Migratory marine, Overfly marine	✗	✗	N/A	✓	Species or species habitat likely to occur within area	✓	Species or species habitat likely to occur within area
Great frigatebird	*Fregata minor*	Migratory marine	✗	✓	Species or species habitat likely to occur within area	✓	Species or species habitat known to occur within area	✓	Species or species habitat known to occur within area
Great knot	*Calidris tenuirostris*	Vulnerable, Migratory Wetlands, Overfly Marine	Critically endangered	✗	N/A	□	Roosting known to occur within area	✓	Roosting known to occur within area
Greater crested tern	*Thalasseus bergii*	Migratory wetlands	✗	✗	N/A	✗	N/A	✓	Breeding likely to occur within area
Greater sand plover	*Charadrius leschenaultii*	Vulnerable, Migratory wetlands, Marine	Vulnerable	✗	N/A	✓	Species or species habitat known to occur within area	✓	Species or species habitat known to occur within area
Grey falcon	*Falco hypoleucos*	Vulnerable, Migratory wetlands, Marine	Vulnerable	✗	N/A	✓	Species or species habitat likely to occur within area	✓	Species or species habitat known to occur within area
Grey plover	*Pluvialis squatarola*	Vulnerable, Migratory wetlands, Overfly marine	✗	✗	N/A	✓	Roosting known to occur within area	✓	Roosting known to occur within area
Grey-tailed tattler	*Tringa brevipes*	Migratory wetlands,	✗	✗	N/A	✓	Roosting known to occur within area	✓	Roosting known to occur within area
Lesser frigatebird	*Fregata ariel*	Migratory marine	✗	✓	Species or species habitat likely to occur within area	✓	Species or species habitat known to occur within area	✓	Species or species habitat known to occur within area
Lesser sand plover	*Charadrius mongolus*	Endangered, Migratory wetlands	Endangered	✗	N/A	✓	Roosting known to occur within area	✓	Roosting known to occur within area
Little curlew	*Numenius minutus*	Migratory wetlands, Overfly marine	✗	✗	N/A	✓	Roosting known to occur within area	✓	Roosting known to occur within area
Little ringed plover	*Charadrius dubius*	Migratory wetlands, Overfly marine	✗	✗	N/A	✓	Roosting known to occur within area	✓	Roosting known to occur within area
Little tern	*Sternula albifrons*	Migratory marine	✗	✗	N/A	✓	Breeding known to occur within area	✓	Breeding known to occur within area
Long-toed stint	*Calidris subminuta*	Migratory wetlands, Overfly arine	✗	✗	N/A	✓	Roosting known to occur within area	✓	Roosting known to occur within area
Marsh sandpiper	*Tringa stagnatilis*	Migratory wetlands, Overfly marine	✗	✗	N/A	✓	Roosting known to occur within area	✓	Roosting known to occur within area
Masked owl (northern)	*Tyto novaehollandiae kimberli*	Vulnerable	Vulnerable	✗	N/A	✓	Species or species habitat likely to occur within area		Species or species habitat known to occur within area
Nunivak bar-tailed godwit, Western Alaskan bar-tailed godwit	*Limosa lapponica baueri*	Vulnerable	✗	✗	N/A	✓	Species or species habitat known to occur within area	✓	Species or species habitat known to occur within area
Oriental cuckoo, horsfield's cuckoo	*Cuculus optatus*	Migratory terrestrial	✗	✗	N/A	✓	Species or species habitat known to occur within area	✓	Species or species habitat known to occur within area
Oriental plover, oriental dotterel	*Charadrius veredus*	Migratory wetlands, Overfly marine	✗	✗	N/A	✓	Roosting known to occur within area	✓	Roosting known to occur within area

Value/sensitivity – Marine fauna		EPBC Act status	NT-listed threatened Species	OA		MEVA		EMBA	
Common name	Scientific name			May be present	Particular values or sensitivities	May be present	Particular values or sensitivities	May be present	Particular values or sensitivities
Oriental pratincole	*Glareola maldivarum*	Migratory wetlands, Overfly marine	✗	✗	N/A	✓	Roosting known to occur within area	✓	Roosting known to occur within area
Oriental reed-warbler	*Acrocephalus orientalis*	Migratory wetlands	✗	✗	N/A	✓	Species or species habitat may occur within area	✓	Species or species habitat may occur within area
Osprey	*Pandion haliaetus*	Migratory wetlands	✗	✗	N/A	✓	Species or species habitat known to occur within area	✓	Breeding known to occur within area
Pacific golden plover	*Pluvialis fulva*	Migratory wetlands	✗	✗	N/A	✓	Roosting known to occur within area	✓	Roosting known to occur within area
Partridge pigeon (eastern)	*Geophaps smithii smithii*	Vulnerable	Vulnerable	✗	N/A	✓	Species or species habitat known to occur within area	✓	Species or species habitat known to occur within area
Pectoral sandpiper	*Calidris melanotos*	Migratory wetlands	✗	✓	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
Pin-tailed snipe	*Gallinago stenura*	Migratory wetlands, Overfly marine	✗	✗	N/A	✓	Roosting likely to occur within area	✓	Roosting likely to occur within area
Red goshawk	*Erythrotriorchis radiatus*	Vulnerable	Vulnerable	✗	N/A	✓	Species or species habitat known to occur within area	✓	Species or species habitat known to occur within area
Red knot, knot	*Calidris canutus*	Vulnerable, migratory wetlands, Overfly marine	Endangered	✓	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
Red-necked stint	*Calidris ruficollis*	Migratory wetlands, Overfly marine	✗	✗	N/A	✓	Roosting known to occur within area	✓	Roosting known to occur within area
Red-rumped swallow	*Cecropis daurica*	Migratory terrestrial, Overfly marine	✗	✗	N/A	✓	Species or species habitat known to occur within area	✓	Species or species habitat known to occur within area
Ruddy turnstone	*Arenaria interpres*	Vulnerable, Migratory wetlands	✗	✗	N/A	✓	Roosting known to occur within area	✓	Roosting known to occur within area
Rufous fantail	*Rhipidura rufifrons*	Migratory terrestrial, Overfly marine	✗	✗	N/A	✓	Species or species habitat known to occur within area	✓	Species or species habitat known to occur within area
Sanderling	*Calidris alba*	Migratory wetlands	✗	✗	N/A	✓	Roosting known to occur within area	✓	Roosting known to occur within area
Sharp-tailed sandpiper	*Calidris acuminata*	Vulnerable, Migratory wetlands	✗	✓	Species or species habitat may occur within area	✓	Roosting known to occur within area	✓	Roosting known to occur within area
Streaked shearwater	*Calonectris leucomelas*	Migratory Marine	✗	✓	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
Swinhoe's snipe	*Gallinago megala*	Migratory wetlands, Overfly marine	✗	✗	N/A	✓	Roosting known to occur within area	✓	Roosting known to occur within area
Terek sandpiper	*Xenus cinereus*	Vulnerable, Migratory wetlands, Overfly marine	✗	✗	N/A	✓	Roosting known to occur within area	✓	Roosting known to occur within area
Tiwi Islands hooded robin	*Melanodryas cucullata melvillensis*	Critically Endangered	Critically Endangered	✗	N/A	✓	Species or species habitat likely to occur within area	✓	Species or species habitat likely to occur within area
Tiwi masked owl	*Tyto novaehollandiae melvillensis*	Endangered	Endangered	✗	N/A	✓	Species or species habitat known to occur within area	✓	Species or species habitat known to occur within area
Wandering tattler	*Tringa incana*	Migratory wetlands	✗	✗	N/A	✓	Roosting known to occur within area	✓	Roosting known to occur within area
Whimbrel	*Numenius phaeopus*	Migratory wetlands	✗	✗	N/A	✓	Roosting known to occur within area	✓	Roosting known to occur within area
White-tailed tropicbird	*Phaethon lepturus*	Migratory 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
Wood sandpiper	*Tringa glareola*	Migratory wetlands, Overfly marine	✗	✗	N/A	✓	Roosting known to occur within area	✓	Roosting known to occur within area
Yellow wagtail	*Motacilla flava*	Migratory terrestrial, Overfly marine	✗	✗	N/A	✓	Species or species habitat known to occur within area	✓	Species or species habitat known to occur within area

3.2.12.6 Biologically important areas and habitat critical to the survival of a species

BIAs and habitat critical to the survival of a species that overlap the OA and EMBA are listed in Table 3-13 and shown in Figure 3-11 to Figure 3-18. BIAs are spatially defined areas where aggregations of individuals of a species are known to display biologically important behaviour such as breeding, foraging, nesting, internesting or migration. Habitat critical to the survival of marine turtles provides areas for turtle activities, long-term maintenance of the species, maintain genetic diversity and long-term evolutionary development and re-introduction of populations or recovery of the species.

Table 3-13: Biologically important areas and habitat critical to the survival of a species identified within the EMBA

Species	BIA behaviour	Distance to OA (km)	MEVA	EMBA	Habitat critical to the survival of a species within EMBA and distance to OA
Marine Mammals					
Australian snubfin dolphin	Breeding	65	×	✓	×
Australian humpback dolphin	Breeding	37.5	✓	✓	×
Spotted bottlenose dolphin	Breeding	65	×	✓	×
Marine Turtles					
Flatback turtle	Foraging	207	×	✓	✓ Overlaps OA, MEVA and EMBA (peak nesting June-September)
	Internesting	Overlaps	✓	✓	
	Internesting buffer	268	×	✓	
Green turtle	Foraging	90	×	✓	✓ 222 km; Overlaps EMBA (nesting December–January)
	Internesting	86	×	✓	
Hawksbill turtle	Internesting	203	×	✓	×
Loggerhead turtle	Foraging	207	×	✓	×
Leatherback turtle	Internesting	245	×	✓	✓ 177 km; Overlaps EMBA (nesting December–January)
Olive ridley turtle	Foraging	64	✓	✓	✓ 9.5 km; Overlaps MEVA and EMBA (nesting May–July)
	Internesting	30	✓	✓	
Birds					
Bridled tern	Breeding	244	×	✓	×
Crested tern	Breeding	240	×	✓	×
	Breeding (high numbers)	90	×	✓	

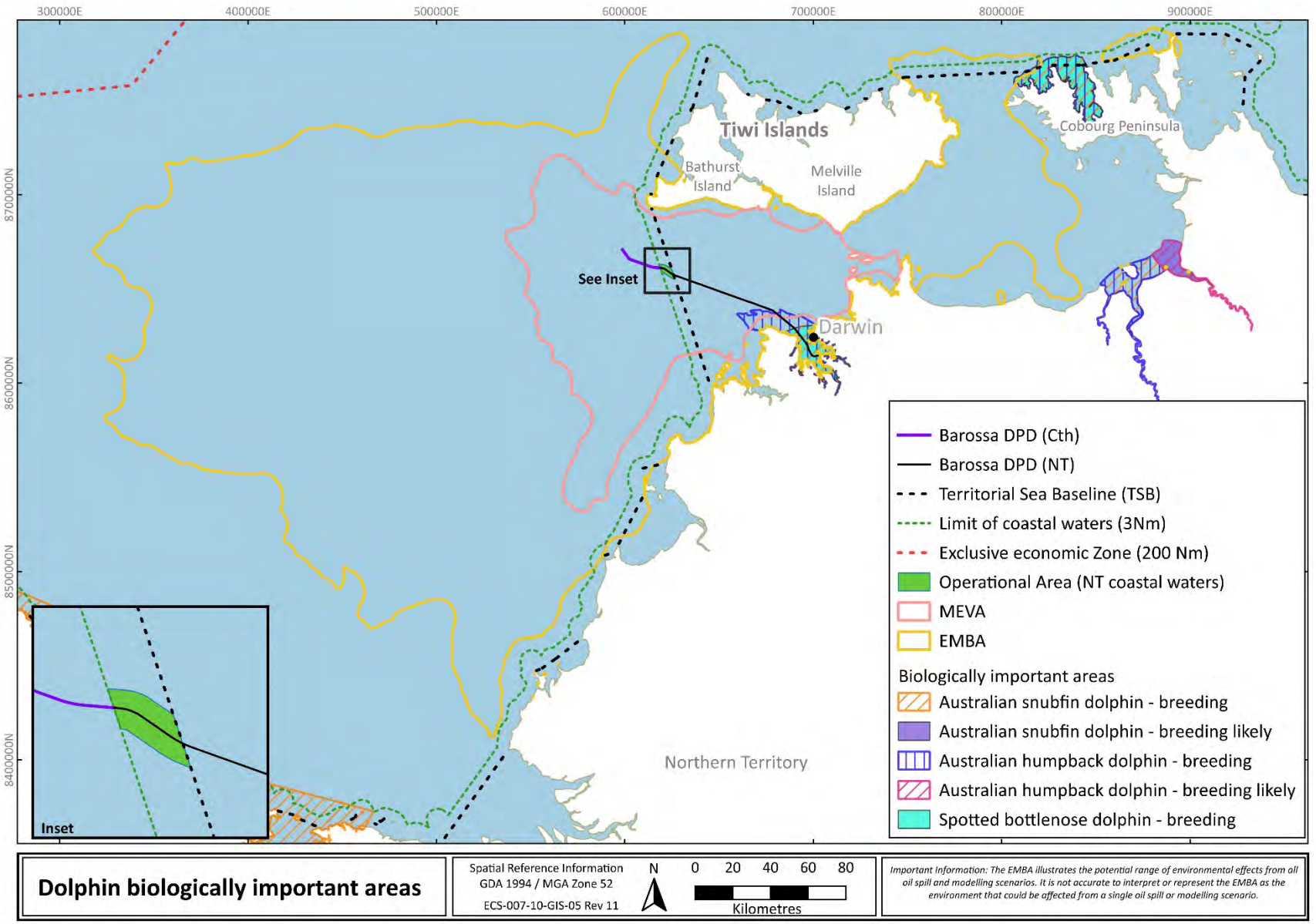


Figure 3-11: Dolphin BIAs overlapping or proximal to the EMBA

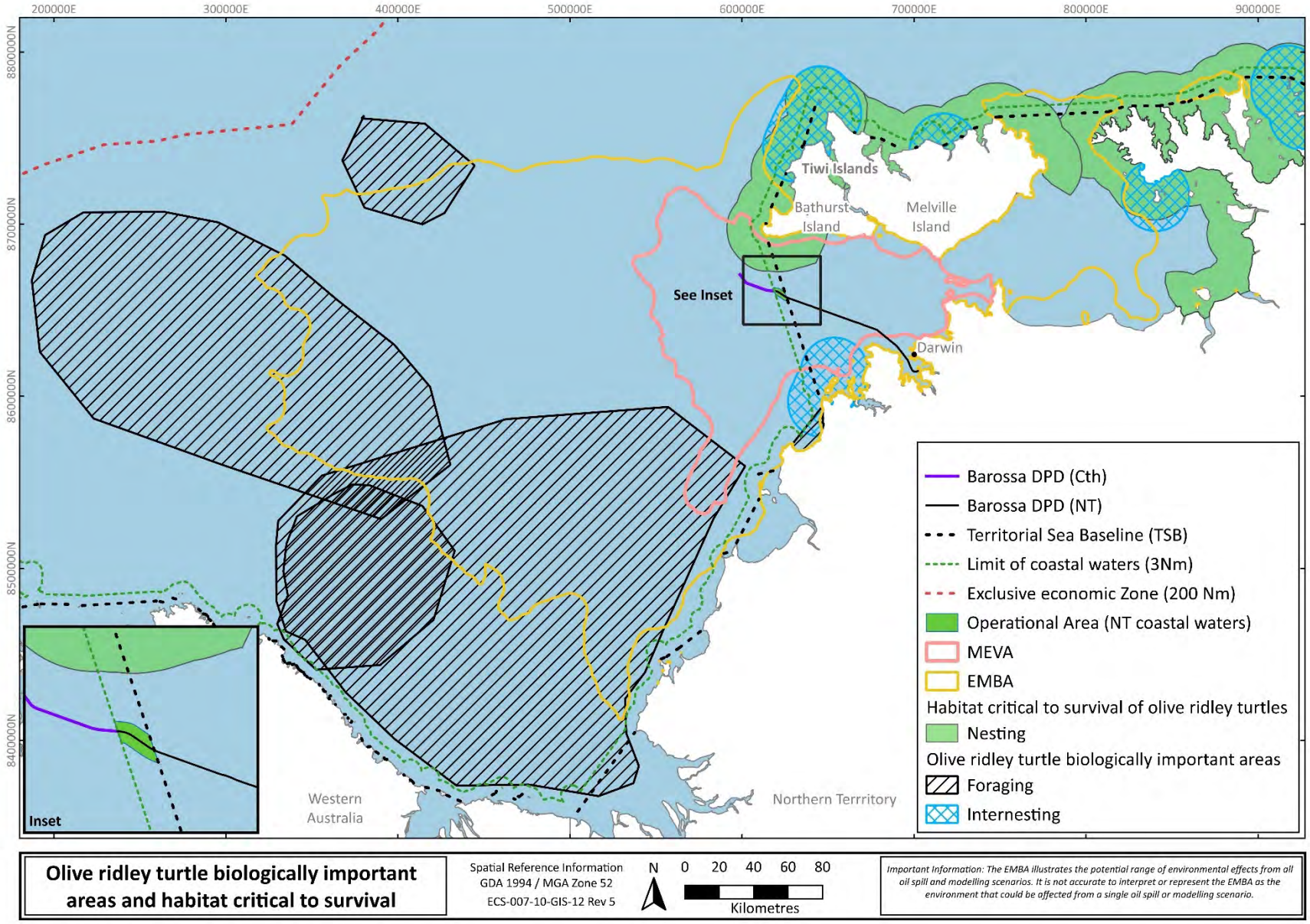


Figure 3-12: Olive ridley turtle BIAs and habitat critical to the survival of olive ridley turtles overlapping or proximal to the EMBA

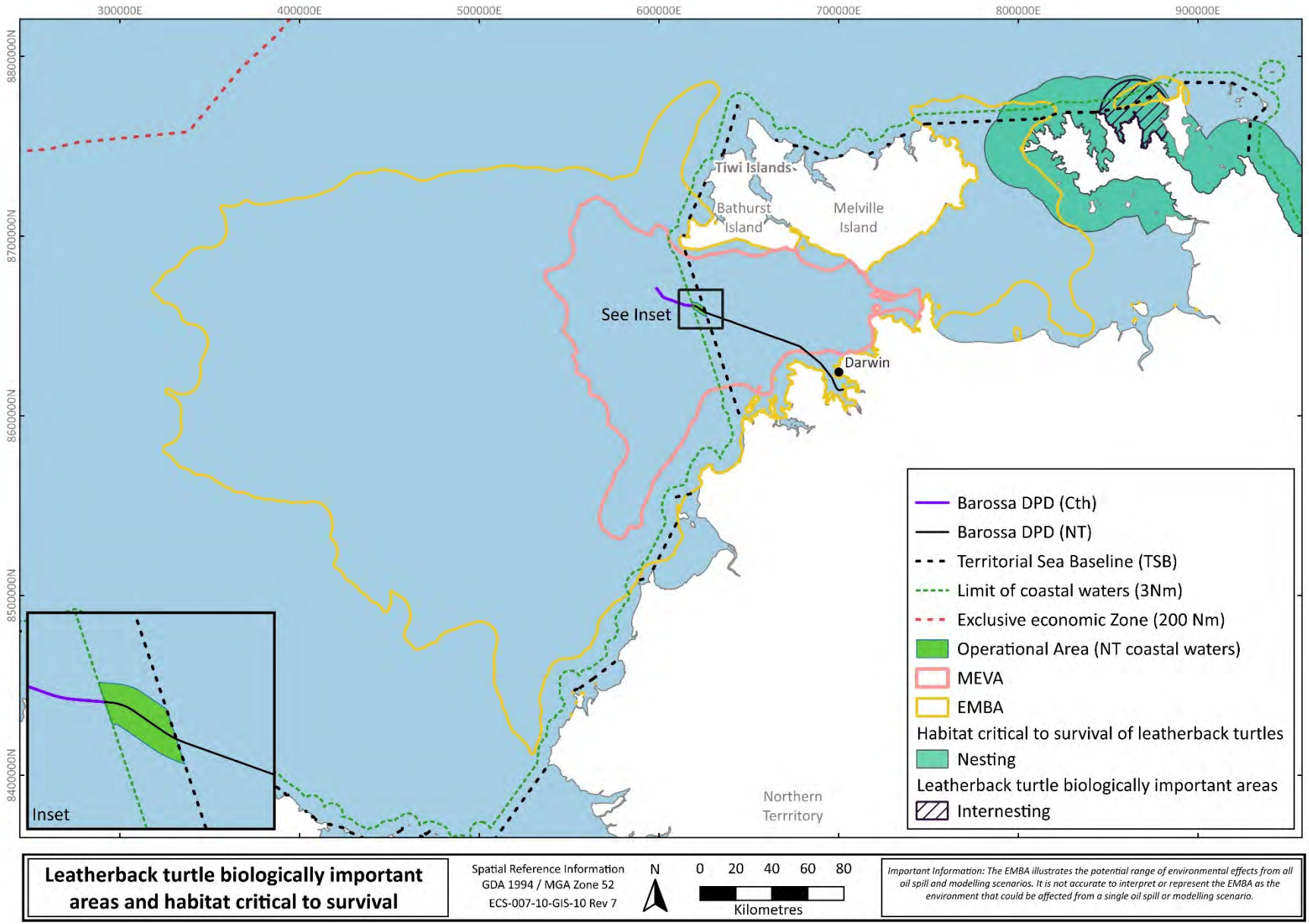


Figure 3-13: Leatherback turtle BIAs and survival of leatherback turtles overlapping or proximal to the EMBA

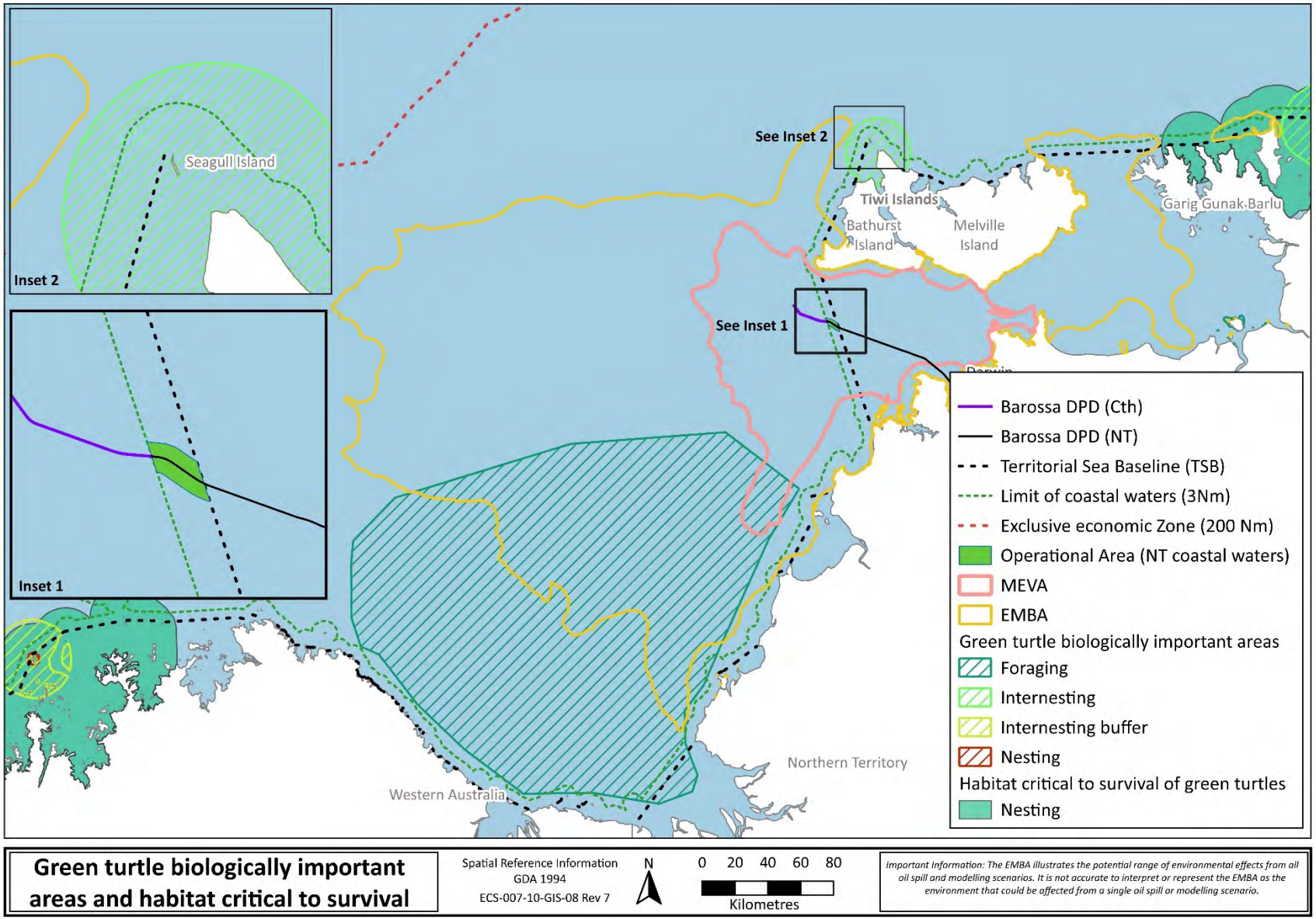


Figure 3-14: Green turtle BIAs and survival of green turtle overlapping or proximal to the EMBA

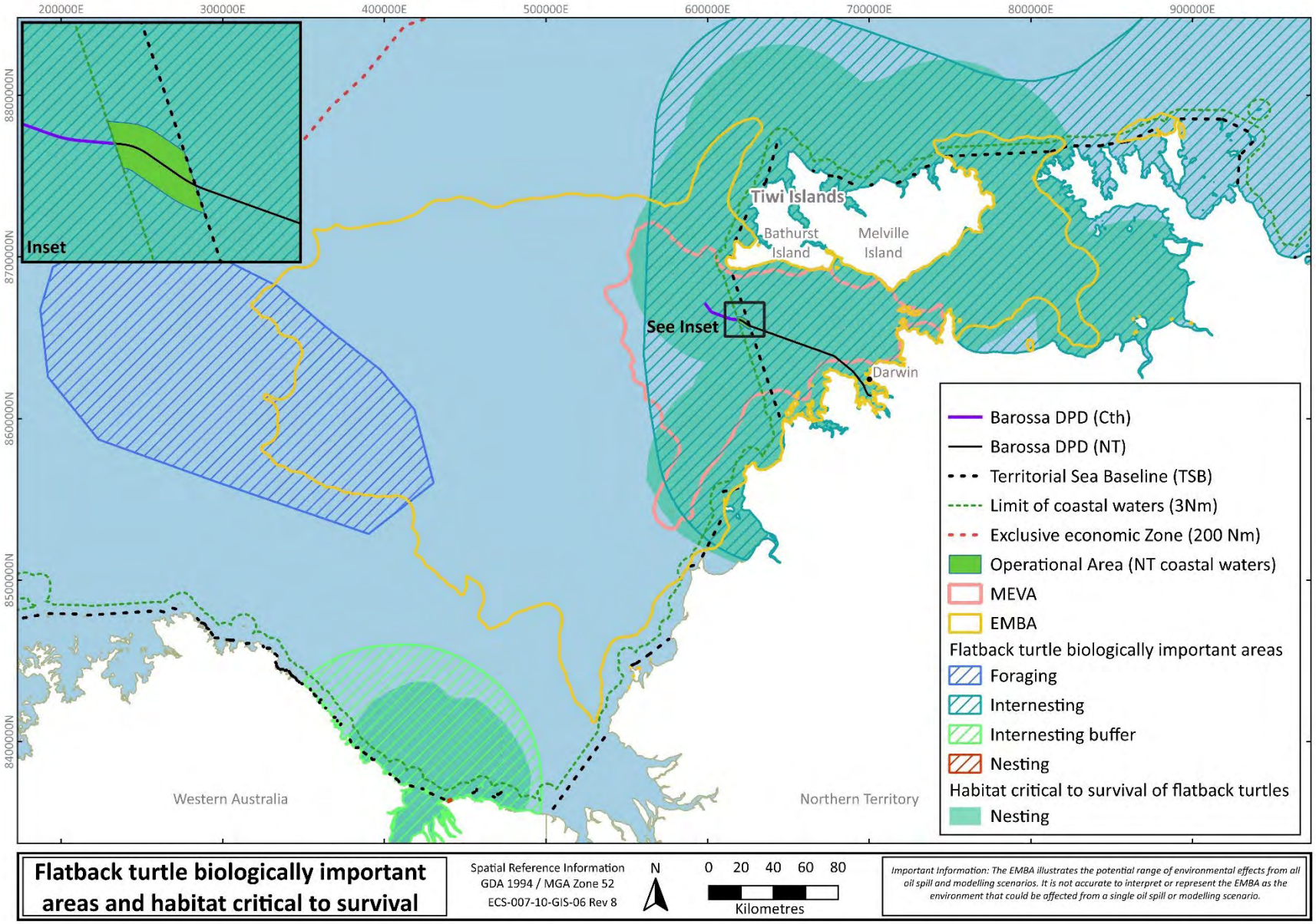


Figure 3-15: Flatback turtle BIAs and habitat critical to the survival of flatback turtles overlapping or proximal to the EMBA

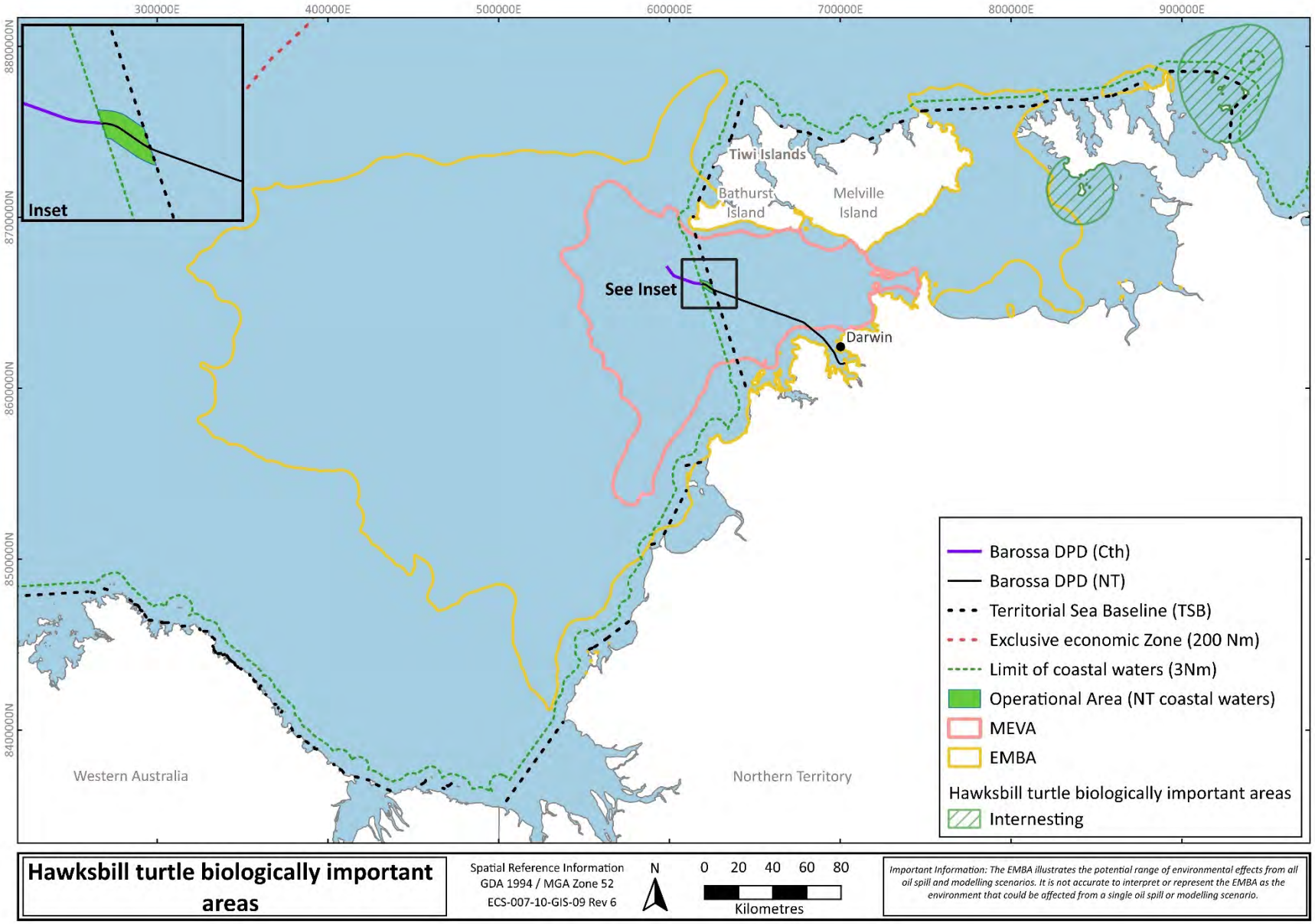


Figure 3-16: Hawksbill turtle BIAs overlapping or proximal to the EMBA

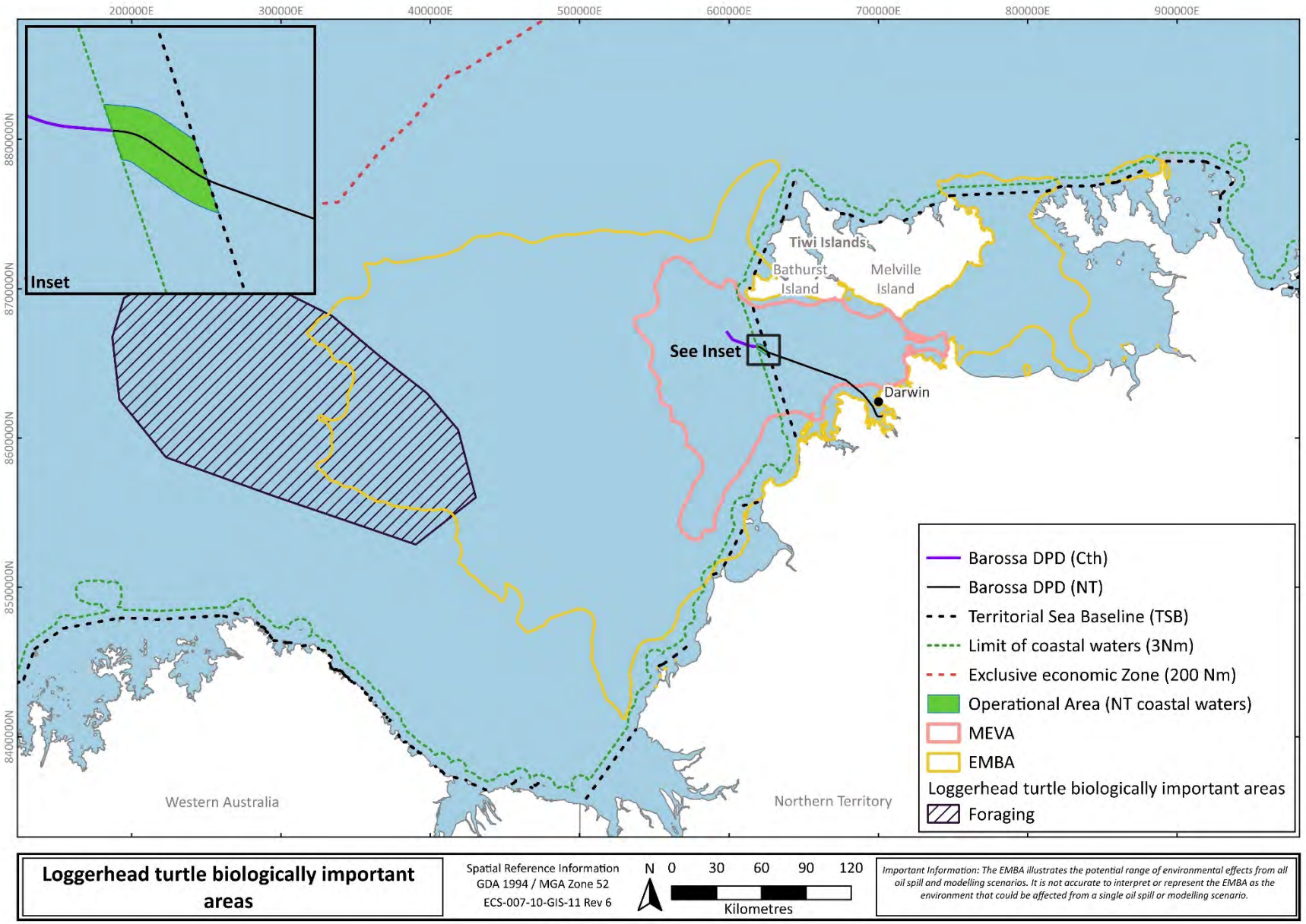


Figure 3-17: Loggerhead turtle BIAs overlapping or proximal to the EMBA

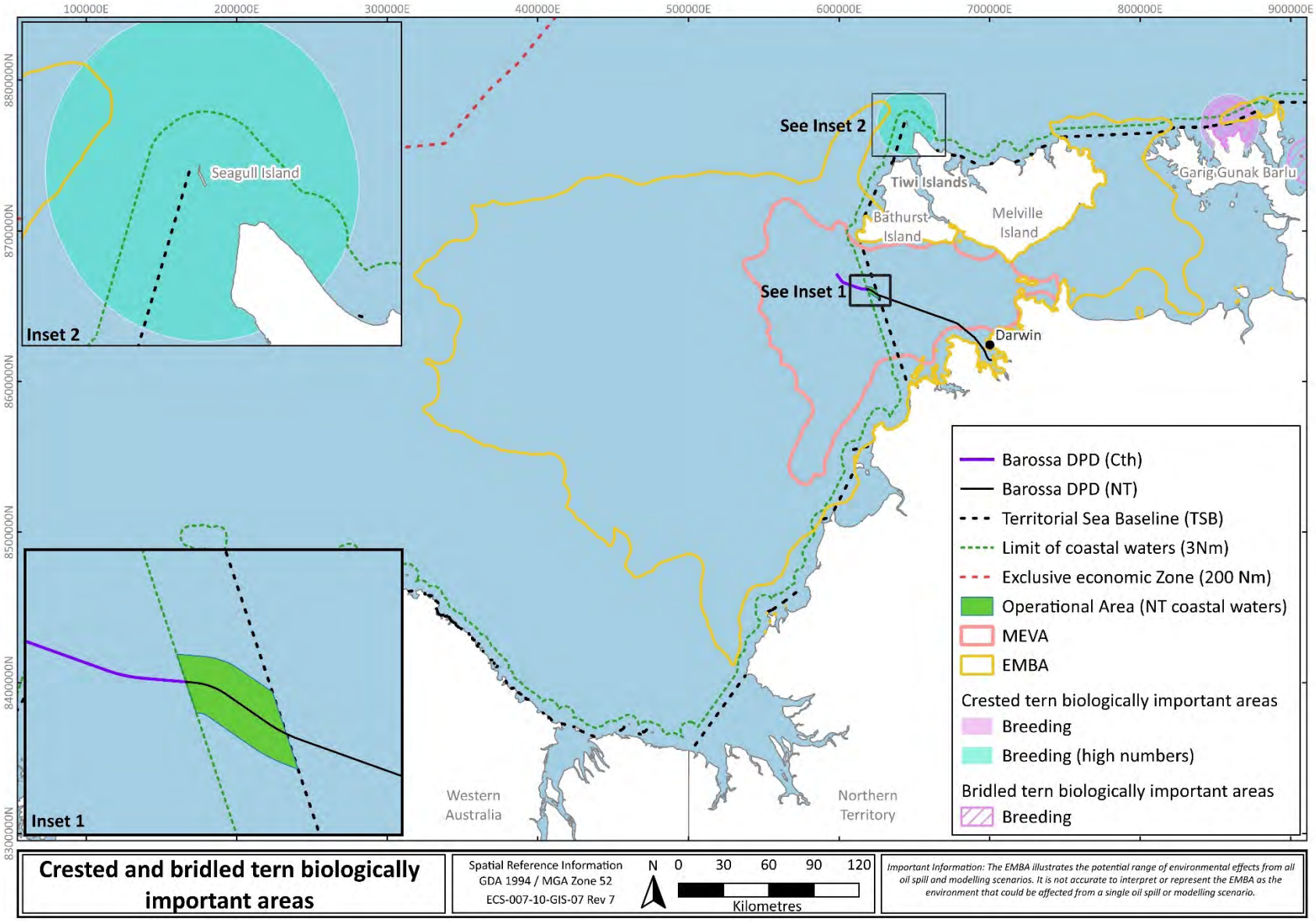


Figure 3-18: Seabird BIAs overlapping the EMBA

3.2.12.7 Conservation advice, recovery plans and management plans

Table 3-14 summarises the conservation actions relevant to the Activity and includes more information on the requirements of the applicable plans of management for those species (including conservation advice, recovery plans and management plans for marine fauna), and lists the sections in the Coastal Waters CEMP where those management requirements are considered.

Table 3-14: Relevant threats and conservation actions identified in recovery plans, conservation advice and management plans for species that occur or may occur within the OA and/or EMBA

Name	Recovery plan/conservation advice/management plan	Relevant objectives	Threats/strategies identified as relevant to the Activity	Relevant conservation actions	Section where addressed (where relevant)
All					
All vertebrate fauna	Threat Abatement Plan for the Impacts of Marine Debris on Vertebrate Wildlife of Australia's Coasts and Oceans (DoEE, 2018)	There are 4 main objectives: • contribute to the long-term prevention of the incidence of harmful marine debris • remove existing harmful marine debris from the marine environment • mitigate the impacts of harmful marine debris on marine species and ecological communities • monitor the quantities, origins and impacts of marine debris and assess the effectiveness of management arrangements over time for the strategic reduction of debris.	Marine debris	No explicit management actions for non–fisheries-related industries (note that management actions in the plan relate largely to managing fishing waste (e.g. 'ghost' gear), and state, territory and Commonwealth management through regulation).	6.1
Fish and sharks					
All sawfish and river sharks including: • dwarf sawfish • green sawfish • largetooth sawfish • speartooth shark • northern river shark	Sawfish and River Sharks Multispecies Recovery Plan (CoA, 2015b)	The primary objective of this recovery plan is to assist the recovery of sawfish and river sharks with a view to: • improving the population status leading to the removal of the sawfish and river shark species from the threatened species list of the EPBC Act • ensuring that anthropogenic activities do not hinder recovery in the near future, or impact the conservation status of the species in the future. The specific objectives of the recovery plan (relevant to industry) are: • Objective 5: Reduce and, where possible, eliminate adverse impacts of habitat degradation and modification on sawfish and river shark species • Objective 6: Reduce and, where possible, eliminate any adverse impacts of marine debris on sawfish and river shark species noting the linkages with the Threat Abatement Plan for the impact of marine debris on vertebrate marine life (DoEE, 2018).	Habitat degradation and modification	Identify risks to important sawfish and river shark habitat and measures needed to reduce those risks.	6.6, 6.7
Dwarf sawfish	Approved Conservation Advice for *Pristis clavata* (Dwarf Sawfish) (DEWHA, 2009)	No explicit relevant objectives.	Habitat degradation and modification	No explicit management actions for industry.	6.6, 6.7
Largetooth sawfish	Approved Conservation Advice for *Pristis pristis* (largetooth sawfish) (TSSC, 2014b)	No explicit relevant objectives.	Habitat degradation and modification	Implement measures to reduce adverse impacts of habitat degradation and/or modification.	6.6, 6.7
Green sawfish	Approved Conservation Advice for Green Sawfish (DEWHA, 2008a)	No explicit relevant objectives.	Habitat degradation and modification	No explicit relevant management actions.	6.6, 6.7
Northern river shark	Approved Conservation Advice for *Glyphis garricki* (northern river shark) (TSSC, 2014a)	No explicit relevant objectives.	Habitat degradation and modification	Implement measures to reduce adverse impacts of habitat degradation and/or modification.	6.6, 6.7
			Marine debris	No explicit relevant management actions.	6.1
Speartooth shark	Approved Conservation Advice for *Glyphis glyphis* (speartooth shark) (DoE, 2014)	No explicit relevant objectives.	Habitat degradation and modification	Implement measures to reduce adverse impacts of habitat degradation and/or modification.	6.6, 6.7
			Marine debris	No explicit management actions for industry (note that the responsibility for the action identified is for Commonwealth Government to implement).	6.1
Grey nurse shark (west coast population)	Recovery Plan for the Grey Nurse Shark (*Carcharias taurus*) (DoE, 2014a)	The overarching objective of this recovery plan is to assist the recovery of the grey nurse shark in the wild with a view to: • improving the population status • ensuring that anthropogenic activities do not hinder the recovery of the grey nurse shark.	Pollution and disease	Review and assess the potential threat of introduced species, pathogens and pollutants.	6.1, 6.2, 6.4, 6.6, 6.7
			Ecosystem effects as a result of habitat modification	Review the level and spatial extent of protection measures at key aggregation sites to ensure appropriate levels of protection, and a consistent approach to the designation and implementation of protective measures, are applied. Use BIAs to help inform the development of appropriate conservation measures, including applying advice in the marine bioregional plans on the types of actions that are likely to have	6.6, 6.7

Name	Recovery plan/conservation advice/management plan	Relevant objectives	Threats/strategies identified as relevant to the Activity	Relevant conservation actions	Section where addressed (where relevant)
				a significant impact on the species and updating such conservation measures as new information becomes available.	
White shark	Recovery Plan for the White Shark (*Carcharodon carcharias*) (DSEWPaC, 2013)	The overarching objective of this recovery plan is to assist the recovery of the white shark in the wild throughout its range with a view to: • improving the population status leading to future removal of the white shark from the threatened species list of the EPBC Act • ensuring that anthropogenic activities do not hinder recovery in the near future, or impact the conservation status of the species in the future. The specific objective of the recovery plan (relevant to industry) is: • Objective 7: Continue to identify and protect habitat critical to the survival of the white shark and minimise the impact of threatening processes within these areas.	Ecosystem effects as a result of habitat modification	No explicit relevant management actions.	6.6, 6.7
Whale shark	Conservation Advice for *Rhincodon typus* (whale shark) (TSSC, 2015g)	To maintain existing levels of protection for the whale shark in Australia while working to increase the level of protection afforded to the whale shark within the Indian Ocean and Southeast Asian region to enable population growth so that the species can be removed from the threatened species list of the EPBC Act.	Boat strike from large vessels	Minimise offshore developments and transit time of large vessels in areas close to marine features likely to correlate with whale shark aggregations along the northward migration route that follows the northern WA coastline along the 200 m isobath (TSSC, 2015g).	6.3
			Habitat disruption from mineral exploration, production and transportation	Implement measures to reduce adverse impacts of habitat degradation and/or modification.	6.6, 6.7
			Marine debris	No explicit relevant management actions.	6.1
Marine mammals					
Cetaceans and other marine megafauna	National Strategy for Reducing Vessel Strike on Cetaceans and other Marine Megafauna (CoA, 2017)	The overarching goal of the strategy is to provide guidance on understanding and reducing the risk of vessel collisions and the impacts they may have on marine megafauna. The specific objective of the strategy (relevant to industry) is: • Objective 3: Mitigation – reduce the likelihood and severity of megafauna vessel collision.	Vessel collision	Encourage innovation and collaboration between research organisations and industry.	6.3
Blue whale (includes pygmy blue whale)	Conservation Management Plan for the Blue Whale 2015–2025 (CoA, 2015a)	The long-term recovery objective is to minimise anthropogenic threats to allow the conservation status of the blue whale to improve so that it can be removed from the threatened species list under the EPBC Act.	Noise interference assess and address anthropogenic noise	Assess and address anthropogenic noise: shipping, industrial and seismic noise.	5.3
			Habitat modification	No explicit relevant management actions.	6.6, 6.7
			Vessel disturbance	Minimise vessel collisions: • develop a national vessel strike strategy that investigates the risk of vessel strike on blue whales and also identifies potential mitigation measures • ensure all vessel strike incidents are reported in the National Ship Strike database [7] • ensure the risk of vessel strikes on blue whales is considered when assessing actions that increase vessel traffic in areas where blue whales occur and, if required, appropriate mitigation measures are implemented.	6.3
			Marine debris	No explicit relevant management actions.	6.1
Fin whale	Conservation Advice for *Balaenoptera physalus* (fin whale) (TSSC, 2015c)	Determine population abundance, trends and population structure for fin whales, and establish a long-term monitoring program.	Habitat degradation including pollution (increasing port expansion and coastal development)	No explicit relevant management actions.	5.6, 6.4, 6.6, 6.7
			Anthropogenic noise	Once the spatial and temporal distribution (including BIAs) of fin whales is further defined, assess the impacts of increasing anthropogenic noise (including seismic surveys, port expansion, and coastal development).	5.3

[7] https://data.marinemammals.gov.au/report/shipstrike/new

Name	Recovery plan/conservation advice/management plan	Relevant objectives	Threats/strategies identified as relevant to the Activity	Relevant conservation actions	Section where addressed (where relevant)
			Vessel strike	Develop a national vessel strike strategy that investigates the risk of vessel strikes on fin whales and identifies potential mitigation measures. Ensure all vessel strike incidents are reported in the National Ship Strike database[7].	6.3
Sei whale	Conservation Advice for *Balaenoptera borealis* (sei whale) (TSSC, 2015b)	Determine population abundance, trends and population structure for sei whales, and establish a long-term monitoring program.	Anthropogenic noise	Once the spatial and temporal distribution (including BIAs) of sei whales is further defined, assess the impacts of increasing anthropogenic noise (including seismic surveys, port expansion, and coastal development).	5.3
			Vessel strike	Minimise vessel collisions: • develop a national vessel strike strategy that investigates the risk of vessel strikes on sei whales and also identifies potential mitigation measures • ensure all vessel strike incidents are reported in the National Ship Strike database[7].	6.3
			Habitat degradation including pollution	No explicit relevant management actions.	6.4, 6.6, 6.7
Water Mouse[8]	Conservation Advice for *Xeromys myoides* (Water Mouse) (DAWE, 2021)	No explicit relevant objectives.	No explicit relevant threats	No explicit relevant management actions.	N/A
Reptiles					
All marine turtles (flatback, green, hawksbill, leatherback, loggerhead, olive ridley)	National Light Pollution Guidelines for Wildlife (DCCEEW, 2023b)	Lighting objectives will need to consider the regulatory requirements and Australian standards relevant to the activity, location and wildlife present. Objectives should be described in terms of specific locations and times for which artificial light is necessary. Consideration should be given to whether colour differentiation is required and if some areas should remain dark, either to contrast with lit areas or to avoid light spill. Where relevant, wildlife requirements should form part of the lighting objectives. A lighting installation will be deemed a success if it meets the lighting objectives (including wildlife needs) and areas of interest can be seen by humans clearly, easily, safely and without discomfort.	Light pollution	Best practice lighting design incorporates these design principles: • start with natural darkness and only add light for specific purposes • use adaptive light controls to manage light timing, intensity and colour • light only the object or area intended – keep lights close to the ground, directed and shielded to avoid light spill • use the lowest intensity lighting appropriate for the task • use non-reflective, dark-coloured surfaces • use lights with reduced or filtered blue, violet and ultraviolet wavelengths.	5.4
	Recovery Plan for Marine Turtles in Australia 2017–2027 (CoA, 2017b)	Long-term recovery objective: • minimise anthropogenic threats to allow for the conservation status of marine turtles to improve so that they can be removed from the EPBC Act threatened species list. Interim objective 3: • anthropogenic threats are demonstrably minimised.	Marine debris	Reduce the impacts from marine debris: • support the implementation of the EPBC Act Threat Abatement Plan for the impacts of marine debris on vertebrate marine life (DoEE, 2018).	6.1
			Chemical and terrestrial discharge	Minimise chemical and terrestrial discharge.	6.4, 6.6, 6.7
			Vessel disturbance	Vessel interactions identified as a threat. No specific management actions in relation to vessels prescribed in the plan.	6.3
			Light pollution	Minimise light pollution: • manage artificial light within or adjacent to habitat critical to the survival of marine turtles such that marine turtles are not displaced from these habitats • develop and implement best practice light management guidelines for existing and future developments adjacent to marine turtle nesting beaches. • identify the cumulative impact on turtles from multiple sources of onshore and offshore light pollution.	5.4

[8] *Species or species habitat is not known to be present in the OA. Hence, some threats typically relevant to petroleum activities (such as debris) have been assessed as not relevant and are not discussed further in the Coastal Waters CEMP.*

Name	Recovery plan/conservation advice/management plan	Relevant objectives	Threats/strategies identified as relevant to the Activity	Relevant conservation actions	Section where addressed (where relevant)
			Noise interference	Assess and address anthropogenic noise: • understand the impacts of anthropogenic noise on marine turtle behaviour and biology.	5.3
			Habitat modification	Manage anthropogenic activities to ensure marine turtles are not displaced from identified habitat critical to their survival. Manage anthropogenic activities in BIAs to ensure that biologically important behaviour can continue.	6.6, 6.7
Leatherback turtle	Approved Conservation Advice for *Dermochelys coriacea* (Leatherback Turtle) (DEWHA, 2008b)	No explicit relevant objectives.	Boat strike	No explicit relevant management actions.	6.3
			Habitat degradation (changes to breeding sites and degradation to foraging areas)	Identify and protect migratory corridors between nesting beaches and common foraging areas to facilitate colonisation.	6.6, 6.7
			Marine debris	No explicit relevant management actions.	6.1
Seabirds and shorebirds					
All seabirds and shorebirds	National Light Pollution Guidelines for Wildlife (DCCEEW, 2023b)	Lighting objectives will need to consider the regulatory requirements and Australian standards relevant to the activity, location and wildlife present. Objectives should be described in terms of specific locations and times for which artificial light is necessary. Consideration should be given to whether colour differentiation is required and if some areas should remain dark, either to contrast with lit areas or to avoid light spill. Where relevant, wildlife requirements should form part of the lighting objectives. A lighting installation will be deemed a success if it meets the lighting objectives (including wildlife needs) and areas of interest can be seen by humans clearly, easily, safely and without discomfort.	Light pollution	Best practice lighting design incorporates these design principles: • start with natural darkness and only add light for specific purposes • use adaptive light controls to manage light timing, intensity and colour. • light only the object or area intended – keep lights close to the ground, directed and shielded to avoid light spill. • use the lowest intensity lighting appropriate for the task. • use non-reflective, dark-coloured surfaces. • use lights with reduced or filtered blue, violet and ultraviolet wavelengths.	5.4
Bridled tern Common noddy Great frigatebird Greater crested tern Lesser frigatebird Little tern Osprey Streaked shearwater Wedge-tailed shearwater White-tailed tropicbird	Wildlife Conservation Plan for Seabirds (CoA, 2020)	Seabirds and their habitats are protected and managed in Australia.	Pollution (marine debris, light, water)	Enhance contingency plans to prevent and/or respond to environmental emergencies that impact seabirds and their habitats.	5.4, 6.1, 6.6, 6.7
			Habitat loss and degradation from pollution	No explicit relevant management actions.	6.6, 6.7
			Anthropogenic disturbance	Ensure all areas of important habitat for seabirds are considered in the development assessment process. Manage the effects of anthropogenic disturbance to seabird breeding and roosting areas.	6.3
Asian dowitcher Bar-tailed godwit Black-tailed godwit Common greenshank Curlew sandpiper Eastern curlew Great knot Greater sand plover Grey plover Lesser sand plover Little curlew Little ringed plover Long-toed stint	Wildlife Conservation Plan for Migratory Shorebirds (CoA, 2015c)	Anthropogenic threats to migratory shorebirds in Australia are minimised or, where possible, eliminated.	Habitat degradation/modification	No explicit relevant management actions.	6.6, 6.7
			Anthropogenic disturbance	Investigate the significance of cumulative impacts on migratory shorebird habitat and populations in Australia. Ensure all areas important to migratory shorebirds in Australia continue to be considered in development assessment processes (specifically for coastal developments).	6.3
			Pollution/contamination	No explicit relevant management actions.	6.4, 6.6, 6.7

Name	Recovery plan/conservation advice/management plan	Relevant objectives	Threats/strategies identified as relevant to the Activity	Relevant conservation actions	Section where addressed (where relevant)
Marsh sandpiper Oriental plover Pacific golden plover Pectoral sandpiper Red knot Red-necked stint Ruddy turnstone Sanderling Sharp-tailed sandpiper Streaked shearwater Terek sandpiper Whimbrel					
Asian dowitcher [9]	Conservation Advice for *Limnodromus semipalmatus* (Asian dowitcher) (DCCEEW, 2024f)	No explicit relevant objectives.	Pollution/contamination	No explicit relevant management actions.	6.6, 6.7
Australian Painted Snipe[9]	Approved Conservation Advice for *Rostratula australis* (Australian painted snipe) (TSSC, 2013)	No explicit relevant objectives.	Habitat loss, degradation and modification	No explicit relevant management actions.	6.6, 6.7
	National Recovery Plan for the Australian Painted Snipe (*Rostratula australis*) (DCCEEW, 2022a)	No explicit relevant objectives.	Habitat loss, degradation and modification	No explicit relevant management actions.	6.6, 6.7
Black-tailed godwit[9]	Conservation Advice for *Limosa limosa* (black-tailed godwit) (DCCEEW, 2024e)	No explicit relevant objectives.	Pollution	No explicit relevant management actions.	6.6, 6.7
Common greenshank[9]	Conservation Advice for *Tringa nebularia* (common greenshank) (DCCEEW, 2024h)	No explicit relevant objectives.	Pollution	No explicit relevant management actions.	6.6, 6.7
Curlew sandpiper	Approved Conservation Advice for *Calidris ferruginea* (Curlew Sandpiper) (TSSC, 2015e)	No explicit relevant objectives.	Habitat loss and degradation from pollution	No explicit relevant management actions.	6.6, 6.7
Eastern curlew	Approved Conservation Advice for *Numenius madagascariensis* (Eastern Curlew) (TSSC, 2015f)	Australian objectives: • achieve a stable or increasing population. • maintain and enhance important habitat. • reduce disturbance at key roosting and feeding sites.	Habitat loss and degradation from pollution	No explicit relevant management actions.	6.4, 6.6, 6.7
			Pollution/contamination	No explicit relevant management actions.	N/A
Great knot[9]	Conservation Advice for *Calidris tenuirostris* (great knot) (DCCEEW, 2024d)	No explicit relevant objectives.	Pollution	No explicit relevant management actions.	6.6, 6.7
Greater sand plover[9]	Conservation Advice *Charadrius leschenaultii* (Greater sand plover) (TSSC, 2016)	No explicit relevant objectives.	Habitat loss and degradation	No explicit relevant management actions.	6.6, 6.7
			Pollution/contamination	No explicit relevant management actions.	N/A
Grey falcon[9]	Conservation Advice *Falco hypoleucos* (Grey Falcon) (TSSC, 2020)	No explicit relevant objectives.	No explicit relevant threats	No explicit relevant management actions.	6.6, 6.7
Grey plover[9]	Conservation Advice for *Pluvialis squatarola* (grey plover) (DCCEEW, 2024g)	No explicit relevant objectives.	Pollution	No explicit relevant management actions.	6.6, 6.7
Lesser Sand Plover, Mongolian Plover[9]	Conservation Advice *Charadrius mongolus* (Lesser Sand Plover, Mongolian Plover) (TSSC, 2016d)	No explicit relevant objectives.	Habitat loss and degradation	No explicit relevant management actions.	6.6, 6.7
			Pollution/contamination	No explicit relevant management actions.	N/A
Partridge Pigeon (eastern)[9]	Conservation Advice *Geophaps smithii smithii (Partridge Pigeon [eastern])* (TSSC, 2015)	No explicit relevant objectives.	No explicit relevant threats	No explicit relevant management actions.	N/A
Masked Owl (northern)[9]	Conservation Advice *Tyto novaehollandiae kimberli* (masked owl [northern]) (TSSC, 2015a)	No explicit relevant objectives.	No explicit relevant threats	No explicit relevant management actions.	6.6, 6.7
		No explicit relevant objectives.	Habitat loss and degradation	Protect important habitat in Australia.	6.6, 6.7

[9] *Species or species habitat is not known to be present within planned impact areas (e.g. OA and light assessment boundary), or threats identified are not relevant to the Activity. Therefore, conservation advice or recovery is not evaluated within Section 5 or Sections 6.1–6.5 and 6.8.*

Name	Recovery plan/conservation advice/management plan	Relevant objectives	Threats/strategies identified as relevant to the Activity	Relevant conservation actions	Section where addressed (where relevant)
Nunivak Bar-tailed Godwit, Western Alaskan Bar-tailed Godwit[9]	Conservation Advice *Limosa lapponica baueri* (Bar-tailed godwit [western Alaska]) (TSSC, 2016a)		Pollution/contamination	Protect important habitat in Australia.	N/A
Red Goshawk[9]	Conservation Advice *Erythrotriorchis radiatus* (Red goshawk) (TSSC, 2015h)	No explicit relevant objectives.	No explicit relevant threats	No explicit relevant management actions.	6.4, 6.6, 6.7
Red knot	Conservation Advice for *Calidris canutus* (red knot) (DCCEEW, 2024c)	No explicit relevant objectives.	Pollution/contamination impacts	No explicit relevant management actions.	6.6, 6.7
			Habitat loss and degradation	No explicit relevant management actions.	6.3
			Anthropogenic disturbance	No explicit relevant management actions.	6.6, 6.7
Ruddy turnstone[9]	Conservation Advice for *Arenaria interpres* (ruddy turnstone) (DCCEEW, 2024a)	No explicit relevant objectives.	Pollution	No explicit relevant management actions.	6.4, 6.6, 6.7
Sharp-tailed sandpiper	Conservation Advice for *Calidris acuminata* (sharp-tailed sandpiper) (DCCEEW, 2024b)	No explicit relevant objectives.	Pollution	No explicit relevant management actions.	6.6, 6.7
Terek sandpiper[9]	Conservation Advice for *Xenus cinereus* (terek sandpiper) (DCCEEW, 2024i)	No explicit relevant objectives.	Pollution	No explicit relevant management actions.	N/A
Tiwi Islands Hooded Robin, Hooded Robin (Tiwi Islands)[9]	Conservation Advice *Melanodryas cucullata melvillensis* (hooded robin [Tiwi Islands]) (TSSC, 2018a)	No explicit relevant objectives.	No explicit relevant threats	No explicit relevant management actions.	N/A
Tiwi Masked Owl, Tiwi Islands Masked Owl[9]	Conservation Advice Tyto *novaehollandiae melvillensis* (masked owl [Tiwi Islands]) (TSSC, 2015i)	No explicit relevant objectives.	No explicit relevant threats	No explicit relevant management actions.	6.6, 6.7

3.2.13 Socioeconomic receptors

Socioeconomic activities that may occur in the OA and EMBA are set out in this section and summarised in Table 3-15. The broader cultural features are addressed in Section 3.2.14.

The EMBA overlaps, the Commonwealth marine area, which includes any part of the sea, including the waters, seabed and airspace, within the EEZ and extended continental shelf of Australia, that is not state or territory waters or coastal waters the rights in respect of which have been vested in a state or territory (Figure 3-2). The Commonwealth marine area stretches from 3 to 200 Nm from the TSB.

Table 3-15: Socioeconomic-related activities that occur or may occur in the OA and EMBA

Value/sensitivity	OA presence	EMBA presence
Commercial fisheries – Commonwealth (see Section 3.2.13.1)	Commonwealth-managed fisheries that overlap the OA (see Figure 3-19 and Table 3-16): • Northern Prawn Fishery • Southern Bluefin Tuna Fishery • Western Skipjack Tuna Fishery • Western Tuna and Billfish Fishery	Commonwealth-managed fisheries that overlap the EMBA are described in Table 3-16 and shown Figure 3-19.
Commercial fisheries – state/territory (see Section 3.2.13.1)	NT-managed fisheries that overlap the OA (see Figure 3-20 and Table 3-16): • Aquarium Fishery • Coastal Line Fishery • Demersal Fishery • Offshore Net and Line Fishery • Spanish Mackerel Fishery	NT- and WA-managed fisheries that overlap the EMBA are described in Table 3-16 and shown in Figure 3-20 and Figure 3-21.
Energy industry (see Section 3.2.13.2)	The Santos operated Bayu-Undan pipeline is located within the OA.	The nearest offshore operating facility is the Eni operated Blacktip facility, approximately 260 km south-west of the OA, and the Santos-operated Bayu–Undan platform, approximately 395 km north-west of the OA. The INPEX operated Ichthys pipeline is 16.5 km south from the OA. Oil and gas exploration permits are operated by other titleholders throughout the EMBA.
Telecommunications cables (see Section 3.2.13.4)	There are no telecommunications cables within the OA.	The North-West Cable System is located within the EMBA (approximately 2 km north of the OA at its closest point), however, a hydrocarbon spill will not have any impact on submarine cables.
Defence (see Section 3.2.13.3)	The OA intersects a designated defence practice area. During their surveillance, Australian Border Force vessels may transit the OA.	The EMBA intersects the practice and training areas of the North Australian exercise area and Darwin air weapons range (Figure 3-22). During their surveillance, Australian Border Force vessels may transit the EMBA.
Shipping (see Section 3.2.13.5)	The closest major commercial port to the OA is Darwin Port, 60 km away (closest point of Port Limits). No designated shipping channels intersect the OA.	Vessel traffic is expected within the EMBA. In 2022–2023, there were 1,569 vessel calls to port (Landbridge Darwin Port, 2024).
Recreation and tourism (see Section 3.2.13.6)	The OA 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 activities tend to be centred around nearshore waters, islands and coastal areas.	There are several offshore shoals, banks, coral reefs, shipwrecks within the EMBA. These areas may be visited by recreational fishers, fishing charter vessels, scuba diving, snorkelling and other charter vessels. The Tiwi Islands are a popular tourist destination offering cruises, fishing, sailing and water tours among other cultural activities. Scuba diving, snorkelling and other charter vessels are also a significant tourist attraction, with operators visiting the numerous shipwrecks, coral reefs and artificial reefs and embarking on day or multiday trips out to offshore islands and shoals.
Underwater cultural heritage (see Section 3.2.13.7)	There is one declared protected UCH site within the OA, the wreck of Japanese submarine 1-124, protected under the *Underwater Cultural Heritage Act 2018* (Cth) (UCH Act). During the design phase of the DPD Project, the pipeline route was deviated to avoid the I-124 Japanese wreck and its 800m radial exclusion zone, with the pipeline route passing 100m to the east of the exclusion zone at its closest point.	There are multiple sites protected under UCH Act and *Heritage Act 2011* (NT). Multiple known and unknown locations of shipwrecks, sunken aircraft, and historic (more than 75 years old) aircraft and shipwrecks and other sites occur or may occur within the EMBA (Figure 3-24).

3.2.13.1 Commercial fisheries

The NWMR and NMR support Commonwealth–, NT– and WA–managed commercial fisheries that target various shark, demersal and pelagic finfish, molluscs, pearl oyster and crustacean species of commercial importance. Marine aquaculture (mariculture) within the EMBA is mostly associated with pearl oyster (*Pinctada maxima*) production in NT waters, which is focused in 4 main areas (NT Government, 2023):

- Bynoe Harbour
- Beagle Gulf
- Cobourg Peninsula and Croker Island
- around the islands north-west of Nhulunbuy.

The NT Government, via the Darwin Aquaculture Centre, is also encouraging the development of aquaculture of other species, including barramundi, sea cucumber, blacklip oysters, and giant clams. Barramundi is currently grown in ponds on the Adelaide River, and trials on Groote Eylandt and Goulburn Island are looking at growing clams in sea-based cages (NT Government, 2023).

The fisheries overlapping the OA and EMBA are shown in Figure 3-19, Figure 3-20 and Figure 3-21. Table 3-16 lists and describes the commercial fisheries and Santos' understanding of fishing effort based on publicly available information and consultation with Relevant Persons.

Consultation with the Australian Fisheries Management Authority (AFMA), NT Department of Industry, Tourism and Trade (NT Fisheries) and appropriate fisheries associations and licence holders is discussed in Section 4. A summary report including the outcomes of consultation with Relevant Persons, including any objections or claims and Santos' assessment of them, satisfying the requirements of section 24(b)(i)-(iii) of the OPGGS(E)R, is provided in Table 4-10. The full records of Relevant Persons consultation, as required by section 24(b)(iv) of the OPGGS(E)R, is provided in the Sensitive Information Report submitted to DME with the Coastal Waters CEMP.

Table 3-16: Commonwealth and state fisheries that overlap the OA and/or EMBA

Commercial fishery	Licence Area		Description	Likelihood of interaction with fishers
	OA	EMBA		
Commonwealth-managed				
Northern Prawn Fishery	✓	✓	**Area**: extends from Joseph Bonaparte Gulf across the top end to the Gulf of Carpentaria. Most of the Northern Prawn Fishery effort lies in the Gulf of Carpentaria, Joseph Bonaparte Gulf and along the Arnhem Land coast (DoA, 2014). **Gear**: trawl. **Key target species**: The key target species are banana, tiger and endeavour prawns. There are 2 fishing seasons—the season end date depends on catch rates: • Season 1 (mainly banana prawns caught): 1 April to 15 June • Season 2 (mainly tiger prawns caught): 1 August to 30 November. Fishing for scampi also occurs in deeper waters, with fishing effort spread across 2–3 months of the year (December to February). **Effort** (2020): 52 active vessels; around 4,767 t (Patterson et al., 2021).	Interaction with this fishery in the OA is possible; however, medium and high fishing effort are outside the OA. The areas of concentrated effort are to the north and west of the Tiwi Islands and south of the OA.
Southern Bluefin Tuna Fishery	✓	✓	**Area**: The Southern Bluefin Tuna Fishery spans the Australian Fishing Zone. However, it is only active in the south and south eastern Australian water. **Gear**: purse seine and pelagic long line. **Key target species**: southern bluefin tuna. **Effort** (2020): 30 active vessels; around 5,429 t (Patterson et al., 2021).	No active commercial fishing effort reported in the OA or EMBA; therefore, interaction with this fishery is unlikely.
Western Skipjack Tuna Fishery	✓	✓	**Area**: The Western Skipjack Tuna Fishery 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. **Gear**: purse seine **Key target species**: skipjack tuna **Effort** (2020): None. There has been no fishing effort since the 2008–2009 season, and in that season, activity was concentrated off South Australia (Patterson et al., 2021).	No active commercial fishing effort reported in the OA or EMBA; therefore, interaction with this fishery is unlikely.
Western Tuna and Billfish Fishery	✓	✓	**Area**: Operates in Australia's EEZ and the high seas of the Indian Ocean. In recent years, fishing effort has concentrated off south-west WA, with occasional activity off South Australia. **Gear**: pelagic longline. **Key target species**: bigeye tuna, yellowfin tuna, striped marlin, swordfish. **Effort** (2020): 3 active vessels; around 161 t (Patterson et al., 2021).	No active commercial fishing effort reported in the OA or EMBA; therefore, interaction with this fishery is unlikely.
NT-managed				
Aquarium Fishery	✓	✓	**Area**: 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 (outside the EMBA). **Gear**: handheld, nets and pots (dive-based). **Key target species**: fish, invertebrates and plants for aquariums. **Effort**: unknown – no restriction on the number of licences (NT Government, 2023).	No active commercial fishing effort reported in the OA. Some effort is possible in the EMBA for very limited periods of the year.
Spanish Mackerel Fishery	✓	✓	**Area**: Commercial fishing for Spanish mackerel is allowed from the high water mark to the outer boundary of the Australian Fishing Zone, which is 200 Nm offshore. Most fishing effort occurs near 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. Fishing generally takes place around reefs, headlands and shoals. **Gear**: trolling, handline. **Key target species**: Spanish mackerel. **Effort**: 15 licences allowed (NT Government, 2023).	Interaction with this fishery in the OA is possible with fishers transiting within the area. Effort is expected within the EMBA at nearby shoals and banks, particularly in waters off Bathurst Island.
Offshore Net and Line Fishery	✓	✓	**Area**: Operates in NT waters from the low water mark to the boundary of the Australian Fishing Zone. Most fishing is done in the coastal zone within 12 Nm of the coast, and immediately offshore in the Gulf of Carpentaria. The fishery has an area of approximately 522,000 km^2 **Gear**: longlines or pelagic nets (there are restrictions on where certain gear can be used). **Key target species**: blacktip sharks, grey mackerel. **Effort**: Unknown – no restriction on the number of licences (NT Government, 2023).	Interaction with this fishery in the OA is possible but unlikely due to the concentration of fishing effort in near coastal areas and the distribution of the targeted species. One licence holder may fish off the south-west end of the Tiwi Islands for small pelagic fish.

Commercial fishery	Licence Area		Description	Likelihood of interaction with fishers
	OA	EMBA		
Demersal Fishery	✓	✓	**Area**: Demersal fishing is allowed from 15 Nm from the low water mark to the outer boundary of the Australian Fishing Zone, excluding the area of the Timor Reef Fishery. **Gear**: lines, fish traps and semi-demersal trawl nets. **Key target species**: snapper (various species). **Effort**: Unknown – 18 licences are currently issued (NT Government, 2023).	Interaction with this fishery in the OA is possible but highly unlikely due to the concentration of fishing effort that occurs along the eastern boundary of the Timor Reef fishery in water depths of 80-100 m, to the north-east of the OA.
Barramundi	✗	✓	**Area**: Barramundi fishing is allowed from the high water mark to 3 Nm seaward of the coast (with exclusion zones and restrictions). **Gear**: nets are set and retrieved from dinghies and fish are processed onboard motherships. **Key target species**: barramundi and king threadfin **Effort**: 14 licences are currently issued. Fishing effort spread across 8 months of the year (February to 30 September). (NT Government, 2023).	No fishery overlaps the OA. Effort is not expected within the EMBA.
Coastal Line	✗	✓	**Area**: Fishery is allowed from the high water mark to 15 Nm seaward of the coast. **Gear**: lines, hooks, cast nets, scoop nets or gaffs. **Key target species**: black jewfish and golden snapper **Effort**: 52 licences are currently issued. (NT Government, 2023).	No fishery overlaps the OA. Effort not expected within the EMBA.
Coastal Net Fishery	✗	✓	**Area**: Fishery is allowed from the high water mark to 3 Nm seaward of the coast. **Gear**: nets. **Key target species**: mullet **Effort**: 5 licences are currently issued. (NT Government, 2023).	No fishery overlaps the OA. Effort is expected within the EMBA.
Trepang Fishery	✗	✓	**Area**: Trepang fishing is allowed from the high water mark to 3 Nm seaward of the coast. Predominantly along the Arnhem Land coast, mainly around the Cobourg Peninsula and Groote Eylandt. **Gear**: harvested by hand either on foot or by diving, usually on neap tides during the dry season. **Key target species**: sea cucumber. **Effort**: 6 licences currently issued (NT Government, 2023).	No fishery overlaps the OA. Effort is expected within the EMBA.
Bait Net Fishery	✗	✓	**Area**: Bait fishing is allowed from the high water mark to 3 Nm seaward of the low water mark, excluding Darwin Harbour and Shoal Bay. **Gear**: bait net, cast net or scoop net. **Key target species**: all fish for use as bait except barramundi, threadfin salmon, Spanish mackerel or mud crab. **Effort**: 2 licences are currently issued (NT Government, 2023).	No fishery overlaps the OA. Effort is expected within the EMBA.
Mollusc Fishery	✗	✓	**Area**: Mollusc harvesting is allowed from the high water mark out to the low water mark. **Gear**: collected by hand. **Key target species**: all molluscs and shellfish, except pearl oysters. **Effort**: 1 licence is currently issued (NT Government, 2023).	No fishery overlaps the OA. Very low effort is expected within the EMBA.
Mud Crab Fishery	✓	✓	**Area**: Mud crab harvesting is confined to coastal mudflats and estuaries, excluding Darwin Harbour, Kakadu National Park, Leaders Creek and most creeks adjoining Shoal Bay. **Gear**: pots. **Key target species**: mud crabs. **Effort**: 49 licences are currently issued (NT Government, 2023).	No fishery overlaps the OA. Fishing effort is concentrated in the Gulf of Carpentaria (outside of the EMBA); however, very low effort may occur within the EMBA.
Pearl Oyster Fishery	✓	✓	**Area**: high water mark to the outer boundary of the Australian fishing zone, 200 Nm offshore. **Gear**: harvested by hand. **Key target species**: pearl oysters. **Effort**: 5 licences are currently issued with each licence able to harvest 138,000 oysters each year (NT Government, 2023).	While there is a licence area that intersects with the OA, there have been no active commercial fishing effort reported in the OA; however, high effort is expected within the EMBA.
WA-managed				
Abalone	✗	✓	**Area**: Operates between the NT and South Australian borders. **Gear**: unknown. **Key target species**: abalone. **Effort** (2020): 0 diver days; total catch 0 t. Closed since 2012 due to environmentally induced mortality (Newman et al., 2021).	N/A
Kimberley Crab Fishery	✗	✓	**Area**: Operates off the north-west coast of WA. **Gear**: crab traps.	No fishery overlaps with the OA and the EMBA intersects the outer limits of the fishing licence boundary. Interaction with this fishery is highly unlikely.

Commercial fishery	Licence Area		Description	Likelihood of interaction with fishers
	OA	EMBA		
			Key target species: green and brown mud crab. **Effort** (2020): effort occurring between April and September with a catch of 1.5 t (Newman et al., 2021).	
Mackerel Managed Fishery	✗	✓	**Area**: Commercially fished between Geraldton and the WA/NT border. **Gear**: trolling. **Key target species**: Spanish mackerel. **Effort**: active vessels: (unknown); around 300 t (Gaughan and Santoro, 2021).	No fishery overlaps the OA. Effort is expected within the EMBA.
Marine Aquarium Fishery	✗	✓	**Area**: Operates between the NT and South Australian borders. Typically more active in waters south of Broome with higher levels of effort around the Capes region of south-west WA, Perth, Geraldton, Exmouth, Dampier and Broome. **Gear**: unknown. **Key target species**: coral, live rock, algae, seagrass and invertebrates. **Effort** (2020): 32.12 t (Newman et al., 2021).	No fishery overlaps with the OA and the EMBA intersects the outer limits of the fishing licence boundary, which extends the entire WA coastline. Interaction with this fishery is highly unlikely.
Northern Demersal Scalefish Fishery	✗	✓	**Area**: Operates off WA's coast in waters east of 120°E longitude. **Gear**: handline, dropline and fish traps, although the fishery has essentially operated as a trap-based fishery since 2002. **Key target species**: goldband snapper and red emperor. **Effort**: active vessels: (unknown); around 1,500 t (Gaughan and Santoro, 2021).	No fishery overlaps the OA. Effort is expected within the EMBA.
South West Coast Salmon Fishery	✗	✓	**Area**: Perth metropolitan area extending to Cape Beaufort (WA/NT border). No fishing takes place north of the Perth metropolitan area. **Gear**: beach seine nets. **Key target species**: Western Australian salmon. **Effort**: Insufficient information.	No fishery overlaps the OA. No fishing takes place north of the Perth metropolitan area, despite the managed fishery boundary extending to Cape Beaufort (WA/NT border).
Specimen Shell Fishery	✗	✓	**Area**: Operates between the NT and South Australian borders. **Gear**: unknown. **Key target species**: cowries, cones, murexes and volutes. **Effort**: 4,258 shells collected. 30 licenses (15 fished in 2020) (Newman et al., 2021).	No fishery overlaps the OA. The EMBA intersects the outer limits of the fishing licence boundary, which extends the entire WA coastline. Interaction with this fishery is highly unlikely.
West Coast Deep Sea Crustacean Fishery	✗	✓	**Area**: Operates primarily in the Gascoyne bioregion in WA. **Gear**: unknown. **Key target species**: champagne, giant and crystal crab. **Effort** (2020): 153 t (Newman et al., 2021).	No fishery overlaps with the OA. The EMBA intersects the outer limits of the fishing licence boundary. The concentration of fishing occurs in the Gascoyne bioregion. Interaction with this fishery is highly unlikely.

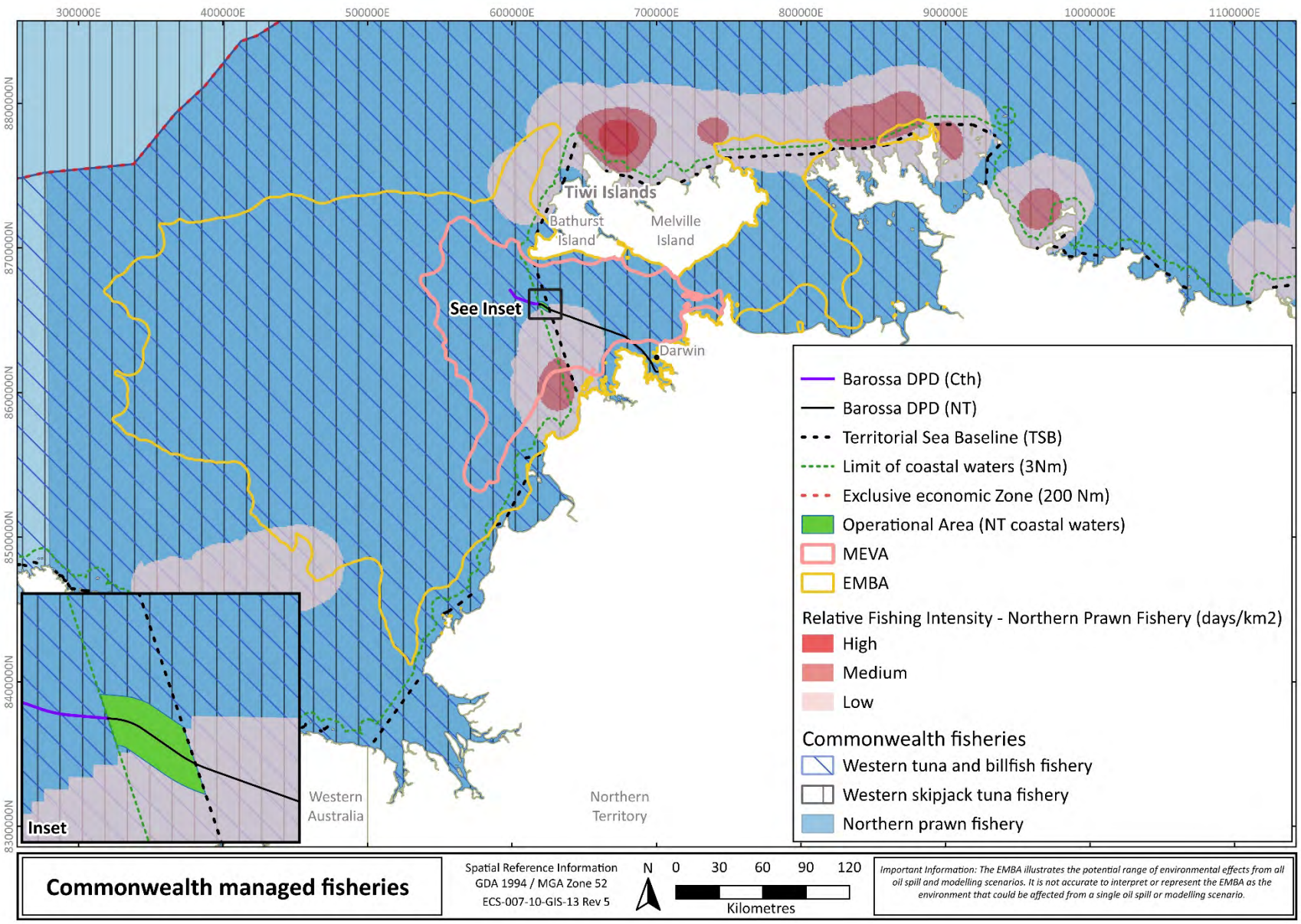


Figure 3-19: Commonwealth-managed fisheries overlapping the OA and/or EMBA

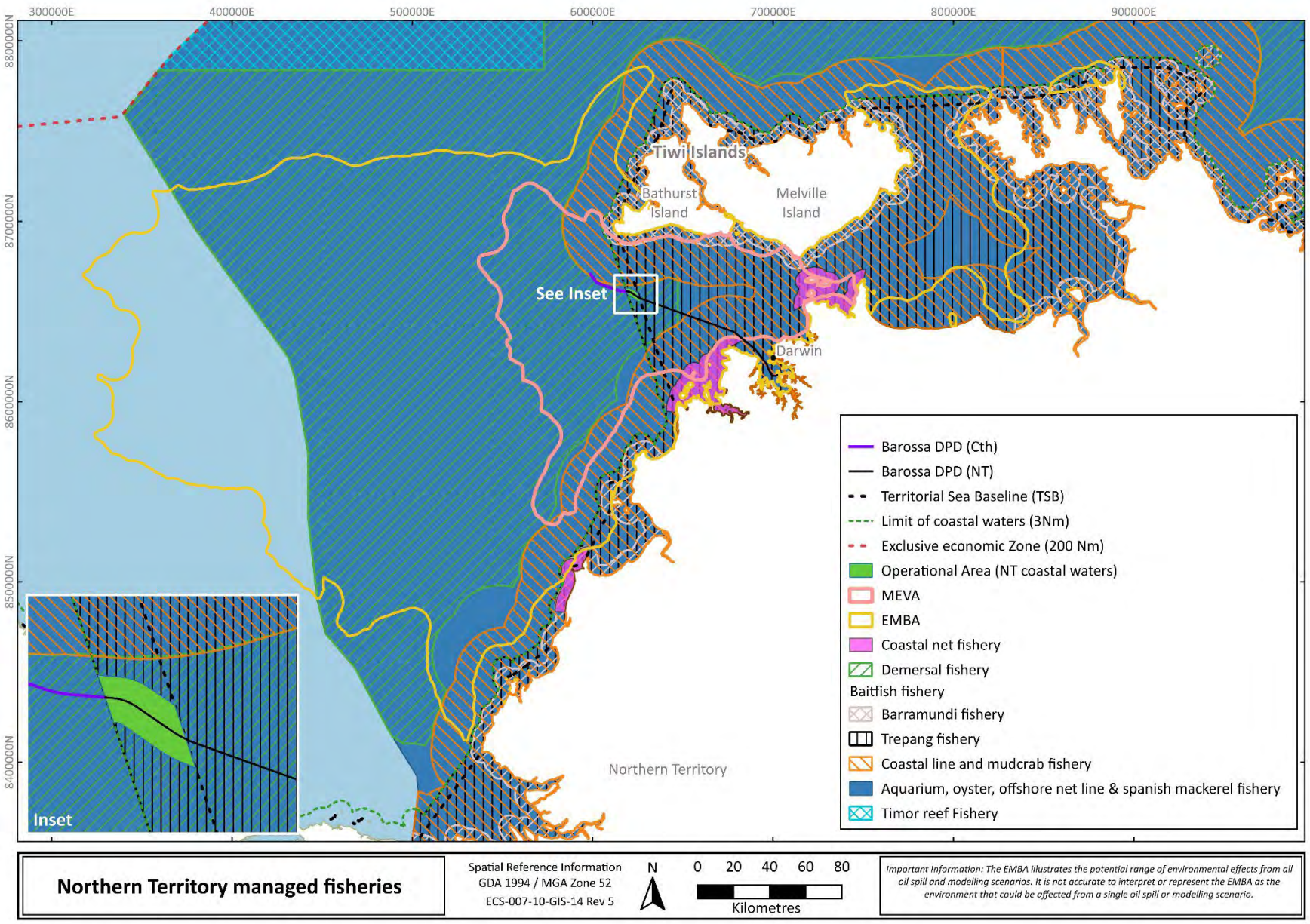


Figure 3-20: Northern Territory managed fisheries overlapping the OA and/or EMBA

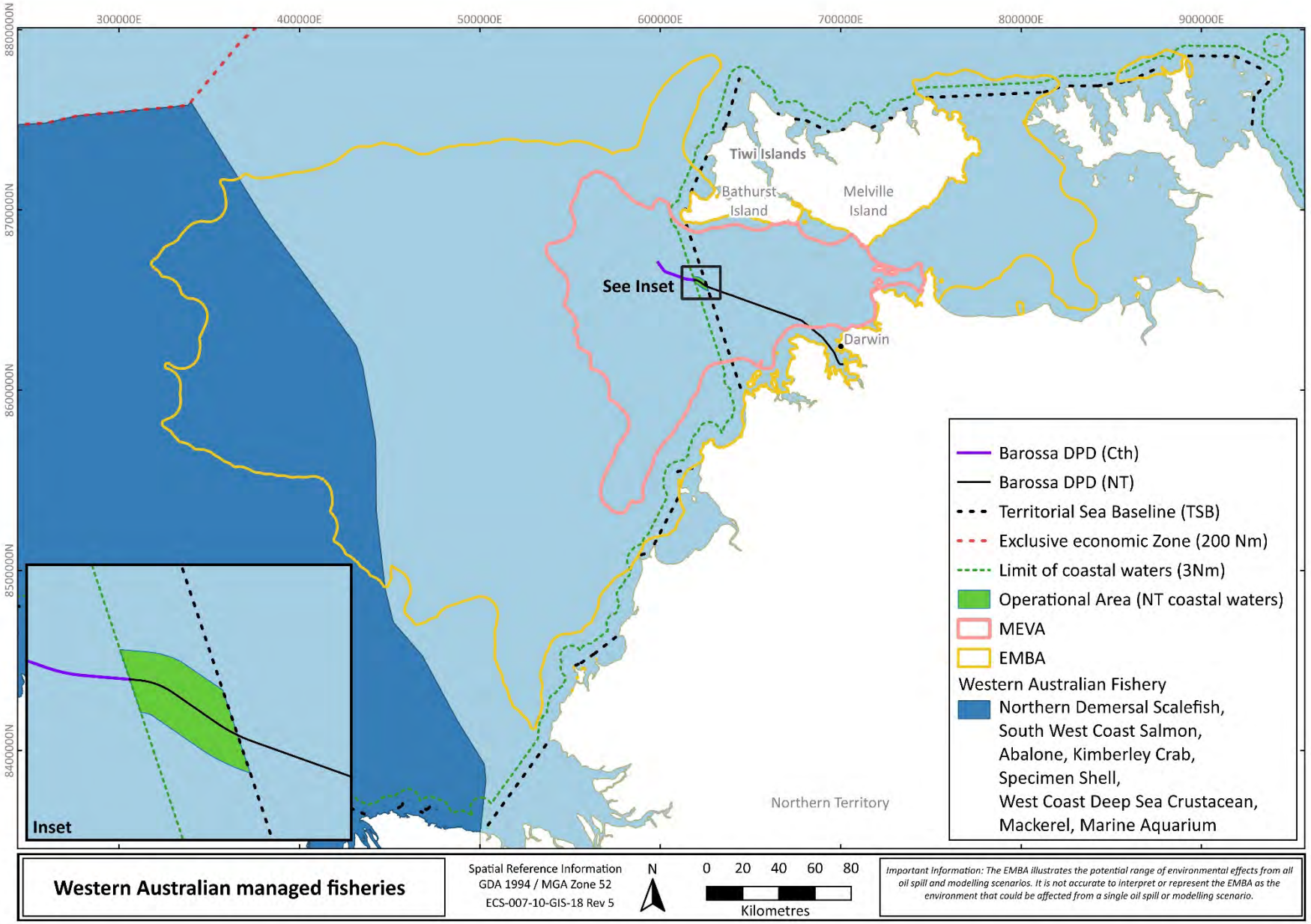


Figure 3-21: Western Australian managed fisheries overlapping the EMBA

3.2.13.2 Energy industry

No established energy operations are located within or in the immediate surrounds of the OA. However, there are 2 existing pipelines within the vicinity— the Santos operated Bayu-Undan pipeline (within the OA) and Ichthys pipeline (16.5 km distance from the OA). The closest operational offshore production facilities and in-field subsea infrastructure are the Eni operated Blacktip Gas, approximately 260 km south-west from the OA and the Santos-operated Bayu–Undan platform, approximately 395 km north-est from the OA.

Petroleum retention lease area and exploration permit leases within the EMBA are held by various energy operators (and subsidiaries) including INPEX Browse, MEO International, Neptune Energy Bonaparte, Eni, EOG Resources and MBS Oil.

3.2.13.3 Defence activities

The OA intersects a practice area, and the EMBA intersects the practice and training areas of the North Australian exercise area and Darwin air weapons range (Figure 3-22). These areas are maritime military zones administered by the Department of Defence and used for offshore naval exercises and onshore weapons-firing training.

The Australian Border Force also undertakes 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 OA and EMBA.

Consultation with the Department of Defence and Australian Border Force is discussed in Section 4. A summary report including the outcomes of consultation with Relevant Persons, including any objections or claims and Santos' assessment of them, satisfying the requirements of section 24(b)(i)-(iii) of the OPGGS(E)R, is provided in Table 4-10.

3.2.13.4 Telecommunications cables

The North-West Cable System (NWCS) is located within the EMBA, approximately 2 km north of the OA at its closest point. 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. Although the NWCS intersects the EMBA, a hydrocarbon spill will not have any impact on submarine cables.

3.2.13.5 Shipping

AMSA has established a network of shipping fairways off the north-west coast of Australia to manage traffic patterns. The shipping fairways are designed to keep shipping traffic away from offshore infrastructure to reduce the risk of a vessel collision (AMSA, 2013).

The use of the fairways is strongly recommended and the International Regulations for Preventing Collisions at Sea 1972 apply to all vessels navigating within or outside the shipping fairways. Under the *Navigation Act 2012* (Cth), certain vessels operating in Australian waters are required to report their location daily to AMSA's Joint Rescue Coordination Centre (JRCC). This Australian Ship Reporting System is an integral part of the Australian Maritime Search and Rescue system.

The OA does not overlap any ports. Darwin Port is a major shipping port in Australia located approximately 60 km south-south east of the OA. In 2022–2023, there were 1,569 vessel calls to port (Landbridge Darwin Port, 2024). Darwin Port is a major port for vessels servicing operations offshore from north-west Australia. The primary shipping channels within the EMBA are between Darwin and Southeast Asian ports. Figure 3-23 illustrates the vessel movement density within the EMBA. Average vessel displacements and speeds for shipping vessels transiting the EMBA and OA include:

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

Although Darwin Port is the primary active port in the region, there is a port, Port Melville, located at the Tiwi Islands (outside of the EMBA), which is approximately 82 km north-east of the OA and 125 km north of Darwin.

3.2.13.6 Recreation and tourism

In NT there were 817,000 visitors for the purposes of tourism during the year ending June 2023 with a ~$1.4 billion spend (NT Tourism, 2023). While tourism activities (e.g. recreational fishing and boating, charter boat operations) may occur within the OA, they are likely to be transitioning the area to access islands, shoals and shipwrecks outside the OA.

In the NT, 95% of recreational fishing occurs in in areas <5 km from the coastline (West et al., 2022). The peak fishing effort is between October to December and April to June (West et al., 2022). The mainland coastline, several shoals and banks within the EMBA may be visited by small numbers of recreational fishers/charter vessels targeting fish inhabiting these shallower offshore features. The mainland coastline also offers recreation, and cultural and environmental tourism activities.

Scuba diving, snorkelling and other charter vessels are also a significant tourist attraction, with operators visiting the numerous shipwrecks, coral reefs and artificial reefs and embarking on day or multiday trips out to offshore islands and shoals (INPEX Browse, 2010). The peak tourism period occurs between May to October.

The Tiwi Islands are a popular tourist destination offering cruises, fishing, sailing and water tours among other cultural activities. Kakadu National Park is also an important visitor attraction which has coastal values that intersect the EMBA. Tourism and recreational activities are likely to be more concentrated within coastal waters of the EMBA, but activities such as deep-water fishing, diving and snorkelling around offshore shoals and reefs may potentially take place in offshore areas of the EMBA.

3.2.13.7 Underwater cultural heritage

Historic shipwrecks and sunken aircraft, including associated artefacts that have been in Australian waters more than 75 years, are subject to automatic protection under the UCH Act. Shipwrecks, sunken aircraft and other types of UCH that have been underwater for less than 75 years can be protected through an individual declaration by DCCEEW based on an assessment of heritage significance (DCCEEW, 2024). Underwater cultural heritage artefacts continue to be protected after removal from the water.

There is one declared protected UCH site within the OA, the wreck of Japanese submarine 1-124 (see Figure 3-24). During the design phase of the DPD Project, the DPD pipeline route was deviated to avoid the I-124 Japanese wreck and its 800m radial exclusion zone, with the pipeline route passing 100m to the east of the exclusion zone at its closest point.

Multiple known shipwrecks, sunken aircraft, and historic (more than 75 years old) aircraft and shipwrecks and other sites occur within the EMBA (see Figure 3-24).Table 3-17 describes the known and located UCH sites protected under the UCH Act and *Heritage Act 2011* (NT) within the EMBA and lists the distances to the OA.

Santos engaged Cosmos Archaeology to undertake a maritime archaeological heritage assessment (MAHA) (Cosmos Archaeology, 2022; Appendix G of the Coastal Waters CEMP) along the DPD pipeline route. The study area of the MAHA is defined as a minimum 1,000 m buffer on either side of the DPD pipeline route (i.e. both Commonwealth and NT waters, including NT Coastal Waters). An archaeological scope of works prepared by the Department of Territory Families, Housing and Communities, NT Heritage branch (DTFHC-NT-Heritage), in November 2021, informed the Cosmos Archaeology assessment. Cosmos Archaeology analysed data collected during the geophysical survey conducted by Fugro in 2021. The study found three seabed anomalies representing potential cultural objects (i.e. not natural in origin) within the MAHA study area, between pipeline kilometre point (KP) 25 to KP28 (Cosmos Archaeology, 2022). Two of these objects, which could not be determined as natural or cultural, were identified between 143 and 214 m away from the pipeline route and another single high-relief feature was located 68m from the pipeline route. This latter anomaly was considered as having only a remote chance of being associated with the I-124 wreck given its distance of over 2.5 km away from the centre point of the wreck (Cosmos Archaeology, 2022). Given the distance of these anomalies from the pipeline route and the nature of the installation activity, these anomalies were not considered likely to be impacted by the pipeline installation activity, and no further work to further identify them was recommended by Cosmos Archaeology (2022).

Cosmos Archaeology also noted that 29 known but unlocated shipwrecks and 25 known but unlocated aircraft wrecks are believed to have sunk within the MAHA study area vicinity based on recorded historical accounts (Cosmos Archaeology, 2022). Therefore, these unlocated shipwrecks and aircraft wrecks could potentially be located within the EMBA but outside the OA. Cosmos Archaeology identified 17 known shipwrecks, 5 unexploded ordnance (UXO) and 6 instances of maritime infrastructure (including anti-submarine defences and telegraph cables) within the MAHA study area (outside of the OA) (Cosmos Archaeology, 2022).

Table 3-17: Located UCH protected under UCH Act and *Heritage Act 2011* (NT) and distance to OA

Name	Protected under the UCH Act	Underwater heritage protected zones	Protected under the *Heritage Act 2011* (NT)	Description	Site distance to OA (~km)
B-25D Mitchell N5-140	✓	×	×	Aircraft crashed off the coast of Nightcliff, NT in April 1943, cause unknown.	77
Booya	×	✓ 150 m under Heritage Act 2011 (NT)	✓	Sailing vessel wrecked during Cyclone Tracy in 1974.	70
Brisbane	✓	×	×	Vessel struck Fish Reef near the entrance to Bynoe Harbour, NT in October 1881 where it became permanently stranded.	42
British Motorist	✓	×	✓	Vessel sunk during attacks by Japanese aircraft in February 1942, while in use by the British Merchant Navy for fuel transportation purposes.	81
Catalina PBY-4 PatWing10 #4 or #8 ("Catalina 6")	✓	×	✓	One of 3 Catalina aircrafts sunk at mooring in February 1942 by Japanese air raid. Part of USN Patrol Wing 10.	87
Dakota A65-115 (VH-RGC)	✓	×	×	Aircraft crashed off the coast of Mindil Beach, NT in September 1945.	75
Ellengowan	✓	×	✓	Vessel sank at its moorings at the Channel Island quarantine station anchorage in 1888.	87
HMAS *Kelat*	✓	×	✓	Ship was sunk during attacks by Japanese aircraft in February 1942.	86
HMAS *Neptuna*	✓	×	✓	Ship was sunk during attacks by Japanese aircraft during February 1942, while in use by the Allies to transport people, troops and supplies.	82
HMAT *Zealandia*	✓	×	✓	Ship was sunk during attacks by Japanese aircraft in February 1942, while in use by the Allies to transport people, troops and supplies.	82
I-124 (Submarine)	✓	✓ 800 m under the UCH Act	×	The submarine was sunk by multiple attacks by Allied Forces including Australian and US in January 1942. I-124 was an Imperial Japanese Navy minelaying submarine and the sinking resulted in the loss of all 74 crew.	overlaps
RAAF Catalina A24-1 (“Catalina 1”)	✓	×	✓	Aircraft crashed during takeoff in August 1945.	92
RAAF Catalina A24-206 (“Catalina 3”)	✓	×	×	Aircraft sunk from accidental depth charge explosion June 1945.	89
RAAF Catalina A24-69 (“Catalina 2”)	✓	×	×	Aircraft caught fire by accident in December 1945 while moored in Darwin Harbour, NT.	87
Spitfire A58-372 (ex-JG106)	✓	×	✓	Aircraft crashed into Clarence Strait, NT in July 1945.	120
SS *Florence D*	✓	✓ 800 m under the UCH Act	×	Ship was sunk during attacks by Japanese aircrafts in February 1942, while chartered by the US Navy to serve as a blockade runner to transport supplies.	96.5

Name	Protected under the UCH Act	Underwater heritage protected zones	Protected under the *Heritage Act 2011* (NT)	Description	Site distance to OA (~km)
SS *Macumba*	✓	✓ 800 m under the UCH Act	×	Merchant ship was sunk during an attack by 2 Japanese aircraft in August 1943, while carrying supplies and war materials from Brisbane to Darwin.	496
Subsea telegraph cable – duplicate	×	×	✓	Duplicate subsea telegraph cable linking Darwin cable station to Banjoewangi cable station, Java, Indonesia. The duplicate cable was of the same composition as the original 1871 cable.	23
Subsea telegraph cable –replacement	×	×	✓	Replacement subsea telegraph cable linking Darwin cable station to Banjoewangi cable station, Java, Indonesia. Cable is of similar composition to the earlier 2 but contained an additional layer of brass tape around the core to protect the cable from marine borer (namely *Teredo navalis*) attack.	46
Subsea telegraph cables landing	×	×	✓	First installation of an approximately 1,561 km long subsea telegraph cable linking Darwin cable station to Banjoewangi cable station, Java, Indonesia. The cable consists of seven stranded copper wires, insulated with gutta-percha latex, sheathed in galvanised iron wire armour, and an outside covering of tarred hemp.	81
USAT *Don Isidro*	✓	×	×	Vessel was sunk during Japanese aircraft during February 1942, while in use by the British Merchant Navy for fuel transportation purposes.	42
USAT *Mauna Loa*	✓	✓ 100 m under *Heritage Act 2011* (NT)	✓	Ship was sunk during attacks by Japanese aircraft in February 1942, while chartered by the US Navy to transport supplies.	41
USAT *Meigs*	✓	✓ 100 m under *Heritage Act 2011* (NT)	✓	Ship was sunk during attacks by Japanese aircraft in February 1942, while chartered by the US Navy to transport supplies.	79
USN Catalina PatWing 10 #41 ("Catalina 4")	✓	×	✓	One of 3 Catalinas sunk at mooring in February 1942 by Japanese air raid. Part of USN Patrol Wing 10.	88.5
USN Catalina PatWing10 #4 or #8 ("Catalina 5")	✓	×	✓	One of 3 Catalinas sunk at mooring in February 1942 by Japanese air raid. Part of USN Patrol Wing 10.	89
USS *Peary*	✓	✓ 100 m under *Heritage Act 2011* (NT)	✓	Ship was sunk during attacks by Japanese aircraft in February 1942.	80

During the Last Glacial Maximum, sea level was at its minimum at 125 m below the present-day sea level (Wessex, 2023). A significant portion of the EMBA is within the 125 m depth contour, which represents the furthest extent of historical human habitation and potential for First Nations UCH. Water depths within the OA are between approximately 40 m to 50 m; therefore, there is potential for unknown First Nations UCH to exist in the OA. Given the extent of time since sea levels were at these low levels (~20,000 years ago), terrestrial landforms, and any associated heritage artefacts, within the EMBA are likely to have been significantly influenced, over thousands of years, by environmental processes of erosion, sedimentation and deposition as sea levels increased to their present levels (Posamentier, 2023).

Santos engaged OzArk Environment and Heritage (OzArk) to conduct a desktop First Nations archaeological assessment for the DPD Project Area, based on a detailed geomorphological assessment. This study focussed on the likelihood for deposits associated with the Last Glacial Maximum (LGM) to be impacted by the DPD Project. Only one location was identified where potential sediments associated with the LGM were indicated; this was in the vicinity of KP36.4 to 37.9 (outside of the OA for this Activity) (OzArk, 2024). At this location, potential sediments are assessed likely to be at a depth of approximately 18 m below the sea floor. At this depth, no activities related to the construction of the DPD project will have any direct or indirect impact on these potential sediments. In any event, the location of the potential sediments associated with the LGM is outside the OA (OzArk, 2024). No known First Nations UCH sites were identified by OzArk (2024) within the OA. The OzArk (2024) report, including recommendations is available on the Santos website: https://www.santos.com/wp-content/uploads/2024/09/Desktop-First-Nations-Archaeological-Assessment-Summary-Report-Darwin-Pipeline-Duplication-Project-KP0-31.pdf.

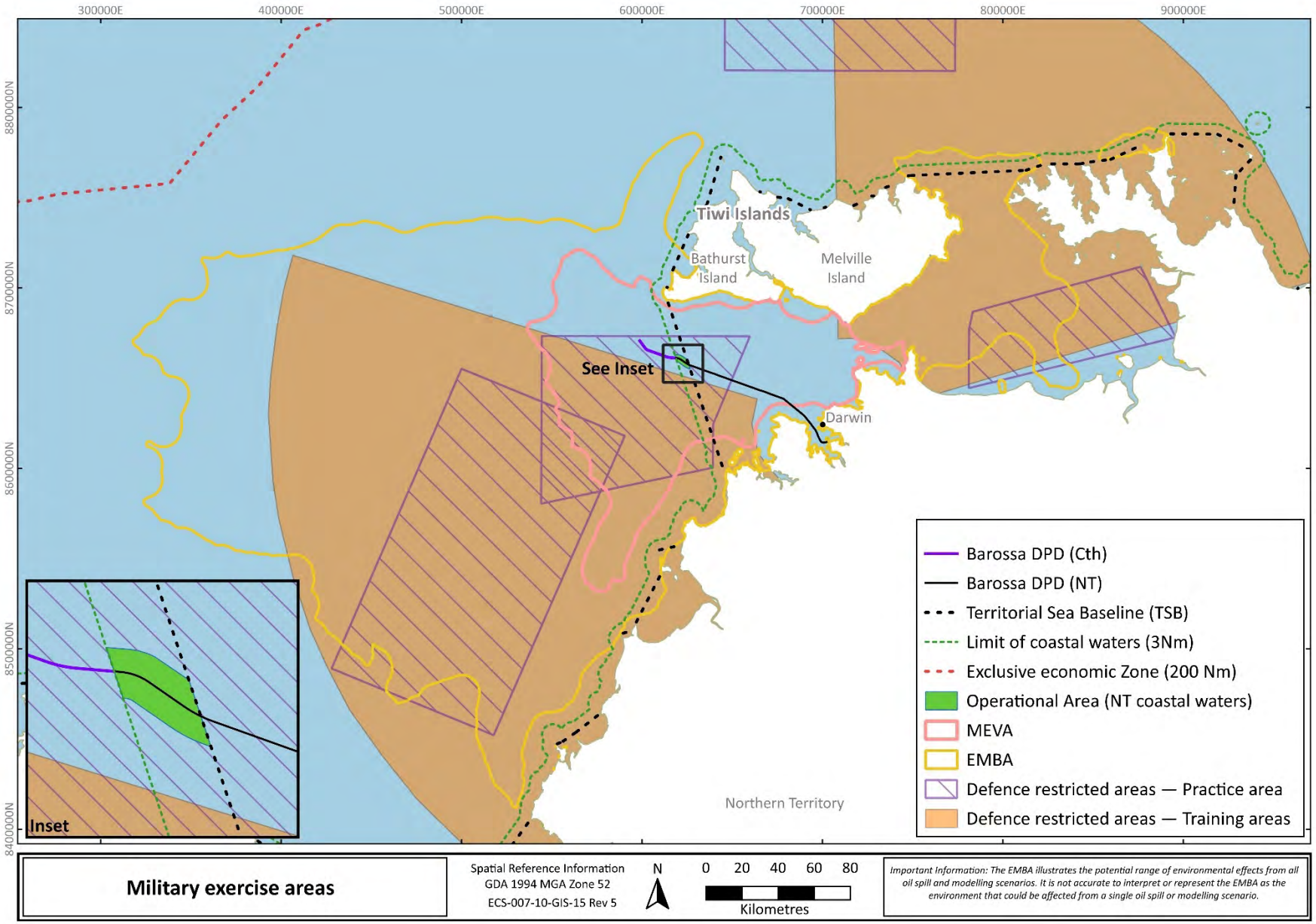


Figure 3-22: Defence training and exercise areas within the EMBA

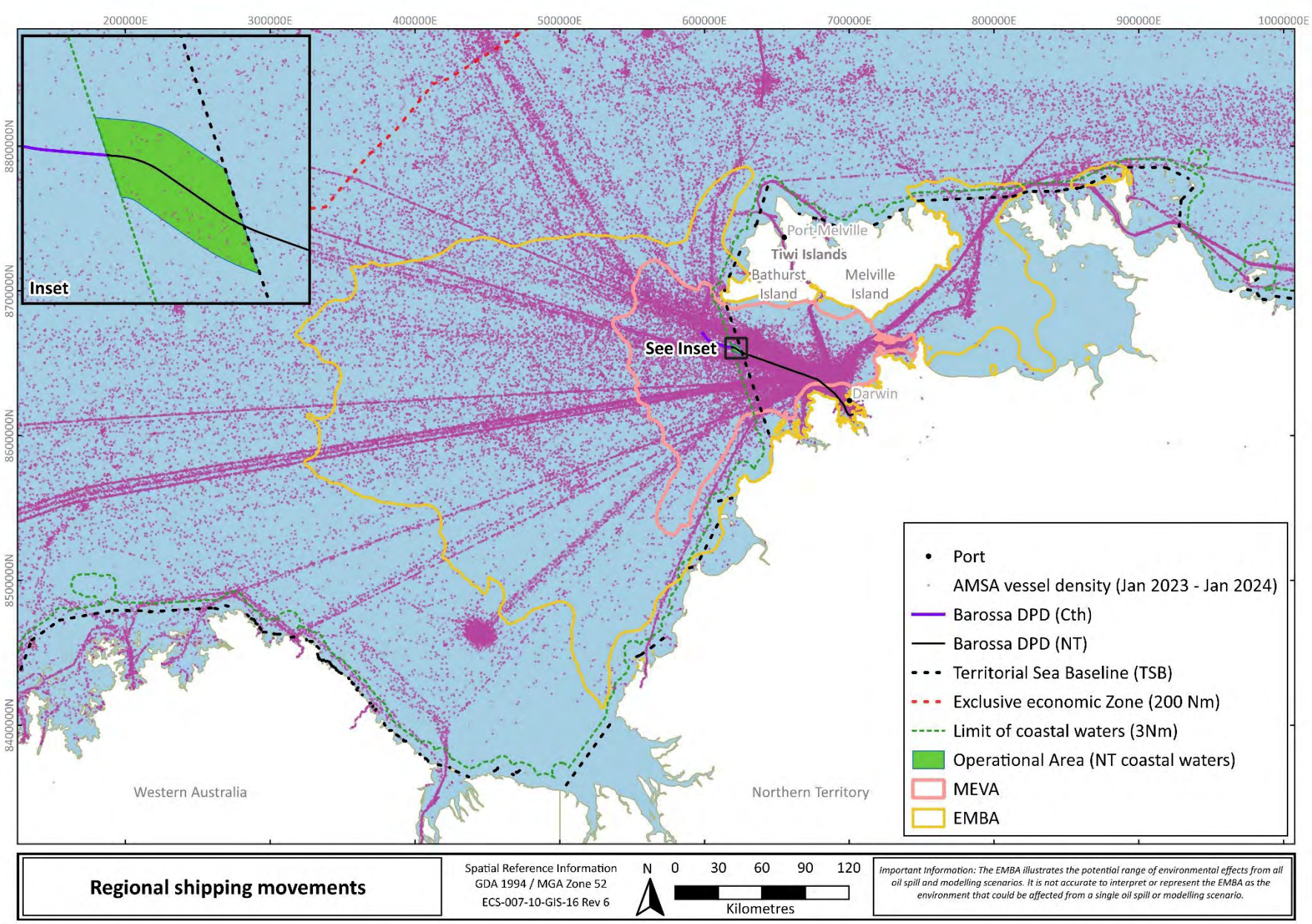


Figure 3-23: Regional shipping movements overlapping or proximal to the EMBA

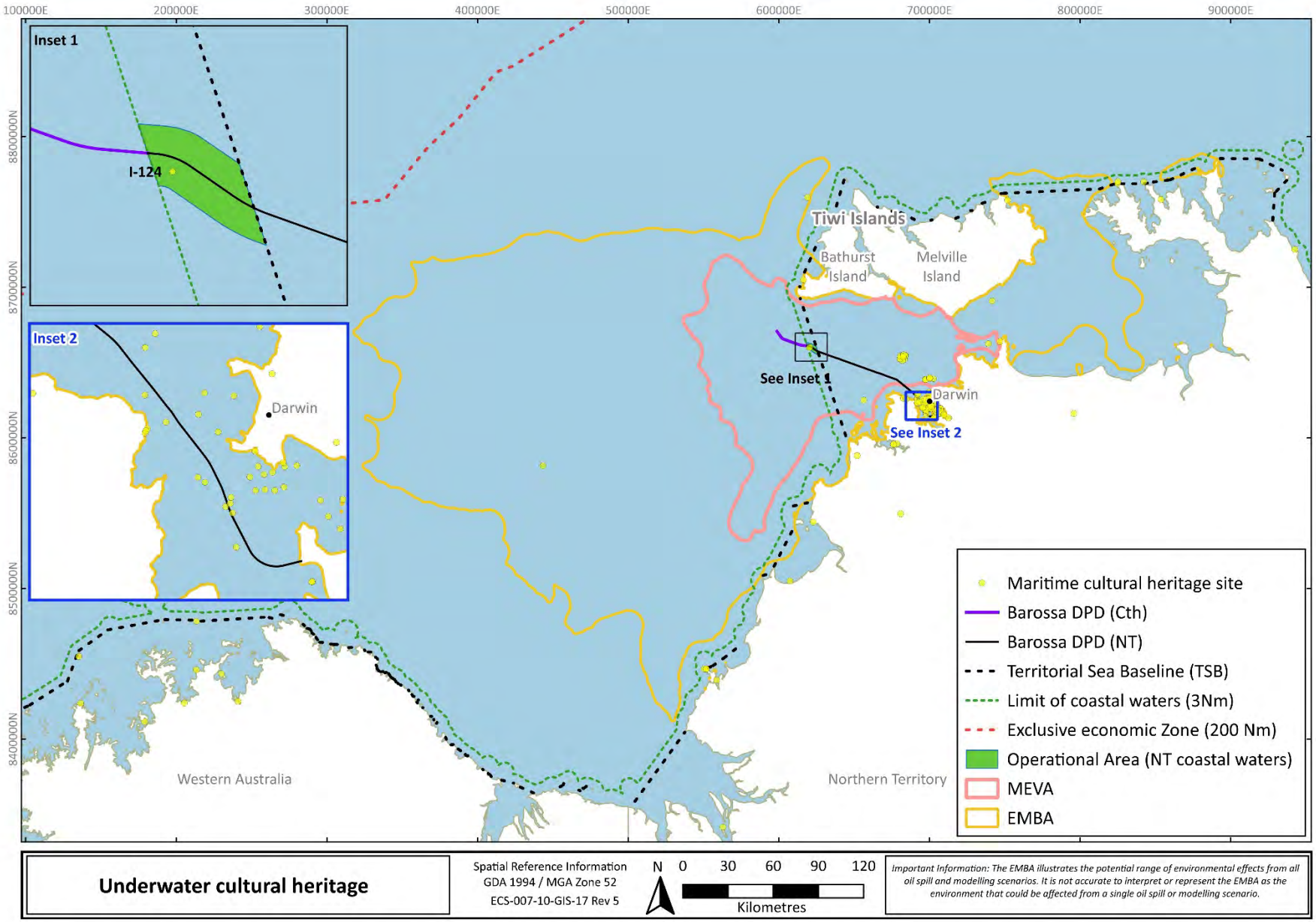


Figure 3-24: Underwater cultural heritage overlapping or proximal to the EMBA

3.2.14 Cultural features

Sections 3.2.14.1 to 3.2.14.12 provide detail on cultural features within the EMBA, other than the protected underwater cultural heritage sites described in Section 3.2.13.7.

3.2.14.1 Meaning of 'cultural features'

In its evaluation, Santos has had close regard to the Court's guidance and findings in *Munkara v Santos NA Barossa Pty Ltd (No 3)* [2024] FCA 9 (*Munkara*) in identifying the cultural features of the environment. In *Munkara*, the Court clarified the meaning of 'cultural features' in the definition of 'environment' in section 4 (now section 5) of the OPGGS(E)R:

- The phrase cultural features has a 'communal aspect' to it. This necessitates that individual beliefs are broadly representative of the beliefs of other members of the group, although there does not need to be consensus [10]. An idiosyncratic view or belief of an individual may be a manifestation of the culture of that person's society, but if it is not broadly representative of the beliefs of a group, then it will not constitute a cultural feature [11].

In the context of limb (a) of the definition of 'environment', 'cultural features' attaches to the word 'ecosystem' with all of its constituent parts, including people and communities. The focus must remain on the ecosystem, of which people form a part. This focus is not upon an individual person devoid of the context of the ecosystem [12].

- In the context of limb (c) of the definition of 'environment', each of the circumstances that:
  - an area is the subject of a spiritual connection to Aboriginal people, provided that the connection is by the laws and customs of *a people* [13];
  - an 'area' is the country of an Aboriginal person in accordance with Aboriginal traditional laws and customs [14]; and
  - there exists in those areas, locations or places cultural heritage in the form of artefacts or other objects evidencing human occupation and activities over the course of human history [15],

  may readily be described as a 'cultural feature' of that location, place or area.
- In order for there to be a 'cultural feature' of the environment, there must be a 'sufficiently cogent or coherent belief' that is 'sufficiently accepted' so that it can be described as having normative content for the people or community viewed as a constituent part of an ecosystem, such that a singular perspective will not suffice [16]. The beliefs and values must be held by the Relevant People as a people [17]. Further, the question of whether a view is sufficiently cogent or coherent may be answered by reference to the customs and practices of the Relevant People, including relevant customs and practices concerning the authority to speak on a topic or relevant customs and practices (if any) concerning the resolution of division [18].
- The inquiry as to what is 'broadly representative' must be undertaken in the proper cultural context, including by assessing which persons are generally accepted as having authority to speak on the particular topic and excluding those persons who are culturally irrelevant [19].
- Evidence of dissenting views cannot be ignored, because they tend against a finding that beliefs have broad acceptance [20].
- Proof that beliefs are broadly representative will be more difficult in the face of discord within the relevant group, and even more so when the discord is among persons of equivalent authority and persons having the same lineage [21].

[10] *Munkara at [922], and see also at [194]-[199].*
[11] *Munkara at [204].*
[12] *Munkara at [204].*
[13] *Munkara at [201].*
[14] *Munkara at [855].*
[15] *Munkara at [200].*
[16] *Munkara at [206].*
[17] *Munkara at [208].*
[18] *Munkara at [206].*
[19] *Munkara at [923].*
[20] *Munkara at [923].*
[21] *Munkara at [924].*

3.2.14.2 Introduction

First Nations people have occupied the Australian continent for a period in the order of 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), A*boriginal and Torres Strait Islander Heritage Protection Act 1984* (Cth) (ATSIHP Act), UCH Act, *Aboriginal Land Rights (Northern Territory) Act 1976* (Cth) (ALR Act) and *Northern Territory Aboriginal Sacred Sites Act 1989* (NT) (NTASS Act) (see Section 3.2.14.3 to 3.2.14.7).

In identifying the cultural features of the OA and EMBA, Santos has considered:

1. information shared during consultation for the Commonwealth Waters DPD EP and the Coastal Waters CEMP;
2. information shared during consultation/engagement relevant to other Barossa EPs;
3. lay and expert evidence adduced in *Munkara*, as well as the court's reasoning and findings;
4. expert advice provided by consultant anthropologists (some of which was considered by the Court in *Munkara*); and
5. other publicly available information.

Information about potential cultural features obtained during consultation/engagement for D&C EP, SURF EP and GEP EPs has been considered and included in the Coastal Waters CEMP where potentially relevant, having regard to the recent guidance in *Munkara*.

Further to point 2 above, Santos was provided with information by First Nations people during consultation meetings for the D&C EP and by NOPSEMA in the course of preparing the D&C EP. NOPSEMA provided Santos with 4 separate letters from 4 Tiwi clan members to NOPSEMA in April 2022 requesting the statement of reasons for NOPSEMA's decision to accept Revision 3 of the D&C EP (2022 Statement of Reasons Requests[22]), and asked Santos to consider the relevance of the information provided in the letters to the D&C EP. Items raised in the letters from the Tiwi clan members include traditional hunting of marine species, totem species, dreamings, songlines and sacred sites, as well as broad concerns about potential impacts from other Barossa Gas Project activities (e.g. noise and light emissions) on the environment. Santos considered this feedback relevant to the Coastal Waters CEMP given:

- songlines, sea country and sacred sites may occur in the general wider area of the Barossa Gas Project,
- the movement of marine and totemic species may occur within the EMBA for the Coastal Waters CEMP, and
- potential environmental impacts associated with this Activity are similar to those associated with the D&C activity (such as noise and light).

Santos also notes that the Tiwi clan members who sent the April 2022 letters attended multiple Tiwi clan consultation sessions for the Coastal Waters CEMP. As described in Section 4, Santos provided Tiwi people (including the authors of the four letters) extensive opportunities for consultation specifically on the activities proposed to be conducted under the Coastal Waters CEMP.

[22] *2022 Statement of Reasons Requests asked for copies of statement of reasons to be sent to EDO email addresses.*

Further to point 4 above, 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 north-west of the Tiwi Islands ("Corrigan 2023 Report"). As part of his work, Dr Corrigan reviewed extensive ethnographic studies of the Tiwi people in order to gain an historical understanding of their society, culture and hierarchy, and conducted extensive interviews amongst the communities.

In addition, Dr Corrigan has also prepared an anthropological survey report ("Corrigan 2024 Report") on cultural and spiritual values in relation to the DPD Project which includes this OA. The Corrigan 2024 Report is based on a review of all relevant available ethnographic, linguistic and historical materials and consultations with key First Nations persons identified as having cultural and spiritual knowledge and authority associated with the study area. As far as possible, all persons understood to hold cultural and spiritual rights and interests in the study area, including those who assert relevant cultural knowledge, were identified and invited to participate.

Dr Corrigan concluded that a precise boundary which captures the extent of interests of both the Tiwi Islanders and Larrakia Peoples' in the context of the DPD and GEP is unclear. However, cultural and spiritual values of these groups are understood as extending out into the seas for an indeterminate distance. For example, the spiritual beings Jirukupai (crocodile man) and Ampitji are thought by Tiwi Islanders to travel in the surrounding sea, but it unclear precisely how far. This is also consistent with a range of views put to the Federal Court more recently, in the context of the GEP EP (see for example, Corrigan 2023). Similarly, Tiwi Islanders routinely travel large distances at sea for the purpose of fishing and hunting turtle and dugong. However, there is no settled evidentiary data on the actual extent of these cultural and economic activities in the context of a sea country claim or the like.

There are no native title claims or determinations registered or First Nations sites recorded under the ATSIHP Act, UCH Act or ALR Act, Aboriginal land rights claimed or granted under the ALR Act or Indigenous Protected Areas (IPAs) within the OA.

3.2.14.3 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 NT Act 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 for obtaining a positive determination of native title in court is proving that there is an organised group that occupied 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 apply to 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 been recognised to have 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, there are no native title claims or determinations that overlap with the OA; however the EMBA intersects the Croker Island and Larrakia native title determinations (refer to Figure 3-25). The areas of responsibility for regional native title representative bodies that overlap the EMBA are shown in Figure 3-26.\

3.2.14.4 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 OA; however, the EMBA does overlap the areas of land and tidal waters (between the low water mark and the high water mark) of the Kenbi ILUA and a small coastal portion of the Mary River ILUA (refer to Figure 3-25).

The Northern Land Council (NLC) is a party to the Kenbi ILUA and NLC and members of the Wulna Clan (refer Table 4-7) are parties to the Mary River ILUA.

3.2.14.5 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 5 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.

There are no IPAs that overlap the OA or EMBA (refer to Figure 3-25).

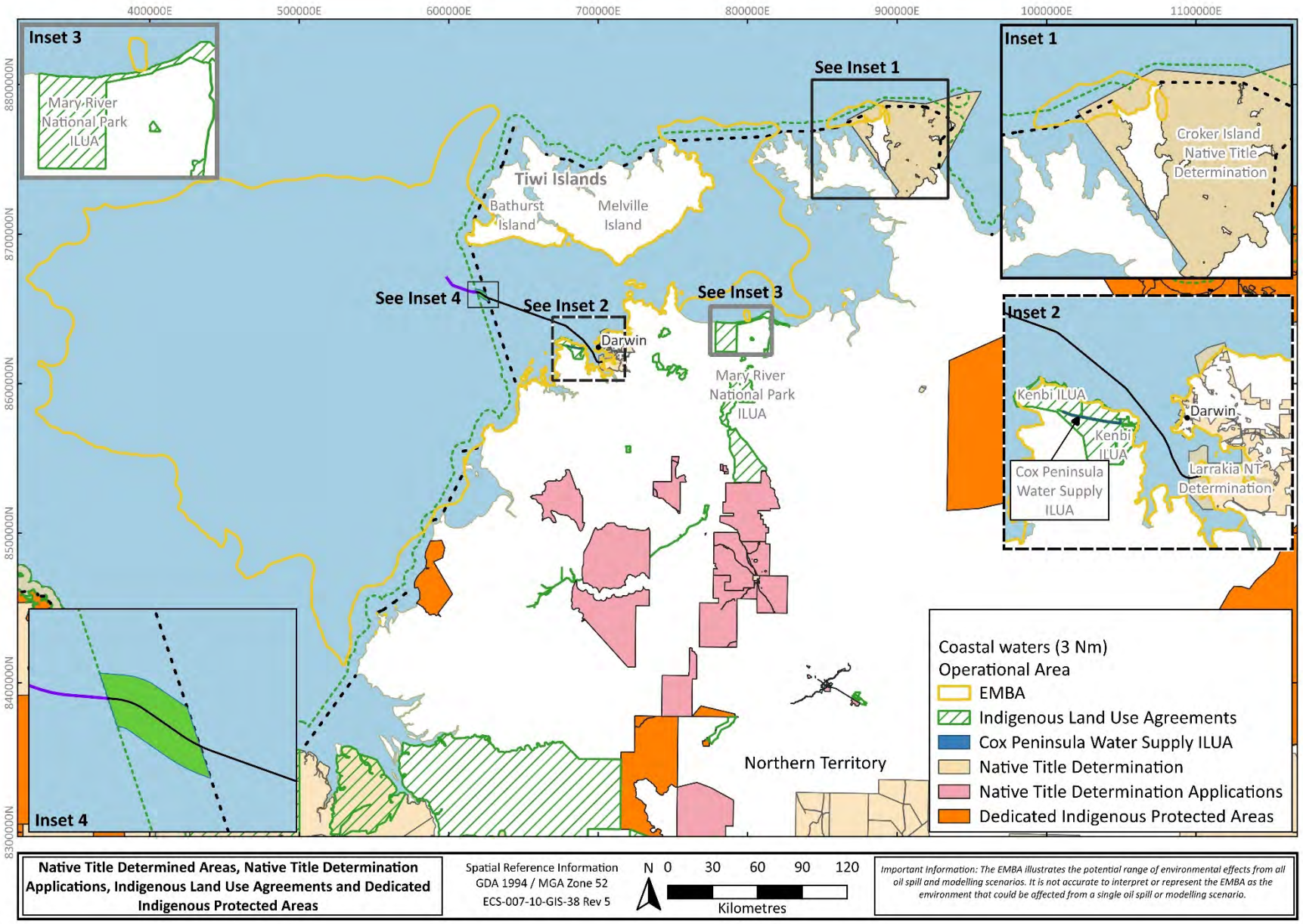


Figure 3-25: Native Title Determined Areas and Applications, ILUAs and IPAs

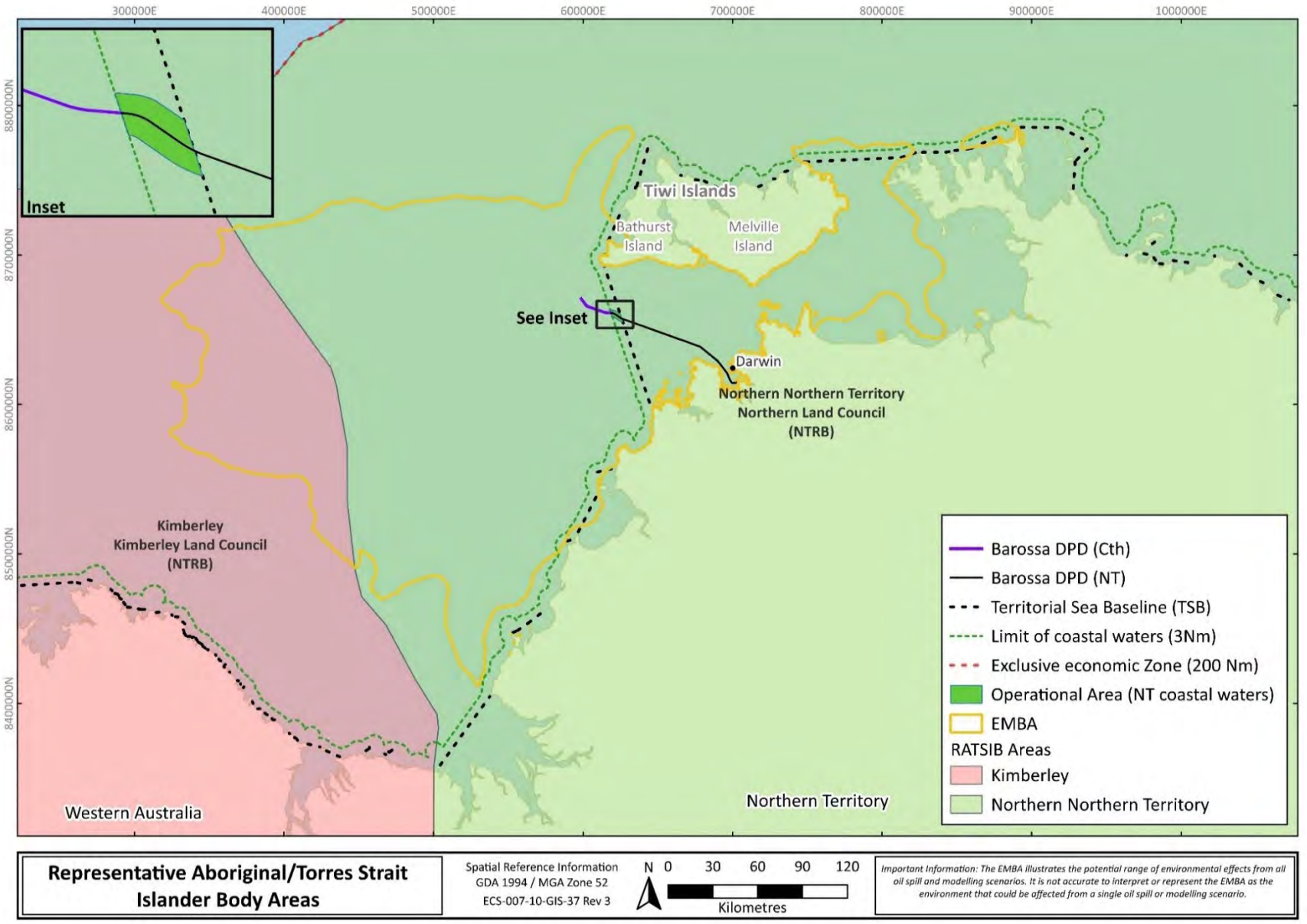


Figure 3-26:Representative Aboriginal/Torres Strait Islander Body Areas

3.2.14.6 Sacred sites

Santos has applied for, and received on 23 December 2022, an Authority Certificate (C2022-098) from the Aboriginal Areas Protection Authority (AAPA), which covers potential seabed disturbance along the pipeline route in NT waters and a nominal ~1,000m buffer each side of the pipeline route, including the DPD pipeline route in the OA. Based on AAPA's research findings, there were no registered or recorded sacred sites, protected under the *Northern Territory Aboriginal Sacred Sites Act 1989* (NT) (NTASS Act), identified within or adjacent to the area represented by a ~1,000m buffer each side of the pipeline route within the OA, nor any specific certificate conditions related to activities within the buffer area.

There are many NT coastal sites along the mainland and island coastlines and potentially the surrounding waters that overlap the EMBA that are protected under the NTASS Act (whether registered, recorded, or not). These sacred sites may include features which lie both above and below the water (AAPA, 2022).

There are extensive coastal areas (down to the low water mark) that intersect the EMBA which are formally recognised as Aboriginal land under the ALR Act.

Members of the Agalda clan, representing western parts of the Cobourg Peninsula, including coastal areas and adjacent sea country, raised with Santos during consultation on the Commonwealth Waters DPD EP and the Coastal Waters CEMP that there are sacred sites around the west and south of Coburg and Croker Island (refer Table 4-10). During consultation meetings for the SURF EP, Santos was also provided with sacred site locations within the EMBA by some members of the Tiwi Island clans. These sacred sites are located on the western coast of Bathurst Island that may also potentially intersect the outer boundary of the EMBA for this Activity.

The Kenbi (Cox Peninsula) Land Claim No. 37 (CoA, 2000) publishes detail on the location and significance of culturally significant First Nations sites within Darwin Harbour and Bynoe Harbour (south-west of Darwin Harbour and separated by the Cox Peninsula), including registered sacred sites. These sites and areas include those used for hunting, fishing, gathering, camping, ceremonies and associated with dreamings. There are numerous sites identified in this report within the EMBA, including those associated with dreamings of totemic marine fauna species, including Ngalwatnyini (manta ray dreaming), Memarrandjamul-nyini (dugong dreaming), Iyn.garrayn-nyini (sea turtle dreaming) (CoA, 2000). The report also identifies 3 sites on the north-eastern side of Darwin Harbour.

All sacred sites in the NT are protected in accordance with the NTASS Act. Sacred sites may also be protected under the ATSIHP Act, *Heritage Act 2011* (NT), the UCH Act, the ALR Act or the EPBC Act. [23]

Sacred sites may be in sea country (whether registered, recorded or not), with access not permitted within 100 metres of any such sacred site, though some sacred sites may have more restrictive access. No sacred sites have been found to be directly impacted by the DPD Project footprint (Corrigan 2024).

3.2.14.7 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 ALTs to hold title to Aboriginal land granted in the NT under that Act.

Aboriginal land rights governed under the ALR Act do not extend past the low water mark of tidal waters overlaying the NT 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 NT coastline have exclusive access rights to the tidal waters overlying their land.

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 OA. The EMBA does overlap areas of land and tidal waters (between the low water mark and the high water mark) granted under the ALR Act. This Aboriginal land is held by the Arnhem Land ALT, the Cobourg Peninsula Sanctuary ALT, the Tiwi ALT, the Kenbi ALT, and the Delissaville/ Wagait/ Larrakia ALT (CoA, 2023).

Section 5(2) of the ALR Act provides that ALTs cannot exercise their functions in relation to land they hold except in accordance with directions given to them by the Land Council for the area in which the relevant land is situated. Where any such directions are given, ALTs must comply with them. Accordingly, ALTs cannot act independently of Land Councils. Under the ALR Act, the functions of Land Councils with respect to ALTs involve administering ALTs

[23] *For completeness Santos notes that on 23 October 2023 it was informed by the DCCEEW that applications had been received under the ATSIHP Act in relation to certain areas of the sea. Santos understands that these areas are outside the OA but overlap the EMBA. Santos understands that no decisions have been made by the Minister in relation to the applications at the time of writing.*

in their area, including storing their common seals and deeds of grant, maintaining a register of ALT membership, negotiating agreements on behalf of ALTs and receiving moneys on behalf of ALTs.

The NLC is the relevant Land Council for the Arnhem Land, Cobourg Peninsula Sanctuary, Kenbi and Delissaville/Wagait/Larrakia ALTs, while the TLC is the relevant Land Council for the Tiwi ALT.

3.2.14.8 Marine parks

The EMBA for the Coastal Waters CEMP overlaps with features of the North MPNMP and the North-West MPNMP, which identify natural, cultural and spiritual values associated with AMPs, specifically 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 into natural, cultural, heritage and socioeconomic categories. 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.

3.2.14.9 Cultural fishing, hunting and gathering

First Nations fishing activity in NT waters predominantly occurs within inshore tidal waters. Approximately 80% of NT's coastline is recognised as being under Aboriginal land and sea ownership under the *Aboriginal Land Rights Act 1976* (NT) (NT Government, 2022). Almost all traditional fishing effort (~93%) is concentrated within NT Internal and Coastal Waters (up to 3 Nm beyond the territorial baseline) and Tiwi Islands (NT Government, 2017).

Darwin Harbour is utilised by Larrakia people for collecting marine resources, including fishing, hunting, crabbing and the collection of shellfish (Corrigan, 2024).

For the Tiwi Island people, traditional fishing effort is greatest near the larger communities of Wurrumiyanga on Bathurst Island, and Pirlangimpi and Milikapiti on Melville Island (DPIF, 2014). Traditional subsistence food sources include fish (mullet, mackerel, barramundi, trevally), mud mussels, mud crabs, long bums shellfish, oysters, yams, eggs (turtle and bird), chilli worms, mangrove worms, turtles, stingrays, and dugongs. Green turtles are the main species harvested in the water, while eggs of all turtle species are taken periodically (Tiwi Land Council, 2022). Information provided during Tiwi Clan meetings during consultation for the D&C EP indicated that some Tiwi people have a particular interest in turtles as a traditional food source. Santos was also provided with information during the preparation of the D&C EP from Croker Island members of the community in Minjilang (located outside the EMBA) rely on fish, turtles, dugong, oysters and other marine food sources. During consultation for D&C and the Coastal Waters CEMP, Santos was not provided details about the locations of traditional fishing, hunting and gathering activities.

Feedback from the 2022 Statement of Reasons letters identified the following First Nations people's use of country for fishing/gathering food (fish, shellfish, turtle/turtle eggs, (mud) mussels, (mud) crabs, yams, mullets, mangrove worm, mackerel, barramundi, trevally, (black lip) oysters, chilli worm, stingray, dugong and seagull eggs.

Traditional subsistence food sources are captured in a culturally appropriate manner learnt from ancestral generations and taught to emerging descendants. This occurs in normal family and community circumstances as well as within the practices of the First Nations groups (Corrigan, 2024).

With the support of the NT Government, Darwin Aquaculture Centre is working with Tiwi People to develop aquacultural enterprises that provide employment and business opportunities (Land Development Corporation, n.d.). Aquacultural options include Barramundi, Trepang, Mud Crab, Prawns, Oysters and Clams (Tiwi Land Council, 2021).

3.2.14.10 Culturally significant marine species

In consultations with Tiwi Clans for the D&C EP, some 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.

As noted above, Santos received the 2022 Statement of Reasons Requests from NOPSEMA in the context of the D&C EP. 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), and that various marine species are traditional food sources for Tiwi people (refer Section 3.2.14.9 on cultural fishing, hunting and gathering). However, the significance of these species was not raised with Santos in its communal consultation sessions with Tiwi people for any of the Barossa EPs, noting that the Tiwi clan members who sent the 2022 Statement of Reasons Requests attended multiple Tiwi clan consultation sessions for the Coastal Waters CEMP.

The NLC in a submission as part of the consultation for the D&C EP indicated a number of marine species that are significant to Aboriginal dreamings including birds, crocodiles, whales, manta rays, crabs, dugong, sea turtle, gropers, sea-eagles, octopus and other turtles. Corrigan (2024) also confirmed that Larrakia people identified turtle, dugong, and stingray dreamings close to Talc Head (within the EMBA) and noting these have significant importance regarding resources and the spiritual dimensions of Larrakia life. Dreamings were identified as being associated with the sea, winds and stars and regarding the moon and the seasons, mermaid dreaming and dreamings near the Charles Point lighthouse. The term dreaming is used throughout the Corrigan 2024 Report to denote knowledge, songs and narratives associated with Aboriginal religious understandings which set out the origins of the social and physical world and expected behaviours within it. Corrigan (2024) also identified species important for protection including turtles, crocodiles, dugong, dolphins and the seagrass beds near Kings Table (within the EMBA).

Terrestrial species of cultural significance are outside the EMBA and therefore are not considered further in the Coastal Waters CEMP.

3.2.14.11 Sea country connection

As outlined in Section 3.2.14.1, Santos acknowledges that the cultural features of the environment include the circumstance that First Nations people have spiritual connections to a particular place within that environment, or that the place forms part of the country of a First Nations group, in accordance with the traditional laws and customs of that group. As such, the circumstance that an area of the environment is part of the sea country of a First Nations group, to which members of that group have a spiritual connection, is a cultural feature of that area of the environment.

The North MPNMP (DNP, 2018a) 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.

The nature of sea country was the subject of extensive lay and expert evidence in the *Munkara* proceeding, to which Santos has had regard in its consideration of cultural features of the environment. Based on this evidence, Santos understands that:

- the concept of country is intimately connected with questions of cultural authority. The First Nations group who is responsible for that area of country has authority to speak in relation to that country, and has custodian responsibilities in respect of that country. One group's area of sea country will end where the next group's begins, although groups may share responsibility for particular Dreamings which traverse different areas of country; and
- sea country connections may manifest in the telling of stories about foundational creation myths explaining features of the landscape or particular species [24].

In order to identify areas of sea country which may be affected by activities under the Coastal Waters CEMP, Santos consulted broadly with First Nations groups and representative organisations both in respect of the Coastal Waters CEMP and its other Barossa EPs. Based on this consultation and Santos' review of publicly available information, Santos has identified that the EMBA likely intersects with sea country, although the geographical extent of sea country interests is inherently indeterminate at this time.

3.2.14.11.1 Features of sea country

In the course of consultation on the Coastal Waters CEMP and previous Barossa EPs, some First Nations Relevant Persons provided additional context as to the manifestation of their sea country connection, being particular stories and creation myths which they believe to be present within the EMBA. Santos acknowledges that expressions of sea country connection may be particular to families and individuals within groups and that there is accordingly divergence in the details of such stories within groups. Notwithstanding this, the information provided is summarised below and has been considered by Santos in the preparation of the Coastal Waters CEMP, including with the benefit of expert anthropological advice.

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 (Corrigan, 2023). This included:

- the travels of the Crocodile Man
- the location and existence of a 'Mother Ampitji'

[24] *Munkara at [866].*

- 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. This is supported by the observations and findings of the Court in *Munkara*[25].

The Corrigan 2024 Report (Corrigan, 2024) also documents input from Larrakia people and relevant First Nations persons from Belyuen and Wagait, who also advise the presence of a range of ancestral beings and dreaming stories of relevance to the Darwin Harbour and surrounding seas. None of these cultural features are known to be associated with any specific or particular places in the DPD Project footprint, but rather have a more general association with the wider area, as well as having associations with particular and specific places outside of the DPD Project footprint.

3.2.14.11.2 Spiritual beings

As part of consultation in the course of preparing the D&C EP 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 D&C EP EMBA, was provided during First Nations consultation meetings for the D&C EP and from other information provided by NOPSEMA to Santos (2022 Statement of Reasons requests).

During Tiwi Clan consultation meetings for the D&C EP, 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. A key Tiwi creation story concerns a spiritual being (or spiritual beings) called Ampitji (sometimes known as a Rainbow Serpent). The Court in *Munkara* considered lay and anthropological evidence about this creation story at [78]-[81], noting that while there was significant divergence in spiritual beliefs concerning Ampitji, it was not disputed that the spiritual belief in one or more Ampitji is a feature of Tiwi spiritual life and that Ampitji may have a role to play in ensuring compliance with Tiwi law.

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 people informed Santos during D&C EP consultation about their connections to sea country. Sea country was defined as to the north of Cape Croker out to the deep water (referred to as Inigarrka). Inigarrka is considered the most sacred place in the ocean and the Croker Island people are prohibited from the sacred area. Santos recognises the potential for sea country and songlines to extend into the EMBA for the activity the subject of the Coastal Waters CEMP (see Table 3-18).

In relation to the GEP EP project footprint, Dr Corrigan concluded that, in accordance with Indigenous tradition, there were no specific UCH places along the GEP route that may be affected by the activities under the GEP EP: that there are no known sacred sites or some other specific places that are part of well-known sets of ancestral creation stories amongst the Tiwi people.

The Court in *Munkara* reached a similar conclusion on tangible cultural heritage, finding that the evidence was insufficient to show anything other than a negligible chance that there exists one or more objects of archaeological value along the GEP route[26]. Regarding intangible cultural heritage, the Court found that the evidence before the Court was insufficient to prove that the accounts given by the Applicant's witnesses in relation to specificities of Ampitji and the Crocodile Man were broadly representative of a belief held by the Relevant People as people, such that the belief would constitute a cultural feature[27]. The Court also found that there was insufficient evidence in relation to Imunka [28] to establish that the belief constituted a cultural feature[29].

Whilst these conclusions of the Court and Dr Corrigan were made in relation to activities covered by the GEP EP, the conclusions are also relevant to the Coastal Waters CEMP due to the spatial proximity with the GEP EP

[25] *See Munkara at [871], [1003], [1011]–[1014], [1027] and [1212].*
[26] *Munkara at [1306].*
[27] *Munkara at [1003] and [1014].*
[28] *Referred to in Munkara as Yiminga.*
[29] *Munkara at [946].*

activities. That is, no intangible cultural heritage values and sensitivities constituting a cultural feature have been identified at specific places along the GEP and DPD route (on DPD, see Corrigan, 2024).

In its correspondence to Santos of 25 August 2023 in relation to the D&C EP, NOPSEMA drew Santos' attention to 2 reports provided to NOPSEMA by the Environmental Defenders Office (EDO) on behalf of 7 Tiwi Islander clients on 21 July 2023. These reports related to the GEP EP (EDO GEP Reports), which NOPSEMA said may contain information relevant to the EMBA for the Activity covered by the Coastal Waters CEMP. One of the EDO GEP Reports was prepared by Mr Lewis. The Court in *Munkara* doubted the rigor of Mr Lewis' anthropological work and, as referred to above, ultimately found that his opinions constituted him acting as an advocate rather than assisting the Court to arrive at the correct answer[30]. The other EDO GEP Report was prepared by Dr O'Leary. The Court ultimately placed no weight on this report and dismissed it, along with the subsequent reports prepared by Dr O'Leary, for all purposes[31].

The EDO GEP Reports claim to provide an assessment of the locations of potential impacts to Indigenous UCH sites along the GEP route. While the locations of these claimed sites of significance are partially within the Activity EMBA, the locations and significance of these claimed sites as put forward in the EDO GEP Reports is disputed by the Corrigan 2023 Report (Corrigan, 2023).

The Corrigan 2023 Report (Corrigan, 2023) included consideration of detailed expert reports on archaeology and sedimentology along the GEP route conducted by Wessex Archaeology and Dr Posamentier; and the EDO GEP reports. Dr Corrigan concluded there are no specific UCH places along the GEP to which people, in accordance with Indigenous tradition, may have spiritual and cultural connections that may be affected by the GEP EP activities (Corrigan, 2023). As the southern section of the GEP extends into the EMBA for the Coastal Waters CEMP, this conclusion also applies to this Activity.

The Corrigan 2023 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;
- The location or even the existence of a mother Ampitji is not agreed by all relevant parties;
- 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 UCH 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 and the crocodile man, Jirukupai, is also said by some to traverse the seas towards the OA. Dr Corrigan accepts, this is offset where some senior Tiwi people make the point that the OA is, in their view, a long way away from the Tiwi islands and that Jirukupai and Ampitji do not go out that far into the water. Of direct relevance these sorts of Tiwi cultural and spiritual values were tested in the Federal Court and were found not to be consistently spread amongst relevant Tiwi Islanders and in any event did not represent a particular 'place' of cultural and spiritual significance.

An important outcome of Dr Corrigan's research is that no sacred sites or dreamings are shown to be directly impacted by the proposed DPD Project footprint, although this is not to say that some persons do not have fears that this could be the case in the event of an unplanned event (Corrigan, 2024).

Santos recognises the importance of cultural and spiritual beliefs to First Nations people. Santos recognises that some First Nations remain concerned about the potential for adverse consequences to First Nations people and natural environment, that may arise as a result of disturbance from the Barossa Gas Project to spiritual dreaming and culturally important spiritual beings. In this regard, Dr Corrigan identified the following recommendation, as put to him by First Nations people:

[30] *Munkara at [1136]-[1139].*

[31] *Munkara at [879] and [1198].*

"*that Santos consider engaging cultural monitors to provide guidance and advice on the protection and maintenance of the cultural and spiritual places and activities throughout the DPD construction process and that a discussion on this topic be held with the Wickham Point Deed Reference Group in the first instance...*" (Corrigan, 2024)

Dr Corrigan's recommendation is considered further when evaluating impacts and risks to intangible cultural features and adoption of appropriate measures to reduce associated impacts and risks to ALARP and acceptable levels. Santos notes that discussions will not be limited to the Wickam Point Deed Reference Group will also be held with other First Nations groups. This recommendation, including discussions with First Nations groups, has been captured as a control measure (C6.2.12) and associated environmental performance standards and measurement criteria.

3.2.14.12 Summary of cultural features

Cultural features relevant to the Activity—as presented in Sections 3.2.14.1 to 3.2.14.11—are summarised in Table 3-16. Table 3-16 also summarises the context for the identified cultural features, sourced information and an assessment of relevance to the EMBA or OA (if known).

The cultural features presented in Table 3-16 are further assessed in the impact and risk assessment sections (Sections 5 and 6), as applicable. Context for these aspects is described below:

- Cultural heritage protected areas – cultural knowledge and the passing down of cultural education to children can occur from performing of ceremonies and rituals and through dreaming narratives and songlines. Traditional laws and customs amongst a group or groups can define indigenous traditions amongst the group or groups. For example, laws and customs can provide a format for social life and ceremonial matters. The transfer of knowledge of traditional law and customs may be integral to a group's [32] intangible cultural heritage (UNESCO, 2003) There may be implications to the transfer of First Nations knowledge if, for example, relevant aspects of the environment disappear. Ongoing observance of First Nations traditional laws and customs can also be recognised through Native Title determinations, and knowledge of and connection with country (land and sea) can be recognised through a range of mechanisms including indigenous land use agreements, indigenous protected areas and Aboriginal land rights claims.
- Sacred sites – areas that are traditionally accessed by First Nations people, such as sea country and sacred sites, are important for transferring traditional knowledge and for caring for country. If physical landscapes are altered this could impact the values of sacred sites. Sacred sites and protection of these is a known cultural heritage concern.
- Cultural fishing, hunting and gathering – Through consultation it was identified that a number of marine species provide sustenance to some First Nations people and are obtained through cultural fishing, customary hunting (turtles and dugongs) and gathering (turtle and bird eggs).
- Culturally significant marine species – A range of marine species (such as marine turtles, fish, dugongs, whales, sea-eagle, crocodile and manta rays) were raised during consultation as being important for Aboriginal dreaming, or as having totemic status and significance culturally. The First Nations people maintain a continuing spiritual connection with sea country, through caring for sea country and access to cultural food sources.
- Marine Parks – Commonwealth and State Marine Park Management Plans have sought to recognise cultural interests of First Nations groups within Marine Parks, and the sea country value of Marine Parks to First Nations people.
- Sea country connection through Songlines – Cultural stories and songlines can extend from the shoreline to deep water areas and they tell an important cultural story (Corrigan, 2023 and 2024). If spiritual injury occurs from an activity, some First Nation people believe that songlines can be damaged. It is believed that damaging songlines may have the potential to interfere with ability for First Nation people to reproduce cultural knowledge and continue to provide cultural education of their children.
- Sea country connection through Dreaming sites and stories, and spiritual beings – Some First Nations people believe dreamings relate to powerful creative ancestors who left much of the natural and human world behind them as they travelled (Corrigan, 2023 and 2024). It is believed ancestors can travel to areas such as in the water or land below the seas, where these ancestors continue to use these areas. Some First Nations people are of the opinion that if spiritual injury is caused it can damage dreaming tracks. They believe it is their responsibility to look after these dreaming sites to protect the known travels of the spiritual

[32] *As noted in Munkara v Santos NA Barossa Pty Ltd (No 3) [2024] FCA 9, this cultural heritage must be held communally by the group, although need not be the subject of consensus.*

beings. Information provided to Santos by First Nations communities during consultation, also highlighted the importance of cultural spiritual beings, such as Ampitji, as protectors of First Nations communities, and that if spiritual beings are upset or offended it can result in natural disasters or sickness among First Nations communities.

Table 3-18: Summary of cultural features and heritage values

Identified cultural feature	Description	Coastal Waters CEMP Source	OA presence	EMBA presence
Archaeological heritage				
First Nations UCH	A First Nations archaeological assessment for the DPD Project Area was based on a detailed geomorphological assessment. This study focussed on the likelihood for deposits associated with the Last Glacial Maximum (LGM) to be impacted by the DPD Project. Only one location where potential sediments associated with the LGM were indicated was in the vicinity of KP36.4 to 37.9 (outside of the OA). At this location, potential sediments are assessed likely to be at a depth of approximately 18 m below the sea floor. At this depth, no activities related to the construction of the DPD project will have any direct or indirect impact on these potential sediments. In any event, the location of the potential sediments associated with the LGM is outside the OA. There are no declared protected First Nations UCH sites within the OA.	Desktop First Nations Archaeological Assessment Summary Report - Darwin Pipeline Duplication Project, KP0-31 (OzArk, 2024).	No	Possible (not declared or spatial extent undefined)
Tangible values				
Native title	First Nations people have interests in an area of land and/or water according to its traditional laws and customs, as recognised through cultural heritage legal and regulatory frameworks. There are no native title claims or determinations that overlap with the OA; however the EMBA intersects the Croker Island and Larrakia native title determinations (refer to Figure 3-25). The areas of responsibility for regional native title representative bodies that overlap the EMBA are shown in Figure 3-26.	Spatial datasets were downloaded from the National Native Title Tribunal website [33] and confirmed during consultation with First Nations people and representative groups (Sections 3.2.14.3 to Section 3.2.14.7).	No	Yes
Indigenous land use agreements	There are no ILUAs within the OA; however the EMBA does overlap the areas of land and tidal waters (between the low water mark and the high water mark) of the Kenbi and Mary River ILUAs (refer to Figure 3-25).		No	No
Indigenous protected areas	There are no IPAs that overlap the OA or EMBA (refer to Figure 3-25).		No	No
Sacred Sites	There are no known registered sacred or First Nations UCH sites within the OA. There are many NT coastal sacred sites along the mainland and island coastlines and potentially the surrounding waters that overlap the EMBA.	AAPA Authority Certificate (C2022-098) Consultation feedback and Corrigan 2024 Report including a view of extensive ethnographic studies (Section 3.2.14.6).	No	Yes
Land rights	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	CoA, 2023 (Section 3.2.14.7)	No	Yes

[33] *Source: http://www.nntt.gov.au/assistance/Geospatial/Pages/Spatial-aata.aspx*

Identified cultural feature	Description	Coastal Waters CEMP Source	OA presence	EMBA presence
	with the OA. The EMBA does overlap areas of land and tidal waters (between the low water mark and the high water mark) granted under the ALR Act. This Aboriginal land is held by the Arnhem Land ALT, the Cobourg Peninsula Sanctuary ALT, the Tiwi ALT, the Kenbi ALT, and the Delissaville/ Wagait/ Larrakia ALT.			
Marine Parks	The North MPNMP and the North-West MPNMP identify natural, cultural and spiritual values associated with AMPs, specifically the Oceanic Shoals AMP and the Arafura AMP.	DNP, 2018a; 2018b. (Section 3.2.14.8)	No	Yes
Cultural fishing, hunting and gathering	Cultural fishing, hunting and gathering of marine species such as fish, shellfish, octopus, worms, turtles, dugongs, eggs (turtle and seagull) occurs within the EMBA. Cultural fishing, hunting and gathering of marine species is possible although not expected within the OA given its depth (>40 m) and distance from nearest shorelines (~30 km).	Corrigan 2024 Report (Corrigan, 2024) and consultation with First Nations people and representative groups (Section 3.2.14.9).	Possible (spatial extent undefined)	Yes
Culturally significant marine species	First Nations persons and groups that have a deep connection with the sea through totems and dreamings such as marine fauna (marine turtles, whales, dugong) and consider them to be of cultural significance.	2022 Statement of Reasons requests and NLC consultation feedback in relation to the D&C EP (Section 3.2.14.10). Consultation feedback and Dr Corrigan reports (2023, 2024) including a view of extensive ethnographic studies.	Yes	Yes
Intangible values				
Sea country connection through Songlines	Songlines can go from land to sea and were identified as important by the Croker Island and Tiwi Islands people, as well as Larrakia people and other First Nations peoples with interests in the DPD Project route. They ordinarily traverse areas in a manner of travelling from named places to named places.	Consultation feedback and Corrigan reports including a view of extensive ethnographic studies (Section 3.2.14.11).	Possible (spatial extent undefined)	Possible (spatial extent undefined)
Sea country connection through Dreaming sites and stories and spiritual beings	*Dreaming* Dreamings were identified as being associated with the sea, winds and stars and regarding the moon and the seasons, mermaid dreaming and dreamings near the Charles Point lighthouse. A number of marine species are significant to Aboriginal Dreaming such birds, crocodiles, shellfish, whales, manta rays, crabs, dugong, sea turtle, gropers, sea-eagles and octopus.	Consultation feedback and Dr Corrigan reports (2023, 2024) including a view of extensive ethnographic studies (Sections 3.2.14.10 and 3.2.14.11). NLC consultation feedback in relation to the D&C EP (Section 3.2.14.10).	Possible (spatial extent undefined)	Possible (spatial extent undefined)

Identified cultural feature	Description	Coastal Waters CEMP Source	OA presence	EMBA presence
	Spiritual beings Spiritual beings are important to Croker Island people and Tiwi Island people, as well as Larrakia people and other First Nations peoples with interests in the DPD Project route for their role as protectors of First Nations people and the natural environment. Spiritual beings are believed to be present in the vicinity of the islands.	Consultation feedback and Dr Corrigan reports (2023, 2024) including a review of extensive ethnographic studies (Section 3.2.14.11).	Possible (spatial extent undefined)	Possible (spatial extent undefined)

4. Consultation

4.1 Consultation background

Santos has continued to undertake consultation with Relevant Persons throughout various phases of the Barossa Gas Project to date in compliance with OPGGS(E)R consultation requirements, applicable case law and applicable guidance (e.g. NOPSEMA guidance issued in May 2023 and subsequent guidance in May 2024), building on Santos' recent history of Relevant Persons consultation in the region for exploration, construction, operations and decommissioning activities.

Recent Relevant Persons consultation under the OPGGS(E)R has been undertaken for the following Santos EPs for activities in waters offshore from the NT. Where relevant, feedback provided for these EPs has been used to inform preparation of the Coastal Waters CEMP:

- OPP (including through ConocoPhillips, as previous operator of the Barossa Development)
- GEP EP (including through ConocoPhillips, as previous operator of the Barossa Development)
- D&C EP
- SURF EP
- Bayu-Undan Gas Export Pipeline EP
- Eos 3D Marine Seismic Survey EP
- Tern-2 Wellhead Abandonment EP.

Santos has also undertaken consultation in compliance with OPGGS(E)R requirements in relation to the DPD Project activity in Commonwealth waters (Commonwealth Waters DPD EP). As the EMBAs for the activity in NT Coastal Waters (covered by the Coastal Waters CEMP) and Commonwealth waters (covered by the Commonwealth Waters DPD EP) are the same, information provided during consultation on the DPD Commonwealth EP has been considered to determine its relevance to the Coastal Waters CEMP. Where relevant, that information has been addressed in the Coastal Waters CEMP.

4.2 OPGGS(E)R consultation requirements

Table 4-1 and Section 8.5 outline the applicable OPGGS(E)R requirements for consultation with Relevant Persons for the Coastal Waters CEMP.

Table 4-1: Consultation requirements under the OPGGS(E)R

OPGGS(E)R 2023 Requirements
Section 24. Other information in the environment plan
The environment plan must contain the following: b. a report on all consultations under section 25 of any relevant person by the titleholder, that contains: i. a summary of each response made by a relevant person; and 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 iii. a statement of the titleholder's response, or proposed response, if any, to each objection or claim; and iv. a copy of the full text of any response by a relevant person.
Section 25. Consultation with relevant authorities, persons and organisations, etc
(1) In the course of preparing an environment plan (including a revised environment plan referred to in Division 5) a titleholder must consult each of the following (a ***relevant person***): a. each Commonwealth, State or Northern Territory agency or authority to which the activities to be carried out under the environment plan may be relevant; b. if the plan relates to activities in the offshore area of a State—the Department of the responsible State Minister; c. if the plan relates to activities in the Principal Northern Territory offshore area—the Department of the responsible Northern Territory Minister; d. a person or organisation whose functions, interests or activities may be affected by the activities to be carried out under the environment plan;

e. any other person or organisation that the titleholder considers relevant. (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. (3) The titleholder must allow a relevant person a reasonable period for the consultation. (4) The titleholder must tell each relevant person the titleholder consults that: a. the relevant person may request that particular information the relevant person provides in the consultation not be published; b. information subject to such a request is not to be published under this Part.
Section 26. Submission of environment plan
Form of environment plan (8) All sensitive information (if any) in an environment plan, and the full text of any response by a relevant person to consultation under section 25 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. Note: Subparagraph 24(b)(iv) requires the plan to contain a copy of the full text of any response by a Relevant Person to consultation under section 25 in the course of preparation of the plan.
Section 28. Publishing environment plan and associated information
(1) If NOPSMEA's provisional decision under section 27 is that the environment plan includes material apparently addressing all the provisions of Division 2 (Contents of an environment plan), NOPSEMA must publish on NOPSEMA's website as soon as practicable: a. the plan with the sensitive information part removed; and b. the name of the titleholder who submitted the plan; and c. a description of the activity or stage of the activity to which the plan relates; and d. the location of the activity; and e. a link or other reference to the place where the accepted offshore project proposal (if any) is published; and f. details of the titleholder's nominated liaison person for the activity.

4.3 Government and industry guidance

Notwithstanding that the Activity covered by the Coastal Waters CEMP is within NT jurisdiction and that the Coastal Waters CEMP will not be accepted by NOPSEMA (but instead by the NT Minister for Mining and Energy), Santos has considered the following NOPSEMA guidance in developing its consultation activities and approach:

- GL2086 – Consultation in the course of preparing an environment plan (EP Consultation Guideline) (NOPSEMA, 2023; 2024)
- GN1847 – Responding to public comment on Environment Plans (NOPSEMA, 2022a)
- GL1887 – Consultation with Commonwealth agencies with responsibilities in the marine area (NOPSEMA, 2024)
- GL1721 – Environment plan decision making (NOPSEMA, 2024c)
- GN1344 – Environment plan content requirement (NOPSEMA, 2024b)
- GN1488 – Oil Pollution Risk Management (NOPSEMA, 2021)
- *Supporting cooperative coexistence of seismic surveys and commercial fisheries in Australia's Commonwealth marine area* (Australian Government, 2022) jointly released by NOPSEMA, the Commonwealth Department of Agriculture, Fisheries and Forestry (DAFF), the Commonwealth Department of Industry, Science and Resources (DISR), and AFMA.
- Petroleum activities and Australian Marine Parks: A guidance note to support environmental protection and effective consultation (Australian Government, 2023) jointly released by NOPSEMA and Parks Australia.

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

- International Standards Organisation
  - ISO14001:2015 Environmental Management Systems
- AFMA

    - Petroleum industry consultation with the commercial fishing industry
- Australian Heritage Commission
    - Ask First - A guide to respecting Indigenous heritage places and values
- DAFF
    - Fisheries and the Environment – OPGGS Act
    - Offshore Installations–Biosecurity Guide (DAFF, 2023a)
- DCCEEW
    - Interim Engaging with First Nations People and Communities on Assessments and Approvals under the *Environment Protection and Biodiversity Conservation Act 1999* (DCCEEW, 2023c)
    - Assessing and Managing Impacts to Underwater Cultural Heritage in Australian Waters: guidelines on the application of the *Underwater Cultural Heritage Act 2018* (Cth) (DCCEEW, June 2024)
- 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 (WAFIC)
    - Commercial Fishing Consultation Framework for the Offshore Oil and Gas Sector - https://www.wafic.org.au/wp-content/uploads/2023/07/Oil-and-Gas-Consultation-Framework.pdf
    - Consultation approach for unplanned events - https://www.wafic.org.au/what-we-do/access-sustainability/oil-gas/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 conducting Relevant Person consultation for the activities covered by the Coastal Waters CEMP, Santos has considered the judgments of:

- Justice Bromberg in Tipakalippa v National Offshore Petroleum Safety and Environmental Management Authority (No. 2) [2022] FCA 1121;
- the Full Federal Court in Santos NA Barossa Pty Ltd v Tipakalippa [2022] FCAFC 193 (Appeal Judgement); and
- Justice Calvin in Cooper v National Offshore Petroleum Safety and Environmental Management Authority (No 2) [2023] FCA 1158.

The EP Consultation Guideline (NOPSEMA, 2023; 2024) provides a summary of the Full Federal Court's interpretation of “functions”, “activities” and “interests” referenced in section 25(1)(d) of the OPGGS(E)R, adopted by NOPSEMA to assist in informing who may be a Relevant Person and how Relevant Persons may be identified, as defined in Table 4-2.

Table 4-2: Relevant person terms and definitions

Term	Interpretation
Functions	Refers to “a power or duty to do something”
Activities	To be read broadly and is broader than the definition of “activity” in section 5 of the OPGGS(E)R and is likely directed to what the Relevant Person is already doing
Interests	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 (NOPSEMA, 2024), 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 section 25 of the OPGGS(E)R.

4.5 Santos’ consultation methodology

4.5.1 Overview

Santos consults to ensure that any activity it is proposing under an EP prepared in accordance with the OPGGS(E)R (e.g. the Coastal Waters CEMP), is carried out in a manner:

- consistent with the principles of ecologically sustainable development set out in section 3A of the EPBC Act; and
- by which the environmental impacts and risks of the Activity will be reduced to ALARP and to an acceptable level.

The consultation process is designed to assist Santos to further ascertain, understand and assess values and sensitivities of the environment (including ecosystems, including people and communities, natural and physical resources, the qualities and characteristics of locations, places and areas and the heritage value of places) 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 the Coastal Waters CEMP 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, encouraging identified Relevant Persons to identify other potential Relevant Persons);
- 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 Coastal Waters CEMP relates;
- providing responses to queries, requests and feedback.

As described below, Santos considered the spatial extent of the EMBA 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 outlines the methodology and steps that Santos has used to identify Relevant Persons.

Santos considered the nature and location of the activity (and key component activities) (described in Section 2), the impacts of planned events and the risks of unplanned events (described in Section 5 and Section 6).

Santos also considered the spatial extent of the EMBA by the activity (refer to Section 3.1.1) and the particular aspects of the relevant environment (refer to Section 3.2) as part of its process for identifying Relevant Persons.

The identification of Relevant Persons was an iterative process. Table 4-3 summarises the preliminary steps adopted by Santos to identify Relevant Persons.

Table 4-3: Preliminary identification methodology

Process steps
1. Identify the impacts of the planned activities and the risks and impacts of unplanned events.
2. Consider the spatial extent of the EMBA by the Activity impacts and risks.
3. Consider and identify aspects of the environment within the environment that may be affected, having regard to: (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 (e) the social, economic and cultural features of the matters mentioned in paragraphs (a), (b), (c) and (d).
4. Identify Relevant Person categories, having regard to: (a) aspects of the environment identified at Item 3 (b) the departments or agencies of Commonwealth, State and Territory governments that could therefore be relevant (c) the kinds of functions, interests or activities of people or organisations that could therefore be affected (d) submissions received in response to Santos' advertisements asking Relevant Persons to identify themselves if they wished to be consulted (e) any other person or organisation that the titleholder considers relevant. Update during consultation based on new information, if appropriate.
5. Identify Relevant Persons within Relevant Person categories, having regard to items 1–4 above.

Table 4-4 outlines the environmental aspects within the EMBA (described in detail in Section 3). Santos considered these aspects for the purpose of identifying Relevant Person categories.

Table 4-4: Environmental aspects considered for Relevant Person category identification

Aspects of the environment	Coastal Waters CEMP Reference
Physical environment	Section 3.2.2
Provincial bioregions	Section 3.2.1.1
Benthic habitats	Section 3.2.8
National heritage place and world heritage property	Section 3.2.11.1
Marine parks	Section 3.2.11.2
Wetlands of international and national importance	Section 3.2.11.3
Key ecological features	Section 3.2.11.4
Threatened and migratory fauna	Section 3.2.12
Biologically important areas and critical habitat	Section 3.2.12.6
Conservation advice, recovery plans and management plans	Section 3.2.12.7
Commercial fisheries	Section 3.2.13.1
Energy industry	Section 3.2.13.2
Defence activities	Section 3.2.13.3
Telecommunications cables	Section 3.2.13.4

Aspects of the environment	Coastal Waters CEMP Reference
Shipping	Section 3.2.13.5
Recreation and tourism	Section 3.2.13.6
Underwater cultural heritage	Section 3.2.13.7
Cultural features	Section 3.2.14

The consideration of the environmental aspects resulted in identification of the following Relevant Person categories:

- Section 25(1)(a)(b)(c) of the OPGGS(E)R:
  - Commonwealth Government agency or authority;
  - NT Government agency or authority; and
  - WA Government agency or authority.
- Section 25(1)(d)(e) of the OPGGS(E)R:
  - academic and research organisations;
  - commercial fishing (Commonwealth-managed);
  - commercial fishing (NT–managed);
  - commercial fishing (WA–managed);
  - energy industry titleholders/operators;
  - environmental conservation organisations;
  - First Nations people and groups;
  - infrastructure operators;
  - industry associations;
  - local government and recognised community reference/liaison groups;
  - recreational fishing;
  - shipping; and
  - tourism operators.

Santos then undertook the actions outlined in Table 4-5 to identify Relevant Persons within those categories. No action was required for the identification of international Relevant Persons for the Coastal Waters CEMP as the EMBA does not enter international waters.

Table 4-5: Actions for identifying Relevant Persons by category

Relevant Person Category	Actions to identify Relevant Persons
All Relevant Person categories	• Review of relevant regional historical consultation by Santos in the region, including all previous Barossa EPs. • Review of identified Relevant Persons in publicly available EPs submitted by other Titleholders that may be relevant to proposed activities in relation to the activities under the Coastal Waters CEMP. • 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 the Coastal Waters CEMP. • Regional advertising as outlined in Section 4.5.9. • Review of information provided by or claims made by or on behalf of organisations who claimed to be Relevant Persons
Section 25(1)(a) of the OPGGS(E)R	
Commonwealth agency or authority to which the activities to be carried out	• Review of government agency websites and directories to understand agency roles, functions and responsibilities.

Relevant Person Category	Actions to identify Relevant Persons
under the environment plan may be relevant	• Review of NOPSEMA and government agency guidance on consultation expectations.
Section 25(1)(b) and (c) of the OPGGS(E)R	
State and Territory Departments/Agencies	• Review of government agency websites and directories to understand agency roles, functions and responsibilities. • Review of NOPSEMA and government agency guidance on consultation expectations.
Section 25(1)(d) and (e) of the OPGGS(E)R	
Academic and research organisations	• 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 or activities that may be affected, having regard to the region, activities or risks/impacts under the Coastal Waters CEMP.
Commercial fishing	• Review of Commonwealth, NT and WA Government commercial fishing catch and effort data. • Review of fisheries entitled to fish in the EMBA.
Energy industry	• Review of EMBA overlap with petroleum, greenhouse gas and any other NOPTA issued titles.
Environmental conservation organisations	• 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 or activities that may be affected, having regard to the region, activities or risks/impacts under the Coastal Waters CEMP. • Review of other publicly available information, e.g. websites of conservation organisations whose functions, interests or activities within the EMBA may be affected.
First Nations people and groups	• Review of the Judgment and the Appeal Judgment. • Review of EMBA overlap with Native Title determined areas and claims, ILUAs, registered / protected sacred sites, land rights and IPAs. • Review of Representative Aboriginal/Torres Strait Island Bodies (RATSIBs) on Native Title website. • Review of prescribed bodies corporate on Native Title website, where relevant. • Conducting searches of public cultural heritage databases relevant to the EMBA. • Review of marine park management plans relevant to the EMBA. • Review of additional publicly available information sources, where relevant. • Engagement with government departments/agencies with relevant knowledge or relevant responsibilities. • Engagement with representative bodies under the NT Act and the ALR Act. • Engagement with other representative organisations in areas of potential relevance to Barossa Project activities such as liaison committees and First Nations Consultative Committees (FNCCs). • Engagement with third party consultants to assist with identification of potential First Nations Relevant Persons.
Infrastructure operators	• Review of EMBA overlap with offshore and onshore infrastructure, such as submarine telecommunications cables or ports.
Industry associations	• Review of industry representation of the following Relevant Person groups: – commercial fishing – local government authorities – local industry – recreational fishing – shipping – tourism operators.
Local government and recognised community reference/liaison groups	Review of EMBA overlap with boundaries of local government areas.

Relevant Person Category	Actions to identify Relevant Persons
Recreational fishing	• Review of EMBA overlap with areas of interest to recreational fishing. • Review of potential presence of recreational fishing club members in the EMBA. • Review of website information of relevant agencies/organisations that represent recreational fishing interests.
Tourism operators	• Review of EMBA overlap with areas of interest to charter and tourism operators. • Review of potential presence in the EMBA. • Review of website information of relevant operators/organisations that represent commercial tourism interests.

4.5.3 Public awareness campaign and self-identification opportunities

In addition to undertaking the process for identification of potential Relevant Persons, as described above, Santos undertakes a range of activities to promote opportunities for other organisations or individuals to self-identify as potential Relevant Persons if they feel that their functions, interests or activities may be affected.

These promotional activities include public information campaigns using a range of appropriate media, including, radio, print media, targeted social media and drop-in meetings where information about the proposed activities is provided. Details of the public information campaign for the activity the subject of the Coastal Waters CEMP, including targeted efforts to ensure First Nations organisations and individuals are provided the same opportunities, are described in Section 4.5.4 and a schedule of advertising is included in Table 4-7. Santos also has an online self-nomination form on its Consultation Hub website, where fact sheets and other consultation materials are published and available for download.

The media and advertising campaign had a regional focus, noting the remoteness of First Nations and other communities in Northern Australia. Social media and/or radio advertising were seen as useful tools to raise awareness in First Nations communities about the proposed Activity and associated consultation opportunities given the known widespread use in these communities of mobile smartphones and social media platforms.

Such activities provide a more than reasonable opportunity for organisations and individuals to self-identify as a Relevant Person for the purpose of OPGGS(E)R section 25 consultation, where they consider themselves to have interests, functions or activities that may be affected by the planned activities and for Relevant Persons to provide their input.

Santos' process involves the provision of reasonable timeframes for the self-identification or nomination of others as Relevant Persons, for Relevant Persons to consider consultation information, ask questions and give their input and for Santos' consideration and assessment of the merits of objections and claims.

4.5.4 Identification and consultation with First Nations people and groups

In addition to the public awareness campaign and self-identification opportunities outlined above, Santos has developed a comprehensive process for identifying and undertaking effective consultation with First Nations Relevant Persons.

As with Santos' process for identifying Relevant Persons generally, this is an iterative process with multiple avenues of enquiry including, but not limited to, the following actions:

- Active steps to identify First Nations people and groups as per actions outlined in Table 4-5, including advertising broadly to ensure that Relevant Persons that are not otherwise identified by Santos' examination of the EMBA are given the opportunity to self-identify.
- Providing opportunities for Relevant Persons to provide input in EP development, including:
  - Registered Native Title Prescribed Bodies Corporate (PBCs), groups associated with Native Title Determinations and groups in active Native Title Claims;
  - Native Title Representative Bodies;
  - Groups who may be parties to Indigenous Protected Areas, or named in Indigenous Land Use Agreements;
  - Existing liaison committees or reference groups, where these committees or groups have been established between Native Title Parties, Native Title Representative Bodies and industry/government;

- Supporting the establishment of liaison committees or groups that are intended to be representative and able to speak on behalf communities where formal structures do not exist, and consulting such committees or groups;
- Individual First Nations people who self-identify as relevant (if any); and
- Asking identified persons if there are other persons or organisations who may be a Relevant Person.

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:

- 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 ILUA) that extend offshore and cross into the EMBA?
- 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).
- 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?
- Are there any 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.

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. However, the EMBA 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 EMBA 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 the Coastal Waters CEMP, 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 spill response mitigation measures, as included in vessel spill response plans and the DPD (NT Waters) OPEP (BAS-210 0026), which would reduce the size of the EMBA by a spill in any scenario. This means the EMBA is an overly conservative representation of the full extent of the EMBA. 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 OA, where planned activities will occur.

It is relevant to note that the outermost boundary of the EMBA for the activity covered by the Coastal Waters CEMP is approximately 65 km from the WA coastline, and the WA coastline is approximately 330 km from the OA at its closest point. 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 4-5)
- including the NLC and the Kimberley Land Council (KLC) 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 (including the NLC and KLC) as to other potential First Nations Relevant Persons; and

- conducting public awareness and advertising campaigns targeted at increasing awareness of the Barossa Gas Project and the DPD Project activity; and encouraging any First Nations Relevant Persons who have not been identified to come forward (see Table 4-8 and Table 4-9).

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 the Coastal Waters CEMP. Santos' process for identifying Relevant Persons involved including in its consultation materials an invitation for Relevant Persons to notify Santos of other potentially Relevant Persons for Santos to consider consulting about the activity the subject of the Coastal Waters CEMP. Santos was not directed to any other First Nations groups or organisations in response to this invitation, other than those Santos had identified.

Santos utilised the advertising and awareness campaign (see Section 4.5.4.3) 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 4-5. 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.

For the activity the subject of the Coastal Waters CEMP, Santos has provided consultation opportunities and supporting information to organisations and clan groups listed in Table 4-7, acknowledging the use of a highly conservative EMBA (as described in Section 3) for the purpose of assisting to identify potentially Relevant Persons.

This conservative approach has ensured a very broad capture of potential interested Relevant Persons and provided them an opportunity to provide input if they feel they may be impacted. The consultation process with each category of First Nations organisations and individuals is further explained below:

- Consulting First Nations people through existing representative organisations, including Registered Native Title Bodies Corporate, groups associated with Native Title Determinations and groups in active Native Title Claims, Native Title Representative Bodies, and groups who may be parties to Indigenous Protected Areas, or be named in ILUAs;
- Consulting First Nations people through existing liaison committees or reference groups that have been established between Native Title Parties, Native Title Representative Bodies and industry/government;
- Supporting the establishment of liaison committees or groups that are intended to be representative and able to speak on behalf communities where formal structures do not exist and consulting such committees or groups; and
- Working with First Nations groups and people to develop culturally appropriate consultation methods reflecting the information needs of each First Nations group. By way of example, Santos held multiple community consultations with Tiwi people at the community's request for previous Barossa EP consultation.

In addition, Santos undertakes a range of activities to promote opportunities for First Nations people to provide input during consultation to support identification and evaluation of environmental impacts and risks for proposed activities and develop appropriate measures to reduce these to ALARP and to an acceptable level.

These promotional activities include public information campaigns using a range of appropriate media, including, radio, print media, targeted social media, drop-in meetings with information about the project activities and inviting people to self-identify as a Relevant Person in response, where they considered themselves to have interests, functions or activities that may be affected by the planned activities. Details of the public information campaign for the activity the subject of the Coastal Waters CEMP are included in Table 4-8 and a schedule of advertising is included in Table 4-9.

Santos has supported the establishment of FNCCs with the intention that these be self-nominating and self-governing and independent of government or industry (refer Section 4.5.5). The activities of these committees are complementary to the functions and responsibilities of representative organisations, such as Land Councils or other formal bodies, with the intention that they be in a position to speak on behalf of communities with respect to traditional lands and waters.

Santos has supported the establishment of these FNCCs in part as a response to the growing need for a means for First Nations voices to be heard and considered.

Following the provision of the Corrigan 2024 report, Santos confirmed that Corrigan's survey participants were already considered in Santos' relevant persons identification process.

4.5.4.1 Consultation with existing representative organisations

Consultation effort in the NT with existing representative organisations has focused on providing input and feedback opportunities for the NLC and TLC, as well as Aboriginal Corporations, including the Larrakia Nation Aboriginal Corporation, Larrakia Development Corporation and Gwalwa Dariniki Association given the proximity of their interests to the OA and the EMBA.

Consultation effort in WA with existing representative organisations has focused on providing input and feedback opportunities for the KLC as the EMBA intersects the Kimberley representative Aboriginal/Torres Strait Islander body (RATSIB) area (refer Figure 3-26). As a RATSIB, the KLC has responsibility for providing services to native title parties in the Kimberley, noting that for the Coastal Waters CEMP the EMBA does not intersect the native title interests of PBCs in this region. Further, the OA is more than 300 km from these interests.

4.5.4.2 Consultation with Larrakia people

A key mechanism for ongoing consultation by Santos with the Larrakia people is through the Wickham Point Deed liaison committee which includes representation of Larrakia family groups. The Wickham Point Deed was entered into between Darwin LNG and the NLC (which is also identified as a Relevant Person in Table 4-7) on 29 April 1999 and the liaison committee represents a long-running dialogue between Santos and Larrakia Traditional Owners. Santos coordinates quarterly Wickham Point Deed liaison committee meetings and the functions of the committee include making recommendations to Santos on various matters such as environmental, cultural heritage, employment and business opportunities.

Santos has discussed the DPD Project with the Wickham Point Deed liaison committee as a regular agenda item from November 2021 onwards, including providing information on Project activities, approval requirements, impacts and risks, the AAPA Authority Certificate process and proposed management measures.

The Wickham Point Deed liaison committee has been identified as a Relevant Person for consultation with respect to activities within the Coastal Waters CEMP (refer Table 4-7), with a consultation session held on 28 November 2023 covering the following:

- an overview of Santos and the Barossa Project
- relevant Commonwealth and NT regulations and approvals required for DPD activities
- the activities covered by the Coastal Waters CEMP, including installation steps and vessel descriptions
- the environmental impacts and risks involved with the planned activities and planned controls to manage those risks
- the EMBA in the event of an unplanned event, the risks and planned controls to manage those risks
- the regulatory consultation processes and privacy provisions.

The information booklet and NOPSEMA consultation brochure were also provided at the consultation session. The session was conducted in person and visual aids, maps, videos and animations were used to present information regarding the activity and the project more generally.

Further detail on this consultation session is provided in Table 4-10.

In order to reach out to Larrakia people, additional to the families represented on the WPDRC, Santos requested assistance from the Larrakia Nation Aboriginal Corporation (LNAC) (Table 4-9). The LNAC was set up to provide a corporate identity for Larrakia people to uphold Native Title claims and has grown to represent the Traditional Owners of the Darwin region and to speak on behalf of Larrakia people while delivering community and outreach services to the broader Darwin community.

In addition to consulting with the LNAC in its own right, Santos consulted with the LNAC to obtain its advice on the best way to directly engage with Larrakia People for the purpose of consulting on the activity the subject of the Coastal Waters CEMP in a culturally sensitive and appropriate way. As advised by LNAC, Santos organised two consultation sessions to be held in Darwin on 19 December 2023. The sessions were advertised in the NT News and held during the day and at a location outside the city centre (Nightcliff Community Centre), as suggested by LNAC.

A further consultation session on DPD activities was advertised in Darwin and held on 12 June 2024. Advertising (refer Table 4-6) included geo-targeting on social media as well as direct phone calls to Larrakia people known to Santos, as Santos has found these methods to be the most effective to reach Larrakia people.

Santos' ongoing engagement with First Nations people and organisations included two dedicated sessions for Larrakia People on the Barossa Project which included discussion of DPD activities and an opportunity to ask questions of Santos subject matter experts. These sessions were held in Darwin on 23 April 2024 and achieved good attendance.

While not tailored specifically to Larrakia people, other opportunities for Larrakia people in the Darwin area to engage on the DPD Project, and the broader Barossa Project, were made available through community drop-in sessions throughout 2023, which were broadly advertised to the Darwin community through radio and local newspapers.

Drop-in sessions are usually timed to occur on dates coinciding with consultation periods for EPs and held at easily accessible locations in the Darwin CBD. At the sessions Santos representatives are available to answer questions and receive feedback on activities including those that are the subject of Coastal Waters CEMP consultation. Information booklets are provided and project maps and i-Pads pre-loaded with video content used as information tools.

Santos notes that further information about Larrakia cultural values and sensitivities was obtained outside the OPGGS(E)R section 25 consultation process via the study into cultural and spiritual values in the DPD Project footprint conducted by Dr Corrigan, an independent anthropologist, which is discussed in Section 3.2.14.

4.5.4.3 Consultation with Tiwi Islands clans and individuals

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 on the Tiwi Islands on the following dates: 5–7 December 2023; 30–31 January 2024, 1–2 February 2024, 5–7 March 2024, 8 and 17 May 2024.
- 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 approximately 4 weeks' prior written notice (see Table 4-6).
- 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).

An independent, qualified interpreter assisted Santos at sessions to provide translation as required. Santos also used local interpreters where qualified interpreters were not available through the Aboriginal Interpreter Service. 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 individuals 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 individuals was prepared and distributed or made available at the consultation sessions.

Santos provided information about NOPSEMA's brochure on consultation on offshore petroleum environment plans and distributed the brochure at 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.

In addition to the sessions held on the Tiwi Islands, sessions were also held in Darwin, one for Tiwi Islands people with interests in the Vernon Islands and the other for any Darwin-based Tiwi People.

Consultation sessions for Tiwi people were notified and advertised as set out in Table 4-6.

Table 4-6 includes a chronology of consultation with Tiwi Islands clans.

Table 4-6: Notification and Advertising of Tiwi and Larrakia Consultation Sessions

Date	Advertising type	Description	Reach
For Tiwi December 2023 sessions			
13 November 2023	Press ad – NT News	Half page, page 6	Target NT with reach of 25,000
14 November to 8 December 2023	Social media ad	Facebook,	Geotargeted Darwin, Tiwi Islands and NT
14 November and 7 December 2023	Social media Notice	Tiwi Notice Board Facebook Page	Geotargeted Tiwi Islands – 2,800 members
For Larrakia December 2023 sessions			
19 December 2023	Press ad – NT News	Full page, page 12	Target NT with reach of 25,000
18, 19 December 2023	Social media ad	Facebook	Geo-targeted Darwin and surrounding areas (e.g. Burrundie and Kakadu, Tiwi Islands and NT
For Tiwi January/February 2024 sessions			
January 2024	Social media notice	Facebook, Tiwi Notice Board Facebook Page	Geotargeted Tiwi Islands – 2,800 members
22 January 2024	Press ad – NT News	Full page, page 6	Target NT with reach of 25,000
19 February 2024	Press ad – NT News	Full page, page 19	Target NT with reach of 25,000
26 February	Press ad – NT News	Full page, page 11	Target NT with reach of 25,000
For Tiwi March/April 2024 sessions			
February/March 2024	Social media Notice	Facebook, Tiwi Notice Board Facebook Page	Geotargeted Tiwi Islands – 2,800 members
4 March 2024	Press ad – NT News	Full page, page 6	Target NT with reach of 25,000
26 March 2024	Press ad – NT News	Full page, page 6	Target NT with reach of 25,000
2 April 2024	Press ad – NT News	Full page, page 6	Target NT with reach of 25,000
6 April 2024	Press ad – NT News	Full page, page 12	Target NT with reach of 25,000
For Tiwi May 2024 sessions			
April / May 2024	Social media Notice	Facebook, Tiwi Notice Board Facebook Page	Geotargeted Tiwi Islands – 2,800 members
8 May 2024	Press Ad NT News	Full page, page 8	Targeted NT with reach of 25,000
15 May 2024	Press Ad NT News	Full page, page 6	Targeted NT with reach of 25,000

Date	Advertising type	Description	Reach
20 May 2024	Press Ad NT News	Full page, page 6	Targeted NT with reach of 25,000
For Larrakia June 2024 sessions			
1 June 2024	Press ad – NT News	Full page, page 30	Target NT with reach of 25,000
5 June 2024	Press ad – NT News	Full page, page 8	Target NT with reach of 25,000
8 June 2024	Press ad – NT News	Full page, page 21	Target NT with reach of 25,000
7-12 June 2024	Social media ad	Facebook, Instagram, Messenger	Geo-targeted Darwin and surrounding areas (e.g. Burrundie and Kakadu, Tiwi Islands and NT)

4.5.5 First Nations Consultative Committees

Santos notes that there are remote areas of coastal Northern Australia where formal mechanisms for consultation are few or non-existent.

To support consultation in these areas for the activities the subject of the Coastal Waters CEMP, Santos engaged a consultant to support the establishment of First Nations Consultative Committees (FNCCs) with the intention that these be self-nominating and self-governing, and independent of government or industry. The intended purpose of these committees is to provide a forum to allow for culturally appropriate consultation with the First Nations peoples represented by the FNCCs, and to serve as a means for those peoples to provide feedback to third parties on matters on which the FNCC is consulted.

The FNCC establishment process is led by cultural advisors, comprising a team of First Nations leaders with extensive knowledge and experience in relation to First Nations cultures of Northern Australia, and who possess deep cultural connections to the First Nations peoples of this region.

The FNCC establishment process commences with the identification by the cultural advisers of First Nations clans and associated persons who may have functions, interests or activities that may be affected by activities Santos proposes to carry out under an environment plan.

The cultural advisors then contact the identified First Nations persons to discuss the FNCC concept. Santos understands that this includes meetings with Elders and other First Nations leaders who speak for coastal and sea country that may be affected by project activities. Where an interest to participate in the FNCC process is expressed, the cultural advisers support the relevant clan group to establish their own FNCC and to self-determine its functions and operations, including in relation to committee membership, leadership and governance arrangements and desired level and method of consultation.

This process involves the cultural advisors sharing knowledge and experience in relation to their participation on established committees and supporting the identified clan members to determine their own rules and processes for committee decision-making, membership and the nomination of chairs. Once determined, these matters are formally documented in charters adopted by the FNCCs. Santos has been provided with a copy of the charters of the FNCCs that it consulted in relation to the activity the subject of the Coastal Waters CEMP, which include details about the FNCCs' purposes, membership and procedures.

Once established, and subject to the wishes of FNCC members, the external cultural advisors may provide ongoing support to the FNCCs, including administrative and advisory services. Santos engaged a consultant to support FNCC establishment and operations. This consultant maintains regular contact with FNCCs and Clan groups to facilitate Santos' consultation with these groups.

For the consultation sessions with these groups, similar to the Tiwi Clan Group sessions (described in Section 4.5.4.3), visual aids, videos and animations were used to present 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.

The activities of these committees are complementary to the functions and responsibilities of representative organisations, such as Land Councils or other formal bodies, with the intention that they be in a position to represent First Nations peoples.

For the activity covered by the Coastal Waters CEMP, FNCC interests are outlined in Table 4-7.

4.5.5.1 Consultation with other clans

In some instances, Santos consulted individual clan groups with NT coastal interests, where FNCCs or other representative bodies are not established. For the activity covered by the Coastal Waters CEMP, Santos consulted members of the Agalda clan and the Wulna clan. Clan interests are outlined in Table 4-7.

4.5.6 Relevant Persons

A list of potentially Relevant Persons was developed through application of the above methodology for the purposes of undertaking preliminary consultation to confirm consultation expectations.

This consultation phase was supported by an advertising campaigned outlined in Table 4-9 to raise public awareness about the proposed DPD Project, including the DPD activities covered by the Coastal Waters CEMP, and provide opportunities for authorities, persons or organisations to identify themselves as Relevant Persons. For the activity covered by the Coastal Waters CEMP, no authorities, persons or organisations self-nominated as Relevant Persons.

Relevant Persons consulted on the activity under the Coastal Waters CEMP are listed in Table 4-7.

Table 4-7: Summary of Relevant Persons

Relevant Person Category	Summary of Relevance
Section 25(1)(a) of the OPGGS(E)R: Departments or agencies of the Commonwealth to which the activities to be carried out under the environment plan may be relevant	
Australian Communications and Media Authority (ACMA)	ACMA is responsible for the regulation of communications and media services in Australia. ACMA is a relevant agency because the Activity has the potential to impact future proposed subsea communications cable installations.
Australian Fisheries Management Authority (AFMA)	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. AFMA expects petroleum operators to consult directly with fishing operators about all activities and projects which may affect day to day fishing activities. AFMA also provides industry association contacts for petroleum operators to use when consultation with fishing operators is required.
Australian Hydrographic Office (AHO)	AHO is responsible for maintaining and disseminating nautical charts, including the distribution of Notices to Mariners.
Australian Institute of Marine Science (AIMS)	AIMS is Australia's tropical marine research agency and is established under the *Australian Institute of Marine Science Act 1972* (AIMS Act).
Australian Maritime Safety Authority (AMSA) – maritime safety	AMSA is the statutory and control agency for maritime safety and vessel emergencies in Commonwealth Waters. AMSA is a relevant agency because the proposed offshore activities may impact on the safe navigation of commercial shipping in Australian waters.
Australian Maritime Safety Authority (AMSA) – marine pollution	AMSA is the statutory and control agency for maritime safety and vessel emergencies in Commonwealth Waters. AMSA is a relevant agency as one of its functions is to prevent and combat ship-sourced pollution in the marine environment.
Department of Agriculture, Forestry and Fisheries (DAFF) – Biosecurity	DAFF administers the *Biosecurity Act 2015* (Cth) which is designed to contain and/or deal with diseases and pests that may cause harm to human, animal or plant health or the environment in Australia. DAFF is a relevant agency for consultation because the Activity involves the movement of vessels into Australia territory and between Australian ports and offshore petroleum facilities.
Department of Agriculture, Forestry and Fisheries (DAFF) – Fisheries	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.
Department of Climate Change, Energy, the Environment and Water (DCCEEW) – Underwater Cultural Heritage	DCCEEW protects Australia's natural environment and heritage sites, helps Australia respond to climate change and carefully manages water and energy resources. The Underwater Cultural Heritage branch at DCCEEW is responsible for administering the UCH Act. It is a relevant agency where an activity has the potential to directly or indirectly adversely impact protected UCH.
Department of Defence (DoD)	DoD is a relevant agency for consultation because: • the proposed Activity may impact DoD training and operational requirements, in that the EMBA overlaps DoD training areas. • the proposed Activity encroaches on known training areas and/or restricted airspace. • there is a risk of unexploded ordnance in the area where the Activity is taking place.
Department of Home Affairs and Australian Border Force (ABF)	The Department of Home Affairs is responsible for overseeing migration, national security and resilience, and border-related functions. 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 km^2. This area includes the EMBA.

Relevant Person Category	Summary of Relevance
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 and GHG storage.
Director of National Parks (DNP)	DNP is the statutory authority responsible for administration, management and control of Commonwealth marine reserves. The DNP is a Relevant Person for consultation where: • the Activity or part of the Activity is within the boundaries of a proclaimed Australian Marine Park; • activities proposed to occur outside a reserve may impact on the values within a Australian Marine Park; and / or • an environmental incident occurs in Commonwealth waters surrounding a Australian Marine Park and may impact on the values within the Australian Marine Park.
Fisheries Research Development Council (FRDC)	FRDC has a formal role in the planning and investment in fisheries research and development to support the ongoing sustainability of aquatic sectors and aquatic ecosystems. It is a co-funded partnership between the Australian Government and fisheries and aquaculture and a statutory corporation under the *Primary Industries Research and Development Act 1989* (Cth) responsible to the Minister for Agriculture, Fisheries and Forestry.
Indigenous Land and Sea Corporation (ILSC)	ILSC is a corporate Commonwealth entity established under the *Aboriginal and Torres Strait Islander Act 2005* (Cth). The ILSC provides assistance for acquiring and managing rights and interests in land, salt water and freshwater country. The ILSC in Darwin works closely with the Northern Land Council. The EMBA enters NT Waters.
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.
Section 25(1)(b) of the OPGGS(E)R: Departments or agencies of the Northern Territory to which the activities to be carried out under the environment plan may be relevant.	
Aboriginal Areas Protection Authority (AAPA)	The AAPA supports development while safeguarding Aboriginal sacred sites. Under the NTASS Act, the AAPA is responsible for overseeing the protection of Aboriginal sacred sites on land and sea across the whole of the NT. The NTASS Act also gives the Authority the power to prosecute people and organisations that damage sacred sites.
Department of Environment, Parks and Water Security (NT) (DEPWS)	DEPWS combines the functions of the previous Department of Environment and Natural Resources and the Parks and Wildlife Commission from the former Department of Tourism, Sport and Culture (DTSC). The government established the department to combine many of the key functions that foster and protect the environment and natural resources in the NT. This includes water, land resource management, environmental issues and the parks and wildlife functions.
Department of Industry, Tourism and Trade (NT) – Fisheries Division	DITT-NT – Fisheries has functions in relation to NT-managed fisheries. The OA overlaps NT-managed fisheries. The Aquatic Biosecurity Unit of Northern Territory Fisheries monitors and manages the risk of new marine pests arriving in the NT. The unit monitors for early detection of aquatic pests; coordinates inspections and treatment of high-risk vessels entering Darwin; responds to reported sightings of invasive freshwater and marine pests; and educates the public about the impacts, prevention and management of aquatic pests. The Department also operates the Darwin Aquaculture Centre, the NT Government's key aquaculture research and development facility.
Department of Infrastructure, Planning and Logistics (NT) – Transport	DIPL-NT-Transport is responsible for all aspects of marine transport in NT waters, including the Port of Darwin which will continue to be the supply base for Barossa offshore activities.
Department of Territory Families, Housing and Communities (NT) – Heritage branch (DTFHC-NT-Heritage)	The DTFHC-NT-Heritage has a role in protecting the maritime heritage of the NT.

Relevant Person Category	Summary of Relevance
NT Department of Police, Fire and Emergency Services	The Department would be involved in response measures in the event of a spill in NT Waters.
Environment Protection Authority (NT)	The Environment Protection Authority (NT) (NT EPA) is an independent authority established under the *Environment Protection Authority Act 2012* (NT). The EPA's functions include implementing environmental legislation the NT, including the Environment Protection Act 2019 (under which the DPD Project in NT jurisdiction was assessed) and the Waste Management and Pollution Control Act 1998. It also assists DEPWS with its responsibilities under the Marine Pollution Act 1999, which could be engaged in the event of an unplanned hydrocarbon spill into NT waters.
Parks and Wildlife Commission of the Northern Territory	Parks and Wildlife Commission of the Northern Territory is the NT Government agency responsible for tasks including the establishment, management and protection of parks, reserves, sanctuaries and other land, and the protection, conservation and sustainable use of wildlife.
Power and Water Corporation (NT)	Power and Water Corporation is a government-owned corporation responsible for the transmission and distribution of electricity and provision of water and sewerage services across the NT.
Tourism NT	Tourism NT is the government statutory authority responsible for promoting tourism in the NT, including potential activity by NT-based operators in the EMBA.
Section 25(1)(b) of the OPGGS(E)R: Departments or agencies of Western Australia to which the activities to be carried out under the environment plan may be relevant.	
Department of Primary Industries and Regional Development (DPIRD-WA) – Fisheries	DPIRD-WA is responsible for managing West Australian fisheries. Several WA-managed commercial fisheries which extend beyond WA Waters and into Commonwealth Waters of the EMBA.
Department of Transport (DoT)	DoT has functions in relation to commercial vessel movements in the navigable waters of the State and seas adjacent to WA. Its interests extend to response to an unplanned spill event through its Maritime Environmental Emergency Response unit.
Section 25(1)(c) of the OPGGS(E)R: Department of the responsible Northern Territory Minister.	
NT Department of Industry, Tourism and Trade (DITT-NT) – Energy Division	DITT-NT- Energy Division is the department of the responsible Northern Territory Minister and is required to be consulted under regulation 25(1)(c) of the OPGGS(E)R.
Section 25(1)(d) of the OPGGS(E)R: Persons or organisations whose functions, interests or activities may be affected by the activities to be carried out under the environment plan	
Academic and Research Organisations	
Arafura Timor Research Facility (ATRF)	ATRF is a joint venture between AIMS and the Australian National University. It was developed through a successful Major National Research Facilities grant application with support from the NT government and Charles Darwin University. The facility was established to accommodate world class research into marine and coastal ecosystems of the Arafura and Timor seas and to explore the increasing threats to Australia's fisheries and marine biodiversity in the region. A wide range of research activities are being processed.
Australian Marine Sciences Association – NT (AMSA-NT)	AMSA-NT is a professional body for marine scientists, with a branch in the 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.
AusTurtle Inc	AusTurtle Inc. is a non-profit organisation that promotes sea turtle conservation and research in northern Australia.

Relevant Person Category	Summary of Relevance
Charles Darwin University	The NT's main university is research-intensive with a range of projects and partnerships in indigenous and tropical health, environmental science and public policy. One example is the current investigation of low technology, sea-based aquaculture systems for remote coastal communities. The team is sampling wild blacklip oysters from 8 locations across the NT, assessing shellfish quality, heavy metals and vibrio testing. CDU is a member of the Darwin Harbour Advisory Committee
Darwin Harbour Advisory Committee	The Darwin Harbour Advisory Committee provides advice to the NT Government through the Minister for Environment, Parks and Water Security on the effective management of Darwin Harbour and its catchment.
Commercial fishing – Commonwealth managed	
Commonwealth-managed fisheries that overlap the EMBA (based on AFMA guidance): • Northern Prawn Fishery • Southern Bluefin Tuna Fishery • Western Skipjack Tuna Fishery • Western Tuna and Billfish Fishery • North-West Slope Trawl Fishery	Licence holders of these fisheries are entitled to fish within the EMBA and consulted based on published AFMA guidance.
Commercial fishing – Northern Territory managed	
NT-managed fisheries that overlap the EMBA: • Aquarium Fishery • Bait Net Fishery • Barramundi Fishery • Coastal Line Fishery • Coastal Net Fishery • Demersal Fishery • Development (Small Pelagic) • Mud Crab Fishery • Offshore Net and Line Fishery • Pearl Oyster Fishery • Spanish Mackerel Fishery • Timor Reef Fishery • Trepang Fishery.	Licence holders of these fisheries are entitled to fish within the EMBA and consulted based on published AFMA guidance.
Commercial fishing – Western Australian managed	
Licence holders in the following WA-managed fisheries:	Licence holders of these fisheries are entitled to fish within the EMBA and consulted based on published AFMA guidance.

Relevant Person Category	Summary of Relevance
• Abalone • Kimberley Crab Fishery • Mackerel Managed Fishery • Marine Aquarium Fishery • Northern Demersal Scalefish Managed Fishery • South-West Costal Salmon Fishery • Specimen Shell Fishery • West Coast Deep Sea Crustacean Fishery	
Energy Industry – Petroleum titleholders and GHG permit holders	
Operators: • Eni Australia Ltd • INPEX Ichthys Pty Ltd • Woodside Energy Ltd • Melbana Energy Pty Ltd • MEO • Neptune Energy • Shell Development (Australia) Pty Ltd	Operators within the EMBA.
Environmental conservation organisations	
Australian Marine Conservation Society – NT (AMCS-NT)	According to its website [34]: • AMCS-NT is a grassroots independent environmental conservation organisation and charity that works to protect ocean wildlife along the NT coastline, waters and seas. • Its members work to protect marine animals and critical ocean ecosystems. • It advocates for evidence-based solutions to conservation activity and works closely with marine research centres. • Its interests for the purposes of the Coastal Waters CEMP relate to marine parks and sanctuary zones within the EMBA for threatened and at-risk species.
Conservation Council of WA (CCWA)	According to its website and correspondence dated June 2024, CCWA [35] promotes an interest in the protection and restoration of the WA natural environment.

[34] *https://www.marineconservation.org.au/northern-territory-marine-parks/*

[35] *https://www.ccwa.org.au/about*

Relevant Person Category	Summary of Relevance
Environment Centre Northern Territory (ECNT)	According to its website, ECNT [36] 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. ECNT is involved in the "Stop Barossa Gas" campaign.
Greenpeace	According to its website, Greenpeace's stated goals include the protection of ocean biodiversity and marine life, including campaigning for protection of whales [37] (fauna identified in the Coastal Waters CEMP as potentially affected by the Activity impacts or risks) and sea turtles [38] (also fauna identified in the Coastal Waters CEMP as potentially affected by the Activity impacts or risks).
Keep Top End Coasts Healthy	According to its website, Keep Top End Coasts Healthy [39] is an alliance of environment groups including the AMCS and the ECNT. In information provided by Keep Top End Coasts Healthy to Santos via Santos' website portal during consultation for the D&C EP, 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, 2 members of the alliance, AMCS and ECNT, are included as Relevant Persons in the Coastal Waters CEMP.
Landcare NT	This organisation's function and activities includes protection of areas along the NT coastline and water quality.
Sea Turtle Foundation	According to its website, the Sea Turtle Foundation [40] 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 the Coastal Waters CEMP as being potentially affected by the impacts or risks of the Activity.
Territory Natural Resource Management	This organisation's function and activities includes protection of areas along the NT coastline and water quality.
The Wilderness Society (TWS)	According to its website, TWS is a peak conservation body with an interest in activities that may affect the marine environment.
World Wildlife Fund (WWF)	WWF is a peak conservation body with an interest in activities that may affect the marine environment.
First Nations People and groups	
The following groups may have interests that intersect the EMBA. Information was also provided to these organisations to help identify and consult groups or individuals whose spiritual or cultural connections to land and sea country in accordance with Indigenous tradition may be affected by proposed activities. In addition, targeted regional advertising was conducted to provide opportunity for individuals whose functions, interests and activities may be affected by the proposed activity to self-identify as Relevant Persons.	
Representative organisations – NT	
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 including responsibility for administering and directing the functions and actions of Aboriginal Land Trusts. NLC's area of interest includes sea

[36] *https://www.ecnt.org.au/campaigns*

[37] *https://www.greenpeace.org.au/what-we-do/protecting-oceans/whales/*

[38] *https://www.greenpeace.org/international/story/28229/turtle-journey-urgent-protect-the-oceans/; https://www.greenpeace.org/international/publication/28181/turtles-under-threat/*

[39] *https://www.topendcoasts.org.au/*

[40] *https://seaturtlefoundation.org/about*

Relevant Person Category	Summary of Relevance
	country where non-exclusive native title rights and interests may exist, including within the EMBA. NLC Executive Council members are also the directors of the Top End (Default PBC/CLA) Aboriginal Corporation RNTBC (TED PBC) which is responsible for an area of sea country near the Croker Islands. The NLC also provides administrative services to the Corporation.
Tiwi Land Council (TLC)	The TLC is governed under the ALR Act. The Tiwi ABT was also established under the ALR Act and the TLC is the only body with authority to direct the Trust. Coastline and sea country interests of Tiwi Island clans are included within the EMBA.
Wickham Point Deed liaison committee	The objective of the Wickham Point Deed liaison committee is to strengthen the dialogue between Santos and the Larrakia people and support the delivery of the parties' commitments under the Wickham Point Deed entered into between Darwin LNG and the Northern Land Council on 29 April 1999. Santos coordinates quarterly meetings with the Wickham Point Deed liaison committee, which includes representatives from Larrakia family groups, the functions of which are set out in the Wickham Point Deed and include making recommendations to Santos on various matters such as environmental, cultural heritage, employment and business opportunities.
First Nations Consultative Committees and coastal clan groups – NT	
Agalda clan	The Agalda clan estate is located over the western parts of the Cobourg Peninsula, including coastal areas and adjacent sea country.
Daly River / Port Keats FNCC	Represents the coastal clan groups of the Daly River / Port Keats ALT and adjacent sea country. These clans are understood to include the Yek Yedere, Rak Kinmu, Yek Nangu, Yek Maninh, Kura Thipma and Kuy clans, whose estates are located in this area. The FNCC was formed with the objective of enabling culturally appropriate consultation with First Nations clan groups represented on the FNCC, so they can provide feedback to third parties on matters that the FNCC wishes to be consulted about.
Mulyurrud Consultative Committee	Represents First Nations peoples of Croker Island, including the traditional owners and custodians of Croker Island and surrounding sea country. It is understood that the Committee represents the Mangalarra and Mandilarri clan estates located on Croker Island and adjacent sea country, and the Ildugidj clan estate located on the mainland coastline (south from Croker Island). The FNCC was formed with the objective of enabling culturally appropriate consultation with the First Nations clan groups represented on the FNCC, so they can provide feedback to third parties on matters that the FNCC wishes to be consulted about.
Rak Badjalarr Consultative Committee	Represents the Kenbi, Emmiyangal, Mendheyangal, Kiyuk, Wadigany, Murranungu, Malak Malak and Marriamu clans which are all part of the Belyuen or Wagait communities. The named clan estates are located over the coastal areas from the Cox Peninsula south to the area of the Daly River and adjacent sea country, including Peron Islands and Channel Point. The FNCC was formed with the objective of enabling culturally appropriate consultation with these First Nations clan groups, so they can provide feedback to third parties on matters that the FNCC wishes to be consulted about.
Tiwi Islands Clan Groups and Individuals	The Appeal Judgment found that "Mr Tipakalippa and the Munupi clan had interests within the meaning of reg 11(A)(d)[41] of the OPGGS(E)R that required them to be consulted[42]. Mr Tipakalippa had claimed that he and the Munupi clan, as well as other Tiwi Island people, have "sea country" in the Timor Sea to the north of the Tiwi Islands. The Tiwi Islands are located approximately 80 km north of Darwin in the Arafura Sea. There are 3 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 8 landowning groups (clans) on the islands, Mantiyupwi, Munupi, Yimpinari, Malawu, Wulirankuwu, Wurankuwu, Mirrikawuyanga and Jikilaruwu (or Tikalaru). Members of the Mantiyupwi clan also speak for the Vernon Islands, which are located between the Tiwi Islands and mainland NT.

[41] *Section 25(1)(d) of updated OPGGS(E)R 2023*

[42] *Santos NA Barossa Pty Ltd v Tipakalippa [2022] FCAFC 193 [80]*

Relevant Person Category	Summary of Relevance
Wulna clan	The Wulna clan estate is located on coastal areas and adjacent sea country from the Gunn Point area in the west and extending east from the Adelaide River. Members of the Wulna clan are Party to the Mary River ILUA.
Larrakia people	The Larrakia people are the traditional owners of the Darwin region. Larrakia country runs from Cox Peninsula in the west to Gunn Point in the north, Adelaide River in the east and down to the Manton Dam area southwards.
Other First Nations organisations – NT	
Aboriginal Sea Company	Incorporated entity with administrative support provided by the NLC. The Aboriginal Sea Company's area of interest is the entire Top End (sea country and intertidal). The Company facilitates the participation of Traditional Owners in commercial fishing, aquaculture and other opportunities associated with fishing activities in NT waters that could be impacted by planned activities or an unplanned spill. The Company is governed by a board comprising representation from the 3 land councils with traditional ownership of sea country – Northern, Tiwi and Anindilyakwa land councils.
Gwalwa Daraniki Association	Place / Area of Interest (descriptions of land includes adjacent sea country): Kalaluk and Minmarama Communities in Darwin.
Kenbi Rangers	Place / Area of Interest (descriptions of land includes adjacent sea country): Cox Peninsula - Darwin and Bynoe Harbours and Islands. Kenbi Rangers' base on Cox Peninsula is administered by the NLC.
Larrakia Development Corporation	Seeks to create economic opportunity for Larrakia People through leading land development activity and advocating for Larrakia People's interests. Represents 9 Larrakia family groups. Place / Area of Interest (descriptions of land includes adjacent sea country): Darwin and surrounds.
Larrakia Nation Aboriginal Corporation	Larrakia Nation is one of Darwin's leading community service organisations. Larrakia Nation Aboriginal Corporation was set up in 1997 through the NLC to provide a corporate identity for Larrakia people to uphold Native Title claims. In 20 years, it has grown to represent the Traditional Owners of the Darwin region and to speak on behalf of Larrakia people while delivering community and outreach services to the broader Darwin community. Larrakia Nation also operates the Larrakia Land and Sea Ranger services.
North Australian Indigenous Land and Sea Management Alliance	Darwin-based Native Title Prescribed Body Corporate with administrative services via the NLC. NLC Executive Council members are the directors of the Top End Default Prescribed Body Corporate. Place / Area of Interest (descriptions of land includes adjacent sea country): Entire Top End.
Representative Organisation – WA	
Kimberley Land Council (KLC)	KLC is the Native Title Representative Body for the Kimberley region in WA. 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 a section of Commonwealth waters off the WA coast within the EMBA (noting that the EMBA does not reach WA waters).
Industry Associations – commercial fishing	
Australian Southern Bluefin Tuna Industry Association (ASBTIA)	ASBTIA represents the interests of commercial fishers in the Southern Bluefin Tuna Fishery and Western Skipjack Fishery.
Commonwealth Fisheries Association (CFA)	CFA represents the interests of commercial fishers with licences in Commonwealth waters.
Northern Prawn Fishery Industry (NPFI)	NPFI represents the interests of the interests of commercial fishers in the Northern Prawn Fishery.
Northern Territory Seafood Council (NTSC)	NTSC is the peak representative body for the wild catch, aquaculture and trader/processor seafood sectors in the NT.

Relevant Person Category	Summary of Relevance
Western Australian Fishing Industry Council (WAFIC)	WAFIC represents the interests of the WA commercial fishing, pearling and aquaculture sector.
Industry Associations – recreational fishing	
Amateur Fishermen's Association of the Northern Territory (AFANT)	AFANT is the peak body representing NT recreational fishers whose interests may intersect the EMBA.
Industry Associations – tourism	
Northern Territory Guided Fishing Industry Association (NTGFIA)	NTGFIA is the peak body responsible for promoting, developing, and maintaining the guided fishing industry in the NT. It represents professional fishing guides and operators. Interests may intersect the EMBA.
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 NT. Interests may intersect the EMBA.
Industry Associations – local industry	
Chamber of Commerce Northern Territory	Regional representative organisation representing the interests of local business.
Infrastructure operators	
BW Digital	BW Digital is privately-owned, carrier-neutral and innovative to deliver optimal customer service. It develops, builds and operates a digital ecosystem, specialising in data transport, compute and storage to connect countries across oceans sustainably.
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 Port and Marine	Private consortium that owns and operates the commercial port at Port Melville on the Tiwi Islands.
Sun Cable	Privately-owned consortium with plans to install new submarine cable infrastructure in NT (across both Internal and Coastal Waters) and Commonwealth waters in the EMBA.
Telstra	Telstra Group Limited is an Australian telecommunications company that builds and operates telecommunications networks and markets related products and services.
Vocus	Operator of the following infrastructure, which is in the EMBA: Darwin-Jakarta-Singapore Cable (DJSC) and North West Cable System (NWCS).
Local Government Authorities – NT	
City Of Palmerston Council	The City of Palmerston is a local government area of the NT. It contains the suburbs of Darwin's satellite city, Palmerston, and is situated between the outer industrial areas of Darwin and the rural areas of Howard Springs.
City of Darwin	The City of Darwin is a local government area of the NT. It includes the central business district of the capital, Darwin City, and represents two-thirds of its metropolitan population. Located on the traditional land and waterways of the Larrakia people.
Litchfield Council	Responsible for local community representation on a range of issues, potentially including environmental protection. The Council's area includes NT coastline.

Relevant Person Category	Summary of Relevance
Wagait Shire Council	The Wagait Shire is a local government area in the NT. It is located west of Darwin, as a 15-minute ferry ride, or a 138 km drive on fully sealed roads.
Tourism Operators – NT	
Darwin and Tiwi Islands-based operators	Marine tourism operators active within the EMBA.

4.5.7 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.

Section 4.5.8 outlines Santos' provision of sufficient information. Preferences expressed by Relevant Persons regarding design of the consultation process were considered and accommodated by Santos, where reasonably practicable and appropriate.

Santos also adopted a tailored approach to consultation with Tiwi Islands clans and individuals, other coastal First Nations communities and Consultative Committees in respect of consultation session structure and format, and consultation materials, based on their specific requests and feedback.

4.5.8 Provision of sufficient information

Santos provided Relevant Persons with 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 the Coastal Waters CEMP;
- 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; and
- How to provide feedback.

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.

At a minimum, this information was available on the Santos website and also included in the fact sheets which Santos sent to Relevant Persons by email or made available during consultation sessions.

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

Examples of the consultation materials used are included in Appendix E of the coastal waters CEMP and include the following:

- Information booklet
- Consultation fact sheets:
- An FAQ document, responding to queries and feedback during consultation with Tiwi People provided as part of the consultation process.
- 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*. 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.

4.5.9 Consultation approach

In developing the Coastal Waters CEMP Santos has sought to work with authorities, persons and organisations on pragmatic and practical approaches to section 25 consultation.

Santos sought feedback about consultation methods and information needs in its correspondence and via consultation meetings. Santos also sought information as to functions, interests or activities that may be affected by the activity.

This approach has included:

- Providing Relevant Persons access to information using different mediums and platforms, including by telephone, email, website, electronic materials, in person and virtual meetings.
- Making information about the proposed activities in relation to the activities under the Coastal Waters CEMP available on the Santos website at www.santos.com/offshoreconsultation. Provision of hyperlinks to this website were included in consultation emails.
- Recognising NTSC's feedback that information should be provided via post direct to relevant licence holders in addition to being provided to the NTSC which consults directly with the chairs of each fishery.
- Recognising NPFI's feedback that it will pass along any information to its members where required and relevant, acknowledging NPFI has advised there is no need for Santos to directly engage with its members.
- Recognising WAFIC's published guidance that petroleum titleholders consult directly with those Western Australian fishery licence holders that have been historically active in Operational Areas, while providing a list of all entitled fisheries that overlap the EMBA. This approach acknowledges previous feedback from WAFIC regarding consultation fatigue among WA's estimated 1500 fishing boat licence holders.
- Application of this activity-centric approach has been applied to consultation with respect to commercial and recreational fishing, given the significant geographic extent of some of commercial fisheries and the location of historical catch and effort by commercial and recreational fishers relative to the proposed petroleum activity. This approach considers:
    - Advice from a representative organisation, the NPFI, that it will pass along any information to its members where it is required and relevant.
    - Using a WAFIC fee-for-service arrangement to circulate Santos' consultation information via email to licence holders and making information available to potentially affected commercial fishing licence holders.
    - Recognising previous feedback from Recfishwest that petroleum titleholders consult directly with those fishing clubs with regional proximity to Operational Areas, while providing information on activity EMBAs that may have broader implications for recreational fishers. This approach acknowledges DPIRD's estimated 620,000 recreational fishers in WA.
- Recognising AFANT's feedback that it will respond on an Association level and pass along any information to its members where required and relevant for their own individual feedback.

All authorities, persons and organisations engaged during the preliminary consultation and consultation phases were provided a link to the NOPSEMA brochure: Consultation on offshore petroleum environment plans.

A schedule of consultation activities is included at Table 4-8 and a schedule of advertising is included Table 4-9.

4.5.10 Reasonable period for consultation

Santos is required to allow a Relevant Person a reasonable period for consultation. In considering what constitutes a reasonable period of time for consultation for each Relevant Person, Santos had regard to the nature, extent and likelihood of the potential impact of the Activity on that person's functions, interests or activities.

Santos has undertaken a comprehensive consultation program for the Barossa Gas Project commencing with the OPP. The OPP has been followed by extensive consultation for each of the activity specific EPs and other regulatory approvals prepared for different stages of the Barossa Gas Project.

For the Coastal Waters CEMP, Santos generally provided:

- approximately 30 days during the formal consultation phase for Relevant Persons to respond with feedback about the proposed activities.
- an additional 2 weeks, through preliminary consultation phase, for Relevant Persons to consider consultation information , which included information about the proposed activities and their potential impacts and risks.

In cases where a different period was provided for consultation, Santos considered this to be reasonable having regard to:

- the nature, extent and likelihood of the potential impact of the Activity on that person's functions, interests or activities; and/or
- Santos' understanding of the Relevant Persons' consultation preferences.

Santos directly contacted Relevant Persons notifying them of the formal consultation process and consultation period. Emails or letters were sent to Relevant Persons to invite feedback on the activity the subject of the Coastal Waters CEMP, confirming the date by which feedback was sought and outlining how feedback may be provided. In other cases, one or more meetings were arranged, by agreement with the Relevant Person, for the purposes of the consultation.

Santos' preliminary consultation period also included a public awareness campaign, which ran from 9 to 22 November 2023 (Table 4-8), to seek out Relevant Persons and to raise public awareness of the Barossa Gas Project generally.

This was followed by a further public awareness campaign from 23 November to 22 December 2023, specifically seeking feedback from Relevant Persons on the activity the subject of the Coastal Waters CEMP (Table 4-8).

As shown in Table 4-6, additional advertising was undertaken outside this period (from January to June 2024) targeted specifically at Tiwi and Larrakia people.

Where no comments were received from a Relevant Person, Santos generally followed up the Relevant Person during the formal consultation phase to prompt them to consider the information materials previously provided and/or confirm whether the Relevant Person intended to provide feedback. In some cases, Santos extended the formal consultation period to allow Relevant Persons more time to make an informed assessment of the possible consequences of the proposed activity on their functions, interests or activities. Santos also accepted feedback from Relevant Persons at any time prior to the submission of the Coastal Waters CEMP, which was approximately 7 months after consultation materials were initially provided to most Relevant Persons.

As outlined elsewhere in the Coastal Waters CEMP, while Santos has considered the full spatial extent of the EMBA as part of its process for identifying Relevant Persons, Santos notes that the EMBA is inherently highly conservative, with there being no single event that could result in the full extent of the EMBA being affected by an unplanned hydrocarbon release at any single point in time. In addition, the likelihood of an unplanned release is assessed as remote given the mitigation and management controls in place, and the residual risk of such an event is considered low. There is an even lower likelihood of an unplanned hydrocarbon release affecting a person's or organisation's functions, interests or activities where these relate to the extremities of the EMBA. While Santos has still consulted Relevant Persons whose functions, interests or activities may only be affected by unplanned events (the likelihood of which is remote), consultation tended to focus more closely on those most proximate to the Operational Area and in respect of whom the period reasonably required for consultation is considered to likely be greater.

Considering the above Santos considers it has provided a more than reasonable period for consultation.

4.5.11 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; and
- In-person or virtual meetings, as appropriate.

Following initial correspondence and/or in person conversations, attempts were made (using different mediums) 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. In most cases multiple follow-up attempts were made.

Table 4-8: Summary of Consultation Activities

Activity	Purpose	Timing
Preliminary Consultation		
Website:	Provide Relevant Persons with: • Information about Santos' consultation obligations and approach.	From 9 November 2023

Activity	Purpose	Timing
Website content and Activity fact sheets developed and made available at: https://www.santos.com/offshoreconsultation/	• Descriptions of proposed activities, including potential activity impacts and risks, and proposed management measures. • Contact details to enable Relevant Persons to provide feedback. • Information about how to self-identify as a Relevant Person, including an on-line nomination form. • Details about how feedback will be managed, including provision of Santos' offshore WA and NT privacy notice.	
Advertising: Advertisements in the following publications: • The Australian • NT News • Advertisements on the following radio stations: – Darwin Hot 100 – Darwin Mix 104.9.	Promote awareness of proposed activities to create opportunities for Relevant Persons to self-identify and seek feedback from Relevant Persons in addition to those identified by Santos as part of its initial public review process.	From 9 November 2023
Consultation materials: Email to identified/potential Relevant Persons with a link to the fact sheet for the activity the subject of the Coastal Waters CEMP	Provide Relevant Persons with details on proposed Activities and establish consultation expectations.	From 9 November 2023
One-to-one meetings: Meetings held with authorities, persons and organisations		From 9 November 2023
Consultation		
Consultation materials: Email to identified Relevant Persons advising the commencement of consultation	Reminder to Santos identified Relevant Persons of the commencement and closing dates for consultation.	From 22 November 2023
Advertising Advertisements in the following publications: • The Australian • NT News • Advertisements on the following radio stations: • Darwin Hot 100 • Darwin Mix 104.9	Promote awareness of proposed Activities and seek feedback from Relevant Persons.	From 22 November 2023
Consultation email: Reminder email to identified Relevant Persons advising pending closure of consultation period	Reminder to Santos identified Relevant Persons of the closing dates for consultation.	From 14 December 2023
Online meetings	Discussions with Relevant Persons who requested an online meeting.	November-December 2023
Meetings (in-person)	Provide Relevant Persons with information about the activity the subject of the Coastal Waters CEMP and discussions with Relevant Persons regarding this information.	November-December 2023

Table 4-9: Additional consultation advertising (November-December 2023)

Publication date	Advertising type	Towns / Communities	Reach
10 November 2023	Press ad – NT News	NT-wide	24,000

Publication date	Advertising type	Towns / Communities	Reach
22, 25, 29 November 2023	Press ads – NT News	NT-wide	24,000
22 November and 6 December 2023	Press ad – The Australian	National	N/A
2, 6, 9, 13, 16, 19 December 2023	Press ads – NT News	NT-wide	24,000
27 November to 15 December 2023	Radio ads – Darwin Hot 100 50 X 30 sec spots	Darwin City, Greater Darwin and surrounds	N/A
4 December to 22 December 2023	Radio ads – Darwin Mix 104.9 50 X 30 sec spots	Darwin City, Greater Darwin and surrounds	N/A

4.6 Consultation report

A summary report including the outcomes of consultation with Relevant Persons, including any objections or claims and Santos' assessment of them, satisfying the requirements of section 24(b)(i)-(iii) of the OPGGS(E)R, is provided in Table 4-10. The full records of Relevant Persons consultation, as required by section 24(b)(iv) of the OPGGS(E)R, is provided in the Sensitive Information Report.

Of the Relevant Persons contacted, feedback on the Activity, environmental values and sensitivities, impacts/risks or control measures was received from the following:

- AusTurtle Inc via email
- One NT managed fishery licence holder via email
- Arafura Bluewater Charters via email
- ECNT via letter/email
- Wickham Point Deed liaison committee via a meeting
- The following First Nation Consultative Committees and coastal clan groups via meetings:
  - Agalda clan
  - Daly River / Port Keats First Nations Consultative Committee
  - Mulyurrud Consultative committee
  - Rak Badjalarr Consultative Committee
  - Wulna clan
- The following Tiwi islands clan groups via meetings:
  - Jikilaruwu clan
  - Malawu clan
  - Mantiyupwu clan
  - Marrikawuyanga clan
  - Munupi clan.
  - Wulirankuwu clan
  - Wurankuwu clan
  - Yimpinari clan

Where objections or claims made during consultation were considered relevant to the Coastal Waters CEMP, sections within the Coastal Waters CEMP and the DPD (NT Waters) OPEP (BAS-210 0026) have been referenced within the consultation report (Table 4-10) for each objection or claim, showing where existing information relevant to that objection or claim is located. Where additional information or measures have been added to the Coastal Waters CEMP or the DPD (NT Waters) OPEP (BAS-210 0026), as a result of the consultation undertaken, references to relevant sections have also been made.

Santos is committed to appropriate consultation post-acceptance of the Coastal Waters CEMP 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. Section 8.5 describes the Santos' post-acceptance consultation implementation strategy.

Table 4-10: Consultation summary report

Section 25(1)(a) of the OPGGS(E)R: Commonwealth agency or authority to which the activities to be carried out under the environment plan may be relevant			
Australian Communications and Media Authority (ACMA)			
Summary of consultation effort: • On 9 November 2023 Santos emailed ACMA to advise it of preliminary consultation regarding proposed activities for consultation in relation to the activities under the Coastal Waters CEMP and the Commonwealth Waters DPD EP. [Con-3236] • The email advised that Santos was seeking information to better understand: – if you are from a government Department or agency, how the proposed DPD activities may be relevant to your department or agency; and – what (if any) functions, interests, or activities you or your organisation have that may be affected by the proposed DPD activities. • The email included information on the regulatory process for the activities in Commonwealth and NT jurisdictions and links to a Santos information booklet on the proposed activities and a NOPSEMA brochure on the consultation process and details of how to contact Santos to register as a Relevant Person. The email stated that the consultation phase would commence on 22 November 2023 and close on 22 December 2023. • On 22 November 2023 Santos emailed ACMA further to the previous correspondence, to advise that it had commenced the consultation phase which would run until 22 December 2023. In addition to the previous information again being provided, Santos provided information on Relevant Persons' entitlements under the regulatory processes, details of how to provide feedback and a reminder of the closing date for consultation. [Con-3238] • On 13 December 2023 Santos followed-up the previous emails with a phone call to ACMA followed by an email on 20 December 2023. [Con-2894] • On 21 December 2023 ACMA responded to the phone calls via email to Santos stating it had no comments on the proposed activities and recommended that Santos contact the owners of any submarine cables (existing or planned) within the OA to discuss the activities. [Con-3296] • On 21 December 2023 Santos responded to ACMA via email and stated it was in regular contact with the relevant submarine cable owners and proponents. [Con-3306] See separate entries in this table for BW Digital, Sun Cable, Telstra, NT Power and Water and Vocus. • No further correspondence or feedback was received from ACMA.			
Summary of Objection or Claim	**Assessment of Merits**	**Santos' Response Statement**	**Coastal Waters CEMP Reference**
• No objections or claims were raised by ACMA. • ACMA recommended Santos engage with the owners of any submarine cables (existing or planned) within the OA to discuss the activities. [Con-3296]	Santos noted and actioned ACMA's advice.	There are no submarine cables within the OA (see Table 3-15 above). Santos has engaged with the relevant owners of submarine cables (existing or planned) in the EMBA in preparing the Coastal Waters CEMP [Con-3306]. See separate entries in this table for BW Digital, Vocus, Telstra and Sun Cable under Infrastructure owners/operators.	Refer to this consultation report table for consultation with owners of submarine cables. No updates or additional controls required.
Australian Fisheries Management Authority (AFMA)			
Summary of consultation effort: • On 9 November 2023 Santos emailed AFMA to advise it of preliminary consultation regarding proposed activities for consultation in relation to the activities under the Coastal Waters CEMP and the Commonwealth Waters DPD EP. [Con-3236] • The email advised that Santos was seeking information to better understand: – if you are from a government Department or agency, how the proposed DPD activities may be relevant to your department or agency; and – what (if any) functions, interests or activities you or your organisation have that may be affected by the proposed DPD activities. • The email included information on the regulatory process for the activities in Commonwealth and NT jurisdictions and links to a Santos information booklet on the proposed activities and a NOPSEMA brochure on the consultation process and details of how to contact Santos to register as a Relevant Person. The email stated that the consultation phase would commence on 22 November 2023 and close on 22 December 2023. • On 22 November 2023 Santos emailed AFMA further to the previous correspondence, to advise that it had commenced the consultation phase which would run until 22 December 2023. In addition to the previous information again being provided, Santos provided information on Relevant Persons' entitlements under the regulatory processes, details of how to provide feedback and a reminder of the closing date for consultation. [Con-3238] • On 13December 2023 Santos followed-up the previous emails with a phone call to AFMA to remind it of the deadline for feedback. • On 14 December 2023 AFMA responded to the phone call via email Santos stating it had already responded when Santos requested feedback on its pipeline licence application for the DPD section in Commonwealth waters. [Con-3265] • On 15 December 2023 Santos responded to AFMA advising it would check this feedback. [Con-3307] • On 7 February 2024 Santos provided further response to AFMA confirming AFMA's standard advice for consultation direct with commercial fishing industry stakeholders. [Con-3328] • No further correspondence or feedback was received from AFMA.			
Summary of Objection or Claim	**Assessment of Merits**	**Santos' Response Statement**	**Coastal Waters CEMP Reference**
• No objections or claims were raised by AFMA. • AFMA referred Santos to its previous advice [Con-3265] which is that Santos should consult directly with commercial fishing industry stakeholders.	Santos noted and actioned AFMA's advice.	Santos advised it was consulting directly with relevant commercial fishing industry stakeholders in preparing the Coastal Waters CEMP. [Con-3328]	Refer this consultation report table for consultation with commercial fishing stakeholders. No updates or additional controls required.
Australian Hydrographic Office (AHO)			
Summary of consultation effort: • On 9 November 2023 Santos emailed AHO to advise it of preliminary consultation regarding proposed activities for consultation to be managed under the Coastal Waters CEMP and the Commonwealth Waters DPD EP. [Con-3236] • The email advised that Santos was seeking information to better understand: – if you are from a government Department or agency, how the proposed DPD activities may be relevant to your department or agency; and – what (if any) functions, interests or activities you or your organisation have that may be affected by the proposed DPD activities. • The email included information on the regulatory process for the activities in Commonwealth and NT jurisdictions and links to a Santos information booklet on the proposed activities and a NOPSEMA brochure on the consultation process and details of how to contact Santos to register as a Relevant Person. The email stated that the consultation phase would commence on 22 November 2023 and close on 22 December 2023. • On 22 November 2023 Santos emailed AHO further to the previous correspondence, to advise that it had commenced the consultation phase which would run until 22 December 2023. In addition to the previous information again being provided, Santos provided information on Relevant Persons' entitlements under the regulatory processes, details of how to provide feedback and a reminder of the closing date for consultation. [Con-3238]			

Section 25(1)(a) of the OPGGS(E)R: Commonwealth agency or authority to which the activities to be carried out under the environment plan may be relevant

- On 23 August 2024 Santos phoned AHO and followed-up with an email advising that, in the absence of any specific response from AHO, Santos has reverted to the standard advice provided by AHO in response to requests for feedback during consultation on Santos EPs. [Con-5596]
- On 27 August 2024 AHO responded to Santos' email stating it did not have any further comment other than to request that, once the activity is fully complete, the final 'as laid' position of the pipeline is sent to the AHO for charting action. [Con-5601] Santos responded via email the same day acknowledging AHO's advice and stating it will ensure the as laid position of the pipeline is provided. [Con-5602]
-

Summary of Objection or Claim	Assessment of Merits	Santos' Response Statement	Coastal Waters CEMP Reference
No objections or claims were raised by AHO.	Santos notes and will action AHO's advice.	• Santos will include all formal notification requirements in the relevant sections of the Coastal Waters CEMP, specifically the following: – Requirement to notify the AHO through datacentre@hydro.gov.au no less than 4 working weeks before operations commence for the promulgation of related notices to mariners. – Requirement to notify AMSA's JRCC through rccaus@amsa.gov.au (Phone: 1800 641 792 or +61 2 6230 6811) for promulgation of radio-navigation warnings 24-48 hours before operations commence. • Santos also acknowledges the following standard AHO advice: – Vessel obligations to comply with the International Rules for Preventing Collisions at Sea (COLREGs), in particular, the use of appropriate lights and shapes to reflect the nature of operations (e.g. restricted in the ability to manoeuvre). Vessels should also ensure their navigation status is set correctly in the ship's AIS unit. – Evaluation and implementation of adequate anti-collision measures, including the collision risk mitigation measures cited by AMSA, being additional warnings and/or lights to attract attention and offshore guard vessel/s that can monitor traffic and take early action to alert a vessel approaching the area of operations. – Santos' vessel anti-collision measures are in accordance with COLREGs and AMSA requirements. • Additionally, Santos will implement cautionary zones around Project vessels and use surveillance vessel to guard cautionary zones. • As requested by AHO, once the activity is fully complete, the final 'as laid' position of the pipeline will be sent to the AHO for charting action.	Notifications to AHO and AMSA JRCC are included in Table 8-6 of the Coastal Waters CEMP. Vessel anti-collision measures, in accordance with COLREGs and AMSA requirements, are included in control measures (refer to C6.1.1 and C6.1.2) and associated performance standards. Additionally, the implementation of speed restrictions and exclusion zones around the pipelay and construction vessels and use of surveillance vessel to act as a surveillance vessel within the immediate vicinity of the pipelay vessel during pipelay activities are included in control measures and associated performance standards (refer to C6.1.2 and C6.1.6). No updates or additional controls required.

Australian Institute of Marine Science (AIMS)

Summary of consultation effort:

- On 9 November 2023 Santos emailed AIMS to advise it of preliminary consultation regarding proposed activities for consultation in relation to the activities under the Coastal Waters CEMP and the Commonwealth Waters DPD EP. [Con-3236]
- The email advised that Santos was seeking information to better understand:
  – if you are from a government Department or agency, how the proposed DPD activities may be relevant to your department or agency; and
  – what (if any) functions, interests or activities you or your organisation have that may be affected by the proposed DPD activities.
- The email included information on the regulatory process for the activities in Commonwealth and NT jurisdictions and links to a Santos information booklet on the proposed activities and a NOPSEMA brochure on the consultation process and details of how to contact Santos to register as a Relevant Person. The email stated that the consultation phase would commence on 22 November 2023 and close on 22 December 2023.
- On 22 November 2023 Santos emailed AIMS further to the previous correspondence, to advise that it had commenced the consultation phase which would run until 22 December 2023. In addition to the previous information again being provided, Santos provided information on Relevant Persons' entitlements under the regulatory processes, details of how to provide feedback and a reminder of the closing date for consultation. [Con-3238]
- On 14 December 2023 Santos followed-up the previous emails with a phone call to AIMS to remind it of the deadline for feedback. AIMS advised that it would not be providing any feedback.
- On 20 December 2023 Santos responded to AIMS via email confirming AIMS' comment during the phone call that it would not be providing any feedback. [Con-2910]
- No further correspondence or feedback was received from AIMS.

Summary of Objection or Claim	Assessment of Merits	Santos' Response Statement	Coastal Waters CEMP Reference
No objections or claims were raised by AIMS.	Nil	Nil	Nil

Australian Maritime Safety Authority (AMSA)

Summary of consultation effort:

- On 9 November 2023 Santos emailed AMSA to advise it of preliminary consultation regarding proposed activities for consultation in relation to the activities under the Coastal Waters CEMP and the Commonwealth Waters DPD EP. [Con-3236]
- The email advised that Santos was seeking information to better understand:
  – if you are from a government Department or agency, how the proposed DPD activities may be relevant to your department or agency; and
  – what (if any) functions, interests or activities you or your organisation have that may be affected by the proposed DPD activities.
- The email included information on the regulatory process for the activities in Commonwealth and NT jurisdictions and links to a Santos information booklet on the proposed activities and a NOPSEMA brochure on the consultation process and details of how to contact Santos to register as a Relevant Person. The email stated that the consultation phase would commence on 22 November 2023 and close on 22 December 2023.
- On 22 November 2023 Santos emailed AMSA further to the previous correspondence, to advise that it had commenced the consultation phase which would run until 22 December 2023. In addition to the previous information again being provided, Santos provided information on Relevant Persons' entitlements under the regulatory processes, details of how to provide feedback and a reminder of the closing date for consultation. [Con-3238]
- On 23 August 2024 Santos phoned AMSA and followed-up with an email advising that, in the absence of any specific response from AMSA, Santos has reverted to the standard advice provided by AMSA in response to requests for feedback during consultation on other Barossa EPs. In the email Santos provided details of the AMSA information being included in the Coastal Waters CEMP and requested any further input by 3 September 2024. [Con-5597]
- Notwithstanding the information provided and the steps described above, no comments or input were received in relation to activities under the Coastal Waters CEMP from AMSA.

Section 25(1)(a) of the OPGGS(E)R: Commonwealth agency or authority to which the activities to be carried out under the environment plan may be relevant

Summary of Objection or Claim	Assessment of Merits	Santos' Response Statement	Coastal Waters CEMP Reference
No objections or claims were raised by AMSA.	In the absence of any specific response in relation to the activity the subject of the Coastal Waters CEMP, Santos reverts to the standard advice provided by AMSA in response to requests for feedback during consultation on any EP.	• Santos will include all formal notification requirements in the relevant sections of the Coastal Waters CEMP, specifically the following: • Requirement to notify AMSA's JRCC through rccaus@amsa.gov.au (Phone: 1800 641 792 or +61 2 6230 6811) for promulgation of radio-navigation warnings 24-48 hours before operations commence. • Requirement to notify the Australian Hydrographic Office through datacentre@hydro.gov.au no less than 4 working weeks before operations commence for the promulgation of related notices to mariners. • Santos also acknowledges the following standard AHO advice: – Vessel obligations to comply with COLREGs, in particular, the use of appropriate lights and shapes to reflect the nature of operations (e.g. restricted in the ability to manoeuvre). Vessels should also ensure their navigation status is set correctly in the ship's AIS unit. – Evaluation and implementation of adequate anti-collision measures, including the collision risk mitigation measures cited by AMSA, being additional warnings and/or lights to attract attention and offshore guard vessel/s that can monitor traffic and take early action to alert a vessel approaching the area of operations. • Santos will provide AMSA with a copy of the accepted Coastal Waters CEMP.	Notifications to AHO and AMSA JRCC are included in Table 8-6 of the Coastal Waters CEMP. Vessel anti-collision measures in accordance with COLREGs and AMSA requirements are included in a control measures (refer to C6.1.1 and C6.1.2) and associated performance standards. Additionally, the implementation of speed restrictions and exclusion zones around the pipelay and construction vessels and use of surveillance vessel to act as a surveillance vessel within the immediate vicinity of the pipelay vessel during pipelay activities are included in control measures and associated performance standards (refer to C6.1.2 and C6.1.6). No updates or additional controls required.

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

Summary of consultation effort:

- On 9 November 2023 Santos emailed DAFF to advise it of preliminary consultation regarding proposed activities for consultation in relation to the activities under the Coastal Waters CEMP and the Commonwealth Waters DPD EP. [Con-3236]
- The email advised that Santos was seeking information to better understand:
  - if you are from a government Department or agency, how the proposed DPD activities may be relevant to your department or agency; and
  - what (if any) functions, interests, or activities you or your organisation have that may be affected by the proposed DPD activities.
- The email included information on the regulatory process for the activities in Commonwealth and NT jurisdictions and links to a Santos information booklet on the proposed activities and a NOPSEMA brochure on the consultation process and details of how to contact Santos to register as a Relevant Person. The email stated that the consultation phase would commence on 22 November 2023 and close on 22 December 2023.
- On 9 November 2023 DAFF emailed Santos to acknowledge receipt of the email. [Con-3244]
- On 22 November 2023 Santos emailed DAFF further to the previous correspondence, to advise that it had commenced the consultation phase which would run until 22 December 2023. In addition to the previous information again being provided, Santos provided information on Relevant Persons' entitlements under the regulatory processes, details of how to provide feedback and a reminder of the closing date for consultation. [Con-3238]
- On 22 November 2023 DAFF emailed Santos to acknowledge receipt of the email. [Con-3251]
- On 23 August 2024 Santos phoned DAFF and followed-up with an email advising that, in the absence of any specific response from DAFF, Santos has reverted to the standard advice provided by DAFF in response to requests for feedback during consultation on other other Barossa EPs. In the email Santos provided details of the DAFF information being included in the Coastal Waters CEMP and requested any further input by 3 September 2024. [Con-5598]
- On 23 August 2024 DAFF emailed Santos to acknowledge receipt of the email. [Con-5600]
- Notwithstanding the information provided and the steps described above, no comments or input were received in relation to activities under the Coastal Waters CEMP from DAFF.

Summary of Objection or Claim	Assessment of Merits	Santos' Response Statement	Coastal Waters CEMP Reference
No objections or claims were raised by DAFF.	In the absence of any specific response in relation to the activity the subject of the Coastal Waters CEMP, Santos reverts to the standard advice provided by DAFF in response to requests for feedback during consultation on any EP.	All DAFF biosecurity requirements are understood and referenced in relevant commitments documented in the Coastal Waters CEMP. Santos will report and engage directly with DAFF for the management of biosecurity risk post Coastal Waters CEMP acceptance as stated in the cited offshore biosecurity guidelines and other associated documentation. Santos will continue to keep DAFF informed and incorporate DAFF's assistance offer into relevant management plans.	Notifications to DAFF are included in Table 8-6 of the Coastal Waters CEMP. Santos' environmental management framework relevant to biosecurity risk is outlined in Section 8.6.4 and 8.6.5 of the Coastal Waters CEMP and is consistent with DAFF requirements. Adopted control measures are listed in Table 6-3. No updates or additional controls required.

Department of Climate Change, Energy, the Environment and Water (Underwater Cultural Heritage Branch)

Summary of consultation effort:

- On 9 November 2023 Santos emailed DCCEEW's Underwater Cultural Heritage Branch to advise it of preliminary consultation regarding proposed activities for consultation in relation to the activities under the Coastal Waters CEMP and the Commonwealth Waters DPD EP. [Con-3236]
- The email advised that Santos was seeking information to better understand:
  - if you are from a government Department or agency, how the proposed DPD activities may be relevant to your department or agency; and
  - what (if any) functions, interests or activities you or your organisation have that may be affected by the proposed DPD activities.
- The email included information on the regulatory process for the activities in Commonwealth and NT jurisdictions and links to a Santos information booklet on the proposed activities and a NOPSEMA brochure on the consultation process and details of how to contact Santos to register as a Relevant Person. The email stated that the consultation phase would commence on 22 November 2023 and close on 22 December 2023.
- On 22 November 2023 Santos emailed DCCEEW's Underwater Cultural Heritage Branch further to the previous correspondence, to advise that it had commenced the consultation phase which would run until 22 December 2023. In addition to the previous information again being provided, Santos provided information on Relevant Persons' entitlements under the regulatory processes, details of how to provide feedback and a reminder of the closing date for consultation. [Con-3238]

Section 25(1)(a) of the OPGGS(E)R: Commonwealth agency or authority to which the activities to be carried out under the environment plan may be relevant

- On 23 August 2024 Santos phoned DCCEEW's Underwater Cultural Heritage Branch and followed-up with an email advising that, in the absence of any specific feedback from DCCEEW's Underwater Cultural Heritage Branch in the context of relevant person consultation, Santos has reverted to advice provided by the Branch during the EPBC Act Referral assessment process with DCCEEW. In the email Santos provided details of the DCCEEW information being included in the Coastal Waters CEMP and requested any further input by 3 September 2024. [Con-5595]
- Notwithstanding the information provided and the steps described above, no comments or input were received in relation to activities under the Coastal Waters CEMP from DCCEEW's Underwater Cultural Heritage Branch.

Summary of Objection or Claim	Assessment of Merits	Santos' Response Statement	Coastal Waters CEMP Reference
No objections or claims were raised by DCCEEW (Underwater Cultural Heritage Branch).	In the absence of any specific response in relation to the activity the subject of the Coastal Waters CEMP, Santos has reverted to advice provided by the Branch during the EPBC Act Referral assessment process with DCCEEW	Santos will ensure that requirements of the UCH Act are met as per previous DCCEEW advice.	Cultural heritage protected under the UCH Act is detailed in Sections 3.2.13.7 and 3.2.14. Section 8.6.6 of the Coastal Waters CEMP describes the DPD Cultural Heritage Management Plan (CHMP)(BAS-210 0028) including unexpected finds protocols for maritime and First Nations UCH. Table 7-2 details the control measure (C6.2.9 and C6.2.11) and associated EPSs. Notifications required under the UCH Act are included in Table 8-6 of the Coastal Waters CEMP. No updates or additional controls required.

Department of Defence (DoD)

Summary of consultation effort:

- On 9 November 2023 Santos emailed DoD to advise it of preliminary consultation regarding proposed activities for consultation in relation to the activities under the Coastal Waters CEMP. [Con-3236]
- The email advised that Santos was seeking information to better understand:
  - if you are from a government Department or agency, how the proposed DPD activities may be relevant to your department or agency; and
  - what (if any) functions, interests or activities you or your organisation have that may be affected by the proposed DPD activities.
- The email included information on the regulatory process for the activities in Commonwealth and NT jurisdictions and links to a Santos information booklet on the proposed activities and a NOPSEMA brochure on the consultation process and details of how to contact Santos to register as a Relevant Person. The email stated that the consultation phase would commence on 22 November 2023 and close on 22 December 2023.
- On 22 November 2023 Santos emailed DoD further to the previous correspondence, to advise that it had commenced the consultation phase which would run until 22 December 2023. In addition to the previous information again being provided, Santos provided information on Relevant Persons' entitlements under the regulatory processes, details of how to provide feedback and a reminder of the closing date for consultation. [Con-3238]
- On 23 August 2024 Santos phoned DoD and followed-up with an email advising that, in the absence of any specific feedback from DoD in the context of relevant person consultation, Santos has reverted to the standard advice provided by DoD in response to requests for feedback during consultation on other Barossa EPs. In the email Santos provided details of the DoD's information being included in the Coastal Waters CEMP and requested any further input by 3 September 2024. [Con-5594]
- Notwithstanding the information provided and the steps described above, no comments or input were received in relation to activities under the Coastal Waters CEMP from DoD.

Summary of Objection or Claim	Assessment of Merits	Santos' Response Statement	Coastal Waters CEMP Reference
No correspondence was received from DoD. Santos engages with the Department on an ongoing basis to provide operational updates on current and proposed offshore activities and schedules.	Santos has followed DoD's standard advice provided for all Barossa Project EPs.	Santos is aware of the potential presence of unexploded ordnance in the military exercise area within the EMBA and related responsibilities of an Operator. UXO surveys have been undertaken in preparation for the activity. Procedures to mitigate risks to unexpected maritime heritage objects (i.e. the UFP for maritime underwater cultural heritage as included in the DPD Cultural Heritage Management Plan (CHMP) (BAS-210 0208)), inclusive of a stop work protocol, will be in place for the activity and includes for identification of UXO amongst other objects.	DoD activity notifications are included in Table 8-6 of the Coastal Waters CEMP. Section 8.6.6 of the Coastal Waters CEMP. describes the CHMP. Table 7-2 details the control measure (C6.2.9) and associated EPSs. No updates or additional controls required.

Department of Home Affairs (DHA) / Australian Border Force (ABF)

Summary of consultation effort:

- On 9 November 2023 Santos emailed DHA/ABF to advise it of preliminary consultation regarding proposed activities for consultation in relation to the activities under the Coastal Waters CEMP and the Commonwealth Waters DPD EP. [Con-3236]
- The email advised that Santos was seeking information to better understand:
  - if you are from a government Department or agency, how the proposed DPD activities may be relevant to your department or agency; and
  - what (if any) functions, interests or activities you or your organisation have that may be affected by the proposed DPD activities.
- The email included information on the regulatory process for the activities in Commonwealth and NT jurisdictions and links to a Santos information booklet on the proposed activities and a NOPSEMA brochure on the consultation process and details of how to contact Santos to register as a Relevant Person. The email stated that the consultation phase would commence on 22 November 2023 and close on 22 December 2023.
- On 22 November 2023 Santos emailed DHA/ABF further to the previous correspondence, to advise that it had commenced the consultation phase which would run until 22 December 2023. In addition to the previous information again being provided, Santos provided information on Relevant Persons' entitlements under the regulatory processes, details of how to provide feedback and a reminder of the closing date for consultation. [Con-3238]
- On 13 December 2023 Santos had a telephone discussion with the DHA/ABF during which DHA stated that its interest in the Barossa Project was only related to the required maritime security plan and it would consult with Santos on the development of that plan at the appropriate time.
- On 21 December 2023 Santos emailed DHA/ABF to confirm the advice provided by DHA/ABF during the telephone discussion of 13 December 2023. [Con-2896].
- On 23 January 2024 ABF emailed Santos to advise that Santos is a potential operator in 3 scenarios that would require an approved security plan to be maintained. [Con-3206]
- On 12 February 2024 Santos emailed DHA/ABF to confirm that, separate to the Coastal Waters CEMP consultation process, contact had previously been initiated and was ongoing with DHA regarding the requirements outlined in the *Maritime Transport and Offshore Facilities Security Act 2003* (Cth). [Con-3207]
- No further correspondence or feedback was received from DHA/ABF relevant to this consultation.

Summary of Objection or Claim	Assessment of Merits	Santos' Response Statement	Coastal Waters CEMP Reference
No objections or claims were raised by DHA/ABF.	Nil	Nil	Nil

Section 25(1)(a) of the OPGGS(E)R: Commonwealth agency or authority to which the activities to be carried out under the environment plan may be relevant

Department of Industry, Science and Resources (DISR)

Summary of consultation effort:

- On 9 November 2023 Santos emailed DISR to advise it of preliminary consultation regarding proposed activities for consultation in relation to the activities under the Coastal Waters CEMP and the Commonwealth Waters DPD EP. [Con-3236]
- The email advised that Santos was seeking information to better understand:
  - if you are from a government Department or agency, how the proposed DPD activities may be relevant to your department or agency; and
  - what (if any) functions, interests or activities you or your organisation have that may be affected by the proposed DPD activities.
- The email included information on the regulatory process for the activities in Commonwealth and NT jurisdictions and links to a Santos information booklet on the proposed activities and a NOPSEMA brochure on the consultation process and details of how to contact Santos to register as a Relevant Person. The email stated that the consultation phase would commence on 22 November 2023 and close on 22 December 2023.
- On 22 November 2023 Santos emailed DISR further to the previous correspondence, to advise that it had commenced the consultation phase which would run until 22 December 2023. In addition to the previous information again being provided, Santos provided information on Relevant Persons' entitlements under the regulatory processes, details of how to provide feedback and a reminder of the closing date for consultation. [Con-3238]
- On 13 December 2023 Santos followed up the previous emails by phone and left a message.
- On 19 December 2023 Santos followed up the phone call with another email to DISR requesting any feedback by 22 December 2023. [Con-2897]
- Notwithstanding the information provided and the steps described above, no comments or input were received in relation to activities under the Coastal Waters CEMP from DISR.

Summary of Objection or Claim	Assessment of Merits	Santos' Response Statement	Coastal Waters CEMP Reference
No objections or claims were raised by DISR.	Nil	Nil	Nil

Director of National Parks (DNP)

Summary of consultation effort:

- On 9 November 2023 Santos emailed DNP to advise it of preliminary consultation regarding proposed activities for consultation in relation to the activities under the Coastal Waters CEMP and the Commonwealth Waters DPD EP. [Con-3236]
- The email advised that Santos was seeking information to better understand:
  - if you are from a government Department or agency, how the proposed DPD activities may be relevant to your department or agency; and
  - what (if any) functions, interests or activities you or your organisation have that may be affected by the proposed DPD activities.
- The email included information on the regulatory process for the activities in Commonwealth and NT jurisdictions and links to a Santos information booklet on the proposed activities and a NOPSEMA brochure on the consultation process and details of how to contact Santos to register as a Relevant Person. The email stated that the consultation phase would commence on 22 November 2023 and close on 22 December 2023.
- On 22 November 2023 Santos emailed DNP further to the previous correspondence, to advise that it had commenced the consultation phase which would run until 22 December 2023. In addition to the previous information again being provided, Santos provided information on Relevant Persons' entitlements under the regulatory processes, details of how to provide feedback and a reminder of the closing date for consultation. [Con-3238]
- On 6 December 2023 DNP emailed Santos stating that unless the Barossa project had materially changed it had no comments to provide on the EP. [Con-3260]
- No further correspondence or feedback was received from DNP.

Summary of Objection or Claim	Assessment of Merits	Santos' Response Statement	Coastal Waters CEMP Reference
No objections or claims were raised by DNP.	The Barossa Project has not materially changed. In the absence of any specific response in relation to the activity the subject of Coastal Waters CEMP, Santos has reverted to the standard advice provided by Parks Australia in response to requests for feedback during consultation on EPs.	In preparing the Coastal Waters CEMP, Santos has completed the following actions: • Considered the NOPSEMA Petroleum Activities and Australian Marine Parks Guidance Note. • Identified and proposed management measures for all impacts and risks on Australian marine park values (including ecosystem values) to an acceptable level and considered all options to avoid or reduce them to as low as reasonably practicable. • Demonstrated that the activity will not be inconsistent with the relevant marine parks management plan(s). • Incorporated all DNP emergency response notification requirements in the relevant sections of the Coastal Waters CEMP.	Australian Marine Parks are identified and described in Section 3.2.11.2. An assessment of impacts/risk against Australian Marine Park objectives is included in Section 6.6 and 6.7. Table 8-6 of the Coastal Waters CEMP and Table 5-1 of the DPD (NT Waters) OPEP (BAS-210 0026) details the DNP emergency notification requirements. No updates or additional controls required.

Fisheries Research and Development Corporation (FRDC)

Summary of consultation effort:

- On 9 November 2023 Santos emailed FRDC to advise it of preliminary consultation regarding proposed activities for consultation in relation to the activities under the Coastal Waters CEMP and the Commonwealth Waters DPD EP. [Con-3236]
- The email advised that Santos was seeking information to better understand:
  - if you are from a government Department or agency, how the proposed DPD activities may be relevant to your department or agency; and
  - what (if any) functions, interests or activities you or your organisation have that may be affected by the proposed DPD activities.
- The email included information on the regulatory process for the activities in Commonwealth and NT jurisdictions and links to a Santos information booklet on the proposed activities and a NOPSEMA brochure on the consultation process and details of how to contact Santos to register as a Relevant Person. The email stated that the consultation phase would commence on 22 November 2023 and close on 22 December 2023.
- On 22 November 2023 Santos emailed FRDC further to the previous correspondence, to advise that it had commenced the consultation phase which would run until 22 December 2023. In addition to the previous information again being provided, Santos provided information on Relevant Persons' entitlements under the regulatory processes, details of how to provide feedback and a reminder of the closing date for consultation. [Con-3238]
- On 13 December 2023 Santos followed-up the previous emails with a phone call to FRDC reminding it of the deadline for feedback.
- On 13 December 2023 FRDC responded to the phone call via email to Santos stating it had forwarded Santos' correspondence to the relevant parties within its organisation. [Con-3261]
- On 20 December 2023 Santos responded to FRDC via email with a reminder to provide any feedback by 22 December 2023. [Con-2898]

- Notwithstanding the information provided, no further correspondence or feedback was received from FRDC.

Summary of Objection or Claim	Assessment of Merits	Santos' Response Statement	Coastal Waters CEMP Reference
No objections or claims were raised by FRDC.	Nil	Nil	Nil

Indigenous Land and Sea Corporation (ILSC)

Summary of consultation effort:

- On 9 November 2023 Santos emailed ILSC to advise it of preliminary consultation regarding proposed activities for consultation in relation to the activities under the Coastal Waters CEMP and the Commonwealth Waters DPD EP. [Con-3236]
- The email advised that Santos was seeking information to better understand:
  - if you are from a government Department or agency, how the proposed DPD activities may be relevant to your department or agency; and
  - what (if any) functions, interests or activities you or your organisation have that may be affected by the proposed DPD activities.
- The email included information on the regulatory process for the activities in Commonwealth and NT jurisdictions and links to a Santos information booklet on the proposed activities and a NOPSEMA brochure on the consultation process and details of how to contact Santos to register as a Relevant Person. The email stated that the consultation phase would commence on 22 November 2023 and close on 22 December 2023.
- On 14 November 2023 Santos sent the email of 9 November 2023 to an additional ILSC email address. [Con-3294]
- On 22 November 2023 Santos emailed ILSC further to the previous correspondence, to advise that it had commenced the consultation phase which would run until 22 December 2023. In addition to the previous information again being provided, Santos provided information on Relevant Persons' entitlements under the regulatory processes, details of how to provide feedback and a reminder of the closing date for consultation. [Con-3238]
- On 15 December 2023 and 9 January 2024 Santos followed-up the previous emails with phone calls to ILSC reminding it of the deadline for feedback.
- Notwithstanding the information provided and the steps described above, no comments or input were received in relation to activities under the Coastal Waters CEMP from ISLC.

Summary of Objection or Claim	Assessment of Merits	Santos' Response Statement	Coastal Waters CEMP Reference
No objections or claims were raised by ILSC.	Nil	Nil	Nil

National Indigenous Australians Agency (NIAA)

Summary of consultation effort:

- On 9 November 2023 Santos emailed NIAA to advise it of preliminary consultation regarding proposed activities for consultation in relation to the activities under the Coastal Waters CEMP and the Commonwealth Waters DPD EP. [Con-3236]
- The email advised that Santos was seeking information to better understand:
  - if you are from a government Department or agency, how the proposed DPD activities may be relevant to your department or agency; and
  - what (if any) functions, interests or activities you or your organisation have that may be affected by the proposed DPD activities.
- The email included information on the regulatory process for the activities in Commonwealth and NT jurisdictions and links to a Santos information booklet on the proposed activities and a NOPSEMA brochure on the consultation process and details of how to contact Santos to register as a Relevant Person. The email stated that the consultation phase would commence on 22 November 2023 and close on 22 December 2023.
- On 22 November 2023 Santos emailed NIAA further to the previous correspondence, to advise that it had commenced the consultation phase which would run until 22 December 2023. In addition to the previous information again being provided, Santos provided information on Relevant Persons' entitlements under the regulatory processes, details of how to provide feedback and a reminder of the closing date for consultation. [Con-3238]
- On 14 December 2023 Santos followed-up the previous email with a phone call to NIAA reminding it of the deadline for feedback.
- Notwithstanding the information provided and the steps described above, no comments or input were received in relation to activities under the Coastal Waters CEMP from NIAA.

Summary of Objection or Claim	Assessment of Merits	Santos' Response Statement	Coastal Waters CEMP Reference
No objections or claims were raised by NIAA.	Nil	Nil	Nil

Section 25(1)(c) of the OPGGS(E)R: Department of the responsible Northern Territory Minister

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

Summary of consultation effort:

- On 9 November 2023 Santos emailed DITT-NT Energy to advise it of preliminary consultation regarding proposed activities for consultation in relation to the activities under the Coastal Waters CEMP and the Commonwealth Waters DPD EP. [Con-3236]
- The email advised that Santos was seeking information to better understand:
  - if you are from a government Department or agency, how the proposed DPD activities may be relevant to your department or agency; and
  - what (if any) functions, interests or activities you or your organisation have that may be affected by the proposed DPD activities.
- The email included information on the regulatory process for the activities in Commonwealth and NT jurisdictions and links to a Santos information booklet on the proposed activities and a NOPSEMA brochure on the consultation process and details of how to contact Santos to register as a Relevant Person. The email stated that the consultation phase would commence on 22 November 2023 and close on 22 December 2023.
- On 22 November 2023 Santos emailed DITT-NT Energy further to the previous correspondence, to advise that it had commenced the consultation phase which would run until 22 December 2023. In addition to the previous information again being provided, Santos provided information on Relevant Persons' entitlements under the regulatory processes, details of how to provide feedback and a reminder of the closing date for consultation. [Con-3238]
- On 23 August 2024 Santos phoned DITT-NT Energy and followed-up with an email advising that, in the absence of any feedback from DITT-NT Energy in the context of relevant person consultation, Santos would note in the EP that DITT-NT-Energy had met separately with Santos (outside the relevant person consultation process) to discuss Santos' regulatory submissions under the Petroleum (Submerged Lands) Act 1981 (NT) / OPGGS(E)R for activities in NT coastal waters and the Energy Pipelines Act 1981 (NT) for activities in NT internal waters. In the email Santos provided details of the DITT-NT-Energy information being included in the Coastal Waters CEMP and requested any further input by 3 September 2024. [Con-5593]
- On 23 August 2024 DITT-NT-Energy responded via email stating it was aware of the activities proposed to be undertaken under the DPD EP and Coastal Waters CEMP and have no comments to make through the relevant person consultation process. [Con-5599]
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Summary of Objection or Claim	Assessment of Merits	Santos' Response Statement	Coastal Waters CEMP Reference
No objections or claims were raised by DITT-NT Energy. Santos has been meeting with DITT-NT Energy outside of the Relevant Person consultation process for the activity subject to the Coastal Waters CEMP submission to meet	Nil	Nil	The requirement for this NT Coastal Waters CEMP under the *Petroleum (Submerged Lands) Act 1981* (NT) is outlined in Section 1.3 of the Coastal Waters CEMP.

the requirements of the *Petroleum (Submerged Lands) Act 1981* (NT) / OPGGS(E)R and the requirements of the *Energy Pipelines Act 1981* (NT) for activities in NT Internal Waters covered by the DPD Offshore CEMP(BAS-210 0024) and the Onshore CEMP (BAS-210 0025).			

Section 25 (1)(a) of the OPGGS(E)R: Northern Territory agency or authority to which the activities to be carried out under the environment plan may be relevant may be relevant

Aboriginal Areas Protection Authority (AAPA)

Summary of consultation effort:

- On 9 November 2023 Santos emailed AAPA to advise it of preliminary consultation regarding proposed activities for consultation in relation to the activities under the Coastal Waters CEMP and the Commonwealth Waters DPD EP. [Con-3236]
- The email advised that Santos was seeking information to better understand:
  - if you are from a government Department or agency, how the proposed DPD activities may be relevant to your department or agency; and
  - what (if any) functions, interests or activities you or your organisation have that may be affected by the proposed DPD activities.
- The email included information on the regulatory process for the activities in Commonwealth and NT jurisdictions and links to a Santos information booklet on the proposed activities and a NOPSEMA brochure on the consultation process and details of how to contact Santos to register as a Relevant Person. The email stated that the consultation phase would commence on 22 November 2023 and close on 22 December 2023.
- On 9 November 2023 Santos sent an additional email to AAPA advising that Santos would be happy to meet with AAPA to discuss the information, suggested a potential week for a meeting and provided additional telephone contact details. [Con-3287]
- On 22 November 2023 Santos emailed AAPA further to the previous correspondence, to advise that it had commenced the consultation phase which would run until 22 December 2023. In addition to the previous information again being provided, Santos provided information on Relevant Persons' entitlements under the regulatory processes, details of how to provide feedback and a reminder of the closing date for consultation. [Con-3238]
- On 22 November 2023 AAPA emailed Santos stating it considered itself a Relevant Person for the consultation and would submit comment by 22 December 2023. [Con-3254]
- On 15 December 2023 and 9 January 2024 Santos followed-up the previous emails with phone calls to AAPA reminding it of the deadline for feedback.
- Notwithstanding the information provided and the steps described above, no further comments or input were received in relation to activities under the Coastal Waters CEMP from AAPA.

Summary of Objection or Claim	Assessment of Merits	Santos' Response Statement	Coastal Waters CEMP Reference
No objections or claims were raised by AAPA in relation to the activity the subject of the Coastal Waters CEMP. Santos has met with AAPA outside of the Relevant Person consultation process regarding Authority Certificate applications for the DPD Project in NT waters, including the NT Coastal Waters Operational Area. Santos has received Authority Certificates for certain seabed/land disturbance works in NT waters for the DPD Project including the NT Coastal Waters Operational Area.	Nil	Nil	Section 3.2.14.6 acknowledges that there are sacred sites, including those registered with AAPA, within the EMBA and summarises the AAPA Authority Certificates received for the DPD Project in NT jurisdiction. The regulatory requirements of the NTASS Act are provided in Sections 3.2.14.2 and 3.2.14.6. Section 8.6.6 of the Coastal Waters CEMP describes the CHMP Table 7-2 details the control measure (C6.2.11) and associated EPSs. Table 8-6 of the Coastal Waters CEMP lists the notifications to Relevant Persons and requirements under the UCH Act. No updates or additional controls required.

Department of Environment, Parks and Water Security (DEPWS)

Summary of consultation effort:

- On 9 November 2023 Santos emailed DEPWS to advise it of preliminary consultation regarding proposed activities for consultation in relation to the activities under the Coastal Waters CEMP and the Commonwealth Waters DPD EP. [Con-3236]
- The email advised that Santos was seeking information to better understand:
  - if you are from a government Department or agency, how the proposed DPD activities may be relevant to your department or agency; and
  - what (if any) functions, interests, or activities you or your organisation have that may be affected by the proposed DPD activities.
- The email included information on the regulatory process for the activities in Commonwealth and NT jurisdictions and links to a Santos information booklet on the proposed activities and a NOPSEMA brochure on the consultation process and details of how to contact Santos to register as a Relevant Person. The email stated that the consultation phase would commence on 22 November 2023 and close on 22 December 2023.
- On 22 November 2023 Santos emailed DEPWS further to the previous correspondence, to advise that it had commenced the consultation phase which would run until 22 December 2023. In addition to the previous information again being provided, Santos provided information on Relevant Persons' entitlements under the regulatory processes, details of how to provide feedback and a reminder of the closing date for consultation. [Con-3238]
- On 14 December 2023 DEPWS responded via email to Santos stating it had provided its feedback on the DPD to the NT Environment Protection Authority's assessment process for the DPD in NT waters. [Con-3267]
- No further correspondence or feedback was received from DEPWS.

Summary of Objection or Claim	Assessment of Merits	Santos' Response Statement	Coastal Waters CEMP Reference
No objections or claims were raised by DEPWS. DEPWS referred to feedback provided to the EPA (NT). DEPWS raised that it has provided feedback to the EPA (NT) through the DPD Project assessment process under the *Environment Protection Act 2019 (NT).* DEPWS feedback from the Flora and Fauna Division was provided to the EPA (NT) on the DPD Project Referral and the Supplementary Environmental Report (SER), which attached draft management plans, including a draft of the Offshore CEMP. Santos responded to DEPWS feedback on the Referral as required within the SER. EPA (NT) considered DEPWS feedback on the SER in its report recommending approval of the DPD Project.	Nil	Nil	DPD Project assessment process under the *Environment Protection Act 2019 (NT)* is outlined in Section 1.2

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

Summary of consultation effort:

- On 9 November 2023 Santos emailed DITT-NT Fisheries to advise it of preliminary consultation regarding proposed activities for consultation in relation to the activities under the Coastal Waters CEMP and the Commonwealth Waters DPD EP. [Con-3236]
- The email advised that Santos was seeking information to better understand:
  - if you are from a government Department or agency, how the proposed DPD activities may be relevant to your department or agency; and
  - what (if any) functions, interests or activities you or your organisation have that may be affected by the proposed DPD activities.
- The email included information on the regulatory process for the activities in Commonwealth and NT jurisdictions and links to a Santos information booklet on the proposed activities and a NOPSEMA brochure on the consultation process and details of how to contact Santos to register as a Relevant Person. The email stated that the consultation phase would commence on 22 November 2023 and close on 22 December 2023.
- On 22 November 2023 Santos emailed DITT-NT Fisheries further to the previous correspondence, to advise that it had commenced the consultation phase which would run until 22 December 2023. In addition to the previous information again being provided, Santos provided information on Relevant Persons' entitlements under the regulatory processes, details of how to provide feedback and a reminder of the closing date for consultation. [Con-3238]
- On 29 November 2023 Santos met with DITT-NT-Fisheries to discuss a *Fisheries Act 1988* (NT) section 11 Permit (2023-2024/ S11/ 524) for activities in NT internal waters. At the meeting the Department had no comments related to proposed DPD activities in Commonwealth Waters and the meeting focussed on matters outside of the Relevant Person consultation process for the DPD EP. [Con-5617]
- Notwithstanding the information provided and the steps described above, no comments or input were received in relation to activities under the Coastal Waters CEMP from DITT-NT Fisheries.

Summary of Objection or Claim	Assessment of Merits	Santos' Response Statement	Coastal Waters CEMP Reference
No objections or claims were raised by DITT-NT Fisheries. Santos met with DITT-NT Fisheries outside of the Relevant Person consultation process regarding a *Fisheries Act 1988* (NT) section 11 Permit (2023-2024/ S11/ 524) for activities in trenching areas within NT Internal Waters.	Nil	Nil	Nil

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

Summary of consultation effort:

- On 9 November 2023 Santos emailed DIPL-NT-Transport to advise it of preliminary consultation regarding proposed activities for consultation in relation to the activities under the Coastal Waters CEMP and the Commonwealth Waters DPD EP. [Con-3236]
- The email advised that Santos was seeking information to better understand:
  - if you are from a government Department or agency, how the proposed DPD activities may be relevant to your department or agency; and
  - what (if any) functions, interests or activities you or your organisation have that may be affected by the proposed DPD activities.
- The email included information on the regulatory process for the activities in Commonwealth and NT jurisdictions and links to a Santos information booklet on the proposed activities and a NOPSEMA brochure on the consultation process and details of how to contact Santos to register as a Relevant Person. The email stated that the consultation phase would commence on 22 November 2023 and close on 22 December 2023.
- On 22 November 2023 Santos emailed DIPL-NT-Transport further to the previous correspondence, to advise that it had commenced the consultation phase which would run until 22 December 2023. In addition to the previous information again being provided, Santos provided information on Relevant Persons' entitlements under the regulatory processes, details of how to provide feedback and a reminder of the closing date for consultation. [Con-3238]
- On 13 December 2023 Santos followed-up the previous emails with a phone call to DIPL-NT-Transport reminding it of the deadline for feedback.
- On 14 December 2023 the Regional Harbourmaster's Office within DIPL-NT-Transport responded via email and requested an extension of time to respond. [Con-3030]
- On 22 December 2023 Santos responded to the Regional Harbourmaster, advising that an extension could be accommodated until mid-January for feedback. [Con-3270]
- On 22 December 2023 the Regional Harbourmaster acknowledged Santos' email of the same day. [Con-3216]
- No further correspondence or feedback was received from DIPL-NT-Transport.

Summary of Objection or Claim	Assessment of Merits	Santos' Response Statement	Coastal Waters CEMP Reference
No objections or claims were raised by DIPL-NT-Transport. Santos has met with DIPL-NT-Transport outside of the Relevant Person consultation process regarding approval of the pipeline route within Darwin Harbour. Santos has also provided a Traffic Impact Assessment for road transport associated with DPD Project to DIPL-NT-Transport as requested. through the *Environment Protection Act 2019 (NT)* assessment process and as a condition of DPD Project Development Permits received under the NT Planning Act. Traffic impacts associated with the DPD Project and the DPD pipeline route through Darwin Harbour are outside the scope of the Coastal Waters CEMP.	Nil	Nil	Nil

Department of Police, Fire and Emergency Services

Summary of consultation effort:

- On 9 November 2023 Santos emailed NT Police, Fire and Emergency Services to advise it of preliminary consultation regarding proposed activities for consultation in relation to the activities under the Coastal Waters CEMP and the Commonwealth Waters DPD EP. [Con-3236]
- The email advised that Santos was seeking information to better understand:
  - if you are from a government Department or agency, how the proposed DPD activities may be relevant to your department or agency; and
  - what (if any) functions, interests or activities you or your organisation have that may be affected by the proposed DPD activities.

- The email included information on the regulatory process for the activities in Commonwealth and NT jurisdictions and links to a Santos information booklet on the proposed activities and a NOPSEMA brochure on the consultation process and details of how to contact Santos to register as a Relevant Person. The email stated that the consultation phase would commence on 22 November 2023 and close on 22 December 2023.
- On 22 November 2023 Santos emailed NT Police, Fire and Emergency Services further to the previous correspondence, to advise that it had commenced the consultation phase which would run until 22 December 2023. In addition to the previous information again being provided, Santos provided information on Relevant Persons' entitlements under the regulatory processes, details of how to provide feedback and a reminder of the closing date for consultation. [Con-3238]
- On 13 December 2023 Santos followed up the previous emails by phone and left a message.
- On 19 December 2023 Santos followed up the phone call with another email to NT Police, Fire and Emergency Services requesting any feedback by 22 December 2023. [Con-2900]
- Notwithstanding the information provided and the steps described above, no comments or input were received in relation to activities under the Coastal Waters CEMP from NT Police, Fire & Emergency Services.

Summary of Objection or Claim	Assessment of Merits	Santos' Response Statement	Coastal Waters CEMP Reference
No objections or claims were raised by NT Police, Fire and Emergency Services.	Nil	Nil	Nil

Department of Territory Families, Housing and Communities, NT Heritage branch (DTFHC-NT-Heritage)

Summary of consultation effort:

- On 9 November 2023 Santos emailed DTFHC-NT-Heritage to advise it of preliminary consultation regarding proposed activities for consultation in relation to the activities under the Coastal Waters CEMP and the Commonwealth Waters DPD EP. [Con-3236]
- The email advised that Santos was seeking information to better understand:
  - if you are from a government Department or agency, how the proposed DPD activities may be relevant to your department or agency; and
  - what (if any) functions, interests or activities you or your organisation have that may be affected by the proposed DPD activities.
- The email included information on the regulatory process for the activities in Commonwealth and NT jurisdictions and links to a Santos information booklet on the proposed activities and a NOPSEMA brochure on the consultation process and details of how to contact Santos to register as a Relevant Person. The email stated that the consultation phase would commence on 22 November 2023 and close on 22 December 2023.
- On 22 November 2023 Santos emailed DTFHC-NT-Heritage further to the previous correspondence, to advise that it had commenced the consultation phase which would run until 22 December 2023. In addition to the previous information again being provided, Santos provided information on Relevant Persons' entitlements under the regulatory processes, details of how to provide feedback and a reminder of the closing date for consultation. [Con-3238]
- On 13 December 2023 Santos followed up the previous emails by phone and left a message.
- On 19 December 2023 Santos followed up the phone call with another email to DTFHC-NT-Heritage requesting any feedback by 22 December 2023 [Con-3263].
- On 20 December 2023 DTFHC-NT-Heritage responded to Santos via email stating it was in ongoing consultation with Santos' project managers and providing timely responses on the DPD Project. [Con-3208]
- On 21 December 2023 Santos emailed DTFHC-NT-Heritage to confirm the ongoing consultation on the DPD Project. Santos stated it would contact DTFHC-NT-Heritage in the new year to check if it had any specific comments related to the activity the subject of the Coastal Waters CEMP. [Con-3209]
- On 12 January 2024 Santos followed up the 21 December 2023 email with a phone call to DTFHC-NT-Heritage to determine whether the Department had feedback.
- No further correspondence or feedback was received from DTFHC-NT-Heritage.

Summary of Objection or Claim	Assessment of Merits	Santos' Response Statement	Coastal Waters CEMP Reference
No objections or claims were raised by DTFHC-NT-Heritage. Santos has engaged with DTFHC-NT-Heritage outside of the Relevant Person consultation to meet its obligations under the UCH Act and the *Heritage Act 2011* (NT). DTFHC-NT-Heritage has provided Santos with an Archaeological Scope of Works to assist Santos in conducting a maritime archaeologist assessment of the DPD project footprint in order to identify potential underwater cultural heritage objects. Reports from this maritime archaeological heritage assessment have been provided to DTFHC-NT-Heritage. Further to this, it is a condition of DPD Project approval under the Environment Protection Act 2019 (NT) for Santos to develop a Cultural Heritage Management Plan (CHMP), inclusive of procedures to mitigate risks to unexpected maritime heritage objects, including a stop work protocol, developed in consultation with, and to the satisfaction of DTFHC-NT-Heritage. The CHMP applies to the Activity in NT Coastal Waters. Santos has confirmation from DTFHC-NT-Heritage that the stop work protocol meets their requirements.	Nil	Nil	Details of the findings of the DPD Project maritime archaeological heritage assessment is provided in Section 3.2.13.7. Section 8.6.6 of the Coastal Waters CEMP details the CHMP and unexpected finds protocols for the DPD Project.

Environment Protection Authority (NT) (EPA (NT))

Summary of consultation effort:

- On 9 November 2023 Santos emailed EPA (NT) to advise it of preliminary consultation regarding proposed activities for consultation in relation to the activities under the Coastal Waters CEMP and the Commonwealth Waters DPD EP. [Con-3236]
- The email advised that Santos was seeking information to better understand:
  - if you are from a government Department or agency, how the proposed DPD activities may be relevant to your department or agency; and
  - what (if any) functions, interests or activities you or your organisation have that may be affected by the proposed DPD activities.
- The email included information on the regulatory process for the activities in Commonwealth and NT jurisdictions and links to a Santos information booklet on the proposed activities and a NOPSEMA brochure on the consultation process and details of how to contact Santos to register as a Relevant Person. The email stated that the consultation phase would commence on 22 November 2023 and close on 22 December 2023.

- On 22 November 2023 Santos emailed EPA (NT) further to the previous correspondence, to advise that it had commenced the consultation phase which would run until 22 December 2023. In addition to the previous information again being provided, Santos provided information on Relevant Persons' entitlements under the regulatory processes, details of how to provide feedback and a reminder of the closing date for consultation. [Con-3238]
- On 13 December 2023 Santos followed-up the previous emails with a phone call to EPA (NT) reminding it of the deadline for feedback.
- On 14 December 2023 the EPA (NT) responded to Santos via email referring Santos to the EPA (NT)'s completed assessment for the DPD in NT Waters and advising it had no comments or feedback on the Coastal Waters CEMP. [Con-3266]
- No further correspondence or feedback was received from EPA (NT).

Summary of Objection or Claim	Assessment of Merits	Santos' Response Statement	Coastal Waters CEMP Reference
No objections or claims were raised by EPA (NT). Santos has engaged with EPA (NT) through the DPD Project formal assessment process under the *Environment Protection Act* 2019 (NT). The EPA (NT) assessment considered the DPD Project SER, which was provided with the draft Offshore CEMP as an attachment. The DPD Project activity in NT Internal Waters is now approved, subject to conditions, as per Environmental Approval EP2022/022-001.	Nil	Nil	The assessment process under the NT EP Act is described in Section 1.2.

NT Power and Water Corporation

Summary of consultation effort:

- On 9 November 2023 Santos emailed NT Power and Water Corporation to advise it of preliminary consultation regarding proposed activities for consultation in relation to the activities under the Coastal Waters CEMP and the Commonwealth Waters DPD EP. [Con-3236]
- The email advised that Santos was seeking information to better understand:
  - if you are from a government Department or agency, how the proposed DPD activities may be relevant to your department or agency; and
  - what (if any) functions, interests or activities you or your organisation have that may be affected by the proposed DPD activities.
- The email included information on the regulatory process for the activities in Commonwealth and NT jurisdictions and links to a Santos information booklet on the proposed activities and a NOPSEMA brochure on the consultation process and details of how to contact Santos to register as a Relevant Person. The email stated that the consultation phase would commence on 22 November 2023 and close on 22 December 2023.
- On 22 November 2023 Santos emailed NT Power and Water Corporation further to the previous correspondence, to advise that it had commenced the consultation phase which would run until 22 December 2023. In addition to the previous information again being provided, Santos provided information on Relevant Persons' entitlements under the regulatory processes, details of how to provide feedback and a reminder of the closing date for consultation. [Con-3238]
- On 13 December 2023 Santos followed-up the previous emails with a phone call to NT Power and Water Corporation reminding it of the deadline for feedback.
- On 20 December 2023 Santos followed up its phone call of 13 December with a further email reminder of the deadline for feedback. [Con-2903]
- Notwithstanding the information provided and the steps described above, no comments or input were received in relation to activities under the Coastal Waters CEMP from NT Power and Water Corporation.

Summary of Objection or Claim	Assessment of Merits	Santos' Response Statement	Coastal Waters CEMP Reference
No objections or claims were raised by NT Power and Water Corporation.	Nil	Nil	Nil

NT Parks and Wildlife Commission

Summary of consultation effort:

- On 9 November 2023 Santos emailed NT Parks and Wildlife Commission to advise it of preliminary consultation regarding proposed activities for consultation in relation to the activities under the Coastal Waters CEMP and the Commonwealth Waters DPD EP. [Con-3236]
- The email advised that Santos was seeking information to better understand:
  - if you are from a government Department or agency, how the proposed DPD activities may be relevant to your department or agency; and
  - what (if any) functions, interests or activities you or your organisation have that may be affected by the proposed DPD activities.
- The email included information on the regulatory process for the activities in Commonwealth and NT jurisdictions and links to a Santos information booklet on the proposed activities and a NOPSEMA brochure on the consultation process and details of how to contact Santos to register as a Relevant Person. The email stated that the consultation phase would commence on 22 November 2023 and close on 22 December 2023.
- On 22 November 2023 Santos emailed NT Parks and Wildlife Commission further to the previous correspondence, to advise that it had commenced the consultation phase which would run until 22 December 2023. In addition to the previous information again being provided, Santos provided information on Relevant Persons' entitlements under the regulatory processes, details of how to provide feedback and a reminder of the closing date for consultation. [Con-3238]
- On 13 December 2023 Santos followed-up the previous emails with a phone discussion with Parks and Wildlife Commission during which a representative confirmed the previous Santos emails had been forwarded to the appropriate person.
- On 20 December 2023 Santos followed-up with an email to the NT Parks and Wildlife Commission reminding it of the 22 December deadline for feedback and comments [Con-2905]
- Notwithstanding the information provided and the steps described above, no comments or input were received in relation to activities under the Coastal Waters CEMP from NT Parks and Wildlife Commission.

Summary of Objection or Claim	Assessment of Merits	Santos' Response Statement	Coastal Waters CEMP Reference
No objections or claims were raised by NT Parks and Wildlife Commission.	Nil	Nil	Nil

Tourism NT

Summary of consultation effort:

- On 9 November 2023 Santos emailed Tourism NT to advise it of preliminary consultation regarding proposed activities for consultation in relation to the activities under the Coastal Waters CEMP and the Commonwealth Waters DPD EP. [Con-3281], [Con-3236]
- The email advised that Santos was seeking information to better understand:
  - if you are from a government Department or agency, how the proposed DPD activities may be relevant to your department or agency; and
  - what (if any) functions, interests or activities you or your organisation have that may be affected by the proposed DPD activities.

- The email included information on the regulatory process for the activities in Commonwealth and NT jurisdictions and links to a Santos information booklet on the proposed activities and a NOPSEMA brochure on the consultation process and details of how to contact Santos to register as a Relevant Person. The email stated that the consultation phase would commence on 22 November 2023 and close on 22 December 2023.
- In the email Santos advised Tourism NT that the information had also been provided to a range of Darwin-based tourism operators and Santos would be happy to arrange a meeting to discuss the information.
- On 22 November 2023 Santos emailed Tourism NT further to the previous correspondence, to advise that it had commenced the consultation phase which would run until 22 December 2023. In addition to the previous information again being provided, Santos provided information on Relevant Persons' entitlements under the regulatory processes, details of how to provide feedback and a reminder of the closing date for consultation. [Con-3238]
- On 13 December 2023 Santos followed-up the previous emails with a phone call to Tourism NT during which Tourism NT advised it would not be making any comments.
- On 20 December 2023 Santos provided Tourism NT with an email record of the phone call. [Con-2906]
- No further correspondence or feedback was received from Tourism NT.

Summary of Objection or Claim	Assessment of Merits	Santos' Response Statement	Coastal Waters CEMP Reference
No objections or claims were raised by Tourism NT.	Nil	Nil	Nil

Section 25 (1)(a) of the OPGGS(E)R: Western Australia agency or authority to which the activities to be carried out under the environment plan may be relevant

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

Summary of consultation effort:

- On 9 November 2023 Santos emailed DPIRD-WA-Fisheries to advise it of preliminary consultation regarding proposed activities for consultation in relation to the activities under the Coastal Waters CEMP and the Commonwealth Waters DPD EP. [Con-3236]
- The email advised that Santos was seeking information to better understand:
  - if you are from a government Department or agency, how the proposed DPD activities may be relevant to your department or agency; and
  - what (if any) functions, interests or activities you or your organisation have that may be affected by the proposed DPD activities.
- The email included information on the regulatory process for the activities in Commonwealth and NT jurisdictions and links to a Santos information booklet on the proposed activities and a NOPSEMA brochure on the consultation process and details of how to contact Santos to register as a Relevant Person. The email stated that the consultation phase would commence on 22 November 2023 and close on 22 December 2023.
- On 22 November 2023 Santos emailed DPIRD-WA-Fisheries further to the previous correspondence, to advise that it had commenced the consultation phase which would run until 22 December 2023. In addition to the previous information again being provided, Santos provided information on Relevant Persons' entitlements under the regulatory processes, details of how to provide feedback and a reminder of the closing date for consultation. [Con-3238]
- On 13 December 2023 Santos followed up the previous emails by phone and left a message.
- On 19 December 2023 Santos followed up the phone call with another email to DPIRD-WA Fisheries requesting any feedback by 22 December 2023. [Con-2908]
- On 20 December 2023 DPIRD-WA Fisheries advised via email that it had returned the phone call on 13 December 2023 via a Santos 1800 number. [Con-3210]
- On 21 December 2023 Santos emailed DPIRD to advise the call related to an Environment Plan for additional pipeline to the south of the Tiwi Islands and comments previously provided may also apply, and Santos will get back in touch in 2024 in relation to the consultation process for future EPs. [Con-3211]
- On 21 December 2023 Santos had a telephone discussion with DPIRD-WA-Fisheries during which the Department advised that it was unlikely to comment and was happy to discuss the consultation process for future EPs with Santos in the new year.
- No further correspondence or feedback was received from DPIRD-WA-Fisheries.

Summary of Objection or Claim	Assessment of Merits	Santos' Response Statement	Coastal Waters CEMP Reference
No objections or claims were raised by DPIRD-WA-Fisheries.	Nil	Nil	Nil

Department of Transport (DoT-WA)

Summary of consultation effort:

- On 9 November 2023 Santos emailed DoT-WA to advise it of preliminary consultation regarding proposed activities for consultation in relation to the activities under the Coastal Waters CEMP and the Commonwealth Waters DPD EP. [Con-3236]
- The email advised that Santos was seeking information to better understand:
  - if you are from a government Department or agency, how the proposed DPD activities may be relevant to your department or agency; and
  - what (if any) functions, interests or activities you or your organisation have that may be affected by the proposed DPD activities.
- The email included information on the regulatory process for the activities in Commonwealth and NT jurisdictions and links to a Santos information booklet on the proposed activities and a NOPSEMA brochure on the consultation process and details of how to contact Santos to register as a Relevant Person. The email stated that the consultation phase would commence on 22 November 2023 and close on 22 December 2023.
- On 22 November 2023 Santos emailed DoT-WA further to the previous correspondence, to advise that it had commenced the consultation phase which would run until 22 December 2023. In addition to the previous information again being provided, Santos provided information on Relevant Persons' entitlements under the regulatory processes, details of how to provide feedback and a reminder of the closing date for consultation. [Con-3238]
- On 23 November 2023 DoT-WA emailed Santos stating it should be contacted if there is a risk of a spill impacting State waters from any of the proposed activities [Con-3255]. DoT's requirement is noted and not relevant to the EMBA.
- On 14 December 2023 DoT-WA emailed Santos to advise they wished to be consulted if any works or deployments are within WA State Waters [Con-3212].
- On 20 December 2023 Santos emailed DoT-WA to acknowledge their feedback. [Con-3213]
- On 7 February 2023 Santos emailed DoT-WA to advise that the project does not include any works or deployments within WA State Waters. [Con-3214]
- No further correspondence or feedback was received from DoT-WA.

Summary of Objection or Claim	Assessment of Merits	Santos' Response Statement	Coastal Waters CEMP Reference
No objections or claims were raised by DoT-WA.	Santos acknowledges the requirement for DoT to be contacted for any hydrocarbon spill entering WA state waters.	An evaluation of spill modelling predicts no contact with WA waters.	The EMBA is provided in Section 3.1.

Section 25 (1)(d) of the OPGGS(E)R: Persons or organisations whose functions, interests or activities may be affected by the activities to be carried out under the environment plan

Academic and Research Organisations

Arafura Timor Research Facility

Summary of consultation effort:

- On 9 November 2023 Santos emailed AIMS, in its capacity as operator of the Arafura Timor Research Facility, to advise it of preliminary consultation regarding proposed activities for consultation in relation to the activities under the Coastal Waters CEMP and the Commonwealth Waters DPD EP. [Con-3236]
- The email advised that Santos was seeking information to better understand:
  - if you are from a government Department or agency, how the proposed DPD activities may be relevant to your department or agency; and
  - what (if any) functions, interests or activities you or your organisation have that may be affected by the proposed DPD activities.
- The email included information on the regulatory process for the activities in Commonwealth and NT jurisdictions and links to a Santos information booklet on the proposed activities and a NOPSEMA brochure on the consultation process and details of how to contact Santos to register as a Relevant Person. The email stated that the consultation phase would commence on 22 November 2023 and close on 22 December 2023.
- On 22 November 2023 Santos emailed AIMS further to the previous correspondence, to advise that it had commenced the consultation phase which would run until 22 December 2023. In addition to the previous information again being provided, Santos provided information on Relevant Persons' entitlements under the regulatory processes, details of how to provide feedback and a reminder of the closing date for consultation. [Con-3238]
- On 14 and 20 December 2023 Santos followed-up the previous emails with phone calls to AIMS in which AIMS advised that it would not be providing any feedback.
- On 20 December 2023 Santos responded to AIMS via email confirming the comment provided in the phone call. [Con-2910]
- No further correspondence or feedback was received from AIMS.

Summary of Objection or Claim	Assessment of Merits	Santos' Response Statement	Coastal Waters CEMP Reference
No objections or claims were raised by the Arafura Timor Research Facility.	Nil	Nil	Nil

Australian Marine Sciences Association – NT (AMSA-NT)

Summary of consultation effort:

- On 9 November 2023 Santos emailed AMSA-NT to advise it of preliminary consultation regarding proposed activities for consultation in relation to the activities under the Coastal Waters CEMP and the Commonwealth Waters DPD EP. [Con-3236]
- The email advised that Santos was seeking information to better understand:
  - if you are from a government Department or agency, how the proposed DPD activities may be relevant to your department or agency; and
  - what (if any) functions, interests or activities you or your organisation have that may be affected by the proposed DPD activities.
- The email included information on the regulatory process for the activities in Commonwealth and NT jurisdictions and links to a Santos information booklet on the proposed activities and a NOPSEMA brochure on the consultation process and details of how to contact Santos to register as a Relevant Person. The email stated that the consultation phase would commence on 22 November 2023 and close on 22 December 2023.
- On 22 November 2023 Santos emailed AMSA-NT further to the previous correspondence, to advise that it had commenced the consultation phase which would run until 22 December 2023. In addition to the previous information again being provided, Santos provided information on Relevant Persons' entitlements under the regulatory processes, details of how to provide feedback and a reminder of the closing date for consultation. [Con-3238]
- On 14 December 2023 Santos followed up the previous emails by phone and left a message.
- On 19 December 2023 Santos followed up the phone call with another email to AMSA-NT requesting any feedback by 22 December 2023. [Con-2911]
- Notwithstanding the information provided and the steps described above, no comments or input were received in relation to activities under the Coastal Waters CEMP from AMSA-NT.

Summary of Objection or Claim	Assessment of Merits	Santos' Response Statement	Coastal Waters CEMP Reference
No objections or claims were raised by AMSA-NT	Nil	Nil	Nil

AusTurtle Inc

Summary of consultation effort:

- On 9 November 2023 Santos emailed AusTurtle Inc to advise it of preliminary consultation regarding proposed activities for consultation in relation to the activities under the Coastal Waters CEMP and the Commonwealth Waters DPD EP. [Con-3236]
- The email advised that Santos was seeking information to better understand:
  - if you are from a government Department or agency, how the proposed DPD activities may be relevant to your department or agency; and
  - what (if any) functions, interests or activities you or your organisation have that may be affected by the proposed DPD activities.
- The email included information on the regulatory process for the activities in Commonwealth and NT jurisdictions and links to a Santos information booklet on the proposed activities and a NOPSEMA brochure on the consultation process and details of how to contact Santos to register as a Relevant Person. The email stated that the consultation phase would commence on 22 November 2023 and close on 22 December 2023.
- On 22 November 2023 Santos emailed AusTurtle Inc further to the previous correspondence, to advise that it had commenced the consultation phase which would run until 22 December 2023. In addition to the previous information again being provided, Santos provided information on Relevant Persons' entitlements under the regulatory processes, details of how to provide feedback and a reminder of the closing date for consultation. [Con-3238]
- Santos followed-up the previous emails with a phone call on 15 December 2023 and then a follow-up email on 20 December 2023 reminding AusTurtle Inc of the deadline for feedback. [Con-2936]
- 29 December 2023 AusTurtle Inc responded via email to Santos and provided feedback as stated in the summary of Objection or Claim below. [Con-3311]
- On 12 January 2024 Santos attempted to contact AusTurtle Inc by phone to acknowledge the feedback provided.
- On 12 February 2024 Santos emailed AusTurtle Inc in response to its feedback. Santos thanked AusTurtle for its comments which were in-line with its previous comments and Santos' understanding of AusTurtle Inc's views. [Con-3312]
- No further correspondence or feedback was received from AusTurtle Inc.

Summary of Objection or Claim	Assessment of Merits	Santos' Response Statement	Coastal Waters CEMP Reference
AusTurtle advised the following in relation to flatback sea turtles:	The information provided by AusTurtle is aligned with Santos' understanding	Santos thanked AusTurtle for its comments which were in-line with its previous comments and Santos' understanding. [Con-3312]	The advice that the DPD route will pass through a flatback turtle internesting BIA is consistent with the information presented in Section 3.2.12.3.1 and impact assessment in Section 6.3.

• AusTurtle has monitored nesting flatback sea turtles since 1996 on Bare Island which is located at the edge of the MEVA. • During construction of the Bayu-Undan pipeline from 2004-2006 and the Inpex Ichthys gas pipeline in 2014-2016 there was no detectable impact on the numbers of nesting turtles. • The DPD section will pass through the flatback turtle internesting area where gravid females will dive to depths of 40 m and rest on the bottom to surface every hour or so to breathe. • The previous pipelines had no detectable impact as is expected with this pipeline. • Any impact, including attraction to lights, is likely to be on individuals rather than the population. [Con-3311]	and assessment in the Coastal Waters CEMP.		The advice that any impact, including attraction to lights, is likely to be on individuals rather than the population is consistent with the impact assessment provided in Section 5.4. Project light emissions were assessed to have a minor impact on marine ecosystems (including marine fauna), meaning an "Insignificant disruption to the breeding cycle of a local population/ area of occupancy of a species/ loss of habitat critical to the survival of a species/ values of a protected area."

Charles Darwin University (CDU)

Summary of consultation effort:

- On 9 November 2023 Santos emailed CDU to advise it of preliminary consultation regarding proposed activities for consultation in relation to the activities under the Coastal Waters CEMP and the Commonwealth Waters DPD EP. [Con-3236]
- The email advised that Santos was seeking information to better understand:
  - if you are from a government Department or agency, how the proposed DPD activities may be relevant to your department or agency; and
  - what (if any) functions, interests or activities you or your organisation have that may be affected by the proposed DPD activities.
- The email included information on the regulatory process for the activities in Commonwealth and NT jurisdictions and links to a Santos information booklet on the proposed activities and a NOPSEMA brochure on the consultation process and details of how to contact Santos to register as a Relevant Person. The email stated that the consultation phase would commence on 22 November 2023 and close on 22 December 2023.
- On 22 November 2023 Santos emailed CDU further to the previous correspondence, to advise that it had commenced the consultation phase which would run until 22 December 2023. In addition to the previous information again being provided, Santos provided information on Relevant Persons' entitlements under the regulatory processes, details of how to provide feedback and a reminder of the closing date for consultation. [Con-3238]
- On 14 December 2023 Santos followed up the previous emails by phone and left a message.
- On 19 December 2023 Santos followed up the phone call with another email to CDU requesting any feedback by 22 December 2023. [Con-2912]
- Notwithstanding the information provided and the steps described above, no comments or input were received in relation to activities under the Coastal Waters CEMP from CDU.

Summary of Objection or Claim	Assessment of Merits	Santos' Response Statement	Coastal Waters CEMP Reference
No objections or claims were raised by.CDU.	Nil	Nil	Nil

Darwin Harbour Advisory Committee (DHAC)

Summary of consultation effort:

- On 9 November 2023 Santos emailed all DHAC members to advise it of preliminary consultation regarding proposed activities for consultation in relation to the activities under the Coastal Waters CEMP and the Commonwealth Waters DPD EP. [Con-3236]
- The email advised that Santos was seeking information to better understand:
  - if you are from a government Department or agency, how the proposed DPD activities may be relevant to your department or agency; and
  - what (if any) functions, interests or activities you or your organisation have that may be affected by the proposed DPD activities.
- The email included information on the regulatory process for the activities in Commonwealth and NT jurisdictions and links to a Santos information booklet on the proposed activities and a NOPSEMA brochure on the consultation process and details of how to contact Santos to register as a Relevant Person. The email stated that the consultation phase would commence on 22 November 2023 and close on 22 December 2023.
- On 9 November 2022 Santos separately emailed the DHAC Chair and Executive Officer to offer a meeting with the committee to discuss the information. [Con-3284]
- On 22 November 2023 Santos emailed DHAC further to the previous correspondence, to advise that it had commenced the consultation phase which would run until 22 December 2023. In addition to the previous information again being provided, Santos provided information on Relevant Persons' entitlements under the regulatory processes, details of how to provide feedback and a reminder of the closing date for consultation. [Con-3238]
- Notwithstanding the information provided and the steps described above, no comments or input were received in relation to activities under the Coastal Waters CEMP from DHAC.

Summary of Objection or Claim	Assessment of Merits	Santos' Response Statement	Coastal Waters CEMP Reference
No objections or claims were raised by DHAC.	Nil	Nil	Nil

Commercial Fishing: Commonwealth-managed fisheries

Northern Prawn Fishery (NPF) Licence Holders (in addition to the consultation undertaken with representative body Northern Prawn Fishery Pty Ltd)

Summary of consultation effort:

- Formal consultation with NPF Licence Holders occurs via their representative association, the Northern Prawn Fishing Industry (NPFI) Ltd (see separate NPFI entry). This is the process requested by the NPFI and licence-holders.
- On 9 November 2023 Santos emailed NPF Licence Holders who had supplied email addresses to advise them of preliminary consultation regarding proposed activities for consultation in relation to the activities under the Coastal Waters CEMP and the Commonwealth Waters DPD EP. [Con-3236]
- The email advised that Santos was seeking information to better understand:
  - if you are from a government Department or agency, how the proposed DPD activities may be relevant to your department or agency; and
  - what (if any) functions, interests or activities you or your organisation have that may be affected by the proposed DPD activities.
- The email included information on the regulatory process for the activities in Commonwealth and NT jurisdictions and links to a Santos information booklet on the proposed activities and a NOPSEMA brochure on the consultation process and details of how to contact Santos to register as a Relevant Person. The email stated that the consultation phase would commence on 22 November 2023 and close on 22 December 2023.
- On 22 November 2023 Santos emailed NPF Licence Holders who had supplied email addresses further to the previous correspondence, to advise that it had commenced the consultation phase which would run until 22 December 2023. In addition to the previous information again being provided, Santos provided information on Relevant Persons' entitlements under the regulatory processes, details of how to provide feedback and a reminder of the closing date for consultation. [Con-3238]
- On 14 December 2023 Santos followed-up the previous emails with phone calls to NPF Licence Holders who had supplied telephone contact details.
- On 19 and 20 December 2023 Santos followed-up the phone calls to NT Licence Holders with further emails to NT Licence Holders who had supplied email contact details. [Con-2913], [Con-2914], [Con-2916], [Con-2923]
- On 20 December 2023 Austral Fisheries responded to Santos via email stating it was already working with Santos' Consultation Coordinator for the Barossa Project. [Con-3313].
- Notwithstanding the information provided and the steps described above, no comments or input were received in relation to activities under the Coastal Waters CEMP from individual NPF licence-holders.

Summary of Objection or Claim	Assessment of Merits	Santos' Response Statement	Coastal Waters CEMP Reference
Nil	Nil	Nil	Nil

Southern Bluefin Tuna/ Western Skipjack Tuna and Western Tuna and Billfish Fisheries Licence Holders

Summary of consultation effort:

- 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.

Summary of Objection or Claim	Assessment of Merits	Santos' Response Statement	Coastal Waters CEMP Reference
Refer to ABSTIA entry.	Nil	Nil	Nil

North-West Slope Trawl Fishery Licence Holders

Summary of consultation effort:

- These stakeholders were consulted via their representative body, the Western Australian Fishing Industry Association (WAFIC). Refer to WAFIC entry in this table for details.

Summary of Objection or Claim	Assessment of Merits	Santos' Response Statement	Coastal Waters CEMP Reference
Refer to WAFIC entry.	Nil	Nil	Nil

Commercial Fishing: NT-managed fisheries Licence Holders (Aquarium Fishery, Bait Net Fishery, Barramundi Fishery, Coastal Line Fishery, Coastal Net Fishery, Demersal Fishery, Development (Small Pelagic), Mud Crab Fishery, Offshore Net and Line Fishery, Pearl Oyster Fishery, Spanish Mackerel Fishery, Timor Reef Fishery, Trepang Fishery)
(In addition to consultation undertaken with the Northern Territory Seafood Council)

Summary of consultation effort:

- On 9 November 2023 Santos emailed NT Licence Holders who had supplied email addresses to advise them of preliminary consultation regarding proposed activities for consultation in relation to the activities under the Coastal Waters CEMP and the Commonwealth Waters DPD EP. [Con-3236]
- The email advised that Santos was seeking information to better understand:
  - if you are from a government Department or agency, how the proposed DPD activities may be relevant to your department or agency; and
  - what (if any) functions, interests or activities you or your organisation have that may be affected by the proposed DPD activities.
- The email included information on the regulatory process for the activities in Commonwealth and NT jurisdictions and links to a Santos information booklet on the proposed activities and a NOPSEMA brochure on the consultation process and details of how to contact Santos to register as a Relevant Person. The email stated that the consultation phase would commence on 22 November 2023 and close on 22 December 2023.
- The initial consultation notification and supporting information was also posted to all NT Licence Holders as per the process requested by their representative body, the NT Seafood Council.
- On 22 November 2023 Santos emailed NT Licence Holders who had supplied email addresses further to the previous correspondence, to advise that it had commenced the consultation phase which would run until 22 December 2023. In addition to the previous information again being provided, Santos provided information on Relevant Persons' entitlements under the regulatory processes, details of how to provide feedback and a reminder of the closing date for consultation. [Con-3238]
- On 14 and 15 December 2023 Santos followed-up the previous emails with phone calls to NT Licence Holders who had supplied telephone contact details.
- On 19 December 2023 Santos followed-up the phone calls to NT Licence Holders with further emails to NT Licence Holders who had supplied email contact details. [Con-2917], [Con-2919], [Con-2921], [Con-2918], [Con-2914], [Con-2920]
- On 19 December 2023, an NT Licence Holder responded to Santos via email requesting that it be kept updated during the project as it had vessels operating in the relevant area at times [Con-3218]
- On 20 December 2023 Austral Fisheries responded to Santos via email stating it was already working with Santos' Consultation Coordinator for the Barossa Project. [Con-3313]
- On 4 January 2024 an NT Licence Holder phoned Santos to express concern at potential impact from the DPD pipelay works south of the Tiwi Islands on his fishing activities. The Licence Holder was asked to provide details in writing to Santos and an email was provided on 5 January 2024 [Con-3314]
- On 8 January 2024 Santos emailed the Licence-Holder asking if they could provide dates suitable to them for a discussion on his concerns. [Con-3315]
- On 9 January 2024 Santos also emailed the Licence-Holder's representative body, the NT Seafood Council (NTSC), to advise it of the correspondence with the Licence Holder, a potential meeting and whether the NTSC and any other person would like to be involved. [Con-3316]

- On 19 January 2024 Santos unsuccessfully attempted to contact the Licence-Holder by phone to gain further information and arrange a meeting.
- On 22 March 2024 Santos again emailed the Licence-Holder who had expressed concern about the activities and provided further opportunity to provide input by 28 March 2024. The email was again copied to the fishers representative body, the NTSC. [Con-3532] No response was received. Santos will continue to keep the Licence-Holder updated as part of its ongoing Barossa Project communications.
- No further correspondence or feedback was received from individual licence-holders.

Summary of Objection or Claim	Assessment of Merits	Santos' Response Statement	Coastal Waters CEMP Reference
One licence-holder expressed a concern at potential fishing impacts within a 5.5 km distance from the work being carried out by Santos.	No information, other than a short email, has been provided. The claim does not contain any detail about the alleged potential impacts of DPD Project activities on the licence holder to allow Santos to assess that claim.	The initial consultation notification and supporting information was posted to the licence holder. Santos has sought information from the Licence-Holder over a period of just under 3 months via email and phone (on multiple occasions) and has sought to organise a meeting with the Licence-Holder and their representative body. No responses have been received to date. Based on the email, the licence holder appears to be concerned about potential impacts on fishing within a 5.5km distance from the work that will be carried out by Santos. However, potential impact will be very limited as the work will be of a short duration and an exclusion zone will only be in operation around moving vessels while the pipeline is being installed. Once installed, there is no permanent exclusion zone around the installed pipeline.	Santos has recognised commercial fishing activities within Section 3.2.13.1. Potential impacts to other marine users, including commercial fishers, from DPD Project activities are acknowledged and evaluated in Section 5.1 and the control measures and associated performance standards relevant to other marine user interactions are provided in Table 8-6 of the Coastal Waters CEMP.
One licence holder requested that it be kept updated during the project as it had vessels operating in the relevant area at times	The request does not include any objections or claims.	Santos ensures this licence-holder is kept updated on the project at all times, including communications prior and during the activities for the Coastal Waters CEMP.	Control measures and associated performance standards relevant to other marine user interactions are provided in Table 8-6 of the Coastal Waters CEMP.

Commercial Fishing: WA-managed fisheries Licence Holders (entitled to fish in EMBA)

Summary of consultation effort:

- These Licence Holders were approached via their representative body, the WAFIC. Refer to the WAFIC entry in this table for details of its consultation requirements.

Summary of Objection or Claim	Assessment of Merits	Santos' Response Statement	Coastal Waters CEMP Reference
Refer to WAFIC entry	Nil	Nil	Nil

Energy Industry

Energy Industry Operators: (Eni Australia, INPEX, Melbana, MEO, Neptune Energy, Shell Development, Woodside Energy)

Summary of consultation effort:

- On 9 November 2023 Santos emailed Energy Industry Operators to advise it of preliminary consultation regarding proposed activities for consultation in relation to the activities under the Coastal Waters CEMP and the Commonwealth Waters DPD EP. [Con-3236]
- The email advised that Santos was seeking information to better understand:
  - if you are from a government Department or agency, how the proposed DPD activities may be relevant to your department or agency; and
  - what (if any) functions, interests or activities you or your organisation have that may be affected by the proposed DPD activities.
- The email included information on the regulatory process for the activities in Commonwealth and NT jurisdictions and links to a Santos information booklet on the proposed activities and a NOPSEMA brochure on the consultation process and details of how to contact Santos to register as a Relevant Person. The email stated that the consultation phase would commence on 22 November 2023 and close on 22 December 2023.
- On 22 November 2023 Santos emailed Energy Industry Operators further to the previous correspondence, to advise that it had commenced the consultation phase which would run until 22 December 2023. In addition to the previous information again being provided, Santos provided information on Relevant Persons' entitlements under the regulatory processes, details of how to provide feedback and a reminder of the closing date for consultation. [Con-3238]
- Between 14 and 18 December 2023 Santos made phone calls to the relevant operators (Eni Australia, INPEX, Melbana, MEO, Neptune Energy, Shell Development, Woodside Energy) reminding them of the deadline for feedback. Messages and follow-up emails were provided to those who could not be contacted:
- On 14 December 2023 Santos followed-up the previous emails with a phone call to INPEX and a follow-up email on 20 December 2023. [Con-2927].
- On 21 December 2023 INPEX responded via email to Santos stating it was working with the Barossa Team on an operational level with INPEX's focus being environmental input for the approval to lay the DPD near its Ichthys GEP in NT Internal Waters. [Con-3317]
- On 18 December 2023 Santos followed-up the previous emails with a phone call and email to Eni [Con-2925]
- On 14 December 2023 Santos followed-up the previous emails with a phone call to MEO and a follow-up email on 19 December 2023. [Con-2934]
- On 14 December 2023 Santos followed-up the previous emails with a phone call to Neptune Energy and a follow-up email. [Con-2933]
- On 14 December 2023 Neptune Energy responded via email to Santos and advised they supported the project and would like to be included in any future communications and did not provide any comments on the activity the subject of the Coastal Waters CEMP or the Commonwealth Waters DPD EP. [Con-3271]
- On 14 December 2023 Santos followed-up the previous emails with a phone call to Shell and a follow-up email on 20 December 2023. Shell advised they do not consider themselves a relevant person. [Con-2930]
- On 18 December 2023 Santos followed-up the previous emails with a phone call to Woodside and a follow-up email on 19 December 2023. [Con-2931]
- On 20 December 2023 Woodside responded via email to Santos stating it had no comments on the proposed activity. [Con-3318]
-

Summary of Objection or Claim	Assessment of Merits	Santos' Response Statement	Coastal Waters CEMP Reference
No objections or claims were raised by Energy Industry Operators.	Nil	Nil	Nil

Environmental Organisations

Australian Marine Conservation Society – NT branch (AMCS-NT)

Summary of consultation effort:

- On 9 November 2023 Santos emailed AMCS-NT to advise it of preliminary consultation regarding proposed activities for consultation in relation to the activities under the Coastal Waters CEMP and the Commonwealth Waters DPD EP. [Con-3236]

- The email advised that Santos was seeking information to better understand:
  - if you are from a government Department or agency, how the proposed DPD activities may be relevant to your department or agency; and
  - what (if any) functions, interests or activities you or your organisation have that may be affected by the proposed DPD activities.
- The email included information on the regulatory process for the activities in Commonwealth and NT jurisdictions and links to a Santos information booklet on the proposed activities and a NOPSEMA brochure on the consultation process and details of how to contact Santos to register as a Relevant Person. The email stated that the consultation phase would commence on 22 November 2023 and close on 22 December 2023.
- On 22 November 2023 Santos emailed AMCS-NT further to the previous correspondence, to advise that it had commenced the consultation phase which would run until 22 December 2023. In addition to the previous information again being provided, Santos provided information on Relevant Persons' entitlements under the regulatory processes, details of how to provide feedback and a reminder of the closing date for consultation. [Con-3238]
- On 14 December 2023 Santos followed up the previous emails by phone and left a message.
- On 19 December 2023 Santos followed up the phone call with another email to AMCS-NT requesting any feedback by 22 December 2023. [Con-2935]
- Notwithstanding the information provided and the steps described above, no comments or input were received in relation to activities under the Coastal Waters CEMP from AMCS-NT.

Summary of Objection or Claim	Assessment of Merits	Santos' Response Statement	Coastal Waters CEMP Reference
No objections or claims were raised by AMCS-NT.	Nil	Nil	Nil

Conservation Council of WA (CCWA)

Summary of consultation effort:

- On 9 November 2023 Santos emailed CCWA to advise it of preliminary consultation regarding proposed activities for consultation in relation to the activities under the Coastal Waters CEMP and the Commonwealth Waters DPD EP. [Con-3236]
- The email advised that Santos was seeking information to better understand:
  - if you are from a government Department or agency, how the proposed DPD activities may be relevant to your department or agency; and
  - what (if any) functions, interests or activities you or your organisation have that may be affected by the proposed DPD activities.
- The email included information on the regulatory process for the activities in Commonwealth and NT jurisdictions and links to a Santos information booklet on the proposed activities and a NOPSEMA brochure on the consultation process and details of how to contact Santos to register as a Relevant Person. The email stated that the consultation phase would commence on 22 November 2023 and close on 22 December 2023.
- On 22 November 2023 Santos emailed CCWA further to the previous correspondence, to advise that it had commenced the consultation phase which would run until 22 December 2023. In addition to the previous information again being provided, Santos provided information on Relevant Persons' entitlements under the regulatory processes, details of how to provide feedback and a reminder of the closing date for consultation. [Con-3238]
- On 14 December 2023 Santos followed-up the previous emails with a phone discussion with CCWA confirmed it had received the previous emails, did not have any feedback at this time but may request an extension to respond. On 21 December 2023, Santos confirmed this in an email to CCWA. [Con-2937]
- On 4 January 2024 CCWA responded to Santos via email stating it was unable to provide consultation at this stage but would engage through the NOPSEMA process. [Con-3319]
- On 22 March 2024 Santos emailed CCWA and provided further opportunity to provide input by 28 March 2024 to the development of the Coastal Waters CEMP [Con-3529]
- Notwithstanding the information provided and the steps described above, no comments or input were received for the Coastal Waters CEMP from CCWA.

Summary of Objection or Claim	Assessment of Merits	Santos' Response Statement	Coastal Waters CEMP Reference
No objections or claims were raised by CCWA.	Nil	Nil	Nil

Environment Centre NT (ECNT)

Summary of consultation effort:

- On 9 November 2023 Santos emailed ECNT to advise it of preliminary consultation regarding proposed activities for consultation in relation to the activities under the Coastal Waters CEMP and the Commonwealth Waters DPD EP. [Con-3236]
- The email advised that Santos was seeking information to better understand:
  - if you are from a government Department or agency, how the proposed DPD activities may be relevant to your department or agency; and
  - what (if any) functions, interests or activities you or your organisation have that may be affected by the proposed DPD activities.
- The email included information on the regulatory process for the activities in Commonwealth and NT jurisdictions and links to a Santos information booklet on the proposed activities and a NOPSEMA brochure on the consultation process and details of how to contact Santos to register as a Relevant Person. The email stated that the consultation phase would commence on 22 November 2023 and close on 22 December 2023.
- On 22 November 2023 Santos emailed ECNT further to the previous correspondence, to advise that it had commenced the consultation phase which would run until 22 December 2023. In addition to the previous information again being provided, Santos provided information on Relevant Persons' entitlements under the regulatory processes, details of how to provide feedback and a reminder of the closing date for consultation. [Con-3238]
- On 22 December 2023 ECNT emailed Santos attaching a letter requesting further information about certain aspects of DPD 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-3320]
- On 9 February 2024 Santos emailed ECNT in response to its email of 22 December 2023 and provided responses to the matters raised in ECNT's letter of 22 December 2023. [Con-3321]
- No further correspondence or feedback was received from ECNT.

Summary of Objection or Claim	Assessment of Merits	Santos' Response Statement	Coastal Waters CEMP Reference
ECNT reasserted that it is a Relevant Person under the OPGGS(E)R for activities under the Commonwealth Waters DPD EP and the Coastal Waters CEMP.	Santos notes ECNT is a Relevant Person for activities under the Coastal Waters CEMP	No response required.	No updates or additional controls required.
Seabed disturbance: • ECNT claimed the information provided in the Information Booklet provided by Santos did not have enough detail. • ECNT claimed the absence of sediment dispersal modelling for mass flow excavation and pipelay made it	Mass flow excavation (MFE) is not an activity proposed for use in NT Coastal Waters and is not included in the Coastal Waters CEMP.	MFE may be undertaken in localised areas within NT Internal Waters but will not be undertaken in NT Coastal Waters. Impacts to the seabed from pipelay are assessed to be minor. Sedimentation/turbidity effects associated with the Activity are predicted to be temporary and very localised. On that basis, Santos does not consider sediment dispersion modelling to be warranted, and that the impacts of these activities are already adequately understood and assessed.	Potential impacts to seabed from the Activity are acknowledged and evaluated in Section 5.2 and the control measures and associated performance standards are provided in Table 5-4.

impossible to assess the impacts of the proposed activity on the seabed. • ECNT requested Santos confirm whether more complete models of seabed disturbance have been conducted and make them available.	Santos believes ECNT has been provided with sufficient information to assess the potential impacts, risks and proposed control measures for the proposed activity on the ECNT's functions, interests and activities and to provide feedback.		
Light pollution: • ECNT claimed a 2018 study of Flatback Turtle hatchlings found that artificial light at sea causes disorientation and creates greater risk of predation. • ECNT claimed Santos does not appear to have considered the impacts of artificial light on turtle hatchlings undertaking ocean dispersal.	Santos acknowledges that there are studies showing that artificial light at sea can cause disorientation and increase predation risk to turtle hatchings. Santos rejects the assertion that it has not considered the impacts of artificial light on turtle hatchlings undertaking ocean dispersal.	Santos has considered potential impacts from DPD Project lighting to nesting turtles and turtle hatchlings, including potential impacts to turtle hatchling ocean dispersal activity. The most significant risk posed to marine turtles from artificial lighting is the potential disorientation of hatchlings following emergence from nests by light spill on beaches. The National Light Pollution Guidelines states that within 15 km of the nesting beach, light impacts may affect flatback hatchling behaviours. The distance of the OA from the closest significant turtle nesting beaches at Cape Fourcroy is approximately 30 km. Santos has conducted a light modelling study to determine the distance away from Project vessels where light could possibly cause behavioural disturbance to turtle hatchlings. This was determined as within 3.3 km of the pipelay vessel, 2.5 km of the offshore construction vessel, and 4.5 km when these vessels are operating side by side. Given the furthest extent of potential impacts from vessel lighting is located beyond the 15 km of nesting beaches identified by the National Light Pollution Guidelines as the relevant zone within which light impacts may affect hatchlings, and the short duration (i.e. days) these vessels will be on location, the risk of Project vessel lighting to turtle hatchlings that disperse from Cape Fourcroy or other more distant locations is not considered significant.	Light emission impacts to marine turtles, including the impact of disorientating hatchlings and increasing predation of hatchlings being caught in vessel 'light pools' is included in Section 5.4 and references the results of a vessel light spill modelling study conducted for the Barossa Project. The control measures relevant to vessel lighting impacts are included in Section 5.4.3 with performance standards included in Table 7-2. Santos has not adopted further control measures.
Noise pollution: • ECNT claims that within the DPD Preliminary Documentation Report (PDR) Santos has relied on limited sources to establish a single behavioural threshold for all sea turtles. • ECNT cited part of Santos' booklet stating that "there is a relatively low probability of encountering significant numbers of noise-sensitive fauna," and that "transiting marine fauna are expected to demonstrate short-term avoidance behaviour within the operational area." • ECNT claimed avoidance behaviour is an insufficient way to manage the impacts of noise pollution and that avoidance is a behavioural change in itself and behavioural changes, such as reduction in foraging and interference with biological signals. Impacts on turtle stocks and species viability may be amplified during the internesting period when some DPD activities will occur. • ECNT claimed Santos has not provided complete information about the risks and impacts on marine megafauna, in particular the impacts of light and noise pollution on turtles. ECNT requested a complete profile of impacts to marine megafauna associated with light and noise pollution, taking into account the internesting period expected to overlap with project activities, and impacts on Flatback turtle hatchlings undertaking ocean dispersal.	Santos considers it has used appropriate behavioural thresholds for marine turtles. Santos confirms the statement from its Information Booklet which is applicable to DPD Project activities in NT Coastal Waters. Santos acknowledges that avoidance behaviour is a behavioural impact but does not rely on this aspect alone in terms of managing noise impacts. Santos considers the existing management measures in place reduce impact to ALARP and acceptable levels. Santos has considered a complete profile of impacts and risks to marine fauna, including, light and noise emissions, considering internesting turtles and turtle hatchlings.	• The OA has water depths greater than ~40 m and therefore does not contain turtle foraging habitat. Flatback turtles may transit the OA during the peak internesting period (June to September). Other species of turtles (green, olive ridley, loggerhead, leatherback, hawksbill) may transit the OA to forage at shoals and banks located outside of the OA. • Santos will not rely on turtle avoidance behaviour alone as the means of managing impacts from underwater noise. The management measures for reducing impacts to marine turtles in the Coastal Waters CEMP include: • vessels complying with Part 8 of the Environment Protection and Biodiversity Conservation Regulations 2000 (Cth) with respect to marine fauna interactions; • maintenance of noise generating equipment (e.g. vessel engines), undertaken as per the vessels' planned maintenance system; • the presence of crew members trained in marine fauna observation on the pipelay vessel, including one crew member trained in marine fauna observation on the vessel bridge at all times; and • the undertaking of vessel inductions by crew members, including marine fauna risks and controls. • Santos recognises that avoidance is a behavioural response to underwater noise. However, due to the wide distribution of foraging habitat, the short duration of DPD Project activities (including pipelay) and the nearest significant turtle nesting beaches being 30 km away, these responses are not likely to have a significant impact on turtles. With the implementation of control measures, Santos considers that impacts are reduced to as low as reasonably practicable and an acceptable level.	An assessment of impacts and risks to marine fauna, including noise and light emissions, inclusive of internesting and hatchling marine turtles, is presented in Section 5.3 and 5.4 and an evaluation of ALARP and acceptability provided in Sections 5.3.6 and 5.4.6. The control measures relevant to underwater noise emissions and light emissions are provided in Sections 5.3.3 and 5.4.3, respectively, with associated management measures inclusive of performance standards included in Table 7-2. No updates or additional controls required.
Rationale for project: • ECNT claimed the risks involved in transporting gas to the existing Darwin LNG facility for processing are greater than the alternative of connecting the existing Bayu-Undan Gas Export Pipeline to the Barossa Field. • ECNT claimed Santos cannot demonstrate the viability of the proposed Bayu-Undan Carbon Capture and Storage facility and thus the need for the DPD Project. • ECNT requested any information available that demonstrates certainty around the necessity of the DPD Project.	Santos has already explained the justification for the DPD Project in submissions it has made in connection with the approval assessment processes for the DPD Project under the *Environment Protection Act 2019 (NT)* and EPBC Act. The submissions are publicly available. Santos does not consider	The OPGGS(E)R do not require an EP to demonstrate 'certainty around the necessity of a project', as requested by the ECNT.	The Coastal Waters CEMP is not required to outline the necessity or justification of the DPD Project. No updates or additional controls required.

• ECNT suggested Santos delay submitting the proposed EP until all approvals for the Bayu-Undan CCS plan, in both Australia and Timor-Leste, have been granted.	justification of the Project or an assessment of alternatives is within the scope of the Coastal Waters CEMP or required under the OPGGS(E)R.		

Greenpeace Australia Pacific

Summary of consultation effort:

- On 9 November 2023 Santos emailed Greenpeace to advise it of preliminary consultation regarding proposed activities for consultation in relation to the activities under the Coastal Waters CEMP and the Commonwealth Waters DPD EP. [Con-3236]
- The email advised that Santos was seeking information to better understand:
  - if you are from a government Department or agency, how the proposed DPD activities may be relevant to your department or agency; and
  - what (if any) functions, interests or activities you or your organisation have that may be affected by the proposed DPD activities.
- The email included information on the regulatory process for the activities in Commonwealth and NT jurisdictions and links to a Santos information booklet on the proposed activities and a NOPSEMA brochure on the consultation process and details of how to contact Santos to register as a Relevant Person. The email stated that the consultation phase would commence on 22 November 2023 and close on 22 December 2023.
- On 9 November 2023 Greenpeace emailed Santos to acknowledge receipt of the email. [Con-3247]
- On 22 November 2023 Santos emailed Greenpeace further to the previous correspondence, to advise that it had commenced the consultation phase which would run until 22 December 2023. In addition to the previous information again being provided, Santos provided information on Relevant Persons' entitlements under the regulatory processes, details of how to provide feedback and a reminder of the closing date for consultation. [Con-3238]
- On 14 December 2023 Santos followed-up the previous emails with a phone discussion with Greenpeace which confirmed that Santos' emails had been received and forwarded to a campaign manager. Santos provided a follow-up email on 21 December 2024 confirming the telephone discussion [Con-2939]
- On 31 May 2024, Santos sent a final reminder to Greenpeace asking that it provide any feedback by 7 June 2024. [Con-4202]
- Notwithstanding the information provided and the steps described above, no comments or input were received in relation to activities under the Coastal Waters CEMP from Greenpeace.

Summary of Objection or Claim	Assessment of Merits	Santos' Response Statement	Coastal Waters CEMP Reference
No objections or claims were raised by Greenpeace.	Nil	Nil	Nil

Keep Top End Coasts Healthy

Summary of consultation effort:

- On 9 November 2023 Santos emailed Keep Top End Coasts Healthy to advise it of preliminary consultation regarding proposed activities for consultation in relation to the activities under the Coastal Waters CEMP and the Commonwealth Waters DPD EP. [Con-3236]
- The email advised that Santos was seeking information to better understand:
  - if you are from a government Department or agency, how the proposed DPD activities may be relevant to your department or agency; and
  - what (if any) functions, interests or activities you or your organisation have that may be affected by the proposed DPD activities.
- The email included information on the regulatory process for the activities in Commonwealth and NT jurisdictions and links to a Santos information booklet on the proposed activities and a NOPSEMA brochure on the consultation process and details of how to contact Santos to register as a Relevant Person. The email stated that the consultation phase would commence on 22 November 2023 and close on 22 December 2023.
- On 22 November 2023 Santos emailed Keep Top End Coasts Healthy further to the previous correspondence, to advise that it had commenced the consultation phase which would run until 22 December 2023. In addition to the previous information again being provided, Santos provided information on Relevant Persons' entitlements under the regulatory processes, details of how to provide feedback and a reminder of the closing date for consultation. [Con-3238]
- On 15 December 2023 Santos followed up the previous emails by phone and left a message.
- On 20 December 2023 Santos followed up the phone call with another email to Keep Top End Coasts Healthy requesting any feedback by 22 December 2023. [Con-2940]
- Notwithstanding the information provided and the steps described above, no comments or input were received in relation to activities under the Coastal Waters CEMP from Keep Top End Coasts Healthy.

Summary of Objection or Claim	Assessment of Merits	Santos' Response Statement	Coastal Waters CEMP Reference
No objections or claims were raised by Keep Top End Coasts Healthy.	Nil	Nil	Nil

Landcare NT

Summary of consultation effort:

- On 9 November 2023 Santos emailed Landcare NT to advise them of preliminary consultation regarding proposed activities for consultation in relation to the activities under the Coastal Waters CEMP and the Commonwealth Waters DPD EP. [Con-3236]
- The email advised that Santos was seeking information to better understand:
  - if you are from a government Department or agency, how the proposed DPD activities may be relevant to your department or agency; and
  - what (if any) functions, interests or activities you or your organisation have that may be affected by the proposed DPD activities.
- The email included information on the regulatory process for the activities in Commonwealth and NT jurisdictions and links to a Santos information booklet on the proposed activities and a NOPSEMA brochure on the consultation process and details of how to contact Santos to register as a Relevant Person. The email stated that the consultation phase would commence on 22 November 2023 and close on 22 December 2023.
- On 22 November 2023 Santos emailed Landcare NT further to the previous correspondence, to advise that it had commenced the consultation phase which would run until 22 December 2023. In addition to the previous information again being provided, Santos provided information on Relevant Persons' entitlements under the regulatory processes, details of how to provide feedback and a reminder of the closing date for consultation. [Con-3238]
- On 14 December 2023 Santos had a telephone discussion with Landcare NT which advised a new email address for communications. Santos followed-up with an email the same day re-attaching the 22 November 2023 email. [Con-2941]
- Notwithstanding the information provided and the steps described above, no comments or input were received in relation to activities under the Coastal Waters CEMP from Landcare NT.

Summary of Objection or Claim	Assessment of Merits	Santos' Response Statement	Coastal Waters CEMP Reference
No objections or claims were raised by Landcare NT.	Nil	Nil	Nil

Sea Turtle Foundation

Summary of consultation effort:

- On 9 November 2023 Santos emailed Sea Turtle Foundation to advise it of preliminary consultation regarding proposed activities for consultation in relation to the activities under the Coastal Waters CEMP and the Commonwealth Waters DPD EP. [Con-3236]
- The email advised that Santos was seeking information to better understand:
  - if you are from a government Department or agency, how the proposed DPD activities may be relevant to your department or agency; and
  - what (if any) functions, interests or activities you or your organisation have that may be affected by the proposed DPD activities.
- The email included information on the regulatory process for the activities in Commonwealth and NT jurisdictions and links to a Santos information booklet on the proposed activities and a NOPSEMA brochure on the consultation process and details of how to contact Santos to register as a Relevant Person. The email stated that the consultation phase would commence on 22 November 2023 and close on 22 December 2023.
- On 22 November 2023 Santos emailed Sea Turtle Foundation further to the previous correspondence, to advise that it had commenced the consultation phase which would run until 22 December 2023. In addition to the previous information again being provided, Santos provided information on Relevant Persons' entitlements under the regulatory processes, details of how to provide feedback and a reminder of the closing date for consultation. [Con-3238]
- On 14 December 2023 Santos phoned Sea Turtle Foundation to follow up on previous emails and remind it of the deadline for feedback. On 20 December 2023 Santos emailed Sea Turtle Foundation to confirm the phone call. [Con-3003]
- Notwithstanding the information provided and the steps described above, no comments or input were received in relation to activities under the Coastal Waters CEMP from Sea Turtle Foundation.

Summary of Objection or Claim	Assessment of Merits	Santos' Response Statement	Coastal Waters CEMP Reference
No objections or claims were raised by Sea Turtle Foundation.	Nil	Nil	Nil

Territory Natural Resource Management

Summary of consultation effort:

- On 9 November 2023 Santos emailed Territory NRM to advise it of preliminary consultation regarding proposed activities for consultation in relation to the activities under the Coastal Waters CEMP and the Commonwealth Waters DPD EP. [Con-3236]
- The email advised that Santos was seeking information to better understand:
  - if you are from a government Department or agency, how the proposed DPD activities may be relevant to your department or agency; and
  - what (if any) functions, interests or activities you or your organisation have that may be affected by the proposed DPD activities.
- The email included information on the regulatory process for the activities in Commonwealth and NT jurisdictions and links to a Santos information booklet on the proposed activities and a NOPSEMA brochure on the consultation process and details of how to contact Santos to register as a Relevant Person. The email stated that the consultation phase would commence on 22 November 2023 and close on 22 December 2023.
- On 22 November 2023 Santos emailed Territory NRM further to the previous correspondence, to advise that it had commenced the consultation phase which would run until 22 December 2023. In addition to the previous information again being provided, Santos provided information on Relevant Persons' entitlements under the regulatory processes, details of how to provide feedback and a reminder of the closing date for consultation. [Con-3238]
- On 14 December 2023 Santos phoned Territory NRM to follow up on previous emails and left a message to remind it of the deadline for feedback. On 20 December 2023 Santos emailed Territory NRM to confirm the phone call. [Con-3002]
- Notwithstanding the information provided and the steps described above, no comments or input were received in relation to activities under the Coastal Waters CEMP from Territory NRM.

Summary of Objection or Claim	Assessment of Merits	Santos' Response Statement	Coastal Waters CEMP Reference
No objections or claims were raised by Territory NRM.	Nil	Nil	Nil

Wilderness Society

Summary of consultation effort:

- On 9 November 2023 Santos emailed the Wilderness Society to advise it of preliminary consultation regarding proposed activities for consultation in relation to the activities under the Coastal Waters CEMP and the Commonwealth Waters DPD EP. [Con-3236]
- The email advised that Santos was seeking information to better understand:
  - if you are from a government Department or agency, how the proposed DPD activities may be relevant to your department or agency; and
  - what (if any) functions, interests or activities you or your organisation have that may be affected by the proposed DPD activities.
- The email included information on the regulatory process for the activities in Commonwealth and NT jurisdictions and links to a Santos information booklet on the proposed activities and a NOPSEMA brochure on the consultation process and details of how to contact Santos to register as a Relevant Person. The email stated that the consultation phase would commence on 22 November 2023 and close on 22 December 2023.
- On 22 November 2023 Santos emailed the Wilderness Society further to the previous correspondence, to advise that it had commenced the consultation phase which would run until 22 December 2023. In addition to the previous information again being provided, Santos provided information on Relevant Persons' entitlements under the regulatory processes, details of how to provide feedback and a reminder of the closing date for consultation. [Con-3238]
- On 14 December 2023 the Wilderness Society responded to Santos via email stating that it will not be providing input at this time. The Wilderness Society stated it would like to be kept updated as the proposal progresses and may provide input at a later time. [Con-3022]
- On 22 March 2024 Santos emailed the Wilderness Society and provided further opportunity to provide input by 28 March 2024 to the development of the Coastal Waters CEMP. [Con-3530]
- Santos notes that the Wilderness Society is provided regular updates on the Barossa Project, including progress of the DPD Project, through quarterly updates.
- Notwithstanding the information provided and the steps described above, no comments or input were received in relation to activities under the Coastal Waters CEMP from the Wilderness Society.

Summary of Objection or Claim	Assessment of Merits	Santos' Response Statement	Coastal Waters CEMP Reference
No objections or claims were raised by the Wilderness Society.	Nil	Nil	Nil

World Wildlife Fund (WWF)

Summary of consultation effort:

- On 9 November 2023 Santos emailed WWF to advise it of preliminary consultation regarding proposed activities for consultation in relation to the activities under the Coastal Waters CEMP and the Commonwealth Waters DPD EP. [Con-3236]
- The email advised that Santos was seeking information to better understand:
  - if you are from a government Department or agency, how the proposed DPD activities may be relevant to your department or agency; and
  - what (if any) functions, interests or activities you or your organisation have that may be affected by the proposed DPD activities.

- The email included information on the regulatory process for the activities in Commonwealth and NT jurisdictions and links to a Santos information booklet on the proposed activities and a NOPSEMA brochure on the consultation process and details of how to contact Santos to register as a Relevant Person. The email stated that the consultation phase would commence on 22 November 2023 and close on 22 December 2023.
- On 9 November 2023 WWF emailed Santos to acknowledge receipt of the email. [Con-3241]
- On 22 November 2023 Santos emailed WWF further to the previous correspondence, to advise that it had commenced the consultation phase which would run until 22 December 2023. In addition to the previous information again being provided, Santos provided information on Relevant Persons' entitlements under the regulatory processes, details of how to provide feedback and a reminder of the closing date for consultation. [Con-3238]
- On 22 November 2023 WWF emailed Santos to acknowledge receipt of the email. [Con-3250]
- On 14 December 2023 Santos phoned WWF to follow up on previous emails and left a message to remind it of the deadline for feedback. Santos emailed WWF on 20 December 2023 to confirm the phone call. [Con-3001]
- On 21 December 2023 WWF responded to Santos via email stating the information had been passed onto its team for review and action. [Con-3322]
- On 31 May 2024, Santos sent a final reminder to WWF asking that it provide any feedback by 7 June 2024. [Con-4203]
- Notwithstanding the information provided and the steps described above, no comments or input were received in relation to activities under the Coastal Waters CEMP from WWF.

Summary of Objection or Claim	Assessment of Merits	Santos' Response Statement	Coastal Waters CEMP Reference
No objections or claims were raised by WWF.	Nil	Nil	Nil

First Nations People and groups: Representative organisations – Northern Territory

Larrakia Nation Aboriginal Corporation (LNAC)

Summary of consultation effort:

- On 9 November 2023 Santos emailed LNAC to advise it of preliminary consultation regarding proposed activities for consultation in relation to the activities under the Coastal Waters CEMP and the Commonwealth Waters DPD EP. [Con-3236]
- The email advised that Santos was seeking information to better understand:
  - if you are from a government Department or agency, how the proposed DPD activities may be relevant to your department or agency; and
  - what (if any) functions, interests or activities you or your organisation have that may be affected by the proposed DPD activities.
- The email included information on the regulatory process for the activities in Commonwealth and NT jurisdictions and links to a Santos information booklet on the proposed activities and a NOPSEMA brochure on the consultation process and details of how to contact Santos to register as a Relevant Person. The email stated that the consultation phase would commence on 22 November 2023 and close on 22 December 2023.
- On 9 November 2023 Santos sent an additional email to LNAC advising that Santos would be happy to meet with LNAC to discuss the information, suggested a potential week for a meeting and provided additional telephone contact details. [Con-3288]
- On 28 November 2023 Santos emailed LNAC further to the previous correspondence, to advise that it had commenced the consultation phase. Santos asked LNAC whether it would like to receive a consultation briefing/information session. Santos also stated it was keen for this information to be shared to all Larrakia families and set up drop-in session for them. [Con-3258]
- On 8 December 2023 LNAC emailed Santos with the LNAC Board's recommended approach to consultation: [Con-3323]
  - Santos undertake Face to Face consultation on 19 December 2023. Venue and time TBC.
  - Santos advertise in the NT News the face-to-face consultation once venue and time is confirmed.
  - Larrakia Nation promote face-to-face consultation on social media including opportunity to provide feedback through Santos' toll-free number on 1800 267 600.
  - Larakia Nation email all LNAC staff to ensure they are aware of the consultation session to be conducted.
- On 12 December 2023 Santos emailed LNAC seeking to confirm the date and location for the consultation session. [Con-3324]
- As advised by LNAC, Santos organised two consultation sessions to be held in Darwin on 19 December 2023 and no Larrakia people attended the sessions. The sessions were advertised in the NT News and held during the day and at a location outside the city centre (Nightcliff Community Centre), as suggested by LNAC.
- LNAC has not provided any objections or claims through any of the channels provided in accordance with the advice from the LNAC Board.
- Notwithstanding the information provided and the steps described above, no comments or input were received in relation to activities under the Coastal Waters CEMP from the LNAC.

Summary of Objection or Claim	Assessment of Merits	Santos' Response Statement	Coastal Waters CEMP Reference
No objections or claims were raised by LNAC.	Nil	Nil	Nil.

Northern Land Council (NLC)

Summary of consultation effort:

- On 9 November 2023 Santos emailed NLC to advise it of preliminary consultation regarding proposed activities for consultation in relation to the activities under the Coastal Waters CEMP and the Commonwealth Waters DPD EP. [Con-3285]
- The email advised that Santos was seeking information to better understand:
  - if you are from a government Department or agency, how the proposed DPD activities may be relevant to your department or agency; and
  - what (if any) functions, interests or activities you or your organisation have that may be affected by the proposed DPD activities.
- The email included information on the regulatory process for the activities in Commonwealth and NT jurisdictions and links to a Santos information booklet on the proposed activities and a NOPSEMA brochure on the consultation process and details of how to contact Santos to register as a Relevant Person. The email stated that the consultation phase would commence on 22 November 2023 and close on 22 December 2023.
- In the email Santos also advised that the information had been provided to a range of indigenous organisations, including the Aboriginal Sea Corporation and the Kenbi Rangers which are both affiliated with the NLC.
- On 10 November 2023 the NLC emailed Santos in response to a request from Santos for further contact details for the Aboriginal Sea Company and the Kenbi Rangers organisations, both of which were copied in the email. The NLC's CEO stated he had also forwarded Santos' information to relevant NLC senior managers. [Con-3325]
- On 10 November 2023 Santos responded to the NLC's email of 10 November 2023 advising that Santos would make sure the information was provided to both organisations and thanked the NLC for its assistance in providing contacts. [Con-3291]
- On 28 November 2023 Santos emailed NLC further to the previous correspondence, to advise that it had commenced the consultation phase which would run until 22 December 2023.Santos asked the NLC whether it would like to receive a consultation briefing/information session. In addition to the previous information again being provided, Santos provided information on Relevant Persons' entitlements under the regulatory processes, details of how to provide feedback and a reminder of the closing date for consultation. [Con-3257]
- During the consultation period, Santos also consulted with 6 First Nations Consultative Committees (FNCC) and/or Clan Groups representing the interests of First Nations people in coastal areas of the NLC regions of West Arnhem, Darwin/Daly/Wagait and Victoria River District. See the separate entries in this table for the outcomes of consultation with each FNCC/Clan Group.
- On 31 January 2024 the NLC also received the Barossa Development Quarterly Update which included advice on consultation and preparation of the EP for the activity under the Coastal Waters CEMP and Commonwealth Waters DPD EP. [Con-4692]

- Notwithstanding the information provided and the steps described above, no comments or input were received in relation to activities under the Coastal Waters CEMP from the NLC.

Summary of Objection or Claim	Assessment of Merits	Santos' Response Statement	EP Reference
No objections or claims were raised by the NLC.	Nil	Nil	Nil.

Tiwi Land Council (TLC)

Summary of consultation effort:

- On 9 November 2023 Santos emailed the TLC to advise it of preliminary consultation regarding proposed activities for consultation in relation to the activities under the Coastal Waters CEMP and the Commonwealth Waters DPD EP. [Con-3236]
- The email advised that Santos was seeking information to better understand:
  - if you are from a government Department or agency, how the proposed DPD activities may be relevant to your department or agency; and
  - what (if any) functions, interests or activities you or your organisation have that may be affected by the proposed DPD activities.
- The email included information on the regulatory process for the activities in Commonwealth and NT jurisdictions and links to a Santos information booklet on the proposed activities and a NOPSEMA brochure on the consultation process and details of how to contact Santos to register as a Relevant Person. The email stated that the consultation phase would commence on 22 November 2023 and close on 22 December 2023.
- On 15 November 2023 Santos emailed the TLC to request permission to attend the TLC meeting being held on 23 November 2023. In seeking the meeting Santos stated that one of the purposes of the request was to update the TLC on the planned consultation sessions with Tiwi clan groups prior to the sessions occurring in early December. [Con-3442] Later the same day Santos met with TLC executive staff who advised that the request to address the 23 November meeting would not be possible. It was agreed to have a regular meeting between Santos and TLC executive personnel. On 27 November 2023 Santos emailed a letter to the TLC on the meeting outcome. [Con-3443]
- On 28 November 2023 Santos emailed TLC further to the previous correspondence, to advise that it had commenced the consultation phase.Santos asked the TLC whether it would like to receive a consultation briefing/information session and advised the TLC of the consultation sessions being held on the Tiwi Islands the following week. [Con-3259]
- On 30 November 2023 TLC executive staff emailed Santos in response to Santos' letter of 27 November 2023. The email stated that TLC staff would contact Santos with suggested dates for the first of the regular meetings. [Con-3444] The first meeting for 2024 was held on 6 February.
- During the consultation period, Santos also consulted with 8 Tiwi Clan Groups that are represented by the TLC. Some elected members of the TLC were often in attendance at the consultation sessions with their respective Clan Groups. See the separate entries in this table for the outcomes of consultation with Tiwi Clan Groups.
- On 31 January 2024 the TLC also received the Barossa Development Quarterly Update which included advice on consultation and preparation of the EP for the activity under the Coastal Waters CEMP and the Commonwealth Waters DPD EP. [Con-4692]
- Notwithstanding the information provided and the steps described above, no comments or input were received in relation to activities under the Coastal Waters CEMP from the TLC.

Summary of Objection or Claim	Assessment of Merits	Santos' Response Statement	Coastal Waters CEMP Reference
No objections or claims were raised by TLC.	Nil	Nil	Nil

Wickham Point Deed liaison committee

Summary of consultation effort:

- On 9 November 2023 Santos emailed the Wickham Point Deed liaison committee to advise it of preliminary consultation regarding proposed activities for consultation in relation to the activities under the Coastal Waters CEMP and the Commonwealth Waters DPD EP. [Con-3236]
- The email advised that Santos was seeking information to better understand:
  - if you are from a government Department or agency, how the proposed DPD activities may be relevant to your department or agency; and
  - what (if any) functions, interests or activities you or your organisation have that may be affected by the proposed DPD activities.
- The email included information on the regulatory process for the activities in Commonwealth and NT jurisdictions and links to a Santos information booklet on the proposed activities and a NOPSEMA brochure on the consultation process and details of how to contact Santos to register as a Relevant Person. The email stated that the consultation phase would commence on 22 November 2023 and close on 22 December 2023.
- On 22 November 2023 Santos emailed the Wickham Point Deed liaison committee further to the previous correspondence, to advise that it had commenced the consultation phase which would run until 22 December 2023. In addition to the previous information again being provided, Santos provided information on Relevant Persons' entitlements under the regulatory processes, details of how to provide feedback and a reminder of the closing date for consultation. [Con-3238]
- On 28 November 2023 Santos held a consultation session with the Wickham Point Deed liaison committee. The following information on the activity covered by the Coastal Waters CEMP and the Commonwealth Waters DPD EP was presented and discussed [Con-3335]:
  - The Commonwealth Government and NT Government regulations and approvals required
  - The activities covered by the Coastal Waters CEMP and the Commonwealth Waters DPD EP, including installation steps and vessel descriptions
  - The environmental impacts and risks involved with the planned activities and planned controls to management those risks
  - The EMBA in the event of an unplanned event, the risks and planned controls to management those risks
  - The presentation also covered the regulatory consultation processes and privacy provisions and provided an overview of Santos the company and the Barossa Project overall.
  - The information booklet and NOPSEMA consultation brochure were also provided at the consultation session.
- The activities were conducted in person and visual aids, maps, videos and animations were also to present information regarding the Activity and the project more generally.
- The majority of the consultation session was consumed by general themes/topics, including the following, which arose by way of discussion without any objections or claims being raised with respect to the Coastal Waters CEMP:
  - The process of installing a pipeline.
  - The precautions that would be taken by Santos to minimise any impacts, including lighting and noise.
  - The process involved in the event of an accident and a spill needing to be cleaned-up.
  - Opportunities for Larrakia people to work on the Barossa Project.
- No objections or claims were raised by the Wickham Point Deed liaison committee at the consultation session. During the session a suggestion was made by one committee member regarding other persons to be consulted. The committee also requested that a one-page summary with information on DPD activities in Darwin Harbour be prepared and made available to members. The summary was provided at the committee's next meeting, held on 7 March [Con-4047]. Both the matters raised are addressed below.
- No further correspondence or feedback was received from the Wickham Point Deed liaison committee.

Summary of Objection or Claim	Assessment of Merits	Santos' Response Statement	Coastal Waters CEMP Reference
The Wickham Point Deed liaison committee requested that a one pager be prepared by Santos and provided to	Santos provided the further information to the	Santos has actioned this request and provided the requested fact sheet as part of its DPD pre-activity communications for Darwin Harbour. Santos ensures this group is kept regularly informed of its planned	No updates or additional controls required on the basis of this feedback.

committee members with the information on DPD activities in Darwin Harbour and measures Santos is taking.	committee at its next meeting held on 7 March in the form of a fact sheet. Santos notes that the request does not relate to activities in NT Coastal Waters which are the subject of this Coastal Waters CEMP.	activities with a specific Barossa update provided at each group meeting. The presentation on 23 November 2023 and the information booklet provided also contains information that is applicable to activities in Darwin Harbour.	
A member of the committee suggested that the Bulgal Community at Peron Islands also need to be considered for consultation on the DPD activities in NT waters and future Barossa Operations.	Santos considers that the Bulgal Community were consulted by Santos via the Rak Badjalarr Consultative Committee.	See separate entry in this table for Rak Badjalarr Consultative Committee.	N/A

First Nations People and groups: First Nations Consultative Committees and coastal clan groups - NT

Mulyurrud Consultative Committee

Summary of consultation effort:

- On 23 November 2023 Santos held a consultation session with the Mulyurrud Consultative Committee at Kakadu Crocodile Hotel, Jabiru. [Con-2950]
- The following information on the activity the subject of the Coastal Waters CEMP and the Commonwealth Waters DPD EP was presented and discussed:
  - The Commonwealth Government and NT Government regulations and approvals required
  - The activities covered by the Coastal Waters CEMP and the Commonwealth Waters DPD EP, including installation steps and vessel descriptions
  - The environmental impacts and risks involved with the planned activities and planned controls to management those risks
  - The EMBA in the event of an unplanned event, the risks and planned controls to management those risks
  - The presentation also covered the regulatory consultation processes and privacy provisions and provided an overview of Santos the company and the Barossa Project overall.
- The information booklet and NOPSEMA consultation brochure were also provided at the consultation session.
- The session was conducted in person and visual aids, maps, videos and animations were also used to present information regarding the Activity and the project more generally.
- At the session only one question was asked by Mulyurrud Consultative Committee members about the size of the pipe that would be installed. A statement made about notifications by Rangers in the event of an unplanned spill is addressed below.
- No objections or claims were raised by the Mulyurrud Consultative Committee. A statement made during the session is specifically addressed below.
- No further correspondence or feedback was received from the Mulyurrud Consultative Committee.

Summary of Objection or Claim	Assessment of Merits	Santos' Response Statement	Coastal Waters CEMP Reference
A statement was made by a meeting attendee that the relevant Rangers would notify clan members if there was ever an issue with a diesel spill.	Santos acknowledges this statement.	Santos responded that spills are very unlikely to happen. Santos will notify relevant FNCCs and clan groups if there is a hydrocarbon spill that has the potential to impact their coastal areas.	Table 8-6 of the Coastal Waters CEMP updated to include relevant FNCCs and clan groups notification requirement if there is a hydrocarbon spill that has the potential to impact their coastal areas. Table 5-1 of the DPD (NT Waters) OPEP (BAS-210 0026) also details the notification requirements: including hydrocarbon spill notification to the FNCCs and clan groups, including the Mulyurrud Consultative Committee.

Rak Badjalarr Consultative Committee

Summary of consultation effort:

- On 16 November 2023 Santos held a consultation session with the Rak Badjalarr Consultative Committee at Crab Claw Island Resort. [Con-2929]
- The following information on the activity the subject of the Coastal Waters CEMP and the Commonwealth Waters DPD EP was presented and discussed:
  - The Commonwealth Government and NT Government regulations and approvals required;
  - The activities covered by the Coastal Waters CEMP and the Commonwealth Waters DPD EP, including installation steps and vessel descriptions;
  - The environmental impacts and risks involved with the planned activities; and planned controls to management those risks and
  - The EMBA in the event of an unplanned event, the risks and planned controls to management those risks.
- The presentation also covered the regulatory consultation processes and privacy provisions and provided an overview of Santos the company and the Barossa Project overall.
- The information booklet and NOPSEMA consultation brochure were also provided at the consultation session.
- The session was conducted in person and visual aids, maps, videos and animations were also used to present information regarding the Activity and the project more generally.
- The majority of the consultation session was consumed by general themes/topics, including the following, which arose by way of discussion without any objections or claims being raised with respect to the Coastal Waters CEMP:
  - The dimensions of the pipeline that will be installed
  - The process of installing a pipeline
  - The extent of the geographical areas covered by the Coastal Waters CEMPEP and the Commonwealth Waters DPD EP
  - How an EMBA is determined and modelled
  - The existing precautions that would be taken by Santos to minimise any impacts, including lighting and noise, on marine animals.
  - The structural integrity and strength of the pipeline during a tsunami, cyclone or natural disaster.
  - The inspection process once the pipeline has been installed

- The process involved in the event of an accident and a spill needing to be cleaned-up and access to spill response training.
- Support for community and ranger activities

- No objections or claims were raised by the Rak Badjalarr Consultative Committee. Some statements and requests made during the session are addressed below.
- No further correspondence or feedback was received from the Rak Badjalarr Consultative Committee.

Summary of Objection or Claim	Assessment of Merits	Santos' Response Statement	Coastal Waters CEMP Reference
A request was made by one attendee that they wanted to keep details of the consultation meeting private and requested a copy of the record from the meeting. Another attendee stated they did not want the information to even "go to Canberra".	Santos noted the requests. Privacy provisions are in place and a copy of the consultation section from the meeting is provided.	Santos advised the attendees that some of the information discussed in the sessions must be shared with the regulator. A consultation summary will be included in the Coastal Waters CEMP and it will be published at some point by the regulator. However, no names are included in the document. Santos explained that conversations on Sea Country that are confidential can also be kept private upon request.	N/A
Following a statement from Santos that sacred sites were important, a response from the committee member was that they had a lot of sacred sites.	No specific information was provided by the Rak Badjalarr Consultative Committee on sacred sites.	Santos responded at the session that whilst many sacred sites can be viewed on a public register, not all are included. As such, Santos seeks feedback and guidance from the Committee to help manage sacred sites. Santos acknowledges the presence of sacred sites within the EMBA, including those registered with AAPA. Santos acknowledges that there are many culturally significant sites identified from the Kenbi (Cox Peninsula) Land Claim No. 37 and that the Kenbi clan is represented on the Rak Badjalarr Consultative Committee. Indigenous heritage areas of the 'Beagle Gulf – Darwin Coast', which includes the area from Cox Peninsula to Daly River, is acknowledged as sensitivity for consideration in spill response planning (Net Environmental Benefit Analysis).	A discussion of sacred sites in the EMBA is included within Section 3.2.14.6. This includes sacred sites identified in the Kenbi (Cox Peninsula) Land Claim No. 37. Indigenous heritage areas of the 'Beagle Gulf – Darwin Coast', which includes the area from Cox Peninsula to Daly River, is acknowledged as sensitivity for consideration in spill response planning (Net Environmental Benefit Analysis) as included in Section 4.6 of the DPD (NT Waters) OPEP (BAS-210 0026)
A statement was made that Santos is speaking to the Committee to avoid reputational risk and due to the Government's requirements.	N/A	Santos explained that consultation was important to the business and the Government, not just to tick a box.	N/A
A request was made by a clan member that they would like to be notified if there was an oil spill.	Santos responded verbally if there was a diesel spill that it would be required to notify affected stakeholders	Santos will notify relevant FNCCs and clan groups if there is a hydrocarbon spill that has the potential to impact their coastal areas	Spill notification requirements to FNCCs and clan groups, including the Rak Badjalarr Consultative Committee, are outlined in Table 8-6 of the Coastal Waters CEMP and Table 5-1 of the DPD (NT Waters) OPEP (BAS-210 0026)

Daly River / Port Keats First Nations Consultative Committee (Daly River / Port Keats FNCC)

Summary of consultation effort:

- On 1 December 2023 Santos held a consultation session with the Daly River / Port Keats FNCC at Club Tropical Resort, Lee Point. [Con-2951]
- The following information on the activity the subject of the Coastal Waters CEMP and the Commonwealth Waters DPD EP was presented and discussed:
  - The Commonwealth Government and NT Government regulations and approvals required
  - The activities covered by the Coastal Waters CEMP and the Commonwealth Waters DPD EP, including installation steps and vessel descriptions
  - The environmental impacts and risks involved with the planned activities and planned controls to management those risks
  - The EMBA in the event of an unplanned event, the risks and planned controls to management those risks
- The presentation also covered the regulatory consultation processes and privacy provisions and provided an overview of Santos the company and the Barossa Project overall.
- The information booklet and NOPSEMA consultation brochure were also provided at the consultation session.
- The session was conducted in person and visual aids, maps, videos and animations were also used to present information regarding the Activity and the project more generally.
- The majority of the consultation session was consumed by general themes/topics, including the following, which arose by way of discussion without any objections or claims being raised with respect to the Coastal Waters CEMP:
  - The extent of the geographical areas covered by the Coastal Waters CEMP and the Commonwealth Waters DPD EP
  - The topography of the seabed where the pipeline will be installed
  - From which countries do the pipeline installation vessels originate
  - The pipeline welding process at sea
  - How Santos will communicate with prawn trawlers in the area where activities will occur
  - How an EMBA is determined and modelled
  - Precautions that will be taken by Santos during the turtle breeding season
  - Precautions that will be taken by Santos to reduce the risk of a collision between vessels
  - The notification process in the event of a hydrocarbon spill
  - Avoidance of fish protection areas (outside of the OA).
  - The structural integrity and strength of the pipeline during a tsunami, cyclone or natural disaster.
  - How actions arising from committee meetings will be managed by Santos and the Committee
  - Privacy provisions during the consultation process
- No objections or claims were raised by the Daly River / Port Keats FNCC. Some statements made during the session are addressed below.
- No further correspondence or feedback was received from the Daly River / Port Keats FNCC.

Summary of Objection or Claim	Assessment of Merits	Santos' Response Statement	Coastal Waters CEMP Reference
A statement was made that some senior people were not at the meeting and, subject to discussion with those people, another meeting may be required with them in attendance.	The committee decides on its representation and the nature of the consultation required. No further meeting was requested.	Santos stated it would be happy to attend another meeting if required.	N/A
Following Santos' explanation of what an EMBA is and the likely scenarios for an unplanned spill during this activity, a statement was made that a spill "wouldn't affect the coastline because of the weather".	N/A	Santos responded that the EMBA is based on computer simulations representing a large accident, which is very unlikely. The model also shows the impact if Santos did not do anything at all in response and is therefore very conservative.	Section 3.1.1 explains the spill modelling that has been used to determine the EMBA. A further description of the spill modelling is provided in the impact and risk assessment (Section 6.6) and within Section 4 of the DPD (NT Waters) OPEP (BAS-210 0026)

Wulna clan

Summary of consultation effort:

- On 13 December 2023 Santos held a consultation session with the Wulna Clan at Windows on the Wetlands, Arnhem Highway. [Con-2966]
- The following information on the activity the subject of the Coastal Waters CEMP and the Commonwealth Waters DPD EP was presented and discussed:
  - The Commonwealth Government and NT Government regulations and approvals required
  - The activities covered by the Coastal Waters CEMP and the Commonwealth Waters DPD EP, including installation steps and vessel descriptions
  - The environmental impacts and risks involved with the planned activities and planned controls to management those risks
  - The EMBA in the event of an unplanned event, the risks and planned controls to management those risks
  - The presentation also covered the regulatory consultation processes and privacy provisions and provided an overview of Santos the company and the Barossa Project overall.
- The information booklet and NOPSEMA consultation brochure were also provided at the consultation session.
- The session was conducted in person and visual aids, maps, videos and animations were also used to present information regarding the Activity and the project more generally.
- The majority of the consultation session was consumed by general themes/topics, including the following, which arose by way of discussion without any objections or claims being raised with respect to the Coastal Waters CEMP:
  - Where vessels are sourced from and what biosecurity precautions involved
  - Potential light and noise impacts from helicopters flying at night
  - The notification process in the event of a hydrocarbon spill and access to spill response training
- No objections or claims were raised by the Wulna Clan however a request around spill notifications is included below.
- No further correspondence or feedback was received from the Wulna Clan.

Summary of Objection or Claim	Assessment of Merits	Santos' Response Statement	Coastal Waters CEMP Reference
A query was made from a clan member if Santos would contact the Land Council and relevant First Nations communities if there was a diesel spill.	Santos responded verbally if there was a diesel spill that it would be required to notify affected stakeholders.	Santos will notify the Northern Land Council and relevant FNCCs and clan groups if there is a hydrocarbon spill that has the potential to impact their coastal areas.	Spill notification requirements to FNCCs and clan groups, including the NLC and Wulna Clan, are outlined in Table 8-6 of the Coastal Waters CEMP and Table 5-1 of DPD (NT Waters) OPEP (BAS-210 0026)

Agalda clan

Summary of consultation effort:

- On 21, 22 and 23 November 2023 Santos held consultation sessions with the Agalda clan at the Kakadu Crocodile Hotel, Jabiru. [Con-2948], [Con-2949].
- The following information on the activity the subject of the Coastal Waters CEMP and the Commonwealth Waters DPD EP was presented and discussed:
  - The Commonwealth Government and NT Government regulations and approvals required
  - The activities covered by the Coastal Waters CEMP and the Commonwealth Waters DPD EP, including installation steps and vessel descriptions
  - The environmental impacts and risks involved with the planned activities and planned controls to management those risks
  - The EMBA in the event of an unplanned event, the risks and planned controls to management those risks
  - The presentation also covered the regulatory consultation processes and privacy provisions and provided an overview of Santos the company and the Barossa Project overall.
- The information booklet and NOPSEMA consultation brochure were also provided at the consultation session.
- The session was conducted in person and visual aids, maps, videos and animations were also used to present information regarding the Activity and the project more generally.
- During the consultation session, questions of a general nature were asked about the pipeline installation process, e.g. how pipeline sections are welded together, how the EMBA for DPD activities was prepared and the involvement of other bodies in Santos' research activities.
- No objections or claims were raised by the Agalda Clan. One concern related to sacred sites was raised and is addressed below along with a request also made at the session.
- No further correspondence or feedback was received from the Agalda Clan

Summary of Objection or Claim	Assessment of Merits	Santos' Response Statement	Coastal Waters CEMP Reference
Concern was expressed about the sacred sites around the west and south of Coburg and Croker Island and the statement made that all sites have been registered with AAPA.	Santos is aware that many scared sites are registered with AAPA and will ensure any additional information provided through the Agalda Clan's identified committee is assessed. No further detail was provided in this instance.	Santos has taken this feedback into account.	Section 3.2.14.6 acknowledges that there are sacred sites, including those registered with AAPA, within the EMBA. Additional text has been added to specifically recognise that there are sacred sites to the west and south of Coburg and Croker Island. Spill notification to the Algada clan is outlined in Table 8-6 of the Coastal Waters CEMP and Table 5-1 of the DPD (NT Waters) OPEP (BAS-210 0026). Indigenous heritage areas of the Coburg Peninsula is acknowledged as sensitivity for consideration in spill response planning (Net Environmental Benefit Analysis) as included in Section 4.6 of the DPD (NT Waters) OPEP (BAS-210 0026)
A request was made to notify the Clan in the event of a hydrocarbon spill.	Santos confirmed that this would be done.	Santos will notify relevant FNCCs and clan groups if there is a hydrocarbon spill that has the potential to impact their coastal areas.	Spill notification requirements to FNCCs and clan groups, including the Algada Clan, are outlined in Table 8-6 of the Coastal Waters CEMP and Table 5-1 of the DPD (NT Waters) OPEP (BAS-210 0026). Indigenous heritage areas of the Coburg Peninsula are acknowledged as sensitivities for consideration in spill response planning (Net Environmental Benefit Analysis) as included in Section 4.6 of the DPD (NT Waters) OPEP (BAS-210 0026).

Larrakia People

Summary of consultation effort:

- In order to assist with its efforts to reach out to Larrakia people in a culturally sensitive and appropriate way, consistent with NOPSEMA's consultation guidelines (2023, 2024), Santos requested advice and assistance from LNAC, which speaks on behalf of Larrakia people, in relation to appropriate ways to engage with Larrakia people. This was additional to Santos' consultation with LNAC in its own right (see the separate entry for LNAC in this Table 4-10).
- On 28 November 2023, Santos emailed LNAC to advise that it had commenced the consultation phase. Santos stated it was keen for information to be shared to all Larrakia families and to set up a drop-in session for them. [Con-3258]
- On 8 December 2023, LNAC emailed Santos with the LNAC Board's recommended approach to consultation with Larrakia people: [Con-3323]
  - Santos undertake face-to-face consultation on 19 December 2023. Venue and time TBC.
  - Santos advertise in the NT News the face-to face consultation once venue and time is confirmed.
  - Larrakia Nation promote face-to-face consultation on social media including opportunity to provide feedback through Santos' toll-free number on 1800 267 600.
  - Larrakia Nation email all LNAC staff to ensure they are aware of the consultation session to be conducted.
- On 12 December 2023, Santos emailed LNAC seeking to confirm the date and location for the consultation session. [Con-3324]
- On 19 December 2023, Santos held two consultation sessions for Larrakia people in Darwin and no Larrakia people attended the sessions. The sessions were advertised in the NT News and held during the day and at a location outside the city centre (Nightcliff Community Centre). The means of advertising and the location and date were all selected in accordance with LNAC's advice. Prior to the sessions, LNAC also advised Santos that it would use its own lines of communication to further disseminate information about the consultation sessions to Larrakia people. [Con-3323]
- On 12 June 2024, Santos held two consultation sessions in Darwin to close-out consultation on DPD activities with Larrakia people. [Con-4264] [Con-4263]
- In addition to the consultation efforts described above, Larrakia families are also represented on the Wickham Point Deed liaison committee, which has been separately consulted in relation to the activity the subject of the Coastal Waters CEMP – see the separate entry for the liaison committee in this Table 4-10. The DPD Project has been a regular agenda item at quarterly Wickham Point Deed liaison committee meetings since November 2021. As per the entry in this table for the liaison committee, consultation with respect to activities within the Coastal Waters CEMP was held on 28 November 2023.

Notwithstanding the information provided and the steps described above, no comments or input were received in relation to activities under the Coastal Waters CEMP from Larrakia People.

Summary of Objection or Claim	Assessment of Merits	Santos' Response Statement	Coastal Waters CEMP Reference
No objections or claims were raised at the consultation sessions.	Nil	Nil	Nil

First Nations People and groups: Representative organisations – Northern Territory

Aboriginal Sea Company (ASC)

Summary of consultation effort:

- On 13 November 2023 Santos emailed the Aboriginal Sea Company (ASC) to advise it of preliminary consultation regarding proposed activities for consultation in relation to the activities under the Coastal Waters CEMP and the Commonwealth Waters DPD EP. [Con-3292]
- The email advised that Santos was seeking information to better understand:
  - if you are from a government Department or agency, how the proposed DPD activities may be relevant to your department or agency; and
  - what (if any) functions, interests or activities you or your organisation have that may be affected by the proposed DPD activities.
- The email included information on the regulatory process for the activities in Commonwealth and NT jurisdictions and links to a Santos information booklet on the proposed activities and a NOPSEMA brochure on the consultation process and details of how to contact Santos to register as a Relevant Person. The email stated that the consultation phase would commence on 22 November 2023 and close on 22 December 2023In the email Santos also advised that it would be in contact again to seek ASC's feedback and provided additional telephone contact details.
- On 16 November 2023 Santos made an attempt to contact the ASC by phone to determine whether ASC would like to discuss the information that had been provided.
- On 22 November 2023 Santos emailed ASC further to the previous correspondence, to advise that it had commenced the consultation phase which would run until 22 December 2023. In addition to the previous information again being provided, Santos provided information on Relevant Persons' entitlements under the regulatory processes, details of how to provide feedback and a reminder of the closing date for consultation. [Con-3238]
- On 14 and 15 December 2023 Santos made further attempts to contact the ASC by phone to remind it of the deadline for feedback.
- Notwithstanding the information provided and the steps described above, no comments or input were received in relation to activities under the Coastal Waters CEMP from ASC.

Summary of Objection or Claim	Assessment of Merits	Santos' Response Statement	Coastal Waters CEMP Reference
No objections or claims were raised by ASC.	Nil	Nil	Nil

Gwalwa Daraniki Association (GDA)

Summary of consultation effort:

- On 15 November 2023 Santos emailed the Gwalwa Daraniki Association (GDA) to advise it of preliminary consultation regarding proposed activities for consultation in relation to the activities under the Coastal Waters CEMP and the Commonwealth Waters DPD EP. [Con-3295]
- The email advised that Santos was seeking information to better understand:
  - if you are from a government Department or agency, how the proposed DPD activities may be relevant to your department or agency; and
  - what (if any) functions, interests or activities you or your organisation have that may be affected by the proposed DPD activities.
- The email included information on the regulatory process for the activities in Commonwealth and NT jurisdictions and links to a Santos information booklet on the proposed activities and a NOPSEMA brochure on the consultation process and details of how to contact Santos to register as a Relevant Person. The email stated that the consultation phase would commence on 22 November 2023 and close on 22 December 2023.
- On 16 and 20 November 2023 Santos made attempts to contact the GDA by phone to determine whether GDA would like to discuss the information that had been provided.
- On 22 November 2023 Santos emailed GDA further to the previous correspondence, to advise that it had commenced the consultation phase which would run until 22 December 2023. In addition to the previous information again being provided, Santos provided information on Relevant Persons' entitlements under the regulatory processes, details of how to provide feedback and a reminder of the closing date for consultation. [Con-3238]
- On 14 and 18 December 2023 Santos made further attempts to contact the GDA by phone to remind it of the deadline for feedback.
- Notwithstanding the information provided and the steps described above, no comments or input were received in relation to activities under the Coastal Waters CEMP from GDA.

Summary of Objection or Claim	Assessment of Merits	Santos' Response Statement	Coastal Waters CEMP Reference
No objections or claims were raised by GDA.	Nil	Nil	Nil

Kenbi Rangers

Summary of consultation effort:

- On 13 November 2023 Santos emailed Kenbi Rangers to advise it of preliminary consultation regarding proposed activities for consultation in relation to the activities under the Coastal Waters CEMP and the Commonwealth Waters DPD EP. [Con-3293]
- The email advised that Santos was seeking information to better understand:
  - if you are from a government Department or agency, how the proposed DPD activities may be relevant to your department or agency; and
  - what (if any) functions, interests or activities you or your organisation have that may be affected by the proposed DPD activities.
- The email included information on the regulatory process for the activities in Commonwealth and NT jurisdictions and links to a Santos information booklet on the proposed activities and a NOPSEMA brochure on the consultation process and details of how to contact Santos to register as a Relevant Person. The email stated that the consultation phase would commence on 22 November 2023 and close on 22 December 2023.
- In the email Santos also advised that it would be in contact again to seek Kenbi Rangers' feedback and provided additional telephone contact details.
- On 16 and 20 November 2023 Santos made attempts to contact the Kenbi Rangers by phone to determine whether Kenbi Rangers would like to discuss the information that had been provided.
- On 22 November 2023 Santos emailed Kenbi Rangers further to the previous correspondence, to advise that it had commenced the consultation phase which would run until 22 December 2023. In addition to the previous information again being provided, Santos provided information on Relevant Persons' entitlements under the regulatory processes, details of how to provide feedback and a reminder of the closing date for consultation. [Con-3238]
- On 18 December 2023 Santos made a further attempt to contact the Kenbi Rangers by phone to remind it of the deadline for feedback.
- Notwithstanding the information provided and the steps described above, no comments or input were received in relation to activities under the Coastal Waters CEMP from Kenbi Rangers.

Summary of Objection or Claim	Assessment of Merits	Santos' Response Statement	Coastal Waters CEMP Reference
No objections or claims were raised by Kenbi Rangers.	Nil	Nil	Nil

Larrakia Development Corporation (LDC)

Summary of consultation effort:

- On 9 November 2023 Santos emailed the Larrakia Development Corporation (LDC) to advise it of preliminary consultation regarding proposed activities for consultation in relation to the activities under the Coastal Waters CEMP and the Commonwealth Waters DPD EP. [Con-3236]
- The email advised that Santos was seeking information to better understand:
  - if you are from a government Department or agency, how the proposed DPD activities may be relevant to your department or agency; and
  - what (if any) functions, interests or activities you or your organisation have that may be affected by the proposed DPD activities.
- The email included information on the regulatory process for the activities in Commonwealth and NT jurisdictions and links to a Santos information booklet on the proposed activities and a NOPSEMA brochure on the consultation process and details of how to contact Santos to register as a Relevant Person. The email stated that the consultation phase would commence on 22 November 2023 and close on 22 December 2023.
- On 9 November 2023 Santos sent an additional email to LDC advising that Santos would be happy to meet with LDC to discuss the information, suggested a potential week for a meeting and provided additional telephone contact details. [Con-3289]
- On 16 and 20 November 2023 Santos made attempts to contact the LDC by phone to determine whether LDC would like to discuss the information that had been provided.
- On 22 November 2023 Santos emailed the LDC further to the previous correspondence, to advise that it had commenced the consultation phase which would run until 22 December 2023. In addition to the previous information again being provided, Santos provided information on Relevant Persons' entitlements under the regulatory processes, details of how to provide feedback and a reminder of the closing date for consultation. [Con-3238]
- On 31 January 2024 LDC also received the Barossa Development Quarterly Update which included advice on consultation and preparation of the Coastal Waters CEMPEP and the Commonwealth Waters DPD EP.[Con-4692]
- Notwithstanding the information provided and the steps described above, no comments or input were received in relation to activities under the Coastal Waters CEMP from LDC.

Summary of Objection or Claim	Assessment of Merits	Santos' Response Statement	Coastal Waters CEMP Reference
No objections or claims were raised by LDC.	Nil	Nil	Nil

North Australia Indigenous Land and Sea Management Alliance (NAILSMA)

Summary of consultation effort:

- On 9 November 2023 Santos emailed the North Australia Indigenous Land and Sea Management Alliance (NAILSMA) to advise it of preliminary consultation regarding proposed activities for consultation in relation to the activities under the Coastal Waters CEMP and the Commonwealth Waters DPD EP. [Con-3236]
- The email advised that Santos was seeking information to better understand:
  - if you are from a government Department or agency, how the proposed DPD activities may be relevant to your department or agency; and
  - what (if any) functions, interests or activities you or your organisation have that may be affected by the proposed DPD activities.
- The email included information on the regulatory process for the activities in Commonwealth and NT jurisdictions and links to a Santos information booklet on the proposed activities and a NOPSEMA brochure on the consultation process and details of how to contact Santos to register as a Relevant Person. The email stated that the consultation phase would commence on 22 November 2023 and close on 22 December 2023.
- On 9 November 2023 Santos sent an additional email to NAILSMA advising that Santos would be happy to meet with NAILSMA to discuss the information, suggested a potential week for a meeting and provided additional telephone contact details. [Con-3290]
- On 15 and 20 November 2023 Santos made attempts to contact NAILSMA by phone to determine whether NAILSMA would like to discuss the information that had been provided.
- On 22 November 2023 Santos emailed NAILSMA further to previous correspondence, to advise that it had commenced the consultation phase which would run until 22 December 2023. In addition to the previous information again being provided, Santos provided information on Relevant Persons' entitlements under the regulatory processes, details of how to provide feedback and a reminder of the closing date for consultation. [Con-3238]
- Notwithstanding the information provided and the steps described above, no comments or input were received in relation to activities under the Coastal Waters CEMP from NAILSMA.

Summary of Objection or Claim	Assessment of Merits	Santos' Response Statement	Coastal Waters CEMP Reference
No objections or claims were raised by NAILSMA.	Nil	Nil	Nil

Tiwi Islands Clan Groups and Individuals

Summary of consultation effort:

- Santos continued its staged approach to consultation with Tiwi Islands clan groups and individuals.
- Consultation activities were conducted in person at 3 locations on the Tiwi Islands, primarily through discussions or presentations.
- The sessions were advertised in advance in accordance with a process agreed with the Clan groups.
- Some elected members of the TLC were often in attendance at the consultation sessions with their respective Clan Groups.
- At the sessions Santos used visual aids, maps, videos, animations to present information regarding the Activity and the project more generally.
- The presentation also covered the regulatory consultation processes and privacy provisions and provided an overview of Santos the company and the Barossa Project overall.
- The information booklet and NOPSEMA consultation brochure were also provided at the sessions.
- The following consultation sessions were held on the Tiwi Islands noting that for the sessions, regardless of location and notice sent out for specified clans, representatives from other clans were permitted to, and did, attend meetings as set out in the relevant meeting minutes:
  - On 5 December 2023 with the Marrikawuyanga, Yimpinari and Wulirankuwu Clans at Milikapati (Social and Sports Club). [Con-2952]
  - On 6 December 2023 with the Jikilaruwu and Mantiyupwu Clans at Wurrumiyanga (Nguiu Club). [Con-2960], [Con-2963]
  - On 7 December 2023 with the Wurankuwu and Malawu Clans at Wurrumiyanga (Mantiyupwi Meeting Room) [Con-2964], [Con-2965]
  - On 30 January 2024 with the Marrikawuyanga, Yimpinari and Wulirankuwu Clans at Milikapati (Sports and Recreation Centre). [Con-3349]
  - On 31 January 2024 with the Jikilaruwu and Mantiyupwu Clans at Wurrumiyanga (Mantiyupki Motel). [Con-3350], [Con-3351]
  - On 1 February 2024 with the Wurankuwu and Malawu Clans at Wurrumiyanga (Mantiyupki Motel). [Con-3352], [Con-3353]

- On 2 February 2024 with the Munupi Clan at Pirlangimpi (Sports and Social Club). [Con-3109]
- On 5 March 2024 with the Marrikawuyanga, Yimpinari and Wulirankuwu Clans at Milikapati (Sports and Recreation Centre). [Con-4160]
- On 6 March 2024 with the Jikilaruwu and Mantiyupwu Clans at Wurrumiyanga (Mantiyupwi Motel). [Con-4161] [Con-4162]
- On 7 March 2024 with the Wurankuwu and Malawu Clans at Wurrumiyanga (Mantiyupwi Motel). [Con-4163] [Con-4164]
- On 8 April 2024 with the Munupi Clan at Pirlangimpi (Sports and Social Club). [Con-4093]
- On 17 May 2024 with the Manupi Clan at Pirlangimpi (Sports and Social Club). [Con-4231]

Note: 2 consultation sessions with the Munupi Clan planned for 8 December 2023 and 8 March 2024 were cancelled due to sorry business.

- In addition to the sessions held on the Tiwi Islands, the following sessions were also held in Darwin:
  - On 14 December 2023 with Tiwi Islands people (Mantiyupwi and Murrumujuk clans) with interests in the Vernon Islands. [Con-2967]
  - On 29 January 2024 for any Darwin-based Tiwi Peoples. [Con-3348]
  - On 22 March 2024 for any Darwin-based Tiwi Peoples. [Con-4844]
- The following information on the activity the subject of the Coastal Waters CEMP and the Commonwealth Waters DPD EP was presented and discussed at each Tiwi consultation session:
  - The Commonwealth Government and NT Government regulations and approvals required
  - The activities covered by the Coastal Waters CEMPEP and the Commonwealth Waters DPD EP, including installation steps and vessel descriptions
  - The environmental impacts and risks involved with the planned activities and planned controls to management those risks
  - The EMBA in the event of an unplanned event, the risks and planned controls to management those risks
  - The majority of the first 2 consultation sessions was consumed by general themes/topics, including the following, which arose by way of discussion without any objections or claims being raised with respect to the Coastal Waters CEMP:
  - the pipeline installation process
  - how Santos would prevent/contain a leak in the pipeline;
  - the safety and maintenance of pipelines once installed
  - the impact of cyclones and other weather events on the infrastructure;
  - management of general waste at sea
  - how the light on vessels may affect turtles hatching and the impact of marine life generally;
  - the risk of spills or explosions and the location of condensate spill kits;
  - vessel collisions and vessel activities around Darwin (and the impact of the pipeline on the same);
  - the environmental impact of the project generally and to the marine life;
  - the pre-activity notification process
  - job opportunities and other benefits for Tiwi Islanders;
  - the involvement of the land rangers as part of the response to a spill.
- A number of the questions raised at these sessions related to activities covered by other EPs (being the D&C, SURF and GEP EPs) that had also been raised and discussed at previous consultation sessions.
- Across all the sessions there were a number of issues raised in the form of either concerns or specific requests, which are addressed below.
- No further correspondence or feedback was received from Tiwi clans.

Summary of Objection or Claim	Assessment of Merits	Santos' Response Statement	Coastal Waters CEMP Reference
Statement that Santos needs to be laying the pipeline flat	Santos acknowledged the feedback and responded verbally within the consultation session.	Santos responded that it undertakes surveys of the seabed to ensure the seabed along the route is as flat as possible and will undertake pre-lay span rectification if required to ensure the pipeline will lay flat with pipeline spanning minimized.	Pre-lay span rectification is detailed in Section 2.5.3.1 of the Coastal Waters CEMP
A suggestion that no lifting should occur during the DPD activity	Santos acknowledged the feedback and responded verbally within the consultation session.	Lifting operations are unavoidable but Santos implements a range of control measures to prevent dropped objects including lifting procedures and equipment certification. Santos adopts no lifting zones to avoid live infrastructure.	Dropped objects is acknowledged as a risk in Section 6.1 and Section 6.8 and control measures and performance standards that will be implemented to reduce impacts and risks are listed in Table 7-2.
Broad concerns about how the activity could impact the islands (Tiwi Islands), and sea and seabed offshore from the islands	Santos provided information during the consultation sessions outlining all impacts and risks associated with the Project that could impact the sea and in the case of a hydrocarbon spill, the Tiwi Islands.	Santos outlined the impacts and risks associated with the activity and the control measures it would be following to reduce the level of impact or risk.	Details of impacts and risks are provided in Sections 5 and 6 and control measures and performance standards that will be implemented to reduce impacts and risks are provided in Table 7-2.
Concerns around the potential for leaks from the DPD pipeline from dropped objects (anchors, shipping containers), natural weather events (strong currents, rough seas, tidal waves and earthquakes) and large megafauna (sharks and crocodiles)	Santos acknowledged the feedback around risks associated with the pipeline once laid and responded verbally in the consultation session. Santos notes that these risks are more relevant to	Santos stated that design of the pipeline is sufficient to withstand impacts including the thickness of the steel and the concrete weighting. Santos explained that maps will show other users where the pipeline is.	Detail of pipeline construction is included in Section 2.5.4 on the Coastal waters CEMP. The marking of the pipeline on nautical charts to alert other marine users of its presence is included as a control measure (C6.1.2), with associated performance standard, in Table 7-2.

	the DPD pipeline once operational rather than construction activities covered under the Coastal Waters CEMP.		
Clan member asked if the pipeline could be built further away	Santos acknowledged the feedback and responded verbally in the consultation session.	Santos replied that the Barossa Gas Export Pipeline (GEP) route has been approved and construction commenced. The DPD pipeline will connect to the Barossa GEP in Commonwealth waters.	N/A
Concerns about pipeline leakage and impacts to fishing	Santos acknowledged the feedback and responded verbally in the consultation session. Santos notes that these risks are more relevant to the DPD pipeline once operational rather than construction activities covered under the Coastal Waters CEMP.	Santos replied that the pipelines are designed not to leak and will be tested (pigging) to ensure it is good condition (thickness and condition of welds) during operations.	Detail of pipeline construction is included in Section 2.5.4 of the Coastal Waters CEMP. Detail of pipeline testing is included in Section 2.6 of the Coastal Waters CEMP. Commercial and recreational fishing within the OA is detailed in Section 3.2.13.1 and Section 3.2.13.6. The impact assessment provided in Section 5.1.
Concerns about vessel cooling water being discharged to the sea	Santos acknowledged the feedback and responded verbally in the consultation session.	Santos outlined the impacts and control measures associated with permitted vessel discharges, including cooling water.	Detail on the impact of vessel discharges is included in Section 5.6 and the control measures and performance standards that will be implemented to manage vessel discharges are included in Section 5.6.3 and Table 7-2.
Clan members requested further information about chemicals to be used during testing of the pipeline.	Santos acknowledged the feedback and provided additional information in subsequent clan sessions.	Santos agreed to provide some more information on chemicals. Further information was provided in subsequent clan meetings including details on the types of chemicals, the appearance of the chemicals, and the concentrations of the chemicals used.	Detail of chemicals used in pipeline testing is included in Sections 2.6 and 2.11 of the Coastal Waters CEMP.
Request made not to touch the Bayu-Undan pipeline when undertaking DPD Project	Santos acknowledged the feedback and responded verbally in the consultation session.	Santos explained there were rules in place for working around the Bayu-Undan pipeline including lifting procedure and certified equipment.	The potential for damage to the Bayu-Undan pipeline and resultant gas release is included as a risk in Section 6.8 with control measures and associated performance standards (Table 7-2).
Statement made that there were lots of trawlers and a concern if they would be aware of the pipeline	Santos acknowledged the potential interaction between trawlers and the DPD pipeline and responded verbally in the consultation session. Santos notes that these risks are more relevant to the DPD pipeline once operational rather than construction activities covered under the Coastal Waters CEMP.	Santos explained that other vessels would be made aware of the construction work and that the pipeline would be marked on nautical charts.	Commercial fishing within the OA is detailed in Section 3.2.13.1 and the impact assessment provided in Section 5.1.The marking of the DPD on nautical charts to alert other marine users of its presence is included as a control measure (C6.1.2), with associated performance standard, in Table 7-2.
A concern that, in the event of a diesel spill, diesel would go 'everywhere' and remain in the water 'forever'.	Santos provided feedback in the session around the worst-case credible diesel spill scenario and where such a spill could go. Santos does not agree that a spill would go everywhere and last forever. Diesel spilt to the ocean undergoes weathering processes that reduce its volume and concentration over time with any residual fraction following initial weathering biodegrading.	Santos provided information on the worst-case credible diesel spill associated with DPD Project and the spill modelling that had been undertaken to define where a worst-case spill could go (i.e. the EMBA). Santos explained that diesel spills do not go everywhere at once but would move depending upon the wind and currents and that they would become less concentrated as they move away from the spill source. Santos explained that spills would be responded to as per spill response plans and supporting arrangements.	Detail on the worst-case credible diesel spill modelling is provided in Section 3.1.1 (in terms of defining the EMBA) and impacts associated with credible diesel spills are detailed in Section 6.6. Santos' spill response arrangements are outlined within the DPD (NT Waters) OPEP (BAS-210 0026).
Statement made that if there was a diesel spill Santos would need someone there on the ground.	Santos acknowledged the feedback and responded verbally in the consultation session.	Detail on the control measures and performance standards that will be implemented to avoid and mitigate diesel spills is provided in Section 6.6.3 and Table 7-2.	The control measures and performance standards that will be implemented to avoid and mitigate diesel spills is provided in Section 6.6.3 and Table 7-2.

			Santos' spill response arrangements are outlined within the DPD (NT Waters) OPEP (BAS-210 0026) and notifications are listed in Table 8-6 of the Coastal Waters CEMP.
Request that the Sea Rangers are engaged with the Project.	Santos acknowledged the request and responded verbally in the consultation session.	Santos explained there were many spill response arrangements in place that would be activated, including mobilisation of people to a spill site.	The role of the Tiwi Island Ranger group in spill response rapid assessment is outlined in Section 3.4.2 of the DPD (NT Waters) OPEP (BAS-210 0026).
Concern that TLC was not notified of Santos activities.	Santos acknowledged the request and responded verbally in the consultation session that this will occur.	Santos confirmed that activity notification list will include the TLC.	TLC has been added to the notification list for start of activities notifications in Table 8-6 of the Coastal Waters CEMP.
Concern raised that the lighting of Project vessels could impact important turtle nesting and seagulls at Seagull Island.	Santos acknowledged the concern and responded verbally in the consultation session.	Santos explained that the DPD pipelay activity in Commonwealth waters is at its closest 27 km away from south-west of Tiwi Islands (noting activities within Coastal Waters are further away) and Seagull Island is >100 km away from the closest part of the OA. At this distance vessel lighting will not have an effect on nesting and turtle hatchling at Seagull Island based on modelling of light spill conducted, nor will it affect seagulls at this distance.	The potential impact on turtles and birds from vessel light spill is included in Section 5.4, which includes further detail on light spill modelling conducted.
Tiwi Islander clan members asked whether a seabed survey could be shared.	Santos acknowledged the feedback and provided additional information in subsequent clan sessions.	Santos responded that it would come back with further information. Santos returned with typical images of the seabed off the Tiwi coast and stated that it typically didn't share full survey information.	Seabed survey information of the DPD pipeline route is provided in Section 3.2.8.
Tiwi Islander clan members asked whether a copy of the activity impacts table presented at the meetings could be shared.	Santos acknowledged the feedback and provided additional information in subsequent clan sessions.	Santos agreed to provide a copy of activity impacts table and provided hardcopy printouts of the table in a subsequent session.	Planned activities impact assessment and associated control measures are detailed in Section 5 and Table 7-2.
Tiwi Islander clan members asked whether cultural heritage monitors onboard vessels could provide feedback directly to Tiwi People at the end of their shift.	Santos acknowledged the feedback verbally and has conducted a subsequent session with a Tiwi Island cultural heritage monitor.	Santos agreed that the request was a good idea. Santos has undertaken subsequent consultation with the aid of a Tiwi cultural heritage monitor.	N/A
At the 14 December 2023 session with Tiwi Islands people (Mantiyupwi clan) with interests in the Vernon Islands, a statement was made that sea rangers would work with Santos in the event of a spill and a question was posed about whether more volunteers would be needed to assist.	Santos responded to the question verbally at the session.	Santos explained that when it prepares an EP it also submits a separate plan (an OPEP) for responding to an unplanned hydrocarbon spill. The OPEP includes arrangements for working with other organisations or groups. This includes the Tiwi Rangers who have been trained on some spill response measures. Santos also explained that there have been occasions where there have been community volunteers also used to assist with coastal clean-up in particular, under the supervision of trained people. This could also happen if required.	Santos management strategy for preventing and mitigating diesel spills is outlined within Section 6.6 of the Coastal Waters CEMP with performance standards included in Table 7-2 and control measures in Section 6.6.3. Applicable spill response strategies outlined within section 4.4 of the DPD (NT Waters) OPEP (BAS-210 0026) The role of the Tiwi Island Ranger group in spill response rapid assessment is outlined in Section 3.4.2 of the DPD (NT Waters) OPEP (BAS-210 0026)
First Nations People and groups: Representative organisations – Western Australia			
Kimberley Land Council (KLC)			
Summary of consultation effort: • On 9 November 2023 Santos emailed KLC to advise it of preliminary consultation regarding proposed activities for consultation in relation to the activities under the Coastal Waters CEMP and the Commonwealth Waters DPD EP. [Con-3283] • The email advised that Santos was seeking information to better understand: – if you are from a government Department or agency, how the proposed DPD activities may be relevant to your department or agency; and – what (if any) functions, interests or activities you or your organisation have that may be affected by the proposed DPD activities. • The email included information on the regulatory process for the activities in Commonwealth and NT jurisdictions and links to a Santos information booklet on the proposed activities and a NOPSEMA brochure on the consultation process and details of how to contact Santos to register as a Relevant Person. The email stated that the consultation phase would commence on 22 November 2023 and close on 22 December 2023. • In the email Santos advised that it would contact the KLC again when the consultation period commenced but would be happy to meet with the KLC earlier. Santos also advised that the information had also been provided to the Northern Land Council and Tiwi Land Council. • On 9 November 2023 Santos emailed the KLC separately in relation to the consultation process for all Santos EPs, including Barossa EPs, stating Santos' understanding of the KLC's current position and Santos' efforts to develop a consultative committee model. [Con-2648] • On 22 November 2023 Santos emailed KLC further to the previous correspondence, to advise that it had commenced the consultation phase which would run until 22 December 2023. In addition to the previous information again being provided, Santos provided information on Relevant Persons' entitlements under the regulatory processes, details of how to provide feedback and a reminder of the closing date for consultation. [Con-3238] • On 13 and 20 December 2023 Santos followed-up the previous emails with phone calls to KLC. • On 31 January 2024 the KLC also received the Barossa Development Quarterly Update which included advice on consultation and preparation of the Coastal Waters CEMPEP and the Commonwealth Waters DPD EP. • Notwithstanding the information provided and the steps described above, no comments or input were received in relation to activities under the Coastal Waters CEMP from the KLC.			
Summary of Objection or Claim	**Assessment of Merits**	**Santos' Response Statement**	**Coastal Waters CEMP Reference**
No objections or claims were raised by KLC.	Nil	Nil	Nil
Industry Associations – Commercial Fishing			

Australian Southern Bluefin Tuna Industry Association (ASBTIA)

Summary of consultation effort:

- On 9 November 2023 Santos emailed ASBTIA to advise it of preliminary consultation regarding proposed activities for consultation in relation to the activities under the Coastal Waters CEMP and the Commonwealth Waters DPD EP. [Con-3236]
- The email advised that Santos was seeking information to better understand:
  - if you are from a government Department or agency, how the proposed DPD activities may be relevant to your department or agency; and
  - what (if any) functions, interests or activities you or your organisation have that may be affected by the proposed DPD activities.
- The email included information on the regulatory process for the activities in Commonwealth and NT jurisdictions and links to a Santos information booklet on the proposed activities and a NOPSEMA brochure on the consultation process and details of how to contact Santos to register as a Relevant Person. The email stated that the consultation phase would commence on 22 November 2023 and close on 22 December 2023.
- On 22 November 2023 Santos emailed ASBTIA further to the previous correspondence, to advise that it had commenced the consultation phase which would run until 22 December 2023. In addition to the previous information again being provided, Santos provided information on Relevant Persons' entitlements under the regulatory processes, details of how to provide feedback and a reminder of the closing date for consultation. [Con-3238]
- Santos followed-up the previous emails with a phone call to ASBTIA on 14 December 2023 and a follow-up email on 20 December 2023 [Con-3000]
- Notwithstanding the information provided and the steps described above, no comments or input were received in relation to activities under the Coastal Waters CEMP from the ASBTIA.

Summary of Objection or Claim	Assessment of Merits	Santos' Response Statement	Coastal Waters CEMP Reference
No objections or claims were raised by ASBTIA.	Nil	Nil	Nil

Commonwealth Fisheries Association (CFA)

Summary of consultation effort:

- On 9 November 2023 Santos emailed CFA to advise it of preliminary consultation regarding proposed activities for consultation in relation to the activities under the Coastal Waters CEMP and the Commonwealth Waters DPD EP. [Con-3236]
- The email advised that Santos was seeking information to better understand:
  - if you are from a government Department or agency, how the proposed DPD activities may be relevant to your department or agency; and
  - what (if any) functions, interests or activities you or your organisation have that may be affected by the proposed DPD activities.
- The email included information on the regulatory process for the activities in Commonwealth and NT jurisdictions and links to a Santos information booklet on the proposed activities and a NOPSEMA brochure on the consultation process and details of how to contact Santos to register as a Relevant Person. The email stated that the consultation phase would commence on 22 November 2023 and close on 22 December 2023.
- On 22 November 2023 Santos emailed CFA further to the previous correspondence, to advise that it had commenced the consultation phase which would run until 22 December 2023. In addition to the previous information again being provided, Santos provided information on Relevant Persons' entitlements under the regulatory processes, details of how to provide feedback and a reminder of the closing date for consultation. [Con-3238]
- Santos followed-up the previous emails with a phone call to CFA on 14 December 2023 and a follow-up email on 20 December 2023 [Con-2999]
- Notwithstanding the information provided and the steps described above, no comments or input were received in relation to activities under the Coastal Waters CEMP From the CFA.

Summary of Objection or Claim	Assessment of Merits	Santos' Response Statement	Coastal Waters CEMP Reference
No objections or claims were raised by CFA.	Nil	Nil	Nil

Northern Territory Seafood Council (NTSC)

Summary of consultation effort:

- On 9 November 2023 Santos emailed NTSC to advise it of preliminary consultation regarding proposed activities for consultation in relation to the activities under the Coastal Waters CEMP and the Commonwealth Waters DPD EP. [Con-3279]
- The email advised that Santos was seeking information to better understand:
  - if you are from a government Department or agency, how the proposed DPD activities may be relevant to your department or agency; and
  - what (if any) functions, interests or activities you or your organisation have that may be affected by the proposed DPD activities.
- The email included information on the regulatory process for the activities in Commonwealth and NT jurisdictions and links to a Santos information booklet on the proposed activities and a NOPSEMA brochure on the consultation process and details of how to contact Santos to register as a Relevant Person. The email stated that the consultation phase would commence on 22 November 2023 and close on 22 December 2023.
- In the email Santos also asked if NTSC would be able to meet during November to discuss the information. Santos also advised that the information would also be posted to NT licence holders the following day.
- On 15 November 2023 Santos attempted to contact the NTSC via phone.
- On 22 November 2023 Santos emailed NTSC further to the previous correspondence, to advise that it had commenced the consultation phase which would run until 22 December 2023. In addition to the previous information again being provided, Santos provided information on Relevant Persons' entitlements under the regulatory processes, details of how to provide feedback and a reminder of the closing date for consultation. [Con-3238]
- Santos followed-up the previous emails with a phone call to NTSC on 14 December 2023 and a follow-up email on 20 December 2023 [Con-3016]
- On 21 December 2023 NTSC responded to Santos via email stating that the information had been provided to the Chair of its Offshore Net and Line Committee and, if Santos did not hear directly from the Chair, there will be no other submission or feedback from NTSC. [Con-3300]
- On 9 January 2024 Santos emailed the NT Seafood Council (NTSC) to advise it of the correspondence with one of its Licence Holders, a potential meeting with the Licence-Holder and whether the NTSC and any other person would like to be involved. [Con-3316]
- On 19 January 2024 Santos unsuccessfully attempted to contact the Licence-Holder by phone to gain further information and arrange a meeting.
- On 22 March 2024 Santos again emailed the Licence-Holder who had expressed concern about the activities and provided further opportunity to provide input by 28 March 2024 to the development of the Coastal Waters CEMP. The email was again copied to the NTSC. [Con-3532]. No response was received.
- Notwithstanding the information provided and the steps described above, no comments or input were received in relation to activities under the Coastal Waters CEMP from NTSC.

Summary of Objection or Claim	Assessment of Merits	Santos' Response Statement	Coastal Waters CEMP Reference
No objections or claims were raised by NTSC.	Nil	Nil	Nil

Northern Prawn Fishing Industry (NPFI) Limited

Summary of consultation effort:

- Formal consultation with NPF Licence Holders occurs via their representative association, the Northern Prawn Fishing Industry (NPFI) Ltd (see separate NPFI entry). This is the process requested by the NPFI and licence-holders.
- On 9 November 2023 Santos emailed NPFI to advise it of preliminary consultation regarding proposed activities for consultation in relation to the activities under the Coastal Waters CEMP and the Commonwealth Waters DPD EP. [Con-3280]
- The email advised that Santos was seeking information to better understand:
  - if you are from a government Department or agency, how the proposed DPD activities may be relevant to your department or agency; and
  - what (if any) functions, interests or activities you or your organisation have that may be affected by the proposed DPD activities.
- The email included information on the regulatory process for the activities in Commonwealth and NT jurisdictions and links to a Santos information booklet on the proposed activities and a NOPSEMA brochure on the consultation process and details of how to contact Santos to register as a Relevant Person. The email stated that the consultation phase would commence on 22 November 2023 and close on 22 December 2023.
- In the email Santos also asked if NPFI would be able to meet later in the month to discuss the information.
- On 15 November 2023 Santos attempted to contact the NPFI via phone.
- On 22 November 2023 Santos emailed NPFI further to the previous correspondence, to advise that it had commenced the consultation phase which would run until 22 December 2023. In addition to the previous information again being provided, Santos provided information on Relevant Persons' entitlements under the regulatory processes, details of how to provide feedback and a reminder of the closing date for consultation. [Con-3238]
- Notwithstanding the information provided and the steps described above, no comments or input were received in relation to activities under the Coastal Waters CEMP from NPFI.

Summary of Objection or Claim	Assessment of Merits	Santos' Response Statement	Coastal Waters CEMP Reference
No objections or claims were raised by NPFI.	Nil	Nil	Nil

Western Australian Fishing Industry Council (WAFIC)

Summary of consultation effort:

- On 9 November 2023 Santos emailed WAFIC to advise it of preliminary consultation regarding proposed activities for consultation in relation to the activities under the Coastal Waters CEMP and the Commonwealth Waters DPD EP. [Con-3236]
- The email advised that Santos was seeking information to better understand:
  - if you are from a government Department or agency, how the proposed DPD activities may be relevant to your department or agency; and
  - what (if any) functions, interests or activities you or your organisation have that may be affected by the proposed DPD activities.
- The email included information on the regulatory process for the activities in Commonwealth and NT jurisdictions and links to a Santos information booklet on the proposed activities and a NOPSEMA brochure on the consultation process and details of how to contact Santos to register as a Relevant Person. The email stated that the consultation phase would commence on 22 November 2023 and close on 22 December 2023.
- On 22 November 2023 Santos emailed WAFIC further to the previous correspondence, to advise that it had commenced the consultation phase which would run until 22 December 2023. In addition to the previous information again being provided, Santos provided information on Relevant Persons' entitlements under the regulatory processes, details of how to provide feedback and a reminder of the closing date for consultation. [Con-3238]
- On 14 December 2023 Santos followed-up the previous emails with a phone discussion during which WAFIC stated it did not need to be consulted given the location of DPD activities. Santos followed up with an email to WAFIC confirming the phone discussion. [Con-3017]
- On 21 December 2023 WAFIC responded to Santos via email re-stating that WAFIC had developed a preferred approach in undertaking consultation with commercial fishing licence holders (from WA State fisheries) that will only be affected by a significant unplanned event, to manage consultation fatigue. [Con-3299]
- No further correspondence or feedback was received from WAFIC.

Summary of Objection or Claim	Assessment of Merits	Santos' Response Statement	Coastal Waters CEMP Reference
WAFIC referred Santos to its preferred approach in undertaking consultation with commercial fishing licence holders (from WA State fisheries) that will only be affected by a significant unplanned event.	Santos acknowledges that WAFIC's stated approach does not require consultation for the activities proposed under the Coastal Waters CEMP.	Santos confirmed the approach with WAFIC.	Nil

Industry associations – Recreational fishing

Amateur Fishermen's Association of the Northern Territory (AFANT)

Summary of consultation effort:

- On 9 November 2023 Santos emailed AFANT to advise it of preliminary consultation regarding proposed activities for consultation in relation to the activities under the Coastal Waters CEMP and the Commonwealth Waters DPD EP. [Con-3236]
- The email advised that Santos was seeking information to better understand:
  - if you are from a government Department or agency, how the proposed DPD activities may be relevant to your department or agency; and
  - what (if any) functions, interests or activities you or your organisation have that may be affected by the proposed DPD activities.
- The email included information on the regulatory process for the activities in Commonwealth and NT jurisdictions and links to a Santos information booklet on the proposed activities and a NOPSEMA brochure on the consultation process and details of how to contact Santos to register as a Relevant Person. The email stated that the consultation phase would commence on 22 November 2023 and close on 22 December 2023.
- On 22 November 2023 Santos emailed AFANT further to the previous correspondence, to advise that it had commenced the consultation phase which would run until 22 December 2023. In addition to the previous information again being provided, Santos provided information on Relevant Persons' entitlements under the regulatory processes, details of how to provide feedback and a reminder of the closing date for consultation. [Con-3238]
- On 14 December 2023 Santos phoned AFANT to follow up on previous emails and seek any feedback on the proposal, and emailed to confirm the call on 20 December 2023 [Con-3008].
- Notwithstanding the information provided and the steps described above, no comments or input were received in relation to activities under the Coastal Waters CEMP from AFANT

Summary of Objection or Claim	Assessment of Merits	Santos' Response Statement	Coastal Waters CEMP Reference
No objections or claims were raised by AFANT.	Nil	Nil	Nil

Industry associations – Tourism

Northern Territory Guided Fishing Industry Association (NTGFIA)

Summary of consultation effort:

- On 9 November 2023 Santos emailed NTGFIA to advise it of preliminary consultation regarding proposed activities for consultation in relation to the activities under the Coastal Waters CEMP and the Commonwealth Waters DPD EP. [Con-3236]
- The email advised that Santos was seeking information to better understand:
  - if you are from a government Department or agency, how the proposed DPD activities may be relevant to your department or agency; and
  - what (if any) functions, interests or activities you or your organisation have that may be affected by the proposed DPD activities.
- The email included information on the regulatory process for the activities in Commonwealth and NT jurisdictions and links to a Santos information booklet on the proposed activities and a NOPSEMA brochure on the consultation process and details of how to contact Santos to register as a Relevant Person. The email stated that the consultation phase would commence on 22 November 2023 and close on 22 December 2023.
- On 22 November 2023 Santos emailed NTGFIA further to the previous correspondence, to advise that it had commenced the consultation phase which would run until 22 December 2023. In addition to the previous information again being provided, Santos provided information on Relevant Persons' entitlements under the regulatory processes, details of how to provide feedback and a reminder of the closing date for consultation. [Con-3238]
- Santos followed-up the previous emails with a phone call to NTGFIA on 14 December 2023 and a follow-up email on 20 December 2023 [Con-2953]
- •Notwithstanding the information provided and the steps described above, no comments or input were received in relation to activities under the Coastal Waters CEMP from NTGFIA.

Summary of Objection or Claim	Assessment of Merits	Santos' Response Statement	Coastal Waters CEMP Reference
No objections or claims were raised by NTGIFA.	Nil	Nil	Nil

Tourism Top End

Summary of consultation effort:

- On 9 November 2023 Santos emailed Tourism Top End to advise it of preliminary consultation regarding proposed activities for consultation in relation to the activities under the Coastal Waters CEMP and the Commonwealth Waters DPD EP. [Con-3236]
- The email advised that Santos was seeking information to better understand:
  - if you are from a government Department or agency, how the proposed DPD activities may be relevant to your department or agency; and
  - what (if any) functions, interests or activities you or your organisation have that may be affected by the proposed DPD activities.
- The email included information on the regulatory process for the activities in Commonwealth and NT jurisdictions and links to a Santos information booklet on the proposed activities and a NOPSEMA brochure on the consultation process and details of how to contact Santos to register as a Relevant Person. The email stated that the consultation phase would commence on 22 November 2023 and close on 22 December 2023.
- In the email Santos advised Tourism Top End that it would be happy to arrange a meeting to discuss the information.
- On 22 November 2023 Santos emailed Tourism Top End further to the previous correspondence, to advise that it had commenced the consultation phase which would run until 22 December 2023. In addition to the previous information again being provided, Santos provided information on Relevant Persons' entitlements under the regulatory processes, details of how to provide feedback and a reminder of the closing date for consultation. [Con-3238]
- On 14 December 2023 Santos had a phone discussion with Tourism Top End during which Tourism Top End advised the emails had been provided to the appropriate person.
- On 20 December 2023 Santos followed-up with an email to Tourism Top End reminding it of the 22 December deadline for feedback or comments. [Con-2954]
- •Notwithstanding the information provided and the steps described above, no comments or input were received in relation to activities under the Coastal Waters CEMP from. Tourism Top End.

Summary of Objection or Claim	Assessment of Merits	Santos' Response Statement	Coastal Waters CEMP Reference
No objections or claims were raised by Tourism Top End.	Nil	Nil	Nil

Industry associations - Local industry

Chamber of Commerce Northern Territory (CCNT)

Summary of consultation effort:

- On 9 November 2023 Santos emailed CCNT to advise it of preliminary consultation regarding proposed activities for consultation in relation to the activities under the Coastal Waters CEMP and the Commonwealth Waters DPD EP. [Con-3236]
- The email advised that Santos was seeking information to better understand:
  - if you are from a government Department or agency, how the proposed DPD activities may be relevant to your department or agency; and
  - what (if any) functions, interests or activities you or your organisation have that may be affected by the proposed DPD activities.
- The email included information on the regulatory process for the activities in Commonwealth and NT jurisdictions and links to a Santos information booklet on the proposed activities and a NOPSEMA brochure on the consultation process and details of how to contact Santos to register as a Relevant Person. The email stated that the consultation phase would commence on 22 November 2023 and close on 22 December 2023.
- On 22 November 2023 Santos emailed CCNT further to the previous correspondence, to advise that it had commenced the consultation phase which would run until 22 December 2023. In addition to the previous information again being provided, Santos provided information on Relevant Persons' entitlements under the regulatory processes, details of how to provide feedback and a reminder of the closing date for consultation. [Con-3238]
- On 14 December 2023 Santos followed-up the previous emails with a phone discussion with CCNT and a follow-up email on 20 December 2023. [Con-3009]
- On 21 December 2023 CCNT responded to Santos via email stating that it had decided not to participate in the Coastal Waters CEMP consultation. [Con-3326]
- No further feedback or correspondence was received from CCNT.

Summary of Objection or Claim	Assessment of Merits	Santos' Response Statement	Coastal Waters CEMP Reference
No objections or claims were raised by CCNT.	Nil	Nil	Nil

Infrastructure Operators

BW Digital

Summary of consultation effort:

- On 9 November 2023 Santos emailed BW Digital to advise it of preliminary consultation regarding proposed activities for consultation in relation to the activities under the Coastal Waters CEMP and the Commonwealth Waters DPD EP. [Con-3236]
- The email advised that Santos was seeking information to better understand:

- if you are from a government Department or agency, how the proposed DPD activities may be relevant to your department or agency; and
- what (if any) functions, interests or activities you or your organisation have that may be affected by the proposed DPD activities.

- The email included information on the regulatory process for the activities in Commonwealth and NT jurisdictions and links to a Santos information booklet on the proposed activities and a NOPSEMA brochure on the consultation process and details of how to contact Santos to register as a Relevant Person. The email stated that the consultation phase would commence on 22 November 2023 and close on 22 December 2023.
- On 22 November 2023 Santos emailed BW Digital further to the previous correspondence, to advise that it had commenced the consultation phase which would run until 22 December 2023. In addition to the previous information again being provided, Santos provided information on Relevant Persons' entitlements under the regulatory processes, details of how to provide feedback and a reminder of the closing date for consultation. [Con-3238]
- Santos followed-up the previous emails with a phone discussion with BW Digital on 18 December 2023 and follow-up email on 19 December 2023 [Con-3004]
- On 19 December 2023, BW Digital emailed Santos to advise that it considered itself to be a relevant person and that it expected to operate vessels in the proposed work area in a similar timeframe to the proposed DPD Project activities. BW Digital noted that it expected Santos' 500m exclusion zone to be sufficient for the safe operation of BW Digital's vessels and requested that Santos maintain contact with BW Digital to ensure that the parties' respective activities were appropriately co-ordinated. [Con-3427]
- On 20 December 2023 BW Digital emailed Santos to provide contact details for ongoing communications on operational matters [Con-3004].
- No further feedback or correspondence was received from BW Digital.

Summary of Objection or Claim	Assessment of Merits	Santos' Response Statement	Coastal Waters CEMP Reference
BW Digital advised that it expected to operate vessels in the proposed work area in a similar timeframe to the proposed DPD Project activities and requested that Santos maintain contact with BW Digital to ensure that the parties' respective activities were appropriately co-ordinated	Santos notes BW Digital's advice that it expects Santos' 500m exclusion zone will be sufficient for the safe operation of BW Digital's vessels	Santos is in regular contact with BW Digital	Control measures and associated performance standards relevant to other marine user interactions are provided in Table 8-5.

Darwin Port

Summary of consultation effort:

- On 9 November 2023 Santos emailed Darwin Port to advise it of preliminary consultation regarding proposed activities for consultation in relation to the activities under the Coastal Waters CEMP and the Commonwealth Waters DPD EP. [Con-3236]
- The email advised that Santos was seeking information to better understand:
  - if you are from a government Department or agency, how the proposed DPD activities may be relevant to your department or agency; and
  - what (if any) functions, interests or activities you or your organisation have that may be affected by the proposed DPD activities.
- The email included information on the regulatory process for the activities in Commonwealth and NT jurisdictions and links to a Santos information booklet on the proposed activities and a NOPSEMA brochure on the consultation process and details of how to contact Santos to register as a Relevant Person. The email stated that the consultation phase would commence on 22 November 2023 and close on 22 December 2023.
- On 22 November 2023 Santos emailed Darwin Port further to the previous correspondence, to advise that it had commenced the consultation phase which would run until 22 December 2023. In addition to the previous information again being provided, Santos provided information on Relevant Persons' entitlements under the regulatory processes, details of how to provide feedback and a reminder of the closing date for consultation. [Con-3238]
- On 14 December 2023 Santos had a phone discussion with Darwin Port during which Darwin Port advised that it had no comments on the activity under the Coastal Waters CEMP or the Commonwealth Waters DPD EP and supported the project. On 20 December 2023 Santos emailed Darwin Port confirming the discussion. [Con-3005].
- No further feedback or correspondence was received from Darwin Port.

Summary of Objection or Claim	Assessment of Merits	Santos' Response Statement	Coastal Waters CEMP Reference
No objections or claims were raised by Darwin Port.	Nil	Nil	Nil

NT Portand Marine

Summary of consultation effort:

- On 9 November 2023 Santos emailed NT Port and Marine to advise it of preliminary consultation regarding proposed activities for consultation in relation to the activities under the Coastal Waters CEMP and the Commonwealth Waters DPD EP. [Con-3236]
- The email advised that Santos was seeking information to better understand:
  - if you are from a government Department or agency, how the proposed DPD activities may be relevant to your department or agency; and
  - what (if any) functions, interests or activities you or your organisation have that may be affected by the proposed DPD activities.
- The email included information on the regulatory process for the activities in Commonwealth and NT jurisdictions and links to a Santos information booklet on the proposed activities and a NOPSEMA brochure on the consultation process and details of how to contact Santos to register as a Relevant Person. The email stated that the consultation phase would commence on 22 November 2023 and close on 22 December 2023.
- On 22 November 2023 Santos emailed NT Port and Marine further to the previous correspondence, to advise that it had commenced the consultation phase which would run until 22 December 2023. In addition to the previous information again being provided, Santos provided information on Relevant Persons' entitlements under the regulatory processes, details of how to provide feedback and a reminder of the closing date for consultation. [Con-3238]
- On 26 August 2024 Santos phoned NT Port and Marine which confirmed that it did not have any comments on the Coastal Waters CEMP, but requested that Santos continue to consult with the company as required for future Santos' EPs and provided an additional contact address. [Con-5605] NT Port and Marine continues to be in voluntary administration.

Summary of Objection or Claim	Assessment of Merits	Santos' Response Statement	Coastal Waters CEMP Reference
No objections or claims were raised by NT Port and Marine.	Nil	Nil	Nil

Sun Cable

Summary of consultation effort:

- On 9 November 2023 Santos emailed Sun Cable to advise it of preliminary consultation regarding proposed activities for consultation in relation to the activities under the Coastal Waters CEMP and the Commonwealth Waters DPD EP. [Con-3236]
- The email advised that Santos was seeking information to better understand:
  - if you are from a government Department or agency, how the proposed DPD activities may be relevant to your department or agency; and
  - what (if any) functions, interests or activities you or your organisation have that may be affected by the proposed DPD activities.

- The email included information on the regulatory process for the activities in Commonwealth and NT jurisdictions and links to a Santos information booklet on the proposed activities and a NOPSEMA brochure on the consultation process and details of how to contact Santos to register as a Relevant Person. The email stated that the consultation phase would commence on 22 November 2023 and close on 22 December 2023.
- On 22 November 2023 Santos emailed Sun Cable further to the previous correspondence, to advise that it had commenced the consultation phase which would run until 22 December 2023. In addition to the previous information again being provided, Santos provided information on Relevant Persons' entitlements under the regulatory processes, details of how to provide feedback and a reminder of the closing date for consultation. [Con-3238]
- On 26 August 2024 Santos phoned Sun Cable and left messages seeking confirmation that Sun Cable did not have any comments on the Coastal Waters CEMP. [Con-5606] Sun Cable has previously advised Santos that any comments it provides in response to an EP consultation are confidential.
- Notwithstanding the information provided and the steps described above, no comments or input were received in relation to activities under the Coastal Waters CEMP from Sun Cable.

Summary of Objection or Claim	Assessment of Merits	Santos' Response Statement	Coastal Waters CEMP Reference
No objections or claims were raised by Sun Cable.	While no objections or claims were raised by Sun Cable, Santos notes that it is in regular communication with all current and future subsea cable owners/operators, including Sun Cable, on interaction required for DPD operational activities.	Nil	Nil

Telstra

Summary of consultation effort:

- On 9 November 2023 Santos emailed Telstra to advise it of preliminary consultation regarding proposed activities for consultation in relation to the activities under the Coastal Waters CEMP and the Commonwealth Waters DPD EP. [Con-3236]
- The email advised that Santos was seeking information to better understand:
  - if you are from a government Department or agency, how the proposed DPD activities may be relevant to your department or agency; and
  - what (if any) functions, interests or activities you or your organisation have that may be affected by the proposed DPD activities.
- The email included information on the regulatory process for the activities in Commonwealth and NT jurisdictions and links to a Santos information booklet on the proposed activities and a NOPSEMA brochure on the consultation process and details of how to contact Santos to register as a Relevant Person. The email stated that the consultation phase would commence on 22 November 2023 and close on 22 December 2023.
- On 22 November 2023 Santos emailed Telstra further to the previous correspondence, to advise that it had commenced the consultation phase which would run until 22 December 2023. In addition to the previous information again being provided, Santos provided information on Relevant Persons' entitlements under the regulatory processes, details of how to provide feedback and a reminder of the closing date for consultation. [Con-3238]
- On 18 December 2023 Santos phoned Telstra to follow up on previous emails and seek any feedback on the proposal. [Con-3006]
- Notwithstanding the information provided and the steps described above, no comments or input were received in relation to activities under the Coastal Waters CEMP from Telstra.

Summary of Objection or Claim	Assessment of Merits	Santos' Response Statement	Coastal Waters CEMP Reference
No objections or claims were raised by Telstra.	While no objections or claims were raised by Telstra, Santos notes that it is in regular communication with all current and future subsea cable owners/operators, including Telstra, on interaction required for DPD operational activities.	Nil	Nil

Vocus

Summary of consultation effort:

- On 9 November 2023 Santos emailed Vocus to advise it of preliminary consultation regarding proposed activities for consultation in relation to the activities under the Coastal Waters CEMP and the Commonwealth Waters DPD EP. [Con-3236]
- The email advised that Santos was seeking information to better understand:
  - if you are from a government Department or agency, how the proposed DPD activities may be relevant to your department or agency; and
  - what (if any) functions, interests or activities you or your organisation have that may be affected by the proposed DPD activities.
- The email included information on the regulatory process for the activities in Commonwealth and NT jurisdictions and links to a Santos information booklet on the proposed activities and a NOPSEMA brochure on the consultation process and details of how to contact Santos to register as a Relevant Person. The email stated that the consultation phase would commence on 22 November 2023 and close on 22 December 2023.
- On 22 November 2023 Santos emailed Vocus further to the previous correspondence, to advise that it had commenced the consultation phase which would run until 22 December 2023. In addition to the previous information again being provided, Santos provided information on Relevant Persons' entitlements under the regulatory processes, details of how to provide feedback and a reminder of the closing date for consultation. [Con-3238]
- On 14 December 2023 Santos followed-up the previous emails with a phone call to Vocus and follow-up email on 20 December 2023. [Con-3007]
- On 21 December 2023 Vocus responded to Santos via email stating that it had already supplied a letter of no objections to the pipeline crossing the North-West Cable System (submarine fibre optic cable) owned and operated by Vocus and has been in contact with other parts of the Barossa team to ensure Vocus' assets are well protected while not impacting Santos' works schedule. [Con-3297]
- No further correspondence or feedback was received from Vocus.

Summary of Objection or Claim	Assessment of Merits	Santos' Response Statement	Coastal Waters CEMP Reference
No objections or claims were raised by Vocus.	While no objections or claims were raised by	Nil	Nil

	Vocus, Santos notes that it is in regular communication with all current and future subsea cable owners/operators, including Vocus, on interaction required for DPD operational activities.		

Local Governments – Northern Territory

City of Darwin

Summary of consultation effort:

- On 9 November 2023 Santos emailed City of Darwin to advise it of preliminary consultation regarding proposed activities for consultation in relation to the activities under the Coastal Waters CEMP and the Commonwealth Waters DPD EP. [Con-3236]
- The email advised that Santos was seeking information to better understand:
  - if you are from a government Department or agency, how the proposed DPD activities may be relevant to your department or agency; and
  - what (if any) functions, interests or activities you or your organisation have that may be affected by the proposed DPD activities.
- The email included information on the regulatory process for the activities in Commonwealth and NT jurisdictions and links to a Santos information booklet on the proposed activities and a NOPSEMA brochure on the consultation process and details of how to contact Santos to register as a Relevant Person. The email stated that the consultation phase would commence on 22 November 2023 and close on 22 December 2023.
- On 9 November 2023 City of Darwin emailed Santos to acknowledge receipt of the email. [Con-3246]
- On 22 November 2023 Santos emailed City of Darwin further to the previous correspondence, to advise that it had commenced the consultation phase which would run until 22 December 2023. In addition to the previous information again being provided, Santos provided information on Relevant Persons' entitlements under the regulatory processes, details of how to provide feedback and a reminder of the closing date for consultation. [Con-3238]
- Santos followed-up the previous emails with a phone call to City of Darwin on 14 December 2023 and a follow-up email on 20 December 2023 [Con-2955]
- Notwithstanding the information provided and the steps described above, no comments or input were received in relation to activities under the Coastal Waters CEMP from City of Darwin.

Summary of Objection or Claim	Assessment of Merits	Santos' Response Statement	Coastal Waters CEMP Reference
No objections or claims were raised by City of Darwin.	Nil	Nil	Nil

Litchfield Council

Summary of consultation effort:

- On 9 November 2023 Santos emailed Litchfield Council to advise it of preliminary consultation regarding proposed activities for consultation in relation to the activities under the Coastal Waters CEMP and the Commonwealth Waters DPD EP. [Con-3236]
- The email advised that Santos was seeking information to better understand:
  - if you are from a government Department or agency, how the proposed DPD activities may be relevant to your department or agency; and
  - what (if any) functions, interests or activities you or your organisation have that may be affected by the proposed DPD activities.
- The email included information on the regulatory process for the activities in Commonwealth and NT jurisdictions and links to a Santos information booklet on the proposed activities and a NOPSEMA brochure on the consultation process and details of how to contact Santos to register as a Relevant Person. The email stated that the consultation phase would commence on 22 November 2023 and close on 22 December 2023.
- On 9 November 2023 Litchfield Council emailed Santos to acknowledge receipt of the email. [Con-3245]
- On 22 November 2023 Santos emailed Litchfield Council further to the previous correspondence, to advise that it had commenced the consultation phase which would run until 22 December 2023. In addition to the previous information again being provided, Santos provided information on Relevant Persons' entitlements under the regulatory processes, details of how to provide feedback and a reminder of the closing date for consultation. [Con-3238]
- On 22 November 2023 Litchfield Council emailed Santos to acknowledge receipt of the email. [Con-3252]
- On 14 December 2023 Santos followed-up the previous emails with a phone call and email to Litchfield Council. [Con-2956]
- Notwithstanding the information provided and the steps described above, no comments or input were received in relation to activities under the Coastal Waters CEMP from Litchfield Council.

Summary of Objection or Claim	Assessment of Merits	Santos' Response Statement	Coastal Waters CEMP Reference
No objections or claims were raised by Litchfield Council.	Nil.	Nil.	Nil

Palmerston Council

Summary of consultation effort:

- On 9 November 2023 Santos emailed Palmerston Council to advise it of preliminary consultation regarding proposed activities for consultation in relation to the activities under the Coastal Waters CEMP and the Commonwealth Waters DPD EP. [Con-3236]
- The email advised that Santos was seeking information to better understand:
  - if you are from a government Department or agency, how the proposed DPD activities may be relevant to your department or agency; and
  - what (if any) functions, interests or activities you or your organisation have that may be affected by the proposed DPD activities.
- The email included information on the regulatory process for the activities in Commonwealth and NT jurisdictions and links to a Santos information booklet on the proposed activities and a NOPSEMA brochure on the consultation process and details of how to contact Santos to register as a Relevant Person. The email stated that the consultation phase would commence on 22 November 2023 and close on 22 December 2023.
- On 10 November 2023 Palmerston Council emailed Santos to acknowledge receipt of the email [Con-3249]
- On 22 November 2023 Santos emailed Palmerston Council further to the previous correspondence, to advise that it had commenced the consultation phase which would run until 22 December 2023. In addition to the previous information again being provided, Santos provided information on Relevant Persons' entitlements under the regulatory processes, details of how to provide feedback and a reminder of the closing date for consultation. [Con-3238]
- On 22 November 2023 Palmerston Council emailed Santos to acknowledge receipt of the email. [Con-3253]
- On 14 December 2023 Santos followed-up the previous emails with a phone call and email to Palmerston Council. [Con-3018]
- On 18 December 2023 Palmerston Council responded via email to Santos stating it had no comments. [Con-3272]

Summary of Objection or Claim	Assessment of Merits	Santos' Response Statement	Coastal Waters CEMP Reference
No objections or claims were raised by Palmerston Council.	Nil	Nil	Nil

Wagait Shire Council

Summary of consultation effort:

- On 9 November 2023 Santos emailed Wagait Shire Council to advise it of preliminary consultation regarding proposed activities for consultation in relation to the activities under the Coastal Waters CEMP and the Commonwealth Waters DPD EP. [Con-3236]
- The email advised that Santos was seeking information to better understand:
  - if you are from a government Department or agency, how the proposed DPD activities may be relevant to your department or agency; and
  - what (if any) functions, interests or activities you or your organisation have that may be affected by the proposed DPD activities.
- The email included information on the regulatory process for the activities in Commonwealth and NT jurisdictions and links to a Santos information booklet on the proposed activities and a NOPSEMA brochure on the consultation process and details of how to contact Santos to register as a Relevant Person. The email stated that the consultation phase would commence on 22 November 2023 and close on 22 December 2023.
- On 22 November 2023 Santos emailed Wagait Shire Council further to the previous correspondence, to advise that it had commenced the consultation phase which would run until 22 December 2023. In addition to the previous information again being provided, Santos provided information on Relevant Persons' entitlements under the regulatory processes, details of how to provide feedback and a reminder of the closing date for consultation. [Con-3238]
- On 15 December 2023 Santos followed-up the previous emails with a phone call to Wagait Shire Council and a follow-up email on the same day providing copies of the previous information sent on 9 November and 22 November. [Con-2957]
- On 20 December 2024 Santos sent a reminder email of the closing date for consultation. [Con-3235]
- On 21 December 2023 Wagait Shire Council responded via email to Santos stating the information had been forwarded to the CEO and councillors for any feedback. [Con-3301]
- Notwithstanding the information provided and the steps described above, no comments or input were received in relation to activities under the Coastal Waters CEMP from Wagait Shire Council.

Summary of Objection or Claim	Assessment of Merits	Santos' Response Statement	Coastal Waters CEMP Reference
No objections or claims were raised by Wagait Shire Council.	Nil	Nil	Nil

Tourism Operators

Alure Fishing Charters

Summary of consultation effort:

- On 9 November 2023 Santos emailed Alure Fishing Charters to advise the start of preliminary consultation regarding proposed activities for consultation in relation to the activities under the Coastal Waters CEMP and the Commonwealth Waters DPD EP. [Con-3236]
- The email advised that Santos was seeking information to better understand:
  - if you are from a government Department or agency, how the proposed DPD activities may be relevant to your department or agency; and
  - what (if any) functions, interests or activities you or your organisation have that may be affected by the proposed DPD activities.
- The email included information on the regulatory process for the activities in Commonwealth and NT jurisdictions and links to a Santos information booklet on the proposed activities and a NOPSEMA brochure on the consultation process and details of how to contact Santos to register as a Relevant Person. The email stated that the consultation phase would commence on 22 November 2023 and close on 22 December 2023.
- On 22 November 2023 Santos emailed NT tourism operators further to the previous correspondence, to advise that it had commenced the consultation phase which would run until 22 December 2023. In addition to the previous information again being provided, Santos provided information on Relevant Persons' entitlements under the regulatory processes, details of how to provide feedback and a reminder of the closing date for consultation. [Con-3238]
- On 14 December 2023 Santos followed-up the previous emails with a phone call and a follow-up email on 20 December 2023 [Con-2997]
- Notwithstanding the information provided and the steps described above, no comments or input were received in relation to activities under the Coastal Waters CEMP from Alure Fishing Charters.

Summary of Objection or Claim	Assessment of Merits	Santos' Response Statement	Coastal Waters CEMP Reference
No objections or claims were raised by Alure Fishing Charters.	Nil	Nil	Nil

Angler's Choice Fishing Safaris

Summary of consultation effort:

- On 9 November 2023 Santos emailed NT tourism operators to advise the start of preliminary consultation regarding proposed activities for consultation in relation to the activities under the Coastal Waters CEMP and the Commonwealth Waters DPD EP. [Con-3236]
- The email advised that Santos was seeking information to better understand:
  - if you are from a government Department or agency, how the proposed DPD activities may be relevant to your department or agency; and
  - what (if any) functions, interests or activities you or your organisation have that may be affected by the proposed DPD activities.
- The email included information on the regulatory process for the activities in Commonwealth and NT jurisdictions and links to a Santos information booklet on the proposed activities and a NOPSEMA brochure on the consultation process and details of how to contact Santos to register as a Relevant Person. The email stated that the consultation phase would commence on 22 November 2023 and close on 22 December 2023.
- On 22 November 2023 Santos emailed NT tourism operators further to the previous correspondence, to advise that it had commenced the consultation phase which would run until 22 December 2023. In addition to the previous information again being provided, Santos provided information on Relevant Persons' entitlements under the regulatory processes, details of how to provide feedback and a reminder of the closing date for consultation. [Con-3238]
- On 14 December 2023 Santos followed-up the previous emails with phone calls on 14 and 20 December and a follow-up email on 22 December 2023 [Con-3019]
- Notwithstanding the information provided and the steps described above, no comments or input were received in relation to activities under the Coastal Waters CEMP from Angler's Choice Fishing Safaris.

Summary of Objection or Claim	Assessment of Merits	Santos' Response Statement	Coastal Waters CEMP Reference
No objections or claims were raised by Angler's Choice Fishing Safaris.	Nil	Nil	Nil

Arafura Bluewater Charters

Summary of consultation effort:

- On 9 November 2023 Santos emailed NT tourism operators to advise the start of preliminary consultation regarding proposed activities for consultation in relation to the activities under the Coastal Waters CEMP and the Commonwealth Waters DPD EP. [Con-3236]
- The email advised that Santos was seeking information to better understand:
  - if you are from a government Department or agency, how the proposed DPD activities may be relevant to your department or agency; and
  - what (if any) functions, interests or activities you or your organisation have that may be affected by the proposed DPD activities.
- The email included information on the regulatory process for the activities in Commonwealth and NT jurisdictions and links to a Santos information booklet on the proposed activities and a NOPSEMA brochure on the consultation process and details of how to contact Santos to register as a Relevant Person. The email stated that the consultation phase would commence on 22 November 2023 and close on 22 December 2023.
- On 22 November 2023 Santos emailed NT tourism operators further to the previous correspondence, to advise that it had commenced the consultation phase which would run until 22 December 2023. In addition to the previous information again being provided, Santos provided information on Relevant Persons' entitlements under the regulatory processes, details of how to provide feedback and a reminder of the closing date for consultation. [Con-3238]
- On 14 December 2023 Arafura Bluewater Charters responded via email to Santos stating that works on the pipeline duplication would affect its business as it runs charters in the area. [Con-3269]
- On 15 December 2023 Santos tried to contact Arafura Bluewater Charter via telephone. The call was not answered, and a message was left.
- On 21 December 2023 Santos followed-up the phone call with an email to Arafura Bluewater Charters asking if the company would like to meet with a Barossa Project representative in Darwin at a time and date suitable to Arafura Charters or the company could contact a mobile telephone number to speak directly with a representative. [Con-3327]
- On 8 January 2024 Santos tried to contact Arafura Bluewater Charter via telephone. The call was not answered, and a message was left.
- No further comments or input were received in relation to activities under the Coastal Waters CEMP from Arafura Bluewater Charters.

Summary of Objection or Claim	Assessment of Merits	Santos' Response Statement	Coastal Waters CEMP Reference
Arafura Bluewater Charters stated that works on the pipeline duplication would affect its business as it runs charters in the area.	Santos has attempted to contact the company to gather more information and/or have a meeting to discuss the claim. The company has not responded to Santos' approaches. The claim does not contain any detail about the alleged potential impacts of DPD Project activities on the operator to allow Santos to assess that claim.	Nil	Nil

Arnhem Land Safaris

Summary of consultation effort:

- On 31 May 2024 Santos emailed Arnhem Land Safaris regarding proposed activities for consultation in relation to the activities under the Coastal Waters CEMP and the Commonwealth Waters DPD EP. The email advised that Santos was seeking information to better understand what (if any) functions, interests or activities you or your organisation have that may be affected by the proposed DPD activities. [Con-4235]
- The email included information on the regulatory process for the activities in Commonwealth and NT jurisdictions and links to a Santos information booklet on the proposed activities and a NOPSEMA brochure on the consultation process.
- The email requested that Arnhem Land Safaris contact Santos by 7 June 2024 to advise whether it considers that it may be a Relevant Person and what functions, interests or activities it has that may be affected by the DPD activities.
- In the email Santos advised if it did not hear from Arnhem Land Safaris by 7 June 2024 it would assume that it did not have functions, interests or activities that may be affected by the DPD activities, or did not wish to be consulted for either the Commonwealth Waters DPD EP or the Coastal Waters CEMPEP.
- On 6 June 2024 Santos followed up the email of 31 May 2024 with a phone call during which Arnhem Land Safaris advised that it did not consider that the activities were relevant to its operations, as it operated on land and inland waters 300km east of Darwin.
- No further feedback or correspondence has been received from Arnhem Land Safaris.

Summary of Objection or Claim	Assessment of Merits	Santos' Response Statement	Coastal Waters CEMP Reference
No objections or claims were raised by Arnhem Land Safaris.	Nil	Nil	Nil

Bayview Marina

Summary of consultation effort:

- On 9 November 2023 Santos emailed NT tourism operators to advise the start of preliminary consultation regarding proposed activities for consultation in relation to the activities under the Coastal Waters CEMP and the Commonwealth Waters DPD EP. [Con-3236]
- The email advised that Santos was seeking information to better understand:
  - if you are from a government Department or agency, how the proposed DPD activities may be relevant to your department or agency; and
  - what (if any) functions, interests or activities you or your organisation have that may be affected by the proposed DPD activities.
- The email included information on the regulatory process for the activities in Commonwealth and NT jurisdictions and links to a Santos information booklet on the proposed activities and a NOPSEMA brochure on the consultation process and details of how to contact Santos to register as a Relevant Person. The email stated that the consultation phase would commence on 22 November 2023 and close on 22 December 2023.
- On 22 November 2023 Santos emailed NT tourism operators further to the previous correspondence, to advise that it had commenced the consultation phase which would run until 22 December 2023. In addition to the previous information again being provided, Santos provided information on Relevant Persons' entitlements under the regulatory processes, details of how to provide feedback and a reminder of the closing date for consultation. [Con-3238]
- On 14 December 2023 Santos followed-up the previous emails with a phone call during which Bayview Marina advised that it did not want to be consulted on the activity under the Coastal Waters CEMP or the Commonwealth Waters DPD EP. A follow-up email was sent by Santos on 20 December 2023 confirming the phone discussion. [Con-2959]
- No further feedback or correspondence has been received from Bayview Marina.

Summary of Objection or Claim	Assessment of Merits	Santos' Response Statement	Coastal Waters CEMP Reference
No objections or claims were raised by Bayview Marina.	Nil	Nil	Nil

Buffalo Boat Hire

Summary of consultation effort:

- On 31 May 2024 Santos emailed Buffalo Boat Hire regarding proposed activities for consultation in relation to the activities under the Coastal Waters CEMP and the Commonwealth Waters DPD EP. The email advised that Santos was seeking information to better understand what (if any) functions, interests or activities you or your organisation have that may be affected by the proposed DPD activities. [Con-4240]
- The email included information on the regulatory process for the activities in Commonwealth and NT jurisdictions and links to a Santos information booklet on the proposed activities and a NOPSEMA brochure on the consultation process.
- The email requested that Buffalo Boat Hire contact Santos by 7 June 2024 to advise whether it considers that it may be a Relevant Person and what functions, interests or activities it has that may be affected by the DPD activities.
- In the email Santos advised if it did not hear from Buffalo Boat Hire by 7 June 2024 it would assume that it did not have functions, interests or activities that may be affected by the DPD activities or did not wish to be consulted for the activity under either the Commonwealth Waters DPD EP or the Coastal Waters CEMP.
- On 6 June 2024 Santos followed up the email of 31 May 2024 with a phone call during which Buffalo Boat Hire advised their activities were restricted to certain areas and they did not conduct tours that far from Darwin.
- No further feedback or correspondence has been received from Buffalo Boat Hire.

Summary of Objection or Claim	Assessment of Merits	Santos' Response Statement	Coastal Waters CEMP Reference
No objections or claims were raised by Buffalo Boat Hire.	Nil	Nil	Nil

Clearwater Island Lodge

Summary of consultation effort:

- On 9 November 2023 Santos emailed NT tourism operators to advise the start of preliminary consultation regarding proposed activities for consultation in relation to the activities under the Coastal Waters CEMP and the Commonwealth Waters DPD EP. [Con-3236]
- The email advised that Santos was seeking information to better understand:
  - if you are from a government Department or agency, how the proposed DPD activities may be relevant to your department or agency; and
  - what (if any) functions, interests or activities you or your organisation have that may be affected by the proposed DPD activities.
- The email included information on the regulatory process for the activities in Commonwealth and NT jurisdictions and links to a Santos information booklet on the proposed activities and a NOPSEMA brochure on the consultation process and details of how to contact Santos to register as a Relevant Person. The email stated that the consultation phase would commence on 22 November 2023 and close on 22 December 2023.
- On 22 November 2023 Santos emailed NT tourism operators further to the previous correspondence, to advise that it had commenced the consultation phase which would run until 22 December 2023. In addition to the previous information again being provided, Santos provided information on Relevant Persons' entitlements under the regulatory processes, details of how to provide feedback and a reminder of the closing date for consultation. [Con-3238]
- On 14 December 2023 Santos followed-up the previous emails with a phone call and a follow-up email on 20 December 2023 [Con-2996]
- Notwithstanding the information provided and the steps described above, no comments or input were received in relation to activities under the Coastal Waters CEMP from Clearwater Island Lodge.

Summary of Objection or Claim	Assessment of Merits	Santos' Response Statement	Coastal Waters CEMP Reference
No objections or claims were raised by Clearwater Island Lodge.	Nil	Nil	Nil

Cobourg Fishing Charters/Venture North

Summary of consultation effort:

- On 31 May 2024 Santos emailed Cobourg Fishing Charters/Venture North regarding proposed activities for consultation in relation to the activities under the Coastal Waters CEMP and the Commonwealth Waters DPD EP. The email advised that Santos was seeking information to better understand what (if any) functions, interests or activities you or your organisation have that may be affected by the proposed DPD activities. [Con-4236]
- The email included information on the regulatory process for the activities in Commonwealth and NT jurisdictions and links to a Santos information booklet on the proposed activities and a NOPSEMA brochure on the consultation process.
- The email requested that Cobourg Fishing Charters/Venture North contact Santos by 7 June 2024 to advise whether it considers that it may be a Relevant Person and what functions, interests or activities it has that may be affected by the DPD activities.
- In the email Santos advised if it did not hear from Cobourg Fishing Charters/Venture North by 7 June 2024 it would assume that it did not have functions, interests or activities that may be affected by the DPD activities, or did not wish to be consulted for the activity under either the Commonwealth Waters DPD EP or the Coastal Waters CEMP.
- On 6 June 2024 Santos followed up the email of 31 May 2024 with a phone call during which a representative of Cobourg Fishing Charters/Venture North advised that they had forwarded Santos' email to other parties within their business and requested that Santos email be re-sent so it could be forwarded to the head skipper. Santos did so that same day, also providing a mobile telephone number if Cobourg Fishing Charters/Venture North wished to speak to a Santos representative about any queries it may have [Con-4242].
- Cobourg Fishing Charters/Venture North confirmed via email to Santos that it does not operate in the waters where DPD activities will be conducted [Con-4267].
- No further feedback or correspondence has been received from Cobourg Fishing Charters/Venture North.

Summary of Objection or Claim	Assessment of Merits	Santos' Response Statement	Coastal Waters CEMP Reference
No objections or claims were raised by Cobourg Fishing Charters/Venture North	Nil	Nil	Nil

Crab Claw Island Resort

Summary of consultation effort:

- On 9 November 2023 Santos emailed NT tourism operators to advise the start of preliminary consultation regarding proposed activities for consultation in relation to the activities under the Coastal Waters CEMP and the Commonwealth Waters DPD EP. [Con-3236]
- The email advised that Santos was seeking information to better understand:
  - if you are from a government Department or agency, how the proposed DPD activities may be relevant to your department or agency; and
  - what (if any) functions, interests or activities you or your organisation have that may be affected by the proposed DPD activities.
- The email included information on the regulatory process for the activities in Commonwealth and NT jurisdictions and links to a Santos information booklet on the proposed activities and a NOPSEMA brochure on the consultation process and details of how to contact Santos to register as a Relevant Person. The email stated that the consultation phase would commence on 22 November 2023 and close on 22 December 2023.

- On 22 November 2023 Santos emailed NT tourism operators further to the previous correspondence, to advise that it had commenced the consultation phase which would run until 22 December 2023. In addition to the previous information again being provided, Santos provided information on Relevant Persons' entitlements under the regulatory processes, details of how to provide feedback and a reminder of the closing date for consultation. [Con-3238]
- On 15 December 2023 Santos followed-up the previous emails with a phone call during which Crab Claw Island Resort advised that it did not want to be consulted on the Commonwealth Waters DPD EP or the Coastal Waters CEMP.
- A follow-up email was sent by Santos on 20 December 2023 confirming the phone discussion. [Con-2961]
- No further feedback or correspondence has been received from Crab Claw Resort.

Summary of Objection or Claim	Assessment of Merits	Santos' Response Statement	Coastal Waters CEMP Reference
No objections or claims were raised by Crab Claw Island Resort.	Nil	Nil	Nil

Cullen Bay Fish Charters

Summary of consultation effort:

- On 9 November 2023 Santos emailed NT tourism operators to advise the start of preliminary consultation regarding proposed activities for consultation in relation to the activities under the Coastal Waters CEMP and the Commonwealth Waters DPD EP. [Con-3236]
- The email advised that Santos was seeking information to better understand:
  - if you are from a government Department or agency, how the proposed DPD activities may be relevant to your department or agency; and
  - what (if any) functions, interests or activities you or your organisation have that may be affected by the proposed DPD activities.
- The email included information on the regulatory process for the activities in Commonwealth and NT jurisdictions and links to a Santos information booklet on the proposed activities and a NOPSEMA brochure on the consultation process and details of how to contact Santos to register as a Relevant Person. The email stated that the consultation phase would commence on 22 November 2023 and close on 22 December 2023.
- On 22 November 2023 Santos emailed NT tourism operators further to the previous correspondence, to advise that it had commenced the consultation phase which would run until 22 December 2023. In addition to the previous information again being provided, Santos provided information on Relevant Persons' entitlements under the regulatory processes, details of how to provide feedback and a reminder of the closing date for consultation. [Con-3238]
- On 14 December 2023 Santos followed-up the previous emails with a phone call and a follow-up email on 20 December 2023 [Con-2995]
- Notwithstanding the information provided and the steps described above, no comments or input were received in relation to activities under the Coastal Waters CEMP from Cullen Bay Fish Charters.

Summary of Objection or Claim	Assessment of Merits	Santos' Response Statement	Coastal Waters CEMP Reference
No objections or claims were raised by Cullen Bay Fish Charters.	Nil	Nil	Nil

Cullen Bay Marina

Summary of consultation effort:

- On 9 November 2023 Santos emailed NT tourism operators to advise the start of preliminary consultation regarding proposed activities for consultation in relation to the activities under the Coastal Waters CEMP and the Commonwealth Waters DPD EP. [Con-3236]
- The email advised that Santos was seeking information to better understand:
  - if you are from a government Department or agency, how the proposed DPD activities may be relevant to your department or agency; and
  - what (if any) functions, interests or activities you or your organisation have that may be affected by the proposed DPD activities.
- The email included information on the regulatory process for the activities in Commonwealth and NT jurisdictions and links to a Santos information booklet on the proposed activities and a NOPSEMA brochure on the consultation process and details of how to contact Santos to register as a Relevant Person. The email stated that the consultation phase would commence on 22 November 2023 and close on 22 December 2023.
- On 22 November 2023 Santos emailed NT tourism operators further to the previous correspondence, to advise that it had commenced the consultation phase which would run until 22 December 2023. In addition to the previous information again being provided, Santos provided information on Relevant Persons' entitlements under the regulatory processes, details of how to provide feedback and a reminder of the closing date for consultation. [Con-3238]
- On 14 December 2023 Santos followed-up the previous emails with a phone call and a follow-up email on 20 December 2023 [Con-2962]
- Notwithstanding the information provided and the steps described above, no comments or input were received in relation to activities under the Coastal Waters CEMP from Cullen Bay Marina.

Summary of Objection or Claim	Assessment of Merits	Santos' Response Statement	Coastal Waters CEMP Reference
No objections or claims were raised by Cullen Bay Marina.	Nil	Nil	Nil

Darwin Bara Fishing Tours

Summary of consultation effort:

- On 9 November 2023 Santos emailed Darwin Bara Fishing Tours to advise the start of preliminary consultation regarding proposed activities for consultation in relation to the activities under the Coastal Waters CEMP and the Commonwealth Waters DPD EP. [Con-3236]
- The email advised that Santos was seeking information to better understand:
  - if you are from a government Department or agency, how the proposed DPD activities may be relevant to your department or agency; and
  - what (if any) functions, interests or activities you or your organisation have that may be affected by the proposed DPD activities.
- The email included information on the regulatory process for the activities in Commonwealth and NT jurisdictions and links to a Santos information booklet on the proposed activities and a NOPSEMA brochure on the consultation process and details of how to contact Santos to register as a Relevant Person. The email stated that the consultation phase would commence on 22 November 2023 and close on 22 December 2023.
- On 22 November 2023 Santos emailed Darwin Bara Fishing Tours further to the previous correspondence, to advise that it had commenced the consultation phase which would run until 22 December 2023. In addition to the previous information again being provided, Santos provided information on Relevant Persons' entitlements under the regulatory processes, details of how to provide feedback and a reminder of the closing date for consultation. [Con-3238]
- On 14 December 2023 Santos followed-up the previous emails with a phone call and a follow-up email on 20 December 2023 [Con-2994]
- Notwithstanding the information provided and the steps described above, no comments or input were received in relation to activities under the Coastal Waters CEMP from Darwin Bara Fishing Tours.

Summary of Objection or Claim	Assessment of Merits	Santos' Response Statement	Coastal Waters CEMP Reference
No objections or claims were raised by Darwin Barra Fishing Tours.	Nil	Nil	Nil

Darwin Dive Academy

Summary of consultation effort:

- On 9 November 2023 Santos emailed Darwin Dive Academy to advise the start of preliminary consultation regarding proposed activities for consultation in relation to the activities under the Coastal Waters CEMP and the Commonwealth Waters DPD EP. [Con-3236]
- The email advised that Santos was seeking information to better understand:
  - if you are from a government Department or agency, how the proposed DPD activities may be relevant to your department or agency; and
  - what (if any) functions, interests or activities you or your organisation have that may be affected by the proposed DPD activities.
- The email included information on the regulatory process for the activities in Commonwealth and NT jurisdictions and links to a Santos information booklet on the proposed activities and a NOPSEMA brochure on the consultation process and details of how to contact Santos to register as a Relevant Person. The email stated that the consultation phase would commence on 22 November 2023 and close on 22 December 2023.
- On 22 November 2023 Santos emailed Darwin Dive Academy further to the previous correspondence, to advise that it had commenced the consultation phase which would run until 22 December 2023. In addition to the previous information again being provided, Santos provided information on Relevant Persons' entitlements under the regulatory processes, details of how to provide feedback and a reminder of the closing date for consultation. [Con-3238]
- On 19 and 20 December 2023 Santos followed-up the previous emails with phone calls and a follow-up email on 22 December 2023 [Con-3020]
- Notwithstanding the information provided and the steps described above, no comments or input were received in relation to activities under the Coastal Waters CEMP from Darwin Dive Academy.

Summary of Objection or Claim	Assessment of Merits	Santos' Response Statement	Coastal Waters CEMP Reference
No objections or claims were raised by Darwin Dive Academy.	Nil	Nil	Nil

Darwin Fish Seeker Charters

Summary of consultation effort:

- On 9 November 2023 Santos emailed Darwin Fish Seeker Charters to advise the start of preliminary consultation regarding proposed activities for consultation in relation to the activities under the Coastal Waters CEMP and the Commonwealth Waters DPD EP. [Con-3236]
- The email advised that Santos was seeking information to better understand:
  - if you are from a government Department or agency, how the proposed DPD activities may be relevant to your department or agency; and
  - what (if any) functions, interests or activities you or your organisation have that may be affected by the proposed DPD activities.
- The email included information on the regulatory process for the activities in Commonwealth and NT jurisdictions and links to a Santos information booklet on the proposed activities and a NOPSEMA brochure on the consultation process and details of how to contact Santos to register as a Relevant Person. The email stated that the consultation phase would commence on 22 November 2023 and close on 22 December 2023.
- On 22 November 2023 Santos emailed Darwin Fish Seeker Charters further to the previous correspondence, to advise that it had commenced the consultation phase which would run until 22 December 2023. In addition to the previous information again being provided, Santos provided information on Relevant Persons' entitlements under the regulatory processes, details of how to provide feedback and a reminder of the closing date for consultation. [Con-3238]
- On 14 December 2023 Santos followed-up the previous emails with a phone call and a follow-up email on 14 December 2023 [Con-3021]
- Notwithstanding the information provided and the steps described above, no comments or input were received in relation to activities under the Coastal Waters CEMP from Darwin Fish Seeker Charters.

Summary of Objection or Claim	Assessment of Merits	Santos' Response Statement	Coastal Waters CEMP Reference
No objections or claims were raised by Darwin Fish Seeker Charters.	Nil	Nil	Nil

Darwin Harbour Cruises

Summary of consultation effort:

- On 9 November 2023 Santos emailed Darwin Harbour Cruises to advise the start of preliminary consultation regarding proposed activities for consultation in relation to the activities under the Coastal Waters CEMP and the Commonwealth Waters DPD EP. [Con-3236]
- The email advised that Santos was seeking information to better understand:
  - if you are from a government Department or agency, how the proposed DPD activities may be relevant to your department or agency; and
  - what (if any) functions, interests or activities you or your organisation have that may be affected by the proposed DPD activities.
- The email included information on the regulatory process for the activities in Commonwealth and NT jurisdictions and links to a Santos information booklet on the proposed activities and a NOPSEMA brochure on the consultation process and details of how to contact Santos to register as a Relevant Person. The email stated that the consultation phase would commence on 22 November 2023 and close on 22 December 2023.
- On 9 November 2023 Darwin Harbour Cruises emailed Santos to acknowledge receipt of the email. [Con-3248]
- On 22 November 2023 Santos emailed Darwin Harbour Cruises further to the previous correspondence, to advise that it had commenced the consultation phase which would run until 22 December 2023. In addition to the previous information again being provided, Santos provided information on Relevant Persons' entitlements under the regulatory processes, details of how to provide feedback and a reminder of the closing date for consultation. [Con-3238]
- On 14 December 2023 Santos followed-up the previous emails with a phone call and a follow-up email on 20 December 2023 [Con-2975]
- Notwithstanding the information provided and the steps described above, no comments or input were received in relation to activities under the Coastal Waters CEMP from Darwin Harbour Cruises.

Summary of Objection or Claim	Assessment of Merits	Santos' Response Statement	Coastal Waters CEMP Reference
No objections or claims were raised by Darwin Harbour Cruises.	Nil	Nil	Nil

Darwin Harbour Fishing Charters

Summary of consultation effort:

- On 9 November 2023 Santos emailed Darwin Harbour Fishing Charters to advise the start of preliminary consultation regarding proposed activities for consultation in relation to the activities under the Coastal Waters CEMP and the Commonwealth Waters DPD EP. [Con-3236]
- The email advised that Santos was seeking information to better understand:
  - if you are from a government Department or agency, how the proposed DPD activities may be relevant to your department or agency; and

- what (if any) functions, interests or activities you or your organisation have that may be affected by the proposed DPD activities.

- The email included information on the regulatory process for the activities in Commonwealth and NT jurisdictions and links to a Santos information booklet on the proposed activities and a NOPSEMA brochure on the consultation process and details of how to contact Santos to register as a Relevant Person. The email stated that the consultation phase would commence on 22 November 2023 and close on 22 December 2023.
- On 22 November 2023 Santos emailed NT tourism operators further to the previous correspondence, to advise that it had commenced the consultation phase which would run until 22 December 2023. In addition to the previous information again being provided, Santos provided information on Relevant Persons' entitlements under the regulatory processes, details of how to provide feedback and a reminder of the closing date for consultation. [Con-3238]
- On 27 November 2023 Darwin Harbour Fishing Charters emailed Santos stating it was open to participate in the consultation process but provided no further comments. [Con-3256]
- On 22 March 2024 Santos emailed Darwin Harbour Fishing Charters and provided further opportunity to provide input by 28 March 2024 to the development of the Coastal Waters CEMP. [Con-3531]
- Notwithstanding the information provided and the steps described above, no comments or input were received in relation to activities under the Coastal Waters CEMP from Darwin Harbour Fishing Charters.

Summary of Objection or Claim	Assessment of Merits	Santos' Response Statement	Coastal Waters CEMP Reference
No objections or claims were raised by Darwin Harbour Fishing Charters.	Nil	Nil	Nil

Darwin Red Devil Fishing Charters

Summary of consultation effort:

- On 9 November 2023 Santos emailed Darwin Red Devil Fishing Charters to advise the start of preliminary consultation regarding proposed activities for consultation in relation to the activities under the Coastal Waters CEMP and the Commonwealth Waters DPD EP. [Con-3236]
- The email advised that Santos was seeking information to better understand:
  - if you are from a government Department or agency, how the proposed DPD activities may be relevant to your department or agency; and
  - what (if any) functions, interests or activities you or your organisation have that may be affected by the proposed DPD activities.
- The email included information on the regulatory process for the activities in Commonwealth and NT jurisdictions and links to a Santos information booklet on the proposed activities and a NOPSEMA brochure on the consultation process and details of how to contact Santos to register as a Relevant Person. The email stated that the consultation phase would commence on 22 November 2023 and close on 22 December 2023.
- On 22 November 2023 Santos emailed Darwin Red Devil Fishing Charters further to the previous correspondence, to advise that it had commenced the consultation phase which would run until 22 December 2023. In addition to the previous information again being provided, Santos provided information on Relevant Persons' entitlements under the regulatory processes, details of how to provide feedback and a reminder of the closing date for consultation. [Con-3238]
- On 14 December 2023 Santos followed-up the previous emails with a phone call during which Darwin Red Devil Fishing Charters advised that it did not want to be consulted on the activity under the Coastal Waters CEMP. A follow-up email was sent by Santos on 20 December 2023 confirming the phone discussion. [Con-2976].
- •No further correspondence or feedback was received from Darwin Red Devil Fishing Charters.

Summary of Objection or Claim	Assessment of Merits	Santos' Response Statement	Coastal Waters CEMP Reference
No objections or claims were raised by Darwin Red Devil Fishing Charters.	Nil	Nil	Nil

Darwin Sailing Club

Summary of consultation effort:

- On 9 November 2023 Santos emailed Darwin Sailing Club to advise the start of preliminary consultation regarding proposed activities for consultation in relation to the activities under the Coastal Waters CEMP and the Commonwealth Waters DPD EP. [Con-3236]
- The email advised that Santos was seeking information to better understand:
  - if you are from a government Department or agency, how the proposed DPD activities may be relevant to your department or agency; and
  - what (if any) functions, interests or activities you or your organisation have that may be affected by the proposed DPD activities.
- The email included information on the regulatory process for the activities in Commonwealth and NT jurisdictions and links to a Santos information booklet on the proposed activities and a NOPSEMA brochure on the consultation process and details of how to contact Santos to register as a Relevant Person. The email stated that the consultation phase would commence on 22 November 2023 and close on 22 December 2023.
- On 22 November 2023 Santos emailed Darwin Sailing Club further to the previous correspondence, to advise that it had commenced the consultation phase which would run until 22 December 2023. In addition to the previous information again being provided, Santos provided information on Relevant Persons' entitlements under the regulatory processes, details of how to provide feedback and a reminder of the closing date for consultation. [Con-3238]
- On 14 December 2023 Santos followed-up the previous emails with a phone call and a follow-up email on 20 December 2023 [Con-2993]
- Notwithstanding the information provided and the steps described above, no comments or input were received in relation to activities under the Coastal Waters CEMP from Darwin Sailing Club.

Summary of Objection or Claim	Assessment of Merits	Santos' Response Statement	Coastal Waters CEMP Reference
No objections or claims were raised by Darwin Sailing Club.	Nil	Nil	Nil

Darwin Trailer Boat Club

Summary of consultation effort:

- On 9 November 2023 Santos emailed Darwin Trailer Boat Club to advise the start of preliminary consultation regarding proposed activities for consultation in relation to the activities under the Coastal Waters CEMP and the Commonwealth Waters DPD EP. [Con-3236]
- The email advised that Santos was seeking information to better understand:
  - if you are from a government Department or agency, how the proposed DPD activities may be relevant to your department or agency; and
  - what (if any) functions, interests or activities you or your organisation have that may be affected by the proposed DPD activities.
- The email included information on the regulatory process for the activities in Commonwealth and NT jurisdictions and links to a Santos information booklet on the proposed activities and a NOPSEMA brochure on the consultation process and details of how to contact Santos to register as a Relevant Person. The email stated that the consultation phase would commence on 22 November 2023 and close on 22 December 2023.
- On 22 November 2023 Santos emailed Darwin Trailer Boat Club further to the previous correspondence, to advise that it had commenced the consultation phase which would run until 22 December 2023. In addition to the previous information again being provided, Santos provided information on Relevant Persons' entitlements under the regulatory processes, details of how to provide feedback and a reminder of the closing date for consultation. [Con-3238]
- On 14 December 2023 Santos had a telephone discussion with Darwin Trailer Boat Club which requested the previous email of 22 November 2023 be re-sent.
- On 14 December 2023 Santos followed-up the phone call with an email re-attaching the 22 November 2023 email. [Con-3205]

- Notwithstanding the information provided and the steps described above, no comments or input were received in relation to activities under the Coastal Waters CEMP from Darwin Trailer Boat Club.

Summary of Objection or Claim	Assessment of Merits	Santos' Response Statement	Coastal Waters CEMP Reference
No objections or claims were raised by Darwin Trailer Boat Club.	Nil	Nil	Nil

Dinah Beach Cruising Yacht Club

Summary of consultation effort:

- On 9 November 2023 Santos emailed Dinah Beach Cruising Yacht Club to advise the start of preliminary consultation regarding proposed activities for consultation in relation to the activities under the Coastal Waters CEMP and the Commonwealth Waters DPD EP. [Con-3236]
- The email advised that Santos was seeking information to better understand:
  - if you are from a government Department or agency, how the proposed DPD activities may be relevant to your department or agency; and
  - what (if any) functions, interests or activities you or your organisation have that may be affected by the proposed DPD activities.
- The email included information on the regulatory process for the activities in Commonwealth and NT jurisdictions and links to a Santos information booklet on the proposed activities and a NOPSEMA brochure on the consultation process and details of how to contact Santos to register as a Relevant Person. The email stated that the consultation phase would commence on 22 November 2023 and close on 22 December 2023.
- On 22 November 2023 Santos emailed Dinah Beach Cruising Yacht Club further to the previous correspondence, to advise that it had commenced the consultation phase which would run until 22 December 2023. In addition to the previous information again being provided, Santos provided information on Relevant Persons' entitlements under the regulatory processes, details of how to provide feedback and a reminder of the closing date for consultation. [Con-3238]
- On 14 December 2023 Santos followed-up the previous emails with a phone call and a follow-up email on 20 December 2023 [Con-2992]
- On 21 December 2023 Dinah Beach Cruising Yacht Club responded via email advising that the information had been forwarded to its committee which would respond by the due date if inclined. [Con-3298]
- Notwithstanding the information provided and the steps described above, no further correspondence or feedback was received from Dinah Beach Cruising Yacht Club.

Summary of Objection or Claim	Assessment of Merits	Santos' Response Statement	Coastal Waters CEMP Reference
No objections or claims were raised by Dinah Beach Cruising Yacht Club.	Nil	Nil	Nil

Dundee Beach Fishing Charters

Summary of consultation effort:

- On 9 November 2023 Santos emailed Dundee Beach Fishing Charters to advise the start of preliminary consultation regarding proposed activities for consultation in relation to the activities under the Coastal Waters CEMP and the Commonwealth Waters DPD EP. [Con-3236]
- The email advised that Santos was seeking information to better understand:
  - if you are from a government Department or agency, how the proposed DPD activities may be relevant to your department or agency; and
  - what (if any) functions, interests or activities you or your organisation have that may be affected by the proposed DPD activities.
- The email included information on the regulatory process for the activities in Commonwealth and NT jurisdictions and links to a Santos information booklet on the proposed activities and a NOPSEMA brochure on the consultation process and details of how to contact Santos to register as a Relevant Person. The email stated that the consultation phase would commence on 22 November 2023 and close on 22 December 2023.
- On 22 November 2023 Santos emailed Dundee Beach Fishing Charters further to the previous correspondence, to advise that it had commenced the consultation phase which would run until 22 December 2023. In addition to the previous information again being provided, Santos provided information on Relevant Persons' entitlements under the regulatory processes, details of how to provide feedback and a reminder of the closing date for consultation. [Con-3238]
- On 14 December 2023 Santos followed-up the previous emails with a phone call and a follow-up email on 20 December 2023 [Con-2991]
- Notwithstanding the information provided and the steps described above, no comments or input were received in relation to activities under the Coastal Waters CEMP from Dundee Beach Fishing Charters.

Summary of Objection or Claim	Assessment of Merits	Santos' Response Statement	Coastal Waters CEMP Reference
No objections or claims were raised by Dundee Beach Fishing Charters.	Nil	Nil	Nil

Equinox Fishing Charters

Summary of consultation effort:

- On 9 November 2023 Santos emailed Equinox Fishing Charters to advise the start of preliminary consultation regarding proposed activities for consultation in relation to the activities under the Coastal Waters CEMP and the Commonwealth Waters DPD EP. [Con-3236]
- The email advised that Santos was seeking information to better understand:
  - if you are from a government Department or agency, how the proposed DPD activities may be relevant to your department or agency; and
  - what (if any) functions, interests or activities you or your organisation have that may be affected by the proposed DPD activities.
- The email included information on the regulatory process for the activities in Commonwealth and NT jurisdictions and links to a Santos information booklet on the proposed activities and a NOPSEMA brochure on the consultation process and details of how to contact Santos to register as a Relevant Person. The email stated that the consultation phase would commence on 22 November 2023 and close on 22 December 2023.
- On 22 November 2023 Santos emailed Equinox Fishing Charters further to the previous correspondence, to advise that it had commenced the consultation phase which would run until 22 December 2023. In addition to the previous information again being provided, Santos provided information on Relevant Persons' entitlements under the regulatory processes, details of how to provide feedback and a reminder of the closing date for consultation. [Con-3238]
- On 14 December 2023 Santos followed-up the previous emails with a phone call during which Equinox Fishing Charters advised that it did not want to be consulted on the activity under the Coastal Waters CEMP.
- A follow-up email was sent by Santos on 20 December 2023 confirming the phone discussion. [Con-2977].
- No further correspondence or feedback was received from Equinox Fishing Charters.

Summary of Objection or Claim	Assessment of Merits	Santos' Response Statement	Coastal Waters CEMP Reference
No objections or claims were raised by Equinox Fishing Charters.	Nil	Nil	Nil

Estuary Escapes Fishing Charters

Summary of consultation effort:

- On 9 November 2023 Santos emailed Estuary Escapes Fishing Charters to advise the start of preliminary consultation regarding proposed activities for consultation in relation to the activities under the Coastal Waters CEMP and the Commonwealth Waters DPD EP. [Con-3236]
- The email advised that Santos was seeking information to better understand:
  - if you are from a government Department or agency, how the proposed DPD activities may be relevant to your department or agency; and
  - what (if any) functions, interests or activities you or your organisation have that may be affected by the proposed DPD activities.
- The email included information on the regulatory process for the activities in Commonwealth and NT jurisdictions and links to a Santos information booklet on the proposed activities and a NOPSEMA brochure on the consultation process and details of how to contact Santos to register as a Relevant Person. The email stated that the consultation phase would commence on 22 November 2023 and close on 22 December 2023.
- On 22 November 2023 Santos emailed Estuary Escapes Fishing Charters further to the previous correspondence, to advise that it had commenced the consultation phase which would run until 22 December 2023. In addition to the previous information again being provided, Santos provided information on Relevant Persons' entitlements under the regulatory processes, details of how to provide feedback and a reminder of the closing date for consultation. [Con-3238]
- On 13 December 2023 Santos followed-up the previous emails with a phone call and a follow-up email on 20 December 2023 [Con-3023]
- Notwithstanding the information provided and the steps described above, no comments or input were received in relation to activities under the Coastal Waters CEMP from Estuary Escapes Fishing Charters.

Summary of Objection or Claim	Assessment of Merits	Santos' Response Statement	Coastal Waters CEMP Reference
No objections or claims were raised by Estuary Escapes Fishing Charters.	Nil	Nil	Nil

Fish the Top End Fishing Charters (incorporating Obsession Fishing Safaris and Vision Sport Fishing Adventures)

Summary of consultation effort:

- On 9 November 2023 Santos emailed Fish the Top End Fishing Charters to advise the start of preliminary consultation regarding proposed activities for consultation in relation to the activities under the Coastal Waters CEMP and the Commonwealth Waters DPD EP. [Con-3236]
- The email advised that Santos was seeking information to better understand:
  - if you are from a government Department or agency, how the proposed DPD activities may be relevant to your department or agency; and
  - what (if any) functions, interests or activities you or your organisation have that may be affected by the proposed DPD activities.
- The email included information on the regulatory process for the activities in Commonwealth and NT jurisdictions and links to a Santos information booklet on the proposed activities and a NOPSEMA brochure on the consultation process and details of how to contact Santos to register as a Relevant Person. The email stated that the consultation phase would commence on 22 November 2023 and close on 22 December 2023.
- On 22 November 2023 Santos emailed Fish the Top End Fishing Charters further to the previous correspondence, to advise that it had commenced the consultation phase which would run until 22 December 2023. In addition to the previous information again being provided, Santos provided information on Relevant Persons' entitlements under the regulatory processes, details of how to provide feedback and a reminder of the closing date for consultation. [Con-3238]
- On 13 December 2023 Santos had a telephone discussion with Fish the Top End Fishing Charters which advised it also represented 2 other operators (as listed) and requested the previous email of 22 November 2023 be re-sent. [Con-2998]
- On 14 December 2023 Santos followed-up the phone call with an email re-attaching the 22 November 2023 email. [Con-3025]
- Notwithstanding the information provided and the steps described above, no comments or input were received in relation to activities under the Coastal Waters CEMP from Fish the Top End Fishing Charters.

Summary of Objection or Claim	Assessment of Merits	Santos' Response Statement	Coastal Waters CEMP Reference
No objections or claims were raised by Fish the Top End Fishing Charters.	Nil	Nil	Nil

FNA Sports Fishing

Summary of consultation effort:

- On 9 November 2023 Santos emailed FNA Sports Fishing to advise the start of preliminary consultation regarding proposed activities for consultation in relation to the activities under the Coastal Waters CEMP and the Commonwealth Waters DPD EP. [Con-3236]
- The email advised that Santos was seeking information to better understand:
  - if you are from a government Department or agency, how the proposed DPD activities may be relevant to your department or agency; and
  - what (if any) functions, interests or activities you or your organisation have that may be affected by the proposed DPD activities.
- The email included information on the regulatory process for the activities in Commonwealth and NT jurisdictions and links to a Santos information booklet on the proposed activities and a NOPSEMA brochure on the consultation process and details of how to contact Santos to register as a Relevant Person. The email stated that the consultation phase would commence on 22 November 2023 and close on 22 December 2023.
- On 22 November 2023 Santos emailed FNA Sports Fishing further to the previous correspondence, to advise that it had commenced the consultation phase which would run until 22 December 2023. In addition to the previous information again being provided, Santos provided information on Relevant Persons' entitlements under the regulatory processes, details of how to provide feedback and a reminder of the closing date for consultation. [Con-3238]
- On 14 December 2023 Santos followed-up the previous emails with a phone call and a follow-up email on 20 December 2023 [Con-2990]
- Notwithstanding the information provided and the steps described above, no comments or input were received in relation to activities under the Coastal Waters CEMP from FNA Sports Fishing.

Summary of Objection or Claim	Assessment of Merits	Santos' Response Statement	Coastal Waters CEMP Reference
No objections or claims were raised by FNA Sports Fishing.	Nil	Nil	Nil

Mousies Barra Fishing Charters

Summary of consultation effort:

- On 31 May 2024 Santos emailed Mousies Barra Fishing Charters regarding proposed activities for consultation in relation to the activities under the Coastal Waters CEMP and the Commonwealth Waters DPD EP. The email advised that Santos was seeking information to better understand what (if any) functions, interests or activities you or your organisation have that may be affected by the proposed DPD activities. [Con-4241]
- The email included information on the regulatory process for the activities in Commonwealth and NT jurisdictions and links to a Santos information booklet on the proposed activities and a NOPSEMA brochure on the consultation process.
- The email requested that Mousies Barra Fishing Charters contact Santos by 7 June 2024 to advise whether it considers that it may be a Relevant Person and what functions, interests or activities it has that may be affected by the DPD activities.

- In the email Santos advised if it did not hear from Mousies Barra Fishing Charters by 7 June 2024 it would assume that it did not have functions, interests or activities that may be affected by the DPD activities, or did not wish to be consulted for the activity under either the Commonwealth Waters DPD EP or the Coastal Waters CEMP.
- On 6 June 2024 Santos followed up the email of 31 May 2024 with a phone call during which Santos provided further information to Mousies Barra Fishing Charters on the proposed activities detailed in the information booklet.
- Notwithstanding the information provided and the steps described above, no comments or input were received in relation to activities under the Coastal Waters CEMP from Mousies Barra Fishing Charters.

Summary of Objection or Claim	Assessment of Merits	Santos' Response Statement	Coastal Waters CEMP Reference
No objections or claims were raised by Mousies Barra Fishing Charters	Nil	Nil	Nil

Humbug Fishing

Summary of consultation effort:

- On 9 November 2023 Santos emailed Humbug Fishing to advise the start of preliminary consultation regarding proposed activities for consultation in relation to the activities under the Coastal Waters CEMP and the Commonwealth Waters DPD EP. [Con-3236]
- The email advised that Santos was seeking information to better understand:
  - if you are from a government Department or agency, how the proposed DPD activities may be relevant to your department or agency; and
  - what (if any) functions, interests or activities you or your organisation have that may be affected by the proposed DPD activities.
- The email included information on the regulatory process for the activities in Commonwealth and NT jurisdictions and links to a Santos information booklet on the proposed activities and a NOPSEMA brochure on the consultation process and details of how to contact Santos to register as a Relevant Person. The email stated that the consultation phase would commence on 22 November 2023 and close on 22 December 2023.
- On 22 November 2023 Santos emailed Humbug Fishing further to the previous correspondence, to advise that it had commenced the consultation phase which would run until 22 December 2023. In addition to the previous information again being provided, Santos provided information on Relevant Persons' entitlements under the regulatory processes, details of how to provide feedback and a reminder of the closing date for consultation. [Con-3238]
- On 13 December 2023 Santos followed-up the previous emails with a phone call and a follow-up email on 20 December 2023 [Con-2989]
- Notwithstanding the information provided and the steps described above, no comments or input were received in relation to activities under the Coastal Waters CEMP from Humbug Fishing.

Summary of Objection or Claim	Assessment of Merits	Santos' Response Statement	Coastal Waters CEMP Reference
No objections or claims were raised by Humbug Fishing.	Nil	Nil	Nil

Offshore Boats Fishing Charters

Summary of consultation effort:

- On 9 November 2023 Santos emailed Offshore Boats Fishing Charters to advise the start of preliminary consultation regarding proposed activities for consultation in relation to the activities under the Coastal Waters CEMP and the Commonwealth Waters DPD EP. [Con-3236]
- The email advised that Santos was seeking information to better understand:
  - if you are from a government Department or agency, how the proposed DPD activities may be relevant to your department or agency; and
  - what (if any) functions, interests or activities you or your organisation have that may be affected by the proposed DPD activities.
- The email included information on the regulatory process for the activities in Commonwealth and NT jurisdictions and links to a Santos information booklet on the proposed activities and a NOPSEMA brochure on the consultation process and details of how to contact Santos to register as a Relevant Person. The email stated that the consultation phase would commence on 22 November 2023 and close on 22 December 2023.
- On 22 November 2023 Santos emailed Offshore Boats Fishing Charters further to the previous correspondence, to advise that it had commenced the consultation phase which would run until 22 December 2023. In addition to the previous information again being provided, Santos provided information on Relevant Persons' entitlements under the regulatory processes, details of how to provide feedback and a reminder of the closing date for consultation. [Con-3238]
- On 13 December 2023 Santos had a telephone discussion with Offshore Boats Fishing Charters which requested the previous email of 22 November 2023 be re-sent.
- On 14 December 2023 Santos followed-up the phone call with an email re-attaching the 22 November 2023 email. [Con-3026]
- Notwithstanding the information provided and the steps described above, no comments or input were received in relation to activities under the Coastal Waters CEMP from Offshore Boats Fishing Charters.

Summary of Objection or Claim	Assessment of Merits	Santos' Response Statement	Coastal Waters CEMP Reference
No objections or claims were raised by Offshore Boats Fishing Charters.	Nil	Nil	Nil

Outback Fishing Charters

Summary of consultation effort:

- On 31 May 2024 Santos emailed Outback Fishing Charters regarding proposed activities for consultation in relation to the activities under the Coastal Waters CEMP and the Commonwealth Waters DPD EP. The email advised that Santos was seeking information to better understand what (if any) functions, interests or activities you or your organisation have that may be affected by the proposed DPD activities.[Con-4237]
- The email included information on the regulatory process for the activities in Commonwealth and NT jurisdictions and links to a Santos information booklet on the proposed activities and a NOPSEMA brochure on the consultation process
- The email requested that Outback Fishing Charters contact Santos by 7 June 2024 to advise whether it considers that it may be a Relevant Person and what functions, interests or activities it has that may be affected by the DPD activities.
- In the email Santos advised if it did not hear from Outback Fishing Charters by 7 June 2024 it would assume that it did not have functions, interests or activities that may be affected by the DPD activities or did not wish to be consulted for the activity under either the Commonwealth Waters DPD EP or Coastal Waters CEMP.
- On 6 June 2024 Santos followed up the email of 31 May 2024 with a phone call during which Santos left a detailed message reminding Outback Fishing Charters of the deadline to advise whether it considered itself to be relevant for the activity under the Commonwealth Waters DPD EP or Coastal Waters CEMP.
- Notwithstanding the information provided and the steps described above, no comments or input were received in relation to activities under the Coastal Waters CEMP from Outback Fishing Charters.

Summary of Objection or Claim	Assessment of Merits	Santos' Response Statement	Coastal Waters CEMP Reference
No objections or claims were raised by Outback Fishing Charters.	Nil	Nil	Nil

Palmerston Game Fishing Club

Summary of consultation effort:

- On 9 November 2023 Santos emailed Palmerston Game Fishing Club to advise the start of preliminary consultation regarding proposed activities for consultation in relation to the activities under the Coastal Waters CEMP and the Commonwealth Waters DPD EP. [Con-3236]
- The email advised that Santos was seeking information to better understand:
  - if you are from a government Department or agency, how the proposed DPD activities may be relevant to your department or agency; and
  - what (if any) functions, interests or activities you or your organisation have that may be affected by the proposed DPD activities.
- The email included information on the regulatory process for the activities in Commonwealth and NT jurisdictions and links to a Santos information booklet on the proposed activities and a NOPSEMA brochure on the consultation process and details of how to contact Santos to register as a Relevant Person. The email stated that the consultation phase would commence on 22 November 2023 and close on 22 December 2023.
- On 22 November 2023 Santos emailed Palmerston Game Fishing Club further to the previous correspondence, to advise that it had commenced the consultation phase which would run until 22 December 2023. In addition to the previous information again being provided, Santos provided information on Relevant Persons' entitlements under the regulatory processes, details of how to provide feedback and a reminder of the closing date for consultation. [Con-3238]
- On 13 December 2023 Santos followed-up the previous emails with a phone call during which Palmerston Game Fishing Club advised that the information sent by Santos was included in a newsletter to members on 10 December. A follow-up email was sent by Santos on 20 December 2023 confirming the phone discussion. [Con-2978]
- Notwithstanding the information provided and the steps described above, no comments or input were received in relation to activities under the Coastal Waters CEMP from Palmerston Game Fishing Club.

Summary of Objection or Claim	Assessment of Merits	Santos' Response Statement	Coastal Waters CEMP Reference
No objections or claims were raised by Palmerston Game Fishing Club.	Nil	Nil	Nil

Reel Screamin Barra Fishing

Summary of consultation effort:

- On 9 November 2023 Santos emailed Reel Screamin Barra Fishing to advise the start of preliminary consultation regarding proposed activities for consultation in relation to the activities under the Coastal Waters CEMP and the Commonwealth Waters DPD EP. [Con-3236]
- The email advised that Santos was seeking information to better understand:
  - if you are from a government Department or agency, how the proposed DPD activities may be relevant to your department or agency; and
  - what (if any) functions, interests or activities you or your organisation have that may be affected by the proposed DPD activities.
- The email included information on the regulatory process for the activities in Commonwealth and NT jurisdictions and links to a Santos information booklet on the proposed activities and a NOPSEMA brochure on the consultation process and details of how to contact Santos to register as a Relevant Person. The email stated that the consultation phase would commence on 22 November 2023 and close on 22 December 2023.
- On 22 November 2023 Santos emailed Reel Screamin Barra Fishing further to the previous correspondence, to advise that it had commenced the consultation phase which would run until 22 December 2023. In addition to the previous information again being provided, Santos provided information on Relevant Persons' entitlements under the regulatory processes, details of how to provide feedback and a reminder of the closing date for consultation. [Con-3238]
- On 13 December 2023 Santos followed-up the previous emails with a phone call during which Reel Screamin Barra Fishing advised that it was not affected by the activity under the Commonwealth Waters DPD EP or the Coastal Waters CEMP activities. A follow-up email was sent by Santos on 20 December 2023 confirming the phone discussion [Con-2979]
- Notwithstanding the information provided and the steps described above, no further comments or input were received in relation to activities under the Coastal Waters CEMP from Reel Screamin Barra Fishing.

Summary of Objection or Claim	Assessment of Merits	Santos' Response Statement	Coastal Waters CEMP Reference
No objections or claims were raised by Reel Screamin Barra Fishing.	Nil	Nil	Nil

River and Reef

Summary of consultation effort:

- On 31 May 2024 Santos emailed River and Reef regarding proposed activities for consultation in relation to the activities under the Coastal Waters CEMP and the Commonwealth Waters DPD EP. The email advised that Santos was seeking information to better understand what (if any) functions, interests or activities you or your organisation have that may be affected by the proposed DPD activities. [Con-4239]
- The email included information on the regulatory process for the activities in Commonwealth and NT jurisdictions and links to a Santos information booklet on the proposed activities and a NOPSEMA brochure on the consultation process.
- The email requested that River and Reef contact Santos by 7 June 2024 to advise whether it considers that it may be a Relevant Person and what functions, interests or activities it has that may be affected by the DPD activities.
- In the email Santos advised if it did not hear from River and Reef by 7 June 2024, it would assume that it did not have functions, interests or activities that may be affected by the DPD activities or did not wish to be consulted for the activity under either the Commonwealth Waters DPD EP or the Coastal Waters CEMP.
- On 6 June 2024 Santos followed up the email of 31 May 2024 with a phone call during which Santos left a detailed message reminding River and Reef of the deadline to advise whether it considered itself to be relevant for the activity under the Commonwealth Waters DPD EP or the Coastal Waters CEMP.
- Notwithstanding the information provided and the steps described above, no comments or input were received in relation to activities under the Coastal Waters CEMP from River and Reef.

Summary of Objection or Claim	Assessment of Merits	Santos' Response Statement	Coastal Waters CEMP Reference
No objections or claims were raised by River and Reef.	Nil	Nil	Nil

Sail Darwin

Summary of consultation effort:

- On 9 November 2023 Santos emailed Sail Darwin to advise the start of preliminary consultation regarding proposed activities for consultation in relation to the activities under the Coastal Waters CEMP and the Commonwealth Waters DPD EP. [Con-3236]
- The email advised that Santos was seeking information to better understand:
  - if you are from a government Department or agency, how the proposed DPD activities may be relevant to your department or agency; and
  - what (if any) functions, interests or activities you or your organisation have that may be affected by the proposed DPD activities.

- The email included information on the regulatory process for the activities in Commonwealth and NT jurisdictions and links to a Santos information booklet on the proposed activities and a NOPSEMA brochure on the consultation process and details of how to contact Santos to register as a Relevant Person. The email stated that the consultation phase would commence on 22 November 2023 and close on 22 December 2023.
- On 22 November 2023 Santos emailed Sail Darwin further to the previous correspondence, to advise that it had commenced the consultation phase which would run until 22 December 2023. In addition to the previous information again being provided, Santos provided information on Relevant Persons' entitlements under the regulatory processes, details of how to provide feedback and a reminder of the closing date for consultation. [Con-3238]
- On 13 December 2023 Santos followed-up the previous emails with a phone call and a follow-up email on 20 December 2023 [Con-2987]
- Notwithstanding the information provided and the steps described above, no comments or input were received in relation to activities under the Coastal Waters CEMP from Sail Darwin.

Summary of Objection or Claim	Assessment of Merits	Santos' Response Statement	Coastal Waters CEMP Reference
No objections or claims were raised by Sail Darwin.	Nil	Nil	Nil

Saltwater Cultural Tours

Summary of consultation effort:

- On 9 November 2023 Santos emailed Saltwater Cultural Tours to advise the start of preliminary consultation regarding proposed activities for consultation in relation to the activities under the Coastal Waters CEMP and the Commonwealth Waters DPD EP. [Con-3236]
- The email advised that Santos was seeking information to better understand:
  - if you are from a government Department or agency, how the proposed DPD activities may be relevant to your department or agency; and
  - what (if any) functions, interests or activities you or your organisation have that may be affected by the proposed DPD activities.
- The email included information on the regulatory process for the activities in Commonwealth and NT jurisdictions and links to a Santos information booklet on the proposed activities and a NOPSEMA brochure on the consultation process and details of how to contact Santos to register as a Relevant Person. The email stated that the consultation phase would commence on 22 November 2023 and close on 22 December 2023.
- On 22 November 2023 Santos emailed Saltwater Cultural Tours further to the previous correspondence, to advise that it had commenced the consultation phase which would run until 22 December 2023. In addition to the previous information again being provided, Santos provided information on Relevant Persons' entitlements under the regulatory processes, details of how to provide feedback and a reminder of the closing date for consultation. [Con-3238]
- On 13 December 2023 Santos followed-up the previous emails with a phone call and a follow-up email on 20 December 2023 [Con-3028]
- Notwithstanding the information provided and the steps described above, no comments or input were received in relation to activities under the Coastal Waters CEMP from Saltwater Cultural Tours.

Summary of Objection or Claim	Assessment of Merits	Santos' Response Statement	Coastal Waters CEMP Reference
No objections or claims were raised by Saltwater Cultural Tours.	Nil	Nil	Nil

Sea Darwin

Summary of consultation effort:

- On 9 November 2023 Santos emailed Sea Darwin to advise the start of preliminary consultation regarding proposed activities for consultation in relation to the activities under the Coastal Waters CEMP and the Commonwealth Waters DPD EP. [Con-3236]
- The email advised that Santos was seeking information to better understand:
  - if you are from a government Department or agency, how the proposed DPD activities may be relevant to your department or agency; and
  - what (if any) functions, interests or activities you or your organisation have that may be affected by the proposed DPD activities.
- The email included information on the regulatory process for the activities in Commonwealth and NT jurisdictions and links to a Santos information booklet on the proposed activities and a NOPSEMA brochure on the consultation process and details of how to contact Santos to register as a Relevant Person. The email stated that the consultation phase would commence on 22 November 2023 and close on 22 December 2023.
- On 22 November 2023 Santos emailed Sea Darwin further to the previous correspondence, to advise that it had commenced the consultation phase which would run until 22 December 2023. In addition to the previous information again being provided, Santos provided information on Relevant Persons' entitlements under the regulatory processes, details of how to provide feedback and a reminder of the closing date for consultation. [Con-3238]
- On 14 December 2023 Santos followed-up the previous emails with a phone call and a follow-up email the same day. [Con-3027]
- On 14 December 2023 Sea Darwin responded via email to Santos stating it had no comments on the Commonwealth Waters DPD EP or the Coastal Waters CEMP activities. [Con-3268]
- No further correspondence or feedback was received from Sea Darwin.

Summary of Objection or Claim	Assessment of Merits	Santos' Response Statement	Coastal Waters CEMP Reference
No objections or claims were raised by Sea Darwin.	Nil	Nil	Nil

Shoal Bay Sportfishing Tours

Summary of consultation effort:

- On 9 November 2023 Santos emailed Shoal Bay Sportfishing Tours to advise the start of preliminary consultation regarding proposed activities for consultation in relation to the activities under the Coastal Waters CEMP and the Commonwealth Waters DPD EP. [Con-3236]
- The email advised that Santos was seeking information to better understand:
  - if you are from a government Department or agency, how the proposed DPD activities may be relevant to your department or agency; and
  - what (if any) functions, interests or activities you or your organisation have that may be affected by the proposed DPD activities.
- The email included information on the regulatory process for the activities in Commonwealth and NT jurisdictions and links to a Santos information booklet on the proposed activities and a NOPSEMA brochure on the consultation process and details of how to contact Santos to register as a Relevant Person. The email stated that the consultation phase would commence on 22 November 2023 and close on 22 December 2023.
- On 22 November 2023 Santos emailed Shoal Bay Sportfishing Tours further to the previous correspondence, to advise that it had commenced the consultation phase which would run until 22 December 2023. In addition to the previous information again being provided, Santos provided information on Relevant Persons' entitlements under the regulatory processes, details of how to provide feedback and a reminder of the closing date for consultation. [Con-3238]
- On 13 December 2023 Santos followed-up the previous emails with a phone call during which Shoal Bay Sportsfishing Tours advised that it did not want to be consulted on the Commonwealth Waters DPD EP or the Coastal Waters CEMP. A follow-up email was sent by Santos on 20 December 2023 confirming the phone discussion [Con-2980]
- No further correspondence or feedback was received from Shoal Bay Sportfishing Tours.

Summary of Objection or Claim	Assessment of Merits	Santos' Response Statement	Coastal Waters CEMP Reference
No objections or claims were raised by Shoal Bay Sportfishing Tours.	Nil	Nil	Nil

Skippers at Dundee

Summary of consultation effort:

- On 31 May 2024 Santos emailed Skippers at Dundee regarding proposed activities for consultation in relation to the activities under the Coastal Waters CEMP and the Commonwealth Waters DPD EP. The email advised that Santos was seeking information to better understand what (if any) functions, interests or activities you or your organisation have that may be affected by the proposed DPD activities. [Con-4238]
- The email included information on the regulatory process for the activities in Commonwealth and NT jurisdictions and links to a Santos information booklet on the proposed activities and a NOPSEMA brochure on the consultation process.
- The email requested that Skippers at Dundee contact Santos by 7 June 2024 to advise whether it considers that it may be a Relevant Person and what functions, interests or activities it has that may be affected by the DPD activities.
- In the email Santos advised if it did not hear from Skippers at Dundee by 7 June 2024 it would assume that it did not have functions, interests or activities that may be affected by the DPD activities or did not wish to be consulted for the activity under either the DPD Commonwealth Waters DPD EP or the Coastal Water CEMP.
- On 6 June 2024 Santos followed up the email of 31 May 2024 with a phone call during which Skippers at Dundee advised that the activities were not likely to affect their operations as their tours do not run that far from Darwin, but it would contact Santos if it had any further questions.
- No further correspondence or feedback was received from on the Coastal Waters CEMP from Skippers at Dundee.

Summary of Objection or Claim	Assessment of Merits	Santos' Response Statement	Coastal Waters CEMP Reference
No objections or claims were raised by Skippers at Dundee.	Nil	Nil	Nil

Spring Tide Safaris

Summary of consultation effort:

- On 9 November 2023 Santos emailed Spring Tide Safaris to advise the start of preliminary consultation regarding proposed activities for consultation in relation to the activities under the Coastal Waters CEMP and the Commonwealth Waters DPD EP. [Con-3236]
- The email advised that Santos was seeking information to better understand:
  - if you are from a government Department or agency, how the proposed DPD activities may be relevant to your department or agency; and
  - what (if any) functions, interests or activities you or your organisation have that may be affected by the proposed DPD activities.
- The email included information on the regulatory process for the activities in Commonwealth and NT jurisdictions and links to a Santos information booklet on the proposed activities and a NOPSEMA brochure on the consultation process and details of how to contact Santos to register as a Relevant Person. The email stated that the consultation phase would commence on 22 November 2023 and close on 22 December 2023.
- On 22 November 2023 Santos emailed Spring Tide Safaris further to the previous correspondence, to advise that it had commenced the consultation phase which would run until 22 December 2023. In addition to the previous information again being provided, Santos provided information on Relevant Persons' entitlements under the regulatory processes, details of how to provide feedback and a reminder of the closing date for consultation. [Con-3238]
- On 13 December 2023 Santos followed-up the previous emails with a phone call and a follow-up email on 20 December 2023 [Con-2986]
- Notwithstanding the information provided and the steps described above, no comments or input were received in relation to activities under the Coastal Waters CEMP from Spring Tide Safaris.

Summary of Objection or Claim	Assessment of Merits	Santos' Response Statement	Coastal Waters CEMP Reference
No objections or claims were raised by Spring Tide Safaris.	Nil	Nil	Nil

Streeter Cruises

Summary of consultation effort:

- On 9 November 2023 Santos emailed Streeter Cruises to advise the start of preliminary consultation regarding proposed activities for consultation in relation to the activities under the Coastal Waters CEMP and the Commonwealth Waters DPD EP. [Con-3236]
- The email advised that Santos was seeking information to better understand:
  - if you are from a government Department or agency, how the proposed DPD activities may be relevant to your department or agency; and
  - what (if any) functions, interests or activities you or your organisation have that may be affected by the proposed DPD activities.
- The email included information on the regulatory process for the activities in Commonwealth and NT jurisdictions and links to a Santos information booklet on the proposed activities and a NOPSEMA brochure on the consultation process and details of how to contact Santos to register as a Relevant Person. The email stated that the consultation phase would commence on 22 November 2023 and close on 22 December 2023.
- On 22 November 2023 Santos emailed Streeter Cruises further to the previous correspondence, to advise that it had commenced the consultation phase which would run until 22 December 2023. In addition to the previous information again being provided, Santos provided information on Relevant Persons' entitlements under the regulatory processes, details of how to provide feedback and a reminder of the closing date for consultation. [Con-3238]
- On 13 December 2023 Santos followed-up the previous emails with a phone call and a follow-up email on 20 December 2023 [Con-2985]
- Notwithstanding the information provided and the steps described above, no comments or input were received in relation to activities under the Coastal Waters CEMP from Streeter Cruises.

Summary of Objection or Claim	Assessment of Merits	Santos' Response Statement	Coastal Waters CEMP Reference
No objections or claims were raised by Streeter Cruises.	Nil	Nil	Nil

Territory Guided Fishing

Summary of consultation effort:

- On 9 November 2023 Santos emailed Territory Guided Fishing to advise the start of preliminary consultation regarding proposed activities for consultation in relation to the activities under the Coastal Waters CEMP and the Commonwealth Waters DPD EP. [Con-3236]
- The email advised that Santos was seeking information to better understand:
  - if you are from a government Department or agency, how the proposed DPD activities may be relevant to your department or agency; and
  - what (if any) functions, interests or activities you or your organisation have that may be affected by the proposed DPD activities.
- The email included information on the regulatory process for the activities in Commonwealth and NT jurisdictions and links to a Santos information booklet on the proposed activities and a NOPSEMA brochure on the consultation process and details of how to contact Santos to register as a Relevant Person. The email stated that the consultation phase would commence on 22 November 2023 and close on 22 December 2023.

- On 22 November 2023 Santos emailed Territory Guided Fishing further to the previous correspondence, to advise that it had commenced the consultation phase which would run until 22 December 2023. In addition to the previous information again being provided, Santos provided information on Relevant Persons' entitlements under the regulatory processes, details of how to provide feedback and a reminder of the closing date for consultation. [Con-3238]
- On 13 December 2023 Santos followed-up the previous emails with a phone call and a follow-up email on 20 December 2023 [Con-2984]
- Notwithstanding the information provided and the steps described above, no comments or input were received in relation to activities under the Coastal Waters CEMP from Territory Guided Fishing.

Summary of Objection or Claim	Assessment of Merits	Santos' Response Statement	Coastal Waters CEMP Reference
No objections or claims were raised by Territory Guided Fishing.	Nil	Nil	Nil

Tiwi Island Adventures

Summary of consultation effort:

- On 9 November 2023 Santos emailed Tiwi Island Adventures to advise the start of preliminary consultation regarding proposed activities for consultation in relation to the activities under the Coastal Waters CEMP and the Commonwealth Waters DPD EP. [Con-3236]
- The email advised that Santos was seeking information to better understand:
  - if you are from a government Department or agency, how the proposed DPD activities may be relevant to your department or agency; and
  - what (if any) functions, interests or activities you or your organisation have that may be affected by the proposed DPD activities.
- The email included information on the regulatory process for the activities in Commonwealth and NT jurisdictions and links to a Santos information booklet on the proposed activities and a NOPSEMA brochure on the consultation process and details of how to contact Santos to register as a Relevant Person. The email stated that the consultation phase would commence on 22 November 2023 and close on 22 December 2023.
- On 22 November 2023 Santos emailed Tiwi Island Adventures further to the previous correspondence, to advise that it had commenced the consultation phase which would run until 22 December 2023. In addition to the previous information again being provided, Santos provided information on Relevant Persons' entitlements under the regulatory processes, details of how to provide feedback and a reminder of the closing date for consultation. [Con-3238]
- On 13 December 2023 Santos followed-up the previous emails with a phone call and a follow-up email on 20 December 2023 [Con-2983]
- Notwithstanding the information provided and the steps described above, no comments or input were received in relation to activities under the Coastal Waters CEMP from Tiwi Island Adventures.

Summary of Objection or Claim	Assessment of Merits	Santos' Response Statement	Coastal Waters CEMP Reference
No objections or claims were raised by Tiwi Island Adventures.	Nil	Nil	Nil

Tiwi Island Retreat

Summary of consultation effort:

- On 9 November 2023 Santos emailed Tiwi Island Retreat to advise the start of preliminary consultation regarding proposed activities for consultation in relation to the activities under the Coastal Waters CEMP and the Commonwealth Waters DPD EP. [Con-3236]
- The email advised that Santos was seeking information to better understand:
  - if you are from a government Department or agency, how the proposed DPD activities may be relevant to your department or agency; and
  - what (if any) functions, interests or activities you or your organisation have that may be affected by the proposed DPD activities.
- The email included information on the regulatory process for the activities in Commonwealth and NT jurisdictions and links to a Santos information booklet on the proposed activities and a NOPSEMA brochure on the consultation process and details of how to contact Santos to register as a Relevant Person. The email stated that the consultation phase would commence on 22 November 2023 and close on 22 December 2023.
- On 22 November 2023 Santos emailed Tiwi Island Retreat further to the previous correspondence, to advise that it had commenced the consultation phase which would run until 22 December 2023. In addition to the previous information again being provided, Santos provided information on Relevant Persons' entitlements under the regulatory processes, details of how to provide feedback and a reminder of the closing date for consultation. [Con-3238]
- On 13 December 2023 Santos followed-up the previous emails with a phone call during which Tiwi Island Retreat advised that it did not want to be consulted on the activity under the Coastal Waters CEMP. A follow-up email was sent by Santos on 20 December 2023 confirming the phone discussion. [Con-3264]
- No further correspondence or feedback was received from Tiwi Island Retreat.

Summary of Objection or Claim	Assessment of Merits	Santos' Response Statement	Coastal Waters CEMP Reference
No objections or claims were raised by Tiwi Island Retreat.	Nil	Nil	Nil

Top End Barra Fishing Tours

Summary of consultation effort:

- On 9 November 2023 Santos emailed Top End Barra Fishing Tours to advise the start of preliminary consultation regarding proposed activities for consultation in relation to the activities under the Coastal Waters CEMP and the Commonwealth Waters DPD EP. [Con-3236]
- The email advised that Santos was seeking information to better understand:
  - if you are from a government Department or agency, how the proposed DPD activities may be relevant to your department or agency; and
  - what (if any) functions, interests or activities you or your organisation have that may be affected by the proposed DPD activities.
- The email included information on the regulatory process for the activities in Commonwealth and NT jurisdictions and links to a Santos information booklet on the proposed activities and a NOPSEMA brochure on the consultation process and details of how to contact Santos to register as a Relevant Person. The email stated that the consultation phase would commence on 22 November 2023 and close on 22 December 2023.
- On 22 November 2023 Santos emailed Top End Barra Fishing Tours further to the previous correspondence, to advise that it had commenced the consultation phase which would run until 22 December 2023. In addition to the previous information again being provided, Santos provided information on Relevant Persons' entitlements under the regulatory processes, details of how to provide feedback and a reminder of the closing date for consultation. [Con-3238]
- On 13 December 2023 Santos followed-up the previous emails with a phone call and a follow-up email on 20 December 2023. [Con-2981]
- Notwithstanding the information provided and the steps described above, no comments or input were received in relation to activities under the Coastal Waters CEMP from Top End Barra Fishing Tours.

Summary of Objection or Claim	Assessment of Merits	Santos' Response Statement	Coastal Waters CEMP Reference
No objections or claims were raised by Top End Barra Fishing Tours.	Nil	Nil	Nil

Yknot Fishing Charters			
Summary of consultation effort: • On 9 November 2023 Santos emailed Yknot Fishing Charters to advise the start of preliminary consultation regarding proposed activities for consultation in relation to the activities under the Coastal Waters CEMP and the Commonwealth Waters DPD EP. [Con-3236] • The email advised that Santos was seeking information to better understand: – if you are from a government Department or agency, how the proposed DPD activities may be relevant to your department or agency; and – what (if any) functions, interests or activities you or your organisation have that may be affected by the proposed DPD activities. • The email included information on the regulatory process for the activities in Commonwealth and NT jurisdictions and links to a Santos information booklet on the proposed activities and a NOPSEMA brochure on the consultation process and details of how to contact Santos to register as a Relevant Person. The email stated that the consultation phase would commence on 22 November 2023 and close on 22 December 2023. • On 22 November 2023 Santos emailed Yknot Fishing Charters further to the previous correspondence, to advise that it had commenced the consultation phase which would run until 22 December 2023. In addition to the previous information again being provided, Santos provided information on Relevant Persons' entitlements under the regulatory processes, details of how to provide feedback and a reminder of the closing date for consultation. [Con-3238] • Notwithstanding the information provided and the steps described above, no comments or input were received in relation to activities under the Coastal Waters CEMP from Yknot Fishing Charters.			
Summary of Objection or Claim	**Assessment of Merits**	**Santos' Response Statement**	**Coastal Waters CEMP Reference**
No objections or claims were raised by Yknot Fishing Charters.	Nil	Nil	Nil

5. Planned activities impact assessment

The results of the impact assessment process undertaken for the planned Activity as per Section 5 of the Coastal Waters CEMP are summarised in Table 5-1. A comprehensive impact assessment for each planned event and subsequent control measures proposed by Santos to reduce the impacts to ALARP and acceptable levels is detailed in the following subsections.

Table 5-1: Environmental impact assessment summary

Coastal Waters CEMP section	Hazard	Residual consequence level
5.1	Interaction with other marine users	II – Minor
5.2	Seabed and benthic habitat disturbance	II – Minor
5.3	Noise emissions	II – Minor
5.4	Light emissions	II – Minor
5.5	Atmospheric emissions	I – Negligible
5.6	Vessel and other activity discharges	I – Negligible

5.1 Interactions with other marine users

5.1.1 Description of event

Event	The marine spread for the Activity includes: • the pipelay vessel, which will be operating along the DPD route 24/7 for a period during the pipelay activities • a construction vessel, which will be operating 24/7 during the Activity • support and supply vessels, which will transit to and from the pipelay and construction vessels daily • survey and other support will occur ad-hoc during the Activity. A 500 m exclusion zone will be established around the pipelay and construction vessels to safeguard them while they are unable to manoeuvre. All activity vessels will be limited to ≤8 knots within the OA. Sources of impact to other marine users may occur as a result of: • vessels frequently moving within and occasionally moving to and from the OA • helicopter operations to and from the OA • ROVs assisting vessel seabed installation within the OA • unplanned and non-routine IMR activities (e.g. post major cyclone) • physical ongoing presence post installation (e.g. potential snag hazard). Other marine users within the OA may include commercial shipping and fishing, tourism (including fishing charters), recreation, defence and traditional fishing.
Extent	Contained within the OA.
Duration	Total cumulative duration of the Activity (prior to the preservation period) is estimated to be ~1 week.

5.1.2 Nature and scale of environmental impacts

Potential receptors: socioeconomic (commercial fisheries, traditional fishing, tourism, recreation, shipping and defence).

Nine managed fisheries (4 Commonwealth, 5 NT) overlap the OA (Section 3.2.13.1). Table 3-16 provides a summary of the commercial fisheries and Santos' understanding of fishing effort based on publicly available information and consultation with Relevant Persons.

No active commercial fishing effort for 5 of the managed fisheries has occurred within the OA. There are 4 fisheries—Northern Prawn, Spanish Mackerel, Offshore Net and Line Fishery and Demersal Fishery—that may potentially occur within the OA. The Northern Prawn Fishery medium and high fishing effort is concentrated to the west and north of the Tiwi Islands and also to the south of the OA. The Spanish Mackerel Fishery fishing effort is concentrated at nearby shoals and banks as well as in the waters off Bathurst Island. The Offshore Net and Line Fishery fishing effort is concentrated near coastal areas and distribution of the targeted species; however, one licence holder may fish off the south-west coast of the Tiwi Islands for small pelagic fish. Demersal Fishery fishing effort is concentrated along the eastern boundary of the Timor Reef fishery in water depths of 80-100 m, to the north-east of the OA.

The OA is approximately 30 km south of the Tiwi Islands, NT. In 2014, the Blue Mud Bay Settlement Deed was signed by NT Government, Tiwi Land Trust and the Tiwi Land Council. Tiwi People are proposing to establish a Marine Indigenous Protected Area that extends to 3 Nm (approximately 5.6 km) around the Tiwi Islands (Tiwi Land Council, 2021). Traditional fishing effort is greatest near the larger communities of Wurrumiyanga on Bathurst Island, and Pirlangimpi and Milikapiti on Melville Island (DPIF 2014). Tiwi people continue to undertake the customary harvesting of sea turtles and dugongs. Green turtles are the main species harvested in the water while eggs of all turtle species are taken periodically. Dugongs are also taken occasionally (Tiwi Land Council, 2022).

The seabed within the OA is characterised as silty, shelly sand, with very sparse (<1%) epibiota with no known seabed features including fishing sites or locations of recreational interest (such as accessible shipwrecks, coral reefs). Tourism, recreation or traditional fishing are not expected in the OA, given the distance to Tiwi Islands (~30 km) and Darwin (~80 km), a lack of seabed features and water depth exceeding 40 m. However, there is the potential that tourism and recreational vessels may transit the area infrequently.

The OA intersects a designated defence practice area. The closest operational offshore production facilities and in-field subsea infrastructure are the Eni operated Blacktip Gas, approximately 260 km south-west from the OA and the Santos-operated Bayu–Undan platform, approximately 395 km north-west from the OA. There are 2 existing pipelines within the vicinity—Bayu-Undan (within the OA) and Ichthys (16.5 km distant). Darwin Port is a major shipping port in Australia located approximately 60 km south-south-east of the OA. In 2022–2023, there were 1,569 vessel calls to port (Landbridge Darwin Port, 2024). Although Darwin Port is the primary active port in the region, there is a port, Port Melville, located at the Tiwi Islands, which is approximately 82 km north-east of the OA

and 125 km north of Darwin. Shipping and other incidental marine traffic are expected to be low based on AMSA's vessel traffic data (AMSA, 2022).

The temporary presence of activity vessels may inhibit other marine users. Helicopter operations within the OA will be short-term and limited to approximately 10 helicopter movements throughout the Activity (based on up to 10 helicopter movements per week), and are unlikely to interfere with other marine users as access around activity vessels will be restricted.

5.1.3 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 described in Table 5-2 to demonstrate the potential impacts from this aspect are ALARP. Control measures that are adopted have associated EPSs and measurement criteria, and are presented in Table 7-2. Rejected control measures have an ALARP evaluation provided to justify their rejection.

Table 5-2: Control measures evaluation for interaction with other marine users

CM reference	Control measure	Environmental benefit	Potential cost/issues	Evaluation
Standard control measures				
C6.1.1	Activity vessels equipped and crewed in accordance with Australian maritime requirements (administrative control)	Ensures vessel lighting, radios and equipment is inspected and maintained so that other marine users are aware of the vessel's physical presence, thus reducing the potential for interaction and collision. Demonstrates appropriately trained and competent personnel are used to navigate vessels to reduce interaction with other marine users.	Regulatory requirement and therefore the cost is not identified as an issue.	**Adopted**
C6.1.2	Undertake consultation with Relevant Persons (including applicable notifications) (administrative control)	Relevant Persons consultation ensures identified marine users are aware of the proposed activities, reducing the likelihood of unplanned interactions around activity vessels. Maritime notifications ensure marine users are informed of the proposed activities, reducing the likelihood of unplanned interactions. Subsea infrastructure will be clearly marked on Australian nautical charts published by the Australian Hydrographic Office (AHO) alerting other marine users to the presence of the installed infrastructure.	Cost to prepare and distribute information, and to address any feedback provided.	**Adopted**
C6.1.3	The Activity will be undertaken in accordance with Santos HSE management and marine vessel vetting processes (administrative control)	Santos marine vetting process ensures vessel lighting, radios and equipment are inspected and maintained so that other marine users are aware of the vessel's physical presence, thus 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.	**Adopted**
Additional control measures				
C6.1.5	Vessel speed restrictions (administrative control)	Restricting vessel speeds within the OA to ≤8 knots reduces the likelihood and consequence (causing harm) and likelihood of vessel-to-vessel collisions by providing vessels with more time to	Administrative costs to update existing Santos procedure and induction materials and train personnel.	**Adopted**

CM reference	Control measure	Environmental benefit	Potential cost/issues	Evaluation
		detect and manoeuvre to avoid each other.		
C6.1.6	One vessel will act as a surveillance vessel within the immediate vicinity of the pipelay vessel during pipelay (administrative control)	A vessel will be in the immediate vicinity of the pipelay vessel to act as a surveillance and intervention vessel. The vessel will mitigate potential interactions between the pipelay vessel and other marine users.	Cost associated with implementing procedures.	**Adopted**
C6.1.7	Communications plan will be implemented for engagement prior to and during the Activity (administrative control)	Communications plan will improve awareness of the Activity, encourage engagement with stakeholders, and provide up-to-date information regarding key activities.	Cost associated with implementing procedures.	**Adopted**
C6.1.8	HSE inductions will include environmental requirements and cultural values (administrative control)	Ensures that crew are aware of the stringent Coastal Waters CEMP, Santos and legislative requirements.	Administrative costs to update existing Santos procedure and induction materials and train personnel.	**Adopted**
N/A	Manage the timing of the Activity to avoid peak marine user periods (e.g. fishing) (elimination control)	Would reduce potential impacts to fisheries and other marine users.	Significant costs and increase in Activity duration to demobilise/remobilise the vessels. It also increases the risk profile of the operation.	**Rejected** – marine users may be present within the OA at any time of the year infrequently. Avoiding the fishing period is not considered justified given this and the disproportionate cost and delay it would cause.

5.1.4 Environmental impact assessment

Receptor	Consequence level
Interaction with other marine users	
Threatened, migratory or local fauna	Not applicable – related to socioeconomic receptors only.
Physical environment or habitat	
Threatened ecological communities	
Protected areas	
Socioeconomic receptors	The OA does not intersect any moderate to high fishing effort areas. This is largely due to the seabed being characterised as silty, shelly sand, with very sparse (<1%) epibiota and the lack of seabed features such as shoals, reefs and banks. The pipelay vessel will move slowly along the DPD route (nominally 2–3 km per day) with the pipelay activities expected to be completed within approximately 1 week. Restricted areas within the OA are limited to the 500 m exclusion zone imposed around the pipelay and construction vessels. Helicopter operations will be infrequent (e.g. maximum helicopter movements will be approximately 10 times a week during the peak utilisation period) and at high altitude, they are therefore, unlikely to interfere with other marine users. Given the short duration of the Activity (cumulative period of ~1 week excluding preservation period), the pipelay vessel moving slowly (1 knot in nominal 12 m steps) along the length of the DPD route, exclusion areas limited to 500 m around the pipeline and construction vessels, low fishing effort within the OA and distance from the coastline, interaction with commercial fisheries is possible but likely to be limited to fishers transiting within the region. On an ongoing basis, the subsea infrastructure may present a hazard to marine users due to the potential for snagging on subsea infrastructure. The risk of snagging was assessed during a fishing interactions survey undertaken for the DPD (Intecsea, 2018). Based on the frequency of trawling vessels crossing the pipeline and location of snagging hazards (e.g. pipeline spanning structures) it was concluded that there is very low likelihood of trawling equipment becoming snagged on installed pipeline. Furthermore, on an ongoing basis, it is not credible for any snagging of trawling equipment to result in a loss of containment of the DPD infrastructure (Intecsea, 2018 and 2022). While there may be some minor restrictions to where fishing activity can occur, no substantial adverse effects are considered likely given the very small area and temporary nature of exclusion. The impact and risks are therefore deemed acceptable. Shipping and other incidental marine traffic in the area is expected to be low based on AMSA's vessel traffic data and that the OA is not in a shipping fairway (AMSA, 2022). Given all shipping vessels and activity vessels are required to comply with the COLREGS and associated Marine Orders, it is expected navigational and communicative aids are sufficient to prevent any negative interactions beyond basic avoidance of activity vessels. Therefore, impacts to shipping activity or commercial fishing vessels are not expected. At worst, a vessel may have to alter course to avoid a 500 m vessel exclusion zone. The OA is also distant from the coastlines, approximately 30 km south of the Tiwi Islands and 80 km north of Darwin, NT. Any interactions with recreational or traditional fishing, scuba diving operators or tourism vessels are expected to be restricted to temporary avoidance of activity vessels while transiting through the OA. The area from which marine users will be excluded is small when compared to the area available for their use and over a very short duration (cumulative period of ~1 week excluding preservation period). Marine users within the OA have coexisted with shipping activities and other nearby restricted areas (e.g. military exercises). Communication before and during the Activity will reduce the likelihood of unplanned interaction with other commercial marine users. Therefore, the consequence level for potential interaction with other marine users is considered to be II – Minor.
Cumulative impacts	
It is considered that negligible additive and cumulative effects associated with the Activity (e.g. physical presence) to other marine users may result, given the limited interaction with other marine users (including fishers, recreation and tourism operators) expected within the OA, an insignificant increase in regional vessel movements based on the annual Darwin Harbour statistics and historical year to year variation (refer to Section 3.2.13.5) and the very short Activity duration (cumulative period of ~1 week excluding preservation period). Therefore, no change to the overall consequence level is expected.	

Receptor	Consequence level
Overall worst-case consequence	II – Minor

5.1.5 Demonstration of as low as reasonably practicable

There are no alternatives to using vessels to undertake the Activity. The pipelay and construction vessels will have a 500 m exclusion zone in place to ensure safety of these vessel and other marine users. Santos' consultation process is described in Section 4. Throughout the consultation period, Relevant Persons were made aware of the proposed exclusion zone around the pipeline and construction vessels and the implications to other marine users including the indicative schedule. No concerns have been raised by Relevant Persons regarding the potential exclusion zone. Notice to Mariners will be issued that detail the location and nature of activities and that the activity vessels will maintain navigation aids.

All reasonably practicable control measures were 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 Santos' risk management criteria and are considered appropriate to reduce impacts to ALARP.

5.1.6 Acceptability evaluation

Is the consequence ranked as I or II?	Yes – maximum consequence from interaction with other marine users is II – Minor.
Is further information required to validate the consequence assessment?	No – potential impacts and risks are well understood through the information available and Relevant Person consultation.
Are the risks and impacts consistent with the principles of ecologically sustainable development (ESD)?	Yes – activity evaluated in accordance with Santos' Offshore Division Environmental Hazard Identification and Assessment Guideline (EA-91-IG-00004), 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. The OA does not intersect any AMP or protected area.
Are performance outcomes, control measures and associated performance standards consistent with legal and regulatory requirements?	Yes – management measures are consistent with the SOLAS and applicable legislation (*Marine Safety (Domestic Commercial Vessel) National Law Act 2012, Navigation Act 2012*). Through acceptance of the Coastal Waters CEMP, legislative and regulatory requirements will be met as per Section 1.6.2 of the Coastal Waters CEMP
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 (Appendix A of the Coastal Waters CEMP)
Are performance outcomes, control measures and associated performance standards consistent with industry standards?	Yes – the most recent and comparable EPs accepted by NOPSEMA were reviewed for consistency with the performance outcomes, control measures and associated performance standards proposed in the Coastal Waters CEMP.
Have performance outcomes, control measures and associated performance standards taken into consideration Relevant Person feedback?	Yes – Relevant Person feedback indicated no recommendations for revising the EPO, CMs or EPSs.
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 interaction with other marine users 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.

5.2 Seabed and benthic habitat disturbance

5.2.1 Description of event

Event	As described in Section 2.5 of the Coastal Waters CEMP, the installation activities will physically disturb the seabed. Disturbance to the seabed may result from: • long-term placement of subsea infrastructure on the seabed (e.g. pipeline and, if required, supporting structures) • temporary placement and set down of equipment and subsea infrastructure on the seabed (e.g. ROV, wet parking) • temporary seabed and sediment disturbance during installation and contingency IMR (e.g. span rectification if required, local seabed rectification if required). The seabed footprint is detailed in Table 2-7 of the Coastal Waters CEMP. Seabed disturbance may also cause a localised temporary increase in water turbidity.
Extent	Localised: within the OA.
Duration	Temporary disturbances and placements for the duration of the Activity (prior to the preservation period) being a cumulative period of ~1 week. The long–term subsea infrastructure placement for the operational life (approximately 25 years) is out of scope of the Coastal Waters CEMP.

5.2.2 Nature and scale of environmental impacts

Potential receptors: physical environment (benthic habitat); threatened, migratory or local fauna (benthic fauna); socioeconomic (commercial fisheries and UCH); and cultural features.

The total seabed footprint from the Activity is provided in Table 2-7 of the Coastal Waters CEMP, which includes a 20% contingency. Section 2.5 of the Coastal Waters CEMP describes the installation activities in detail.

The pipeline and associated structures (including mattresses and grout bags for contingency span rectification) are lowered onto the seabed in a controlled manner with minimal disturbance to sediment. Habitat directly below structures will most likely be replaced by the hard substrate of the structures, however, over time the structures will inevitably become colonised by epibenthic fauna that will most likely be similar in nature to those that are present on hard substrates at equivalent depths within the broader region.

5.2.2.1 Physical environment

The Activity will involve direct and indirect impact to the sea floor and will inevitably result in localised impact to benthic habitat (and associated fauna) within the OA.

The seabed within the OA is characterised as featureless silty, shelly sand (Figure 3-6), with very sparse (<1%) epibiota (mainly soft corals and crinoids) (RPS, 2023a). The closest shoal to the OA is greater than 6 km away and Shepparton Shoal is the closest named shoal or bank to the OA which is greater than 16 km away (Figure 3-5). Given the mobile nature of sediments and high current speeds, the seabed is expected to return to near its original state over time – no substantial changes to seabed features are predicted. The potential consequence on benthic communities is localised and limited given the very sparse cover of benthic communities and expected recovery through recolonisation. Benthic habitats and fauna assemblages that are expected to be impacted are considered widespread throughout the region. The pipeline and supporting structures are expected to sink or become partially buried, with localised and low in relief sediment accumulation around the pipeline due to the soft sediment. Although local scouring may occur, this is minimised through the structural integrity design. Depressions on the seabed caused by the activity are predicted to infill naturally with sediments and detrital matter over time and recovery and recolonisation of soft sediment habitats is expected to happen within a short time (weeks to months). Furthermore, the installed infrastructure will create a hard substrate in an otherwise featureless and soft seabed. It can be reasonably expected that the substrate could serve as an anchor for benthic organisms providing a localised increase in biodiversity after the Activity.

5.2.2.2 Water quality

Water quality impacts resulting from the Activity are anticipated to be limited to elevated suspended sediment and subsequent sediment deposition due to span rectification (if required). These effects are expected to be localised and short-term, with the water column returning to its original state within days. The impact on water quality is projected to be negligible, with no substantial changes that could adversely affect biodiversity, ecological integrity, social amenity, or human health. As such, the impact is considered acceptable.

5.2.2.3 Threatened, migratory or local fauna

The DPD route in NT Coastal Waters is located in water depths of approximately 40 m to 50 m and in an area of high turbidity, limiting photosynthetically active radiation and benthic primary producer habitats.

Seabed disturbance from span rectification, if required, may temporarily make prey for predatory demersal fish (e.g. infauna) more available. Increased prey availability could result in a short-term attraction of demersal fish to the area. The seabed within the OA is predominantly bare sediment, which supports relatively low diversity and low abundance fish assemblages compared to more complex habitats (e.g. reefs). The installed infrastructure may create a more rugose seabed and provide a substrate for the attachment of organisms such as sponges and gorgonians. The resulting habitat will be relatively complex compared to much of the pre-existing habitat and will serve as an artificial reef. Recent survey work on the North West Shelf has highlighted the increased fish species richness and abundance associated with subsea pipelines (Bond et al., 2018; McLean et al., 2017). These studies noted that the fish assemblages associated with pipelines tended to have a relatively high portion of large, commercially important fish species that preferred complex habitats (Bond et al., 2018; McLean et al., 2017). The predicted increase in the fish assemblage diversity and abundance is not expected to have any adverse environmental consequences.

The protected matters search tool (PMST) report for the OA (Appendix D of the Coastal Waters CEMP, summarised in Table 3-12) lists the following shark species with their respective conservation status: whale shark (vulnerable), northern river (endangered), white (vulnerable) and scalloped hammerhead (conservation dependent); and the NT-listed threatened shark species with their respective conservation status and northern river (endangered) (refer to Table 3-12). Due to the highly mobile nature and wide representation of these sharks as well as the limited seabed disturbance associated with the Activity, it is unlikely that these species will be adversely impacted.

The southern coastline of the Tiwi Islands hosts nesting populations of flatback turtles and internesting habitat critical for the survival of flatback turtles (Figure 3-15). Other species of marine reptiles, such as sea snakes and saltwater crocodiles, are not expected to be present in notable numbers within the OA and are not considered further. Flatback turtles forage in soft-bottom sub-tidal environments. Flatback turtles are carnivorous and feed opportunistically on a range of benthic invertebrates such as molluscs, crustaceans, soft corals and holothurians; pelagic prey such as jellyfish may also be consumed (Limpus, 2007). The OA does not contain suitable turtle foraging habitat and is deeper than foraging turtles typically dive to, particularly internesting females. Suitable internesting habitat for flatback turtles is defined as water depths shallower than 16 m (Whittock et al., 2016 in Pendoley, 2019), which is shallower than the shallowest point (greater than 40 m) in the OA.

Cape Fourcroy—located on the south western coastline of Bathurst Island, Tiwi Islands—also is a known flatback, olive ridley and green turtle nesting beach and supports an olive ridley turtle internesting BIA and habitat critical for the survival of flatback and olive ridley turtles (outside the OA) (Figure 3-12, Figure 3-15) (Pendoley, 2022a).

Internesting olive ridley turtles remain relatively close to nesting beaches during the nesting period (in comparison to post-nesting movements); tagged turtles remained within 48 km of the nesting beach in waters typically <30 m water depth, although the turtles moved considerable distances within this radius (up to 200 km) (Hamel et al., 2008). These behaviours are consistent with observations from other populations, which indicate that internesting olive ridley turtles typically remain in relatively shallow waters within 30 km of the nesting beach (Maxwell et al., 2011; Rees et al., 2012). Internesting olive ridley and flatback turtles are expected to be concentrated in relatively shallow coastal waters (<30 m) around nesting beaches. Benthic habitat within the 30 m isobath around the Tiwi Islands is broadly represented regionally, and the OA is deeper than 30 m, ranging from 40 to 50 m. Therefore, seabed disturbance within the OA is unlikely to affect the internesting turtle habitat.

Based on the habitat preferences (shallower coastal and estuarine waters) of sawfish and the water depth of the OA, it is unlikely that they will be present in large numbers. It is recognised that individuals may be encountered within the OA including 3 sawfish species (dwarf, freshwater and green) listed as vulnerable under the EPBC Act and TPWC Act (Appendix D of the Coastal Waters CEMP, summarised in Table 3-12). The proposed installed infrastructure is unlikely to result in adverse impacts to sawfish based on the following:

- mobile nature of sawfish species and preference for shallow habitat
- wide representation of habitats within the region
- localised seabed disturbance
- low profile of the DPD pipeline, which is expected to become partially or fully buried over time and considered unlikely to prevent the movement of sawfish over the pipeline.

Habitat modification is identified as a potential threat to several marine fauna species in relevant recovery plans and conservation advice (Table 3-14), some of which have cultural significance as totems or cultural food sources. However, seabed disturbance at the proposed scale is not anticipated to significantly affect marine fauna that may be present in the OA, such as marine mammals, marine reptiles, sawfish, sharks, rays and other fish that may be

considered to hold cultural significance as totemic species (Section 3.2.14.10). The seabed within the OA is predominantly bare sediment and contains low abundance and diversity of infauna.

The area of seabed to be disturbed within the OA also represents a negligible portion of the habitat available for threatened, migratory or local fauna. There is also no significant benthic habitat and communities that will result in a reduction in food sources. Therefore, no impacts to marine mammals, cartilaginous fish or marine reptiles from seabed disturbance are expected.

5.2.2.4 Socioeconomic

5.2.2.4.1 Commercial fisheries

Potential impacts to benthic habitats, and subsequently to associated 'fish' species of commercial importance, will be localised and the potential impact to, and displacement of, fish is expected to be insignificant at a stock level. In addition, studies noted that the fish assemblages associated with pipelines tended to have a relatively high portion of large, commercially important fish species that preferred complex habitats (Bond et al., 2018; McLean et al., 2017).

5.2.2.4.2 Underwater Cultural Heritage

There is one known and protected underwater cultural heritage (UCH) feature within the OA; the I-124 Japanese submarine wreck. During the design phase of the DPD Project, the pipeline route was deviated to avoid the I-124 Japanese wreck and its 800m radial exclusion zone, with the pipeline route passing 100m to the east of the exclusion zone at its closest point.

As per an Archaeological Scope of Works provided by the Heritage Branch of the NT Department of Territory Families, Housing and Communities (DTFHC), Santos engaged the services of a maritime archaeologist to undertake an underwater heritage assessment of the pipeline route, including within NT Coastal Waters (Cosmos Archaeology, 2022).

Along the pipeline corridor, Cosmos Archaeology (2022) analysed data collected during a geophysical survey conducted by Fugro in 2021 (Appendix G of the Coastal Waters CEMP). The study found three seabed anomalies representing potential cultural objects (i.e. not natural in origin) within the OA, between pipeline kilometre point (KP) 25 to KP28 (Cosmos Archaeology, 2022). Two of these objects, which could not be determined as natural or cultural, were identified between 143 and 214m away from the pipeline route and another single high-relief feature was located 68m from the pipeline route. This latter anomaly was considered only a remote chance of being associated with the I-124 wreck given its distance of over 2.5km away from the centre point of the wreck (Cosmos Archaeology, 2022). Given the distance of these anomalies from the pipeline route and the nature of the installation activity, these anomalies were not considered likely to be impacted by the pipeline installation activity, and no further work to further identify them was recommended by Cosmos Archaeology (2022).

Santos engaged OzArk to conduct a desktop First Nations archaeological assessment for the DPD Project Area, based on a detailed geomorphological assessment (Section 3.2.13.7). The First Nations archaeological assessment report listed four recommendations (Table 5-3). A First Nations Unexpected Finds Protocol (FNUFP) has been developed to manage any residual uncertainty and risk to tangible cultural features (in the highly unlikely event of a discovery) to ALARP (refer to Section 8.6.6.2 of the Coastal Waters CEMP). This protocol will be used during pre-lay surveys and pipelay activities, which may require localised re-routing of the DPD in the highly unlikely scenario of a discovery.

Table 5-3: Relevant OzArk (2024) recommendations

OzArk Recommendation (OzArk, 2024)	Addressed in the Coastal Waters CEMP
Ahead of pipeline laying, a survey should be undertaken of the DPD pipeline corridor to identify in detail the characteristics of the seafloor, to ensure that the installation of the pipeline can be undertaken in a streamlined fashion and to identify any objects of interest. This survey should comprise a number of optional data generating sources, including but not limited to, capturing video and still footage, side scan sonar, echosounder and multibeam data of the seafloor.	Adopted through Control Measure C6.2.1 (Confirmation of DPD route prior to and during installation, which includes a survey).
The First Nations Unexpected Finds Protocol (FNUFP) and Protocol for Protection Underwater Cultural Heritage (PPUCH) prepared for this project have been approved and the provisions contained within them should be applied to any unexpected heritage finds encountered.	Santos will implement the First Nations underwater cultural heritage unexpected finds protocol. Refer Section 8.6.6.2 of the Coastal Waters CEMP and Control Measure C6.2.11 (Cultural Heritage Management Plan, including protocols for First Nations cultural heritage) (Table 7-2). The PPUCH is written for Commonwealth waters only and is applicable to the DPD Project in Commonwealth waters but not NT Coastal Waters.
The FNUFP should be provided to crews of vessels undertaking pre-lay survey and laying the pipeline	Adopted through Section 8.6.6.2 of the Coastal Waters CEMP (First Nations underwater cultural heritage unexpected finds protocol) and Control Measure C6.2.11 (Cultural Heritage Management Plan, including protocols for First Nations cultural heritage) and associated Environmental Performance Standard (see Table 7-2).
All staff and contractors should undertake First Nations cultural heritage inductions to ensure they are aware of the legislative protection afforded to sacred sites and First Nations Archaeology and to become familiar with the requirements of the FNUFP and the PPUCH.	Adopted through Control Measure C6.1.8 (HSE inductions will include environmental requirements and cultural values) (see Table 7-2). The PPUCH is written for Commonwealth waters only and is applicable to the DPD Project in Commonwealth waters but not NT Coastal Waters.

5.2.2.5 Cultural features

Santos has applied for, and received on 23 December 2022, an Authority Certificate (C2022-098) from the Aboriginal Areas Protection Authority (AAPA), which covers potential seabed disturbance along the pipeline route in NT waters and a nominal 1,000m buffer each side of the pipeline route, including the DPD pipeline route in the OA. There were no registered or recorded sacred sites, protected under the *Northern Territory Aboriginal Sacred Sites Act 1989* (NT) (NTASS Act), identified in the OA, nor any specific certificate conditions related to activities within the OA.

No First Nations people feedback was provided about potential seabed impacts to any geographically specific cultural features during consultation (refer to Table 4-10). The potential impacts to tangible cultural features from seabed disturbance are likely to be associated with any direct or indirect impacts to culturally significant marine fauna habitat and species (such as dreaming and totem species including fish, turtles, crocodiles and rays) are assessed in Section 5.2.2.3.

Previous information potentially relevant to cultural features obtained during consultation for the D&C EP is included in the Coastal Waters CEMP where relevant. Information provided during the UCH assessment for the GEP EP is also considered, having regard to the Court's findings and observations in *Munkara*. Feedback provided during the D&C EP consultation 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.

During consultation on the D&C EP, Tiwi clients of the EDO raised concerns about:

- disturbance to important ancestral spirits and beings, including Ampitji, 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 Ampitji is disturbed, there are concerns that there could be tidal waves or king tide, and that it may also disturb the 3 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 defined by some as “drilling through us, through our very being” and; “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.”

Items raised in the 2022 Statement of Reasons Requests from the Tiwi clan members included traditional hunting of marine species and totem species. There are no known traditional hunting or gathering areas in the OA. Section 5.2.2.3 assesses the potential direct or indirect impacts to culturally significant marine fauna species such as dreaming and totem species (i.e. marine mammals, marine reptiles, sawfish, sharks, rays and other fish) Consequently, it is anticipated that the proposed seabed and benthic habitat disturbance is unlikely to impact traditional hunting practices or resources.

As presented in Section 3.2.14, some First Nations people cultural beliefs place significance on culturally important spiritual beings and the protection they afford First Nations communities from natural disasters and sickness. Dr Corrigan concluded that both the Tiwi Islanders and Larrakia Peoples’ cultural and spiritual values within the OA are geographically indeterminate (Corrigan, 2024), based on the materials able to be considered. As part of his study, Dr Corrigan spoke directly with, and obtained information from, many First Nations people, including Larrakia people, Tiwi Islanders and members of the Belyuen community. Engagement with Tiwi Islanders undertaken by Dr Corrigan also shows that spiritual beings (e.g. crocodile man and Ampitji) are not widely thought to travel to and within the OA due to the distance from the Tiwi Islands, as expressed by some relevant and senior Tiwi people. Of direct relevance these sorts of Tiwi cultural and spiritual values were tested in the Federal Court and were found not to be consistently spread amongst relevant Tiwi Islanders and in any event do not represent a particular ‘place’ of cultural and spiritual significance[43].

As presented in Section 3.2.14, some First Nations people believe that damaging songlines may have the potential to interfere with ability for First Nations people to reproduce cultural knowledge and continue to provide cultural education of their children.

During consultation for the Coastal Waters CEMP, the Croker Island people did not identify any sacred sites or songlines within the OA, and no objections or claims were raised.

Santos recognises that some First Nations people remain concerned about the potential for adverse consequences to First Nations people and natural environment, that may arise as a result of disturbance from the Barossa Development to spiritual dreaming and culturally important spiritual beings. Santos understands the spiritual protection believed to be afforded to the First Nations 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 (Corrigan, 2023).

Dr Corrigan (2024) documented input from Larrakia people and relevant First Nations persons from Belyuen and Wagait, who advised the presence of a range of ancestral beings and dreaming stories of relevance to the Darwin Harbour, surrounding seas and the DPD Project footprint. None of these cultural features are known to be associated with any specific or particular places in the DPD Project footprint, but rather have a more general association with the wider area, as well as having associations with particular and specific places outside of the

[43] The concepts of places, sites and similar are used in various pieces of legislation that contain mechanisms to protect First Nations cultural heritage (including the ATSIHP Act, ALR Act and NTASS Act), to describe specific items or places that should be protected.

DPD Project footprint. In this regard, Dr Corrigan identified the following recommendation, as put to him by First Nations people:

"*that Santos consider engaging cultural monitors to provide guidance and advice on the protection and maintenance of the cultural and spiritual places and activities throughout the DPD construction process...*" (Corrigan, 2024)

While Dr Corrigan's assessment concluded that there are no particular places of specific cultural heritage vales[44] as opposed to a general heritage values in existence in the general area along the DPD pipeline route, Santos recognises the broad and cultural and spiritual beliefs and connections to First Nations people.

Santos has determined that the laying of the pipeline will have low impact and risk to cultural and/or spiritual beliefs because:

- no specific UCH places have been identified by Dr Corrigan, which is consistent with the conclusions arrived at through consultation with First Nations people and through the examination of relevant records in the course of preparing the Coastal Waters CEMP
- these intangible cultural and spiritual heritage interests and connections have co-existed with other seabed disturbance activities in the region (including the area surrounding the Tiwi Islands) with no evidence to support actual adverse effects from the actions of spiritual beings in response to impacts on the environment. Regional seabed disturbing activities include fish trawling activities, drilling of nearly 900 offshore wells and subsea infrastructure placement, such as the Bayu-Undan pipeline since approximately 2006, the Ichthys Pipeline since approximately 2016 and the North West Cable System since approximately 2016 and the GEP since 2023.
- on the views of some Tiwi Islanders who provided information to Dr Corrigan, there are no cultural impediments to the laying of the pipeline
- even taking the highest views of Tiwi Islanders as to significance, being those expressed by the EDO's clients, the impact and risk will be low, and not significant, having regard to the existing state of the environment because the pipeline will not meaningfully add to the level of disturbance currently experienced in the area
- the additional control measures proposed in the Coastal Waters CEMP to further ensure impacts are reduced to ALARP and an acceptable level (being the implementation of the CHMP for underwater cultural heritage (C6.2.11) and the cultural heritage control measure to implement the suggestions of First Nations people reported by Dr Corrigan).

Santos considers that control measure based on Dr Corrigan's recommendations will allow intangible impacts and risks to be reduced to ALARP and an acceptable level and has adopted these recommendations as C6.2.10 and C6.2.12.

5.2.3 Environmental performance outcomes and control measures

The EPOs relating to this event include:

- Seabed disturbance limited to planned activities and defined locations within the OA [EPO-02]
- No significant impacts to cultural features from the Activity [EPO-14]
- No impacts to underwater cultural heritage from the Activity [EPO-15]

An assessment of the environmental benefits and the potential costs or issues associated with control measures for this activity are described in Table 5-4 to demonstrate the potential impacts from this aspect are ALARP. Control measures that are adopted have associated EPSs and measurement criteria, and are presented in Table 7-2.

Table 5-4: Control measures evaluation for seabed and benthic habitat disturbance

CM reference	Control measure	Environmental benefit	Potential cost/issues	Evaluation
Standard control measures				
C6.2.1	Confirmation of DPD route prior to and during installation (administrative control)	Ensures that the pipeline is laid along the planned route, which was determined taking into account (amongst other factors)	Cost of surveys and maintaining records.	**Adopted**

[44] *See above*

CM reference	Control measure	Environmental benefit	Potential cost/issues	Evaluation
		environmental and cultural sensitivities identified during the design and consultation phase. This control is very effective in avoiding sensitive receptors and span rectification by design.		
C6.2.2	DP pipelay vessel will be used for installation of the pipeline (substitution control)	Effective in reducing seabed disturbance, in combination with the DGPS systems, due to high accuracy DPD positioning and eliminating the use of anchors. The proposed DPD route has been designed to avoid sensitive benthic features and minimise the requirement for span rectification.	The use of DP will generate broadband underwater noise; refer to Section 5.3 for the assessment of underwater noise impacts. The DP thrusters will increase fuel usage and atmospheric emissions.	**Adopted**
C6.2.3	Differential global positioning system (DGPS) for pipelay vessel to maintain accurate vessel position during installation (engineering control)	The control is effective in ensuring vessels, in combination with DP systems, are positioned with high accuracy. This ensures the pipeline is installed along the desired route. The proposed DPD route has been designed to avoid sensitive benthic features and minimise the requirement for span rectification.	Costs are expected as part of standard procedure.	**Adopted**
C6.2.5	Vessel planned maintenance system (administrative control)	Ensures DP equipment is operating within its parameters, eliminating the requirement for a vessel to anchor.	Costs are expected as part of standard procedure.	**Adopted**
Additional control measures				
C6.1.8	HSE inductions will include environmental requirements and cultural values (administrative control)	Provides crew awareness of the stringent Coastal Waters CEMP, Santos and legislative requirements.	Administrative costs to update existing Santos procedure and induction materials and train personnel.	**Adopted**
C6.2.6	Span correction procedures to be developed, if required (administrative control)	Provides clear direction on how spans shall be rectified and surveyed to minimise seabed disturbance.	Costs are expected as part of standard procedure.	**Adopted**
C6.2.7	Project vessels will use DP where required with no planned vessel anchoring within the OA, within the Habitat Protection Zones (IUCN IV) – Zone 2 of Oceanic Shoals Marine Park or in named banks or shoals (administrative control)	Effective in preventing anchoring on sensitive benthic habitats associated with the named banks and shoals in the region. The OA has been designed to avoid these features. No anchoring in the OA removes potential for anchoring within the Japanese submarine wreck I-124 and its 800 m radial exclusion zone.	The use of DP will generate broadband underwater noise; refer to Section 5.3 for the assessment of underwater noise impacts. The DP thrusters will increase fuel usage and atmospheric emissions.	**Adopted**

CM reference	Control measure	Environmental benefit	Potential cost/issues	Evaluation
C6.2.8	Establish a subsea infrastructure inventory (administrative control)	Enables Santos to fulfil future decommissioning and removal responsibilities.	Cost of surveys, maintaining equipment and records.	**Adopted**
C6.2.9	CHMP including protocols for maritime underwater cultural heritage (administrative control)	Provides guidance in the event that an unexpected maritime archaeology find is encountered. By implementing the protocol, potential impacts to maritime UCH objects and values will be minimised.	Administrative costs to update existing Santos procedures and induction materials and train personnel.	**Adopted**
C6.2.10	Cultural heritage training and cultural ceremony (administrative control)	Santos has been implementing cultural heritage training and ceremony in the course of undertaking activities authorised pursuant to the GEP EP since November 2023 with broad support of First Nations communities as a culturally appropriate practice and response to cultural concerns.	Time and cost to work with First Nations communities.	**Adopted**
C6.2.11	CHMP including protocols for First Nations underwater cultural heritage (administrative control)	Provides guidance in the event that an unexpected First Nations find is encountered. By implementing the protocol, potential impacts to First Nations UCH objects and values will be minimised.	Administrative costs to update existing Santos procedures and induction materials and train personnel.	**Adopted**
C6.2.12	First Nations cultural heritage monitor in the field, subject to availability of the cultural heritage monitor	Provides guidance and advice on the protection and maintenance of the cultural and spiritual places and activities throughout the pipelay and pre-commissioning activities	Provides guidance and advice on the protection and maintenance of the cultural and spiritual places and activities throughout the DPD construction process.	**Adopted**

5.2.4 Environmental impact assessment

Receptor	Consequence level
Seabed and benthic habitat disturbance	
Physical environment or habitat	Localised sediment (silty, shelly sand) disturbance and turbidity caused by seabed disturbance is expected to be minor in nature and limited to within the OA. Therefore, the consequence level is considered to be II – Minor.
Threatened, migratory or local fauna	Given the limited scale of seabed disturbance and knowledge of the existing environment, potential impact to threatened, migratory or local fauna species is unlikely. Habitat modification is identified as a potential threat to several marine fauna species in relevant recovery plans and conservation advice (Table 3-14). However, the benthic habitat within the OA is well represented in the wider surrounds and there are no known significant marine fauna feeding or aggregation areas within the OA. Marine invertebrates that may inhabit disturbed soft sediment benthic habitats are expected to occur elsewhere within the OA and surrounds. Therefore the disturbance is not expected to negatively affect prey availability for protected fauna species. Seabed disturbance is not expected to cause a significant decrease in local population size, area of occupancy of species, loss or disruption of critical habitat, and disruption to the breeding cycle of any threatened or migratory marine fauna. Therefore, the consequence level is considered to be II – Minor.

Receptor	Consequence level
Threatened ecological communities	Not applicable – no threatened ecological communities were identified in the area where seabed disturbance could occur.
Protected areas	Not applicable – no protected areas over which seabed disturbance could occur.
Socioeconomic receptors	Seabed disturbance is not expected to impact commercial fisheries based on the small size of disturbance compared with the total available fishing area. There is one clearly identified wreck within the OA (the Japanese submarine I-124, discussed below). If an unexpected find of underwater cultural heritage is identified during the pre-lay survey, the unexpected find will be assessed following the maritime UCH UFP (Appendix 4 of the CHMP) to minimise potential impacts to maritime archaeology UCH objects and values (see Section 8.6.6 of the Coastal Waters CEMP). If required, Relevant Persons will be notified and the object managed in accordance with the UCH Act, as applicable (refer to C6.2.9 and Table 8-6 of the Coastal Waters CEMP). For assessment of impacts to First Nations UCH objects and values, refer to the assessment for cultural features. Santos considers the adoption of EPO-15 and C6.2.9, practicable and appropriate. The consequence of seabed disturbance on receptors is assessed as I – Negligible.
Cultural features	There is one UCH site, the Japanese submarine wreck I-124, located within the OA and protected under the UCH Act. Santos has deviated the pipeline route around the I-124 800m radial exclusion zone, with the closest point 100m from this exclusion zone, to ensure seabed disturbance does not encroach into this zone. A maritime archaeology assessment (Cosmos Archaeology, 2022), assessing geophysical data collected along the route, did not identify any cultural heritage objects likely to be impacted by seabed disturbance associated with the activity within the OA. There are no sacred sites registered or recorded under the NTASS Act or protected under the ATSIHP Act, UCH Act, ALR Act or EPBC Act that overlap the OA. Of the culturally important sites (including underwater sites) identified by First Nations people, all of the identified sites are outside the OA. If a First Nations underwater cultural heritage unexpected find is identified during the survey or installation activities, the unexpected find will be assessed following the First Nations UFP (Appendix 5 of the CHMP) to minimise potential impacts to First Nations UCH objects and values (see Section 8.6.6 of the Coastal Waters CEMP). If required, Relevant Persons will be notified and the object managed in accordance with the UCH Act, as applicable (refer to C6.2.11 and Table 8-6 of the Coastal Waters CEMP). In relation to seabed disturbance, Santos notes that existing subsea infrastructure has previously been placed on the seabed in the region, such as the Bayu-Undan pipeline since approximately 2006, the Ichthys Pipeline since approximately 2016, and the North West Cable System since approximately 2016. The region also has a history of significant historic and ongoing industrial shipping, fish trawling activities and drilling of almost 900 offshore wells. There is no evidence to support actual adverse effects from spiritual beings in response to impacts on people or the environment from these activities. An important outcome of Dr Corrigan's research is that no sacred sites or dreamings are shown to be directly impacted by the proposed DPD project footprint, however some marine species are known to be associated with dreamings and songs (Corrigan, 2024). For the assessment of impacts to marine species of cultural significance, refer to the assessment for threatened, migratory or local fauna. It is anticipated that the proposed seabed and benthic habitat disturbance is unlikely to impact traditional hunting practices or resources. Notwithstanding, a control measure (C6.2.10) relating to cultural heritage training and cultural ceremony and a control measure (C6.2.12) for a First Nations cultural heritage monitor in the field subject to availability were developed with input from Relevant Persons and acknowledges the recommendations by First Nations people as suggested to Dr Corrigan (Corrigan, 2024). Santos considers the adoption of EPO-14, EPO-15, C6.2.10, C6.2.11, C6.2.12 and Table 8-6 of the Coastal Waters CEMP, practicable and appropriate.
Cumulative impacts	
The cumulative area of benthic disturbance, from relevant activities proposed within the Coastal Waters CEMP, is an incidental proportion of similarly representative regional habitat, predominantly bare sediment with a low abundance and diversity of infauna. The additive effect of this Activity and existing infrastructure in the vicinity of the OA (e.g. Barossa GEP, Bayu-Undan pipeline, Ichthys pipeline and telecommunication cables) are expected to not substantially change or adversely impact on biodiversity or ecological integrity of benthic communities. Hence, additive and cumulative seabed and benthic habitat disturbance effects are considered negligible. Therefore, no change to the overall consequence level has resulted.	
Overall worst-case consequence	II – Minor

5.2.5 Demonstration of as low as reasonably practicable

There are no reasonably practicable better alternatives for installing subsea infrastructure. All reasonably practicable control measures were 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 Santos' risk management criteria and are considered appropriate to manage the impacts to ALARP.

In relation to spiritual and/or cultural heritage beliefs and connections to sea country and related concerns of some First Nations people, Dr Corrigan suggested that Santos consider engaging cultural monitors to provide guidance and advice on the protection and maintenance of the cultural and spiritual places and activities during the pipeline construction process (Corrigan, 2024). For example, a common practice is the use of ceremonies to introduce activities or the presence of strangers to spiritual beings (refer to Section 3.2.14.11), this has been adopted in the Coastal Waters CEMP where any First Nations Relevant Person has raised similar concerns, even if the concern was raised during consultation for the D&C EP and GEP EP and not expressly raised in relation to the Coastal Waters CEMP. Santos has also been implementing cultural heritage training and ceremony in the course of undertaking activities authorised pursuant to the GEP EP since November 2023 with broad support of First Nations communities as a culturally appropriate practice and response to cultural concerns. Santos considers that the adopted control measures (C6.2.10 and C6.2.12) based on the Corrigan 2024 Report recommendations and the adoption of control measure (C6.2.11) will reduce environmental impacts and risks to ALARP, as relevant to First Nations individuals who hold these concerns in relation to their beliefs.

5.2.6 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 OA to inform the assessment.
Are the risks and impacts consistent with the principles of ecologically sustainable development (ESD)?	Yes – activity evaluated in accordance with Santos' Offshore Division Environmental Hazard Identification and Assessment Guideline (EA-91-IG-00004), 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 as a threat to marine fauna, significant impacts 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 the Coastal Waters CEMP, legislative and regulatory requirements will be met as per Section 1.6.2 of the Coastal Waters CEMP. On 6 December 2023 and 10-11 January 2024, DCCEEW UCH Branch—responsible for administering the UCH Act—was consulted regarding the notification and management of potential UCH for the SURF EP. Feedback on C6.2.9 was affirmative and as a result also adopted for the Coastal Waters CEMP.
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 (Appendix A of the Coastal Waters CEMP).
Are performance outcomes, control measures and associated performance standards consistent with industry standards?	Yes – the most recent and comparable EPs accepted by NOPSEMA were reviewed for consistency with the performance outcomes, control measures and associated performance standards proposed in the Coastal Waters CEMP.
Have performance outcomes, control measures and associated performance standards taken into consideration Relevant Person feedback?	Yes – no objections or claims were specifically raised for this Activity. However, feedback received from the Corrigan 2024 Report, GEP EP and D&C EP has been considered and where applicable additional EPOs, CMs and EPSs (e.g. EPO-14, C6.2.6, C6.2.7, C6.2.9, C6.2.10, C6.2.11 and C6.2.12) were adopted.
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.

5.3 Noise emissions

5.3.1 Description of event

Event	Potential impacts from noise emissions may occur in the OA from the following sources: • vessel activities (e.g. vessel engines, thrusters and other machinery and equipment) • acoustic positioning system (USBL) on the pipelay and construction vessels, ROV and deployed equipment • ROV activities • survey equipment • helicopter activities. The potential for cumulative noise effects from the Activity and other marine users (e.g. fishing, tourism and shipping) is acknowledged. Therefore, the cumulative impacts have been considered in this assessment.
Extent	• Localised: a representative pipelay vessel will have sound levels which do not exceed the marine mammal behavioural disturbance threshold beyond 9.8 km. • Localised: a conservative estimate for the use of survey equipment is within a few hundred metres radius. • Localised: a conservative estimate for the use of acoustic positioning system is within hundreds of metres of the source.
Duration	Continuous vessel noise emissions during the pipelay activities are expected to occur cumulative period of ~1 week along the DPD pipeline route, with intermittent emissions from discrete activities (e.g. helicopter movements, ROVs, acoustic positioning and survey equipment etc).

5.3.1.1 Introduction

Santos commissioned a technical study into underwater noise impacts on marine fauna (JASCO, 2020) using contemporary criteria and has used the findings to inform the underwater noise emissions impact assessment. Noise sources involved in the activities described in the Coastal Waters CEMP include both non-impulsive and impulsive noise sources. 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, 2020). The relevant terminology for underwater acoustic levels relevant to non-impulsive sources are sound pressure levels (SPL), and accumulated sound exposure levels (SEL).

The assessment undertaken for the Barossa Development (ConocoPhillips, 2018) applied Southall et al. (2007) to assess potential hearing impairment in marine mammals. Southall et al. (2019) has improved the assessment approach for low-frequency (LF) cetaceans by determining the effect ranges and applying the unweighted SEL results and LF hearing group specific thresholds. Therefore, the modelling is considered conservative because it does not account for the weighting of frequencies for fauna that do not hear as well. Note also that Southall et al. (2021) reports further research recommendations that are aiming to improve the assessment of the severity of marine mammal behavioural responses to human noise.

5.3.1.2 Noise generated by vessels

Vessel operational noise includes machinery noise (e.g. engine noise), equipment noise (e.g. SBES) and hydrodynamic noise (e.g. water flowing past the hull, thruster use and propeller singing). The impacts associated with SBES (see Section 2.4 of the Coastal Waters CEMP) are considered negligible and hence not considered further. Machinery on a ship radiates sound through the hull into the water. During normal operations, the activity vessels will generate continuous noise from propeller cavitation, thrusters, hydrodynamic flow around the hull, and machinery and equipment operations. The activity vessels and their activities are listed in Table 2-3 of the Coastal Waters CEMP. Typically, 3 types of vessel operations occur under DP:

- vessel steaming at low speed during activity operation e.g. pipelay vessel
- manoeuvring during subsea infrastructure handling operations (supporting infrastructure installation may occur but is not expected in the OA)
- resupply activities to activity vessels.

For activity vessels, the noisiest anticipated activity is when the vessel uses thrusters to maintain its position. McCauley et al. (1998) measured underwater SPLs equivalent to approximately 182 dB re 1 µPa @ 1 m with a frequency range of 20 Hz to 10 kHz from a support vessel holding station in the Timor Sea. The thruster noise dropped below 120 dB re 1 µPa within 3–4 km and was audible above ambient noise up to 20 km away (McCauley,

1998). This has been taken as the greatest noise-generating activity for assessment purposes, as other vessel activities will require the vessel to be idle or moving. McCauley et al. (1998) measured underwater sound levels from the Pacific Ariki, a 64 m long support vessel with 6,000 kW main engines during calm conditions in the Timor Sea in 110 m of water while transiting at 11 knots, and found the distance to 120 dB re 1 µPa to be approximately 1 km.

5.3.1.3 Noise generated by a helicopter

Sound travelling 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/sea water 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 less than 13° (Richardson et al., 1995). 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 µPa (SPL) when the helicopter was 152 m from the surface and the hydrophone 3 and 18 m under the surface.

For context, the Bell 214ST uses a single powerful Lycoming LTC4B-8 engine of 2,185 kW (Frawley, 2003), while the modern Bell 412, often used as a rescue helicopter in Australia (Air Services Australia, 2020) uses twin 1,250 hp (930 kW) turboshaft engines (Bell Helicopter, 2012). Typical offshore crew change and medivac helicopters in Australia are Leonardo AW139s (Milne, 2019), which have been measured to be 2 dB(A) quieter than the Bell 412 helicopters (Air Services Australia, 2020).

Helicopter activities produce strong underwater sounds for brief periods when the helicopter takes off/lands on the vessel. Sound from helicopter activities is very localised and infrequent. Further, helicopter operations are expected to result in received underwater noise levels lower than those associated with vessel operations.

5.3.1.4 Noise generated from survey equipment

Survey activities will be undertaken within the OA to identify debris, seabed features, buried assets and obstructions. Survey activities may also be undertaken to confirm the location of the infrastructure and supporting structures with a duration of ~0.5 days per survey dependent on the area being surveyed. Survey methods will primarily involve:

- MBES, such as the Reson SeaBat 7125 transmitting at 400 kHz. At 400 kHz, it has a 1° beamwidth along the track, and a source level of 220 dB re 1 µPa (Coastal Frontiers, 2017)
- SBP with a chirp frequency range from 2 to 50 kHz, with 3 chirp transducers for 3 frequency ranges, 2 to 9 kHz, 10 to 20 kHz and 20 to 50 kHz. The in-beam estimated maximum source levels are about 200 to 205 dB re 1µPa @ 1 m (DOC, 2016). SBP with a boomer with a lower-frequency from 0.5 Hz to 5kHZ.
- SSS is generally considered a high acoustic density source and medium frequency generator. The frequency ranges from 75 to 900 kHz (Jiménez-Arranz et al., 2017). The sound pressure level ranges from 200–235 dB re 1µPa SPL.

5.3.1.5 Noise generated from acoustic positioning

A USBL acoustic positioning system will be used to accurately position ROVs and subsea equipment.

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

The USBL system uses a vessel-mounted transceiver to detect the range and bearing to a target using acoustic signals. An acoustic pulse is transmitted by the transceiver and detected by the subsea transponder (located on the ROV or piece of subsea equipment), which replies with its own acoustic pulse. This return pulse is detected by the shipboard transceiver. The time from the transmission of the initial acoustic pulse until the reply is detected is measured by the USBL system and is converted into a range. To calculate a subsea position, the USBL calculates both a range and an angle from the transceiver to the subsea beacon. Angles are measured by the transceiver, which contains an array of transducers. A method called ‘phase-differencing’ within this transducer array is used to calculate the angle to the subsea transponder. The transducer will then send sound signals, typically at 19–33 kHz to a USBL transponder. Table 5-5 details the nominal specifications of likely acoustic positioning systems as detailed in McPherson (2020).

Table 5-5: Specifications of nominal acoustic positioning systems

Manufacturer	Model	Source frequency (kHz)	Source level (dB re 1 µPa @ 1 m)
Kongsberg	HiPAP 500	33	206
Sonardyne	Ranger USBL	18–36	204

5.3.1.6 Noise generated from ROV operations

ROVs and associated mounted equipment (e.g. cutting device) may be launched from activity vessels to undertake the activities described in Sections 2.4.5.2 and 2.7.1 of the Coastal Waters CEMP. Typically, the noise generated from an ROV and associated mounted equipment will have a considerably lower intensity than vessel noise, survey equipment and acoustic positioning systems.

Underwater sound levels depend on the primary (noisiest) sound source rather than being strictly additive. ROV operations will be undertaken from a vessel, and thus will make little contribution to the overall noise emissions associated with vessel activities, survey equipment and acoustic positioning systems, as described in Sections 5.3.1.2, 5.3.1.4 and 5.3.1.5. ROVs and associated mounted equipment are not risk assessed further for noise impacts (see Section 5.3.1.7).

5.3.1.7 Summary of noise sources and rationale for assessment

Of the noise sources described in Sections 5.3.1.2 to 5.3.1.6, noise from helicopters and ROVs (and associated mounted equipment) is expected to be intermittent during the Activity and underwater received levels will not exceed that of activity vessels.

Therefore, the assessment focused on the operations of the activity vessels, survey equipment and acoustic positioning systems.

5.3.2 Nature and scale of environmental impacts

Potential receptors: threatened, migratory, or local marine fauna (marine mammals, marine turtles, sharks, rays, other fish and invertebrates); socioeconomic and cultural features. 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 3.2.14.9 and 3.2.14.10).

A PMST search was undertaken for the 20 km noise assessment boundary around the OA as a conservative buffer (Appendix D of the Coastal waters CEMP). One additional threatened species, the speartooth shark and one additional migratory species- the fork-tailed swift-was identified within the noise assessment boundary compared with the OA (Table 3-12). The 20 km noise assessment boundary intersects the flatback internesting BIA and habitat critical to the survival of the flatback and does not intersect any known marine mammal or bird BIA.

Marine fauna use sound in a variety of functions, including social interactions, foraging, orientation, and response to predators. Underwater noise can affect marine fauna in these ways:

- attraction
- disturbance, leading to behavioural changes or displacement to fauna. The occurrence and intensity of disturbance is highly variable and depends on a range of factors relating to the animal and situation
- disruption to underwater acoustic cues
- increased stress levels
- indirectly by inducing behavioural and physiological changes in predator or prey species
- localised avoidance
- injury to hearing or other organs; hearing loss may be temporary (TTS) or permanent (PTS)
- masking or interfering with other biologically important sounds (including vocal communications, echolocation, signals and sounds produced by predators or prey).

The nature and scale of impacts must be considered in the context of the ambient noise environment. Ambient underwater noise levels depend on location, and are often dominated by local wind noise, waves, biological noise and vessel traffic. Wind speed and seabed conditions have a clear influence on the ambient noise level. Fish choruses are capable of reaching very high levels, in excess of 130 dB re 1 µPa (McCauley, 2012). Anthropogenic underwater noise sources in the region comprise shipping and small vessel traffic, petroleum production and exploration drilling activities and sporadic petroleum seismic surveys.

Marine fauna respond variably when exposed to underwater noise from anthropogenic sources, with effects depending on various factors, including distance from the sound source, water depth and bathymetry, the animal's hearing sensitivity, type and duration of sound exposure and the animal's activity at the time of exposure. Broadly, the effects of sound on marine fauna can be categorised as:

- Acoustic masking – anthropogenic sounds may interfere with, or mask, biological signals, therefore reducing the communication and perceptual space of an individual. Auditory masking impacts could occur when audibility is reduced for one sound (signal) that is caused by the presence of another sound (noise). For this to occur, the noise must be loud enough and have a similar frequency to the signal, and both signal and noise must occur at the same time.
- Behavioural response – behavioural impacts will depend on the audible frequency range of each potential receptor in relation to the noise frequency—marine animals will only respond to acoustic signals they can detect, as well as the noise intensity. The intensity of behavioural responses of marine mammals to sound exposure ranges from subtle responses, which may be difficult to observe and have little implications for the affected animal, to obvious responses, such as avoidance or panic reactions. The context in which an animal receives the sound affects the nature and extent of responses to a stimulus. The threshold for eliciting behavioural responses depends on the received sound level and multiple contextual factors such as the activity state of animals exposed to different sounds, the nature and novelty of a sound, spatial relations between a sound source and receiving animals, and the gender, age, and reproductive status of the receiving animal.
- Physiological impacts – auditory threshold shift (temporary and permanent hearing loss) – marine fauna exposed to intense sound may experience a loss of hearing sensitivity or even potentially mortal injury. Hearing loss may be temporary (TTS) from which an animal recovers within minutes or hours, or permanent (PTS) from which the animal does not recover.

The levels of acoustic exposure that may result in injury or behavioural changes in marine fauna is an area of increasing research. Because of differences in experimental design, methods and units of measure, comparing studies to determine likely sound exposure thresholds can be difficult. After assessing the available scientific information, thresholds were defined to inform the impact assessment and interpret the estimated sound ranges. These are discussed for each receptor in JASCO (2020).

The assessment compared modelled received underwater sound levels to defined noise effect criteria, as determined by scientific research and academic papers (JASCO, 2020), 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).

5.3.2.1 Marine mammals

There are no known BIAs for marine mammals within the 20 km noise assessment boundary (Table 3-13). Therefore, marine mammals are unlikely to aggregate within the noise assessment area, however, cetaceans and sirenians may transit the area. The closest significant feature to the noise assessment boundary are breeding dolphin BIAs—spotted bottlenose (Darwin Harbour stock), Australian humpback (a sub-species of the Indo-Pacific humpback dolphin; Darwin Harbour and Van Diemen Gulf stock) and Australian snubfin (Darwin Harbour and Van Diemen Gulf stock) which are greater than 37 km away from the OA (refer to Table 3-13). The nearest whale (pygmy blue) BIA (migration) to the OA is greater than 600 km away and outside of the EMBA.

The PMST report for the 20 km noise assessment boundary identified several threatened marine mammal species, including whales (blue, fin and sei) and migratory marine mammal species, including dolphins and dugong (Appendix D of the Coastal Waters CEMP). A number of migratory species of whales may also occur within the noise assessment boundary, including humpback and Bryde's. These whales have been classified as LF cetaceans based on their hearing range. A number of odontocetes (including dolphins and killer whales) may also be transiting the noise assessment boundary and have been classified as high frequency (HF) cetaceans. For dugongs, there are no assessments for impacts of vessel noise on dugongs (sirenians) using the Southall et al. (2019) criteria. As their frequency-weighting is most similar to HF cetaceans, and their thresholds are higher (as they are less sensitive), results for vessel noise impacts on HF cetaceans have been used as a proxy for those on dugong, noting that this is likely to be conservative.

The Conservation Management Plan for the Blue Whale 2015–2025 (CoA, 2015a), Conservation Advice for *Balaenoptera physalus* (fin whale) (TSSC, 2015c) and Conservation Advice for *Balaenoptera borealis* (sei whale) (TSSC, 2015b) list noise disturbance as a threat, specifically relating to impulsive sound sources, such as seismic surveys, and acute industrial noise, such as pile driving. Although seismic surveys and pile driving are outside the scope of the Coastal Waters CEMP, survey activities are an impulsive sound source. Impulsive sound sources present a greater risk than most continuous sounds because of the high peak levels and frequent repetition (CoA, 2015a). Shipping noise in busy shipping channels is also identified as a potential source of noise emissions, although the risk assessment determines that consequences would be restricted to individuals, and no population-level effects are expected. The Conservation Management Plan for the Blue Whale 2015–2025 requires that

anthropogenic noise in BIAs will be managed such that any blue whales may continue to use the area without injury. Because the noise assessment boundary does not impact any blue whale BIA, impacts will be managed in adherence with the Management Plan (CoA, 2015a).

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 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 National Marine Fisheries Service (NMFS) (2018) and most recently by Southall et al. (2019). The categorisation 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.

For non-impulsive continuous noises, NMFS currently uses a step-function (all-or-none) threshold of 120 dB re 1 µPa SPL (unweighted) to assess and regulate noise-induced behavioural impacts for marine mammals (Table 5-6; NOAA, 2019). The behavioural disturbance threshold criteria applied uses the most recent scientific literature on the impacts of sound on marine mammal hearing, considered the most relevant to this activity.

Table 5-6 and Table 5-7 details marine mammal behavioural response, TTS and PTS thresholds for continuous noise (activity vessels) and impulsive noise (survey activities).

Table 5-6: Continuous noise: summary of marine mammals impact thresholds

Hearing group	NOAA (2019)	Southall et al. (2019)	
	Behaviour	PTS onset thresholds (received level)	TTS onset thresholds (received level)
	SPL (dB re 1 µPa)	Weighted SEL_{24h} ($L_E{}^{45}{}_{,24h;}$ dB re 1 µPa^{2}s)	Weighted SEL_{24h} ($L_E{}^{45}{}_{,24h;}$ dB re 1 µPa^{2}s)
LF cetaceans	120	199	179
HF cetaceans, including sirenians (dugongs)		198	178

Table 5-7: Impulsive noise: summary of marine mammals impact thresholds

Hearing group	NOAA (2019)	NMFS (2018); Southall et al. (2019)			
	Behaviour	PTS onset thresholds[46] (received level)		TTS onset thresholds[46] (received level)	
	SPL (dB re 1 µPa)	Weighted SEL_{24h} ($L_E{}^{45}{}_{,24h;}$ dB re 1 µPa^{2}s)	PK ($L_{pk}{}^{47}$; dB re 1 µPa)	Weighted SEL_{24h} ($L_E{}^{45}{}_{,24h;}$ dB re 1 µPa^{2}s)	PK ($L_{pk}{}^{47}$; dB re 1 µPa)
LF cetaceans	160	183	219	168	213
HF cetaceans, including sirenians (dugongs)	160	185	230	170	224

5.3.2.1.1 Potential impacts from activity vessels

Using the predicted noise levels (as described in Section 5.3.1.2), the estimated distances from activity vessels to behavioural and physiological thresholds (as listed in Table 5-6) for marine mammals were calculated and are provided in Table 5-8.

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

[45] *LE denotes cumulative sound exposure over a 24 hour period.*

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

[47] *Lpk denotes peak sound pressure and is flat weighted or unweighted.*

The *Audacia* has a similar total installed thruster power to the Mobile Offshore Drilling Unit (MODU) (outside the scope of the Coastal Waters CEMP) considered in McPherson et al. (2019), 35,000 kW compared to 30,400 kW. McPherson et al. (2019) consider the most recent criteria for potential physiological effects (Southall, 2019) (refer to Table 5-6) and the equivalent NMFS (2018) from vessels in water depths less than 600 m. Therefore, it has been considered where there are similarities to the sound sources for the Activity.

Table 5-8: Estimated distances to behavioural and physiological thresholds (as listed in Table 5-6) for marine mammals from vessels

Potential marine mammal receptor	Estimated distance (km)	Justification/ reference
PTS		
HF cetaceans, including sirenians (dugongs)	Not predicted to occur	McPherson et al. (2019), offshore support vessel under DP, MODU under DP
LF cetaceans	<110 m	McPherson et al. (2019), offshore support vessel under DP, MODU under DP
TTS		
HF cetaceans, including sirenians (dugongs)	<120 m	McPherson et al. (2019), offshore support vessel under DP, MODU under DP
LF cetaceans	<1.5 km	McPherson et al. (2019), offshore support vessel under DP, MODU under DP
Behaviour		
HF cetaceans, including sirenians (dugongs)	1.3 – 9.8 km	McPherson et al. (2019), offshore support vessel under DP (1.3 km) Zykov et al. (2013), pipelay vessel under DP in 80 m water (9.8 km)
LF cetaceans		

McPherson et al. (2019) demonstrate that in both the project location and for a reasonable surrogate using the latest criteria, PTS is not exceeded for HF cetaceans, including sirenians (dugongs).

Auditory masking impacts could occur when audibility is reduced for one sound (signal) that is 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 simultaneously. 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 auditory masking. Thus, the potential for masking and communication impacts is classified as high near the vessel (within tens of metres), moderate within hundreds of metres, and low within thousands of metres (Clark et al., 2009).

Generally, the spatial and temporal scale of behavioural (such as avoidance) response effects on marine mammals would be limited to the localised area surrounding the proposed activity vessels (thousands of metres) and periods of intensified activities. Because the pipelay vessel slowly moves along the DPD pipeline route at approximately 2 to 3 km per day and does not overlap any marine mammal BIA, significant effects at the population level are not expected—impacts will be managed in accordance with the Conservation Management Plan for the Blue Whale 2015–2025 (CoA, 2015a), Conservation Advice for *Balaenoptera borealis* (sei whale) (TSSC, 2015b) and Conservation Advice for *Balaenoptera physalus* (fin whale) (TSSC, 2015c).

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 vessel noise sources is limited to up to 2 km from Activity noise sources within the OA. Notably, the modelled exposure area for the SEL_{24} criteria represents an area within which the animals may be exposed to sound levels associated with impairment (PTS or TTS) if they remain within the ensonified area for a duration of 24 hours. The pygmy blue migration BIA is over 600 km away km from the OA and the pygmy blue foraging BIA is approximately 890 km from the OA. As such, the Activity is not inconsistent with the requirements of the Blue Whale Conservation Management Plan.

As outlined in Table 5-8, marine sound generated from vessel activities can cause behavioural responses, such as avoidance, in marine mammals within 1.3 to 9.8 km of the pipelay vessel.

While it is considered unlikely that transiting individuals would remain in close proximity to the sound source, PTS could occur in LF cetaceans within close proximity (<110 m) of the vessel. TTS could occur up to 1.5 km away for LF cetaceans and within close proximity (<120 m) for HF cetaceans, including sirenians (dugongs).

The impact risk is further reduced as the pipelay vessel slowly moves along the DPD pipeline route at approximately 2 to 3 km per day. The likelihood of an individual remaining within the distances above for any length of time is highly unlikely.

5.3.2.1.2 Potential impacts from helicopters

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

5.3.2.1.3 Potential impacts from survey and positioning equipment

McPherson (2020) indicates that both peak and frequency-weighted SEL noise emissions from survey equipment such as MBES operating at 400 kHz or SBP are typically below sound levels that could result in LF and HF marine mammal TTS or PTS from either PK or SEL criteria (Table 5-7) in a horizontal direction. The threshold for behavioural disturbance (Table 5-7) could be exceeded within 120 m (McPherson, 2020).

SSS and MBES sound levels are outside the auditory range of LF species such as baleen whales (e.g. humpback and pygmy blue whales) but within the mid-frequency and HF cetacean marine fauna auditory range (e.g. sperm whales and dolphins). However, PTS and TTS thresholds for these species (Table 5-7) are only expected to be exceeded close to the source. Due to the lack of aggregating areas 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.

Measurements of vessel mounted SBP indicated that the threshold for behavioural disturbance could be exceeded up to 141 m (NOAA, 2021).

The source levels for the positioning equipment are below those for the MBES. As the MBES will not cause the thresholds for physiological impact to be exceeded (Table 5-7), neither will the positioning equipment. However, the threshold for behavioural disturbance (Table 5-7) could be exceeded within 40 m (McPherson, 2020).

Survey and positioning equipment could cause masking of vocalisations of cetaceans due to the overlap in the frequency range between signals and vocalisations. Masking will primarily apply to HF cetaceans, including sirenians (dugongs), 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 LF 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 µPa (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 noise assessment boundary, 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.

5.3.2.2 Marine reptiles

The 20 km noise assessment boundary intersects the flatback turtle internesting BIA (>800 km of coastline) and habitat critical to the survival of the flatback turtle. The flatback turtle peak internesting period occurs between June to September and low-density nesting occurs during the wet season. Notwithstanding, the OA represents a minute fraction of the NT-wide total areas of flatback turtle BIA (internesting) and habitat critical to the survival of flatback turtles (nesting) shown in Figure 3-12. Furthermore, as the OA is located in water depths greater than 40 m and has a lack of foraging habitat, the potential numbers of affected internesting turtles is expected to be limited. The OA may also be traversed by green, olive ridley, loggerhead, leatherback and hawksbill turtles nesting in other areas of northern Australia as marine turtle migratory pathways are largely restricted to the waters less than 100 m deep (Pendoley, 2022a).

The Recovery Plan for Marine Turtles in Australia 2017–2027 (CoA, 2017b) highlights noise interference from anthropogenic activities as a threat to marine turtles. The plan refers to vessel noise and the operation of some energy infrastructure as sources of chronic (continuous) noise in the marine environment, exposure to which may lead to the avoidance of important turtle habitat. The recovery plan notes there is limited information available on

the impact of noise on marine turtles and that the impact of noise on turtle stocks may vary depending on whether exposure is short (acute) or long term (chronic). Turtles have been shown to respond to LF sound, with indications that they have the highest hearing sensitivity in the frequency range of 100–700 Hz (Bartol and Musick, 2003).

Finneran et al. (2017) presented revised thresholds for marine turtle injury and hearing impairment (TTS and PTS). Their rationale is that marine turtles have better auditory sensitivity at low frequencies and poor auditory sensitivity at other frequencies (Bartol and Ketten, 2006; Dow Piniak et al., 2012; Martin et al., 2012). Accordingly, TTS and PTS thresholds for turtles are likely more similar to those of fish than to marine mammals (Popper et al., 2014).

Studies show that marine turtle behavioural responses occur to received sound levels of approximately 166 dB re 1 µPa and that avoidance responses occur at around 175 dB re 1 µPa (McCauley et al., 2000). These levels overlap with the sound frequencies produced by activity vessels. Based on the limited data regarding noise levels that elicit a behavioural response in turtles, the lower level of 166 dB re 1 µPa from the National Science Foundation (NSF, 2011) is typically applied, both in Australia and by NMFS, as the threshold level at which behavioural disturbance could occur. The recommended criteria for continuous and impulsive sound sources for turtles are listed in Table 5-9 and Table 5-10.

Table 5-9: Continuous noise: criteria for vessel noise exposure for sea turtles

Potential marine fauna receptor	Popper et al. (2014)		Finneran et al. (2017) Weighted SEL_{24h} (dB re 1 μPa^2s)	
	Masking	Behaviour	PTS onset threshold	TTS onset threshold
Marine turtle	(N) High (I) High (F) Moderate	(N) High (I) Moderate (F) Low	220	200

Note: Relative risk (high, moderate, low) is given for animals at 3 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).

Table 5-10: Impulsive noise: criteria for impulsive noise exposure for turtles, adapted from Popper et al., 2014

Potential Marine Fauna Receptor	Masking	Behaviour	TTS	Recoverable Injury	Mortality and Potential Mortal Injury
Marine Turtle	(N) Low (I) Low (F) Low	(N) High (I) Moderate (F) Low	(N) High (I) Low (F) Low	(N) High (I) Low (F) Low	>210 dB SEL24h or >207 dB PK

Note: Relative risk (high, moderate, low) is given for animals at 3 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.

5.3.2.2.1 Potential impacts from vessels

Based on the criteria listed in Table 5-9, there is a low risk of acoustic 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. Turtles have not been shown to rely on sound for finding food or avoiding predators. Sounds potentially could be used by turtles in a social manner to synchronise activities during the nesting season (Ferrara et al., 2014); however, this has not been demonstrated for marine turtles. Turtle noises are relatively quiet (Ferrara et al., 2014) and thus would only have a limited range of detection by turtles even in ideal conditions, with masking from natural sounds likely. The impacts from masking are expected to be low. Such impacts are considered unlikely to affect marine turtle populations or distribution substantially.

5.3.2.2.2 Potential impacts from helicopters

Helicopter noise will be intermittent during the Activity and below the behavioural impact threshold (PTS and TTS). Impacts to marine turtles from helicopter noise are expected to be limited to short term behavioural impacts (i.e. diving or swimming rapidly) when the helicopter is taking off, based on measurements of helicopter noise (Richardson et al. 1995). Such impacts are considered unlikely to affect marine turtle populations or distribution substantially.

5.3.2.2.3 Potential impacts from survey and positioning equipment

The sound levels of the acoustic survey and positioning equipment (Sections 5.3.1.4 and 5.3.1.5) are below those associated with the PK criteria for injury (PTS and TTS) (Table 5-10) 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 5-10). 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 and positioning equipment are all outside of the hearing frequency range for turtles (approximately 50 to 2000 Hz, with the 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 and positioning equipment are considered unlikely to result in substantial impacts given that impacts are likely to be limited to physiological impacts in individuals located within tens of metres of the sound source, and behavioural impacts in individuals located within hundreds of metres of the sound source. 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.

5.3.2.2.4 Summary

Considering the offshore location and water depths of greater than 40 m within the OA, only individual turtles may be affected as they transit the area, and impacts from noise are not considered significant because:

- the 20 km noise assessment boundary intersects a minute fraction of the total area of flatback turtle internesting BIA (>800 km of coastline) and habitat critical to the survival of the flatback turtle
- there are no flatback turtle nesting sites within the noise assessment boundary
- vessel noise, and survey and positioning equipment are expected to be below the thresholds for PTS and TTS given the typical size of vessels used during the Activity and the slow vessel speeds within the OA; the received levels may result in behavioural impacts, but for a limited time and will not result in significant impacts
- individual marine turtles may traverse the 20 km noise assessment boundary but are unlikely to aggregate
- helicopter noise will be intermittent during the Activity and below the thresholds for behavioural impacts (PTS and TTS)
- following the impact thresholds outlined in Table 5-9 and Table 5-10, marine turtles are at low credible risk of mortality or permanent injury due to continuous noise sources, even near the source
- behavioural responses are expected to occur near the sources but will be limited to avoidance or a temporary change in swimming behaviour.

5.3.2.2.5 Sea snakes and crocodiles

There is limited information on the effects of noise on sea snakes and crocodiles. A current research project investigating the impacts of impulsive noise (based on seismic surveys, noting seismic surveys are outside the scope of the Coastal Waters CEMP) found that the hearing sensitivity of sea snakes is similar to species of fish without a swim bladder. Therefore, it is considered that there is a moderate risk in the near and intermediate distances (which extend hundreds of metres) of behavioural impacts to sea snakes, with the impacts being limited to temporary avoidance of the area. There are no known studies that have investigated the effects of noise on crocodiles so the thresholds for turtles shown in Table 5-9 and Table 5-10 are considered applicable. Such impacts are considered unlikely to result in substantial affects to sea snake populations or distribution. Crocodiles are considered to hold cultural significance as totemic species (Section 3.2.14.10).

5.3.2.3 Sharks, rays and other fish

The PMST report for the noise assessment boundary identified the speartooth shark additional to the several sawfish, ray, shark and other fish species listed in the PMST report for the OA (and Appendix D of the Coastal Waters CEMP). There are no known fish spawning or aggregation areas along the DPD pipeline route; however, individuals or schools may transit. The closest shoal that likely supports site attached fish is more than 16 km from the OA. No impacts to fish stocks are expected. The closest known fish BIA is approximately 460 km from the OA (whale sharks).

All fish species can detect noise sources, although hearing ranges and sensitivities vary substantially between species (Dale et al., 2015). Sensitivity to sound pressure in fish seems to be functionally correlated to the presence or absence of gas-filled chambers in the sound transduction system. These chambers enable fish to detect sound

pressure and extend their hearing abilities to lower sound levels and higher frequencies (Ladich and Popper, 2004; Braun and Grande, 2008). Based on their morphology, Popper et al. (2014) classified fish into 3 animal groups comprising:

- fish with swim bladders whose hearing does not involve the swim bladder or other gas volumes
- fish whose hearing does involve a swim bladder or other gas volume
- fish without a swim bladder that can sink and settle on the substrate when inactive.

Thresholds for PTS and recoverable injury are between 207 dB peak and 213 dB peak (depending on the presence or absence of a swim bladder), and the threshold for TTS is 186 dB SEL_{cum} (Popper et al., 2014). Because there are no exposure criteria for sawfish, sharks and rays, the same criteria are adopted, although these species do not possess a swim bladder.

The criteria defined in Popper et al. (2014) for continuous (Table 5-11) and impulsive (Table 5-12) noise sources were applied when assessing impacts to sharks, rays and other fish.

Table 5-11: Continuous noise: summary of fish impact thresholds

Potential marine fauna receptor	Mortality / 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 hours	158 dB SPL for 12 hours	(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

Source: Adapted from Popper et al., 2014

Note: Relative risk (high, moderate, low) is given for animals at 3 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 5-12: Impulsive noise: summary of fish impact thresholds

Potential marine fauna receptor	Mortality / potentially mortal injury	Impairment			Behaviour
		Recoverable injury	TTS	Masking	
Type 1 Fish: No swim bladder (particle motion detection); includes sharks and rays	> 219 dB SEL_{24h} or > 213 dB PK	> 219 dB SEL_{24h} or > 213 dB PK	>>186 dB SEL_{24h}	(N) Low (I) Low (F) Low	(N) High (I) Moderate (F) Low
Type 2 Fish: Swim bladder not involved in hearing (particle motion detection)	210 dB SEL24h or > 207 dB PK	203 dB SEL_{24h} or > 207 dB PK	>>186 dB SEL_{24h}	(N) Low (I) Low (F) Low	(N) High (I) Moderate (F) Low
Type 3 Fish: Swim bladder involved in hearing (primarily pressure detection)	207 dB SEL_{24h} or > 207 dB PK	203 dB SEL_{24h} or > 207 dB PK	186 dB SEL_{24h}	(N) Low (I) Low (F) Moderate	(N) High (I) High (F) Moderate
Fish eggs and fish larvae	> 210 dB SEL_{24h} or > 207 dB PK	(N) Moderate (I) Low (F) Low	(N) Moderate (I) Low (F) Low	(N) Low (I) Low (F) Low	(N) Moderate (I) Low (F) Low

Source: Adapted from Popper et al., 2014

Note: Relative risk (high, moderate, low) is given for animals at 3 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.

5.3.2.3.1 Potential impacts from vessels

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 but 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 could 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). Masking could occur within thousands of metres under a worst-case scenario of vessel operations, but typically any effect will be limited to within hundreds of metres.

Whale sharks are not considered to be particularly vulnerable to noise-related impacts and are categorised as 'fish with no swim bladder' when determining impact thresholds. Whale sharks would be expected to show avoidance to vessel noise, although they are likely to tolerate low-level noise—whale sharks have been observed swimming close to energy industry platforms on WA's North West Shelf.

Any presence of fish within the OA is expected to be of a transitory nature only, with no sensitive or significant benthic features known to be present that would cause an aggregation of fauna. In addition, impacts to fish are not considered to have the potential to be significant because noise levels from helicopters and vessels that may cause behavioural responses are expected to be within a radius of a few hundred metres of the noise source.

5.3.2.3.2 Potential impacts from survey and positioning equipment

The criteria defined in Popper et al. (2014) for impulsive noise sources has been adopted (Table 5-12). Impulsive noises from survey equipment could result in physiological impacts to fish located within metres of the sound source, considering the results presented in Sections 5.3.1.4 and 5.3.1.5.

Behavioural impacts to fish from survey equipment noise could 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 LF 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).

Impacts to fish are not considered to have the potential to be significant because noise levels from helicopters, vessels, survey or positioning equipment that may cause behavioural responses are expected to be within a radius of a few hundred metres of the noise source.

5.3.2.4 Invertebrates

5.3.2.4.1 Potential impacts from vessels

Benthic invertebrates are considered unlikely to be negatively impacted from noise generated due to their distance from vessel activities (i.e., water depth is greater than 40 m) or from other Activity sources (such as ROVs). There are no thresholds or guidelines regulating the exposure of marine invertebrates to underwater noise.

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 what, extent marine invertebrates use acoustic cues to communicate with others of their species or their environment. Anecdotal information indicates no functional relevance of sound for these animals. However, vibration, such as ground-borne or near-field particle motion, can be assumed to have functional relevance—vibration can provide 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 of noise-generating sources. In the worst-case scenario, the consequence of acoustic/vibrational masking is considered to be moderate for individuals. A limited number of individuals are expected to experience this masking; thus, it would have a negligible effect at a population level.

Limited and inconclusive data are 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. However, in the absence of conclusive scientific information on the scope of these effects and the animals' ability to compensate for them, it is impossible to assess the consequences of behavioural responses and noise-induced impairment or injury.

Plankton and pelagic invertebrates could drift close to high-energy noise sources (e.g., bow thrusters). However, any negative impacts that could occur would be restricted to within metres of the sound source, apart from physical

damage at that close range. At such a localised extent, noise impacts would be negligible at an ecosystem or population level.

5.3.2.4.2 Potential impacts from survey and positioning 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 HF 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.

5.3.2.5 Socioeconomic

Impacts to socioeconomic receptors, including commercial fisheries, recreation and tourism are considered to be minor due to the localised and temporary noise levels and low socioeconomic activity levels expected within the noise assessment boundary.

5.3.2.6 Cultural features

No First Nations people feedback was provided about potential noise impacts to any geographically specific cultural features (excluding marine fauna species) during consultation (refer to Table 4-10). The potential direct or indirect impacts to culturally significant marine fauna species (such as dreaming/song and totem species including whales, dolphins, dugongs, crocodiles, sawfish, sharks, rays and other fish) are assessed in Sections 5.3.2.1 to 5.3.2.4.

In the 2022 Statement of Reasons Requests, the Tiwi clan members raised their concern regarding traditional hunting of marine species and totem species. First Nations people maintain a continuing spiritual connection with sea country, including marine fauna species with cultural significance, such as totems or as a cultural food source. The potential impacts to culturally significant marine fauna species are likely to be limited to localised, temporary behavioural impacts (see Sections 5.3.2.1 to 5.3.2.4). It is unlikely to result in significant impacts to marine species at the individual or population level. Consequently, it is anticipated that noise emissions are unlikely to impact traditional hunting practices or resources.

During consultation with Tiwi Clans for the D&C EP, concerns were raised about the potential impact from drilling noise emissions on their dreaming totems (including turtle totems). Tiwi clients of the EDO also raised concerns about the potential impacts to marine life by noise from the drilling 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 drilling activity this could impact Tiwi people and make them sick.

As presented in Section 3.2.14, some First Nations peoples' cultural beliefs place significance on culturally important spiritual beings and the protection they afford First Nations communities from natural disasters and sickness. 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. Of direct relevance these sorts of Tiwi cultural and spiritual values were tested in the Federal Court and were found not to be consistently spread amongst relevant Tiwi Islanders and in any event did not represent a particular 'place' of cultural and spiritual significance.

Santos notes that existing subsea infrastructure has previously been placed on the seabed in the region, such as the Bayu-Undan pipeline since approximately 2006, the Ichthys Pipeline since approximately 2016, the North West Cable System since approximately 2016 and the GEP since 2023. The region also has a history of significant historic and ongoing industrial shipping, fish trawling activities and drilling of almost 900 offshore wells. There is no evidence to support actual adverse effects from the actions of spiritual beings in response to impacts on the environment from these activities.

Santos recognises the importance of cultural and spiritual beliefs to First Nations people. Santos recognises that some First Nations people remain concerned about the potential for adverse consequences to First Nations people and natural environment, that may arise as a result of disturbance from the Barossa Gas Project to spiritual dreaming and culturally important spiritual beings. Santos understands the spiritual protection believed to be afforded to the First Nations 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 (Corrigan, 2023).

Dr Corrigan (2024) documented input from Larrakia people and relevant First Nations persons from Belyuen and Wagait, who advised the presence of a range of ancestral beings and dreaming stories of relevance to the Darwin Harbour, surrounding seas and the DPD Project footprint. None of these cultural features are known to be associated with any specific or particular places in the DPD Project footprint, but rather have a more general association with the wider area, as well as having associations with particular and specific places outside of the DPD Project footprint. In this regard, Dr Corrigan identified the following recommendation, as put to him by First Nations people:

"*that Santos consider engaging cultural monitors to provide guidance and advice on the protection and maintenance of the cultural and spiritual places and activities throughout the DPD construction process...*" (Corrigan, 2024)

Santos considers that control measure based on Dr Corrigan's recommendations will allow intangible impacts and risks to be reduced to ALARP and an acceptable level and has adopted these recommendations as C6.2.10 and C6.2.12. Santos has also considered those concerns relating to potential noise impacts relating to other Barossa Gas Project EPs and where applicable additional EPOs, EPSs and CMs have been adopted.

5.3.2.7 Summary

The marine fauna impacts of the Activity will be limited due to the short-term nature of installation activities (cumulative duration of ~1 week) and the low sound levels generated by the Activity. Activity noise levels may cause marine fauna behavioural responses, such as avoidance, that are expected to be confined to the noise assessment boundary and concentrated within a radius of approximately 9.8 km to a few hundred metres of the noise source, depending upon the noise sources and operations.

No known marine mammal BIAs occur within the noise assessment boundary. A flatback turtle internesting BIA and habitat critical to survival occur within the noise assessment boundary. Due to the OA water depths (greater than 40 m), the BIA extending across more than 800 km of coastline, a lack of foraging habitat and that no aggregations are expected, the potential numbers of affected internesting turtles are expected to be limited. Migratory and threatened fauna, including turtles are considered likely to be limited to transiting individuals due to the distance from the coastline, water depth and lack of foraging habitat within the OA.

Noise effects to fish of potential commercial value would be restricted to within hundreds of metres of the noise source.

Negligible effects to benthic invertebrates are expected, including those of commercial value.

5.3.3 Environmental performance outcomes and control measures

The EPOs relating to this event include:

- No significant impacts to marine fauna from noise emissions [EPO-03]
- No significant impacts to cultural features from the Activity [EPO-14].

An assessment of the environmental benefits and the potential costs or issues associated with control measures for this activity are described in Table 5-13 to demonstrate the potential impacts from this aspect are ALARP. Control measures that are adopted have associated EPSs and measurement criteria, and are presented in Table 7-2. Rejected control measures have an ALARP evaluation provided to justify their rejection.

Table 5-13: Control measure evaluation for noise emissions

CM reference	Control measure	Environmental benefit	Potential cost/issues	Evaluation
Standard control measures				
C6.3.1	Apply Santos' Protected Marine Fauna Interaction and Sighting Procedure (EA-91-II-00003) to vessel and helicopter activities when in the vicinity of cetaceans and turtles (isolation control)	Santos implements EPBC Regulations– Part 8 Division 8.1 Interacting with cetaceans (and applied for marine turtles) where vessel crew act as marine fauna observers (MFOs) to reduce the risk of a collision with marine fauna (Section 6.3). Reduces potential noise impacts by maintaining a minimum separation distance between	Operational costs to adhere to marine fauna interaction restrictions, such as vessel and helicopter speed and direction, are based on legislated requirements and must be accepted.	**Adopted** – Note, control measure is aligned with EPBC Regulations (Part 8).

CM reference	Control measure	Environmental benefit	Potential cost/issues	Evaluation
		cetaceans and turtles and the activity vessel. It also reduces helicopter noise levels received at the sea surface during flight by maintaining a minimum separation distance between the cetaceans and the helicopter. Reduces the potential impacts to culturally significant marine species, including totemic species, such as marine turtles and marine mammals.		
C6.1.1	Activity vessels equipped and crewed in accordance with Australian maritime requirements (administrative control)	Reduces noise emissions by ensuring contracted vessels are operated, maintained and crewed in accordance with industry standards and regulatory requirements.	Costs are expected as part of standard procedure.	**Adopted**
C6.2.5	Vessel planned maintenance system (administrative control)	Ensures equipment that generates noise is operating optimally and sound source levels are appropriately verified and within desired operating range.	Costs are expected as part of vessel maintenance requirements.	**Adopted**
Additional control measures				
C6.1.8	HSE inductions will include environmental requirements and cultural values (administrative control)	Ensures that crew are aware of the stringent Coastal Waters CEMP, Santos and legislative requirements. Ensures personnel are suitably aware of cultural features and values.	Administrative costs to update existing Santos procedure and induction materials and train personnel.	**Adopted**
C6.2.10	Cultural heritage training and cultural ceremony (administrative control)	Santos has been implementing cultural heritage training and ceremony in the course of undertaking activities authorised pursuant to the GEP EP since November 2023 with broad support of First Nations communities as a culturally appropriate practice and response to cultural concerns.	Time and cost to work with First Nations communities.	**Adopted**
C6.2.12	First Nations cultural heritage monitor in the field, subject to availability of the First Nations cultural heritage monitor	Provides guidance and advice on the protection and maintenance of the cultural and spiritual places and activities throughout the pipelay and pre-commissioning activities.	Time and cost to liaise with relevant First Nations Groups and work with the First Nations cultural heritage monitor.	**Adopted**
C6.3.2	A crew member trained in marine fauna observations (MFO) will be present on the	Improved ability to spot and identify marine fauna. This control measure is also	Operational costs to adhere to training crew	**Adopted**

CM reference	Control measure	Environmental benefit	Potential cost/issues	Evaluation
	pipelay and construction vessel bridge at all times during daylight hours and will continuously monitor and record marine fauna present in the caution zone (administrative control)	consistent with EPBC Regulations Part 8 and Condition 2b of EPBC 2022/09372.	members as MFOs and implementation.	
C6.3.3	Helicopter planned maintenance system (administrative control)	Ensures helicopter engine and equipment that generates noise is operating optimally and sound source levels are appropriately verified and within desired operating range.	Costs are expected as part of helicopter maintenance requirements.	**Adopted**
N/A	Manage the timing of the Activity to avoid sensitive periods such as migration (whales), spawning (fish) or nesting (turtles) (administrative control)	Reduces potential impacts to fauna during key life stages.	Reduces the window of opportunity for undertaking the Activity.	**Rejected** – not considered necessary or feasible as primary noise is from vessel DP thrusters and engines. The OA does not overlap with any whale migration BIAs and therefore seasonal presence of species is not expected to be higher at certain times of the year. Additionally, given the low potential impacts to individual fauna including marine turtles, significant impacts to migratory or nesting behaviours are not expected, therefore, no impacts at a population level are predicted that would warrant altering the timing of the Activity.
N/A	Noise management plan (administrative control)	Impacts are predicted to be minor (e.g. potential temporary and minor behavioural changes); therefore, a noise management plan, and associated management controls, will have little or no benefit in terms of outcomes (i.e. reducing impacts further).	Personnel costs of preparing and reviewing the management plan.	**Rejected** – the Activity does not occur near any resting, foraging, calving or confined migratory pathway for protected cetacean species, therefore the cost associated with developing a management plan outweighs the little or no benefit for a short duration activity that has a minor impact (e.g. potential temporary and minor behavioural changes).

CM reference	Control measure	Environmental benefit	Potential cost/issues	Evaluation
N/A	Verification of noise levels (administrative control)	Allow adaptive management controls to be implemented if impact is greater than expected. May help verify estimated potential noise impact zones.	Costs of deploying noise monitoring equipment and processing data. Field monitoring program not warranted where potential impacts are low risk.	**Rejected** the OA does not occur in any resting, foraging, calving or confined migratory pathway for protected marine mammal species. Very short-term presence of vessels (approximately 1 week's duration) would prevent noise verification being completed before the Activity is finished. Cost disproportionate to the increase in environmental benefit given that the rapid reduction in noise levels from vessels and the low-level behavioural response expected.
N/A	Helicopters will not land or take off if marine megafauna are present in the vicinity of an activity vessel (elimination control)	Reduces potential impacts to megafauna.	May impact safety during landing or take off.	**Rejected** – increased exposure risk to passengers. Risk of exhausting fuel supplies.

5.3.4 Environmental impact assessment

Receptor	Consequence level
Noise emissions	
Threatened, migratory or local fauna	While the level of noise expected from temporary and intermittent operational activities has the potential to cause physical injury to marine fauna, most species that may transit through the OA are expected to demonstrate avoidance behaviour if noise levels approach those that could cause pathological effects. Avoidance behaviour is likely to be localised (less than 1 km) within the area of the activity vessels (due to the small spatial extent of elevated noise) and temporary (duration of the activity vessels operating). Impacts to marine mammals from underwater noise generated by the Activity are considered unlikely to be substantial given that there are no significant feeding, breeding or aggregation areas in the vicinity of the OA. The closest marine mammal BIA is the dolphin breeding BIA, located approximately 37 km from the OA, outside the area predicted to exceed thresholds for behavioural, masking or physiological impacts. The nearest whale (pygmy blue) BIA (migration) is greater than 600 km away. Any responses will be limited to transiting individuals, which is unlikely to result in substantial impacts to marine mammal populations or distribution. Behavioural impacts may include increased swimming speed, changes in dive behaviour or avoidance of the area. Such impacts would be temporary, with no significant impacts predicted to individuals or populations. Potential behavioural impacts from underwater noise will be limited to within 9.8 km of activity vessels. There is potential for TTS to occur within 120 m and 1,500 m from the source for HF cetaceans, including sirenians (dugongs) and LF cetaceans, respectively. The potential for PTS in LF cetaceans is estimated to be within 110 m of the source. Notably, the modelled exposure area for the SEL_{24} criteria represents an area within which the animals may be exposed to sound levels associated with impairment (PTS or TTS) if they remain within the ensonified area for a duration of 24 hours. Given the pipelay vessel will be travelling at approximately 2-3 km per day, the transitory presence of marine mammals and the absence of any areas important for critical behaviours (feeding, breeding or resting), significant impacts to marine mammals are not credible. Further, it is anticipated that individuals may show avoidance behaviour in response to the continuous noise sources before respective TTS and PTS thresholds are exceeded. Behavioural impacts to fish from survey equipment noise may occur in individuals located within hundreds of metres of the source. Survey 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 aggregating areas for these species and significant distances to the

Receptor	Consequence level
	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. In the Recovery Plan for Marine Turtles in Australia 2017–2027 (CoA, 2917b), noise interference to marine turtles depends on whether the exposure is short (acute) or long-term (chronic). The noise generated by the Activity is acute, with impacts restricted to localised changes in behaviour within hundreds of metres of the source. The 20 km noise assessment boundary intersects the flatback internesting BIA and habitat critical to the survival of the flatback. However, due to the OA water depths (greater than 40 m), the BIA extending across more than 800 km of coastline, a lack of foraging habitat and that no aggregations are expected, the potential numbers of affected internesting turtles are expected to be limited. Potential impacts to marine turtles from underwater noise are considered unlikely to result in substantial impacts to populations or distribution given that impacts are likely to be limited to behavioural and masking impacts within a relatively small area of important turtle habitat. Noise effects to other marine reptiles are likely to be limited to individual marine turtles transiting the area within tens of metres of the sound source. Potential impacts to threatened or migratory sawfish, sharks, rays or other fish species are limited to the potential for avoidance behavioural responses within hundreds of metres of the source. Although there is the potential for TTS within this range, this is not expected due to noise avoidance behaviour. Impacts to fish are not considered to have the potential to be significant because noise levels from noise sources that may cause avoidance behavioural responses are expected to be within a radius of a few hundred metres of the noise source. Other protected species are not expected to be affected given their wide distribution (in the case of sea snakes, crocodiles and sharks), distances to seabird breeding colonies, and preference for shallow coastal habitats (sawfish). For the above reasons, no substantial change to threatened and migratory species is anticipated that may: • lead to a long-term decrease in the size of a population • reduce the area of occupancy of the species • fragment an existing population into 2 or more populations • adversely affect habitat critical to the survival of a species • displace threatened and migratory marine fauna from habitat critical to the survival of a species areas • disrupt biologically important behaviours of threatened and migratory marine fauna within BIAs • disrupt the breeding cycle of a population • modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline • interfere with the recovery of the species. The consequence of noise emissions is assessed as II – Minor.
Physical environment or habitat	Not applicable – no impacts to physical environments or habitats from noise emissions are expected.
Threatened ecological communities	Not applicable – no threatened ecological communities have been identified in the area over which noise emissions are expected.
Protected areas	Not applicable – no protected areas have been identified in the area over which noise emissions are expected.
Socioeconomic receptors	The consequence of noise emissions on receptors is assessed as II – Minor. Impacts to fauna, including fish and other marine species is likely to be limited to temporary behavioural impacts within a 9.8 km radius around activities, and will not result in significant impacts to marine species at the individual or population level. Given the negligible consequence to marine species, subsequent impacts to commercial fish stock are not anticipated. Impacts to socioeconomic receptors, including commercial fisheries, recreation and tourism are considered to be minor due to the localised and temporary noise levels and low socioeconomic activity levels within the noise assessment boundary.
Cultural features	No First Nations people feedback was provided about potential noise impacts to cultural features during consultation. An important outcome of Dr Corrigan's research is that no sacred sites or dreamings are shown to be directly impacted by the proposed DPD project footprint, however some marine species are known to be associated with dreamings and songs (Corrigan, 2024). It is anticipated that noise emissions are unlikely to impact traditional hunting practices or resources. 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. Santos notes that existing subsea infrastructure has previously been placed on the seabed in the region, such as the Bayu-Undan pipeline since approximately 2006, the Ichthys pipeline since

Receptor	Consequence level
	approximately 2016, the North West Cable System since approximately 2016 and Barossa GEP since 2023. The region also has a history of significant historic and ongoing industrial shipping, fish trawling activities and drilling of almost 900 offshore wells. There is no evidence to support actual adverse effects from the actions of spiritual beings in response to impacts on the environment from these activities. Notwithstanding, in response to the concerns raised by some First Nations people during consultation for the D&C EP and the GEP EP (noting no concerns were raised by First Nations people for this Activity during the development of the Coastal Waters CEMP), a control measure (C6.2.10) relating to cultural heritage training and cultural ceremony and a control measure (C6.2.12) for a First Nations cultural heritage monitor in the field subject to availability were developed with input from Relevant Persons and acknowledges the recommendations by First Nations people as suggested to Dr Corrigan (Corrigan, 2024). Santos considers the adoption of C6.2.10, C6.2.12 and EPO-14 practicable and appropriate.
Cumulative impacts	
There is a potential for cumulative vessel noise from the Activity and other marine users, such as fishing and shipping, in the surrounding area. However, is not anticipated that there will be any significant cumulative noise emission impacts from Activity vessels and other marine users due to the: • short-term nature of the Activity (cumulative period of ~1 week) • limited concurrent operations in OA – most likely to be supply vessel and pipelay vessel operations. • offshore location of the OA • low sound levels generated by continuous vessel noise sources • Activity vessel speeds in the OA will be limited to ≤8 knots • marine fauna are expected to be limited to transiting individuals • other marine user vessels are not expected within the 500 m exclusion zone of the pipelay vessel, and construction vessel if required, and likely to be transiting. Therefore, negligible additive and cumulative noise effects are expected, and no change to the overall consequence level is expected to result.	
Overall worst-case consequence	II – Minor

5.3.5 Demonstration of as low as reasonably practicable

The use of vessels on DP, survey equipment, acoustic positioning and ROVs for the Activity are unavoidable as there are no other options for safe installation methods. The activity vessels are expected to produce similar noise emissions to other marine vessels that frequent or transit through the vicinity of the OA. The proposed management controls will verify that the activity vessels and subsea acoustic position systems are operating optimally; hence sound levels are expected to be within the normal operating range.

The sound levels generated by surveys are medium– to high–frequency and decay rapidly with distance travelled from the source, as demonstrated by Zykov (2013), with the furthest distance survey noise is expected to travel being hundreds of metres. Note that marine fauna affected in varying degrees by acoustic noise (i.e., marine mammals, marine reptiles, sawfish, sharks and fish) are all expected to avoid the source of noise and will unlikely remain within the ensonified area for a duration of 24 hours. Avoidance behaviours are likely to be from a small area and to be temporary.

Using helicopters to transfer personnel to and from activity vessels is necessary to allow operational activities to occur safely and effectively. Some personnel also need to be rotated to and from other locations, and a rapid method to transfer personnel is required in 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. Lastly, the use of additional vessels for crew transfer would also prolong the presence of noise generating sources (i.e. vessel engines and thrusters) within the OA.

All reasonably practicable control measures were reviewed and those adopted are considered appropriate to manage the impacts such that the residual consequence is assessed to be II – Minor. The proposed management controls are in accordance with Santos' risk management criteria and are considered appropriate to reduce impacts to ALARP.

In relation to spiritual and/or cultural heritage beliefs and connections to sea country and related concerns of some First Nations people, Dr Corrigan reported the suggested that Santos consider engaging cultural monitors to provide guidance and advice on the protection and maintenance of the cultural and spiritual places and activities during the pipeline construction process (Corrigan, 2024). For example, a common practice is the use of ceremonies to introduce activities or the presence of strangers to spiritual beings (refer to Section 3.2.14.11), this has been adopted in the Coastal Waters CEMP where any First Nations Relevant Person has raised similar

concerns, even if the concern was raised during consultation for the D&C EP and GEP EP and not expressly raised in relation to the Coastal Waters CEMP. Santos has also been implementing cultural heritage training and ceremony in the course of undertaking activities authorised pursuant to the GEP EP since November 2023 with broad support of First Nations communities as a culturally appropriate practice and response to cultural concerns. Santos considers that the adopted control measure (C6.2.10 and C6.2.12) based on the Corrigan 2024 Report recommendations will reduce environmental impacts and risks to ALARP, as relevant to First Nations individuals who hold these concerns in relation to their beliefs.

The proposed management controls are in accordance with Santos' risk management criteria and are considered appropriate to reduce impacts to ALARP.

5.3.6 Acceptability evaluation

Is the consequence ranked as I or II?	Yes – maximum consequence from noise emissions 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 the risks and impacts consistent with the principles of ecologically sustainable development (ESD)?	Yes – activity evaluated in accordance with Santos' Offshore Division Environmental Hazard Identification and Assessment Guideline (EA-91-IG-00004), 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 Table 3-14, including: **Conservation Advice:** • Conservation Advice for *Balaenoptera physalus* (fin whale) (TSSC, 2015c) • Conservation Advice for *Balaenoptera borealis* (sei whale) (TSSC, 2015b) **Recovery Plans:** • Conservation Management Plan for the Blue Whale 2015–2025 (CoA, 2015a) identifies noise interference as a threat to blue whales. No known BIAs for the pygmy blue whale occur within the noise assessment boundary. • Recovery Plan for Marine Turtles in Australia 2017–2027 (CoA, 2017b) identifies noise interference as a threat to marine turtles. Recovery plans / conservation advice for other species that may occur in the noise assessment boundary do not identify noise emissions as a key threat or have explicit relevant objectives or management actions related to noise emissions. The noise assessment boundary does not overlap any AMP or protected area. The objectives and actions of these publications were considered during impact and risk assessments. For all the plans identified above, the objectives are achieved by adopting EPO-03 and the controls outlined in Table 5-13 are consistent with the objectives of the material listed above and Santos considers the impacts of noise emissions to be not inconsistent with these objectives.
Are performance outcomes, control measures and associated performance standards consistent with legal and regulatory requirements?	Yes – management measures are consistent with EPBC Regulations Part 8 and Condition 2b of EPBC 2022/09372. Through acceptance of the Coastal Waters CEMP, legislative and regulatory requirements will be met as per Section 1.6.2 of the Coastal Waters CEMP
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 (Appendix A of the Coastal Waters CEMP).
Are performance outcomes, control measures and associated performance standards consistent with industry standards?	Yes – the most recent and comparable EPs accepted by NOPSEMA were reviewed for consistency with the performance outcomes, control measures and associated performance standards proposed in the Coastal Waters CEMP.
Have performance outcomes, control measures and associated performance standards taken into consideration Relevant Person feedback?	Yes – Relevant Person feedback indicated no recommendations for revising the EPO, CMs or EPSs.

	However, feedback received during the development of other Barossa Gas Project EPs and the Corrigan 2024 Report has been considered and where applicable, additional EPOs, CMs and EPSs (e.g. EPO-14, C6.2.10, C6.2.12 and C6.3.2) were adopted.
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 Activity will be conducted over a very short time period where it is anticipated that there is a relatively low probability of encountering significant numbers of noise-sensitive fauna. During pipelay activities, the pipelay vessel will be travelling at approximately 2 to 3 km per day, therefore vessel noise will not impact any one location for an extended duration.

Minimal behavioural changes are expected from all marine fauna in the noise assessment boundary, and therefore the minor impacts expected from these noise sources are considered environmentally acceptable. No long-term harm is expected to result to EPBC Act listed marine fauna during operational activities. Through adherence to Santos' Protected Marine Fauna Interaction and Sighting Procedure (EA-91-II-00003), which drives compliance with EPBC Policy Statement Part 8, and EPS6.3.2.1, whereby a crew member trained in marine fauna observations (MFO) will be present on the pipelay vessel bridge at all times during daylight hours and the vessel master or crew act as wildlife observers, the Activity is considered acceptable to undertake in the area. In addition, no concerns from stakeholders have been raised to indicate that the Activity will have any unacceptable impacts to socioeconomic receptors as a result of noise. The noise generated from vessels, helicopters, survey equipment and acoustic positioning and the potential impacts are well documented. With the controls proposed including EPBC Regulations Part 8 (Vessels and Aircraft) and aligned with the applicable management actions outlined in relevant recovery plans and approved conservation advice, the potential consequences of impacts to noise-sensitive receptors in the area are assessed to be II – Minor and ALARP.

5.4 Light emissions

5.4.1 Description of event

Event	Light emissions will occur from activity vessels and other support (see Section 2.4 of the Coastal Waters CEMP). Activity vessels and other support will routinely use external lighting to facilitate navigation and safe operations at night. Lighting typically comprises bright white (i.e. metal halide, halogen, fluorescent) lights, and is similar to that used in other offshore activities in the region, including fishing and shipping. Lighting levels will be determined primarily by operational safety and navigational requirements under relevant legislation, specifically the *Navigation Act 2012* (Cth). Activity vessels will be required to generate and use navigational lighting at night to indicate their position and they must indicate their limited ability to manoeuvre during operations under the *Navigation Act 2012* (Cth). Spot lighting may be used on an as-needed basis, such as when deploying or retrieving equipment. The ROV will be used during the activity and spot lighting will be used when it is working underwater. Lighting will typically comprise bright white (i.e. metal halide, halogen, fluorescent) lights. Lighting will be limited to that required for safety and navigational purposes on the activity vessels.
Extent	The light assessment boundary of 20 km from the source is considered representative of the extent of light exposure, in accordance with National Light Pollution Guidelines for Wildlife (DCCEEW, 2023b). This additional 20 km buffer around the OA is the extent relevant to the impact assessment for planned light emissions. Cumulative modelling of 2 vessels working together indicates that light is predicted to reduce to below ambient levels at approximately 21.6 km and potential behavioural impacts to turtles is limited to 4.5 km (Pendoley, 2022a).
Duration	Navigational, safety and task lighting is required on a 24-hour basis for the duration of the Activity (prior to the preservation period) being of approximately 1 week cumulative duration, as described in Section 2.

5.4.2 Nature and scale of environmental impacts

Potential receptors: threatened, migratory or local fauna (marine mammals, marine turtles, sharks, rays, other fish and seabirds); socioeconomic; and cultural features

To humans, light is visible between wavelengths of approximately 380–780 nanometres between the violet and red regions of the electromagnetic spectrum. In fauna it is visible between 300 and more than 700 nanometres, depending on the species. Some fauna do not see long wavelength red light at all, while others see light beyond the blue-violet end of the spectrum and into the ultraviolet (DCCEEW, 2023b). Therefore, the source of impact from light not only relates to the amount of artificial light, but also the types of light and the wavelengths that the different light types emit.

Activity vessels will have external lighting to provide a safe working environment and to comply with relevant maritime navigation requirements at night. Light from the larger construction vessels will be the most visible and therefore was used to determine the worst-case distance that light may be visible for activity vessels.

Figure 5-1 provides photographs of a typical pipelay vessel, *Audacia*, with lights on at dusk. Lights include:

- regular halogen light bulbs (60–75 watt) and fluorescent lights (18–36 watt) that illuminate various gangways throughout the vessel and will be on all night for safety reasons
- floodlights of various power ratings (250–500 watt) that illuminate working areas
- helideck lights including floodlights (35 watt) and LEDs (3 watt) that provide lighting for the helicopter platform during night-time operations. Such lighting is obligatory but the platform will only be lit for safe helicopter landing and take off activities (e.g. medivacs or inspections). This lighting will be turned off during normal operations at night that do not involve helicopters
- navigation LEDs, which are installed at various locations around the vessel and are obligatory
- search lights, which are very bright but used only in emergency situations; these are turned off under normal operation.

Figure 5-1: Photographs of a typical pipelay vessel at dusk

Light modelling was undertaken for construction vessels to predict the extent of biologically relevant light spill. Specifics of the respective vessels' lighting design and luminaire specifications were applied to the Illumina Artificial Light At Night (ALAN) model (Aubé et al., 2005). The Illumina model is a 3D model that accounts for both line of sight and atmospheric scattering, allowing the attenuation of light over distance and extent of light glow to be modelled.

Since light sources (i.e. individual luminaires) can be placed individually within the area of interest, the model can replicate specific lighting designs in terms of light type, spectral distribution, height and orientation of individual luminaires, including any shielding, thus increasing model accuracy. This information was extracted from lighting layout drawings and light manufacturer data sheets for a typical pipelay and construction vessel, *Audacia* and *Fortitude* respectively. The model assumed that all vessel lights were turned on (apart from search lights, which are only used in an emergency) with no additional shielding other than that provided by the vessel structures. It also assumed vessels were orientated north–south and that cloud cover was zero (no contribution of light from cloud reflectance). Model outputs are provided in radiance (W/m²/sr, where W = watts, m² = metres squared and sr = steradian). Also modelled was the cumulative assessment (combined light spill) of the construction and pipelay vessel working together.

In the absence of any published or generally accepted units of measure, or scale, for measuring the impact of artificial light at night on turtle hatchlings, moonlight was used as a proxy. Output from the light model (radiance, units of watts/m²/sr) was converted to units of full moon equivalents to provide biological relevance to the radiance output.

Table 5-14 presents potential impact criteria for marine turtles related to the proportion of radiance of a full moon. This was derived by Pendoley (2022a) using their extensive experience observing marine turtles and how they respond to light in field settings. The range of moon brightness across a whole lunar cycle provides a realistic scale representative of ambient light levels to which turtle eyes are adapted. The scale is logarithmic to represent the nature of light decay with distance (a function of the inverse square law). At the lower end of the scale, the radiant output is equivalent to no light in the sky (a new moon) while the upper limit is equivalent to the brightness of 10 full moons.

Table 5-14: Artificial light impact potential criteria (marine turtles)

OFOV FME[48] ranges*	Impact potential to marine turtles
10 to 100	Light or light glow visible and impact likely
1 to 10	Light or light glow visible and impact likely
0.1 to 1	Light or light glow visible and behavioural impact possible, depending on ambient moon phase
0.01 to 0.1	Light or light glow visible but behavioural impact unlikely (i.e. not biologically relevant)
<0.01	Light or light glow is considered ambient and no impact expected

Source: Pendoley (2022a)

**Where 10 equals the radiance of 10 full moons and 0.01 equals 100th the radiance of one full moon.*

Light emissions were predicted to reduce to below ambient levels (0.01 orientation field of view full moon equivalents [OFOV FME], or 1%, radiance of a full moon) at 14.8 km from the offshore pipelay vessel, 10.9 km from the construction vessel and 21.6 km when both vessels are together (Pendoley, 2022a). There is predicted to be a potential for behavioural impacts to turtles (0.01–0.1 OFOV FME, or 10%, radiance of a full moon) within 3.3 km of the offshore pipelay vessel, 2.5 km of the construction vessel and 4.5 km when both vessels are together (see Table 5-15). The closest regionally significant flatback turtle nesting site is located at Cape Fourcroy on Tiwi Islands, NT (approximately 30 km north of the OA). Light spill from pipelay activities will therefore not impact Cape Fourcroy, which is also outside the light assessment boundary.

Table 5-15: Distance of equivalent moon radiances from the source

Proportion of radiance of a full moon*	Distance from source (m)		
	Pipelay vessel	Construction vessel	Cumulative
10–100	<160	<126	<202
1–10	160	126	202
0.1–1	724	557	957
0.01–0.1	3,274	2,469	4,542
<0.01	>14,804	>10,949	>21,559

Source: Pendoley (2022a)

** Where 10 equals the radiance of 10 full moons and 0.01 equals 100th the radiance of one full moon.*

Continuous lighting may result in localised alterations to normal marine fauna behaviours that can alter foraging and breeding activity. Marine turtle and seabird species have the greatest sensitivity to light. The combinations of colour, intensity, closeness, direction and persistence of a light source are key factors in determining the magnitude of environmental impact (Environmental Protection Authority WA [EPA WA], 2010).

A PMST search was undertaken for the 20 km light assessment boundary around the OA, as recommended in the National Light Pollution Guidelines for Wildlife (DCCEEW, 2023b). One additional marine species, the speartooth shark, and one additional migratory species, the fork-tailed swift, was identified was identified within the light assessment boundary compared to the OA (Appendix D of the Coastal Waters CEMP). An internesting buffer BIA for flatback turtles and habitat critical to the survival of flatback turtles overlaps the light assessment boundary.

5.4.2.1 Marine mammals

Although no marine mammal BIAs occur within the 20 km light assessment boundary, cetaceans may travel through the area. The nearest breeding dolphin BIA—spotted bottlenose (Darwin Harbour stock), Australian humpback (a sub-species of the Indo-Pacific humpback dolphin; Darwin Harbour and Van Diemen Gulf stock) and

[48] *orientation field of view full moon equivalents*

Australian snubfin (Darwin Harbour and Van Diemen Gulf stock) are greater than 37 km away. The nearest whale (pygmy blue) BIA (migration) is over 600 km away from the OA.

The PMST report for the 20 km light assessment boundary for the OA identified several EPBC Act listed threatened marine mammal species including blue, fin and sei whales and migratory marine mammal species including dolphins, humpback whale and Bryde's whale. Light is not listed as a threat in the conservation advice or recovery plans, nor in the Conservation Management Plan for the Blue Whale 2015–2025 (CoA, 2015a).

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). However, light glow may act as an attractant to light-sensitive prey species (e.g. squid and fish) that may alter predator-prey dynamics, particularly in dolphins. The impact from light is considered negligible.

5.4.2.2 Marine reptiles

5.4.2.2.1 Marine turtles

The National Light Pollution Guidelines for Wildlife (DCCEEW, 2023b) state that a 20 km buffer (based on sky glow) to important habitats for turtles should be applied when considering possible impacts. However, the demonstrated impacts on which this buffer is based were in response to light emissions associated with a liquefied natural gas (LNG) plant. The light modelling found that the spatial extent of a measurable change in ambient light from the pipelay and construction vessels is predicted to be approximately 14.8 km and 10.9 km, respectively (Pendoley, 2022a). The cumulative impact of these vessels working together is predicted to reduce below ambient levels at approximately 24.6 km. Potential behavioural impacts to turtles is predicted within 3.3 km of the pipelay vessel, 2.5 km of the construction vessel and 4.5 km cumulative impact (Table 5-15) (Pendoley, 2022a). These studies indicate that the spatial extent of a change to ambient light is less than the 20 km light assessment boundary used for impact assessment, based on the National Light Pollution Guidelines for Wildlife (DCCEEW, 2023b).

An internesting buffer BIA and habitat critical to the survival for flatback turtles overlaps the OA with no other turtle BIA or nesting habitat overlapping the light assessment boundary. Due to the OA water depths (greater than 40 m), the BIA extending across more than 800 km of coastline, and a lack of foraging habitat, the potential numbers of affected internesting turtles is expected to be limited to a small number of individuals. Flatback turtles may transit the OA in higher numbers during the peak internesting period (June to September); however, they do not exhibit discrete nesting/hatching seasons. No evidence, published or anecdotal, suggests internesting turtles are impacted by light from either natural or anthropogenic sources, as they do not use light as a cue for this behaviour. Furthermore, nothing in their biology would indicate this as a plausible threat (Pendoley, 2019; Witherington and Martin, 2003). In addition, individual turtles (green, olive ridley, loggerhead, leatherback, hawksbill) may transit the OA to forage or migrate to suitable habitat (e.g. nesting beaches and shoals) that is outside of the OA. For the reasons set out above, similarly to interesting turtles, if individual turtles are present, light emissions from activity vessels are unlikely to be of concern.

Once hatchlings enter the ocean, they are thought to employ a survival strategy that involves rapid dispersal away from predator-rich nearshore habitats to reach deeper waters where they develop into juveniles. An internal compass is set while crawling down the beach, and wave cues are used to reliably guide them offshore (Lohmann & Lohmann, 1992; Stapput & Wiltschko, 2005). In the absence of wave cues, however, swimming hatchlings have been shown to orient towards light cues (Lorne & Salmon, 2007; Harewood & Horrocks, 2008), and in some cases, wave cues were overridden by light cues (Thums et al., 2013, 2016). Currents substantially influence the speed and direction of at-sea dispersal; the offshore trajectory of flatback hatchlings at Thevenard Island was displaced by tidal currents which ran parallel to the beach, an effect that increased as the hatchlings moved further offshore (Wilson et al., 2018).

However, when light was present, this effect was diminished, showing that hatchlings actively swam against currents and towards the light source, which slowed their offshore dispersal from 0.5 m/s when no light was present, to 0.35–0.44 m/s, depending on the type of light (Wilson et al., 2018). The mean swimming speeds of flatback hatchlings under natural light conditions (0.5 m/s) were similar to green turtle hatchlings (0.49 m/s) (Thums et al., 2016). The swimming speed of olive ridley hatchlings has not been measured; however, since they are smaller than flatback and green turtle hatchlings, swimming speeds are expected to be lower (Pendoley et al., 2020).

These results suggest that hatchlings can move in any direction when their swimming speed is greater than the speed of the nearshore current, although the speed at which currents can no longer be overcome is species-specific and related to swimming speeds. Wilson et al. (2018) reported that when flatback hatchlings were within 150 m of the beach, they were able to swim against currents up to 0.3 m/s, although 0.3 m/s was the maximum current speed recorded during the study. Therefore, whether flatback hatchlings can swim against stronger currents is currently untested. If an olive ridley hatchling has a similar response to light cues as flatback hatchlings, their smaller size suggests a reduced capability to swim against currents compared to flatback turtles.

The Recovery Plan for Marine Turtles in Australia 2017–2027 (CoA, 2017b) 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 and Rich, 2016). The National Light Pollution Guidelines for Wildlife (DCCEEW, 2023b) states that within 15 km of the nesting beach, light impacts may affect flatback hatchling behaviours. The nearest turtle nesting beach is approximately 30 km from the OA and modelling predicts that light spill at an intensity that could lead to turtle behavioural effects are possible at distances less than 3.2 km for the pipelay vessel, 2.4 km for the construction vessel, and 4.5 km for both vessels together (Pendoley, 2022a). Therefore, impacts to hatchlings are considered unlikely.

In summary, vessel light emissions are not expected to impact nesting females or emerging hatchlings at nesting beaches since modelling predicts that light or light glow will not exceed intensities considered biologically relevant (Pendoley, 2022a). Additionally, vessel light emissions are not expected to impact individual internesting turtles since there is no evidence, published or anecdotal, to suggest internesting turtles are impacted by light from offshore vessels.

5.4.2.2.2 Sea snakes

Studies have shown that sea snakes display varying responses to light. For example, Hydrophine species appear to be attracted to light and have been observed floating on the sea surface and swimming up to light (pers. comm. M. Guinea, Charles Darwin University, 2014). However, the Aispysurus species of sea snake do not appear to be attracted to light and are not seen on the surface at night (pers. comm. M. Guinea, Charles Darwin University, 2014). Most sea snakes are likely to be associated with the shoals and banks, with the closest being more than 8 km from the DPD pipeline route in the OA. It is recognised that some individuals (*Pelamis* genus) may occur in the OA and may be attracted to the light from activity vessels; however, it is considered unlikely that they will stay within the area (pers. comm. M. Guinea, Charles Darwin University, 2014).

5.4.2.3 Sharks, rays and other 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. Given the transitory presence of the pipelay activity (pipelay vessel travelling at 2-3 km per day), short duration of the activities and absence of critical habitats within the OA light impacts will not result in population level effects and will not extend to any areas of biological importance for these species.

5.4.2.4 Seabirds and shorebirds

The National Light Pollution Guidelines for Wildlife recommended using a 20 km threshold, which provides a precautionary limit based on observed effects of sky glow on fledgling seabirds grounded in response to artificial light 15 km away (DCCEEW, 2023b). There is one listed threatened species—sharp-tailed sandpiper—protected under the EPBC Act and 3 listed threatened bird species protected under both the EPBC Act and TPWC Act that may occur in the area—eastern curlew, red knot and curlew sandpiper. Table 3-12 lists the migratory shorebird and seabird species that may occur in the area. Table 3-14 lists the relevant bird conservation advice within the light assessment boundary. None identify light as a threat, however, light pollution is identified as a low-risk threat in the Wildlife Conservation Plan for Seabirds (CoA, 2020). The 20 km light assessment boundary does not intersect any known bird BIAs or habitat critical area.

Seabirds and shorebirds may either be directly attracted by the light source or indirectly—structures in offshore environments tend to attract marine life at all trophic levels, creating food sources and providing artificial shelter for birds (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 and noddies, are most vulnerable to negative effects of artificial light. However, the nearest wedge-tailed shearwater and common noddy BIAs are greater than 660 km and 680 km from the OA, respectively (Table 3-13), and the nearest breeding colony is further still. At these distances, fledglings are not expected to occur in the OA. Cannell et al. (2019) reported mean foraging trip distances for wedge-tailed shearwaters, during different stages of the breeding cycle, as ranging from 183 to 5,113 km. As such, activity vessels within the OA should not significantly impact foraging behaviour, given the large distances typically covered by breeding individuals and the relatively short-term nature of the Activity.

5.4.2.5 Protected and significant areas; socioeconomic receptors; and cultural features

The OA is approximately 66.5 km from the nearest protected area (Oceanic Shoals AMP), which is a submerged receptor outside the light assessment boundary. The Northern Prawn Fishery's medium- and high-intensity fishing areas will not be impacted by lighting from activity vessels.

No First Nations people feedback was provided about potential light impacts to cultural features (excluding marine fauna species) during consultation (refer to Table 4-10). Information provided by some Tiwi people during consultation for the Coastal Waters CEMP and the D&C, and GEP EPs, raised concerns about the potential impacts of lights on marine turtles from Barossa activities, and potential impacts to marine life generally, and that if totemic species (e.g. turtles) are impacted by the Barossa activities this can impact Tiwi people and make them sick.

It is noted that Seagull Island is too distant (>100 km away from the OA) for marine fauna located there to be affected by the Activity. Impacts to turtles from the Activity lighting are expected to be restricted to localised attraction and temporary disorientation, with no long-term or residual impact and no impact to nesting beaches given their distance from the OA.

In the 2022 Statement of Reasons Requests, the Tiwi clan members raised their concern regarding traditional hunting of marine species and totem species. First Nations people maintain a continuing spiritual connection with sea country, including marine fauna species with cultural significance, such as totems or as a cultural food source. The potential impacts to culturally significant marine fauna species (such as dreaming and totem species including marine mammals, marine reptiles, sawfish, sharks, rays and other fish) are assessed in Sections 5.4.2.1 to 5.4.2.4. The potential impacts to marine fauna is likely to be limited to localised, temporary behavioural impacts and is unlikely to result in significant impacts to marine species at the individual or population level. Consequently, it is anticipated that light emissions are unlikely to affect traditional hunting practices or resources.

Given the minor consequence to culturally significant marine fauna, subsequent impacts to socioeconomic receptors including cultural features (e.g. culturally significant marine fauna) are not anticipated.

5.4.3 Environmental performance outcomes and control measures

The EPOs relating to this event include:

- No significant impacts to marine fauna from lighting emissions [EPO-04]
- No significant impacts to cultural features from the Activity [EPO-14].

An assessment of the environmental benefits and the potential costs or issues associated with control measures for this activity are described in Table 5-16 to demonstrate the potential impacts from this aspect are ALARP. Control measures that are adopted have associated EPSs and measurement criteria, and are presented in Table 7-2. Rejected control measures have an ALARP evaluation provided to justify their rejection.

Table 5-16: Control measures evaluation for light emissions

CM reference	Control measure	Environmental benefit	Potential cost/issues	Evaluation
Standard control measures				
C6.4.1	The pipelay vessel will have an enclosed pipe welding deck (engineering control)	An enclosed pipe welding deck is highly effective in preventing light emissions from a highly lit working zone.	Negligible costs.	**Adopted**
Additional control measures				
C6.4.2	Vessel searchlights will only be operated in an emergency (administrative control)	Searchlights are the most significant source of light from activity vessels. Not operating these lights during planned activities will reduce light spill.	Negligible costs.	**Adopted**

CM reference	Control measure	Environmental benefit	Potential cost/issues	Evaluation
C6.4.3	Lighting will be used as required for safe work conditions and navigational purposes HSE induction to crew includes minimising light emissions from vessel during night hours where possible. (isolation control)	Light spill from unnecessary lighting reduced, even further lowering the likelihood of impacts to fauna from project vessel lighting. Lighting is assessed to only provide necessary lighting for safety and navigation during the activity. Reducing the potential for additional light pollution to the environment, thus reducing the potential impacts to marine fauna.	Limited additional cost associated with compliance assurance only.	**Adopted**
C6.4.4	Shielding, where practicable, and/or orienting operational lights (excluding navigational lighting) on vessels to limit light spill to the environment (engineering control)	Light spill from unnecessary lighting reduced, even further lowering the likelihood of impacts to fauna from project vessel lighting.	Limited additional cost associated with compliance assurance only.	**Adopted**
C6.4.5	Housekeeping measures will be adopted, including requiring all crew to keep shutters on windows closed at night, and switching off unnecessary lighting, to limit light emissions from vessels (administrative control)	Light spill from unnecessary lighting reduced, even further lowering the likelihood of impacts to fauna from project vessel lighting.	Limited additional cost associated with compliance assurance only.	**Adopted**
C6.1.8	HSE inductions will include environmental requirements and cultural values (administrative control)	Ensures that crew are aware of the stringent Coastal Waters CEMP, Santos and legislative requirements. HSE induction includes information for vessel crew to minimise light emissions during night hours, where possible.	Administrative costs to update existing Santos procedure and induction materials and train personnel.	**Adopted**
C6.2.10	Cultural heritage training and cultural ceremony (administrative control)	Santos has been implementing cultural heritage training and ceremony in the course of undertaking activities authorised pursuant to the GEP EP since November 2023 with broad support of First Nations communities as a culturally appropriate practice and response to cultural concerns.	Time and cost to work with First Nations communities.	**Adopted**
C6.2.12	First Nations cultural heritage monitor in the field, subject to availability of the First Nations cultural heritage monitor	Provides guidance and advice on the protection and maintenance of the cultural and spiritual places and activities throughout the pipelay and pre-commissioning activities.	Time and cost to liaise with relevant First Nations Groups and work with the First Nations cultural heritage monitor.	**Adopted**
N/A	Restrict pipe transfer operations to day light hours during peak hatchling emergence season (administrative control)	Potentially reduce the disturbance of turtle behaviours caused by artificial lighting. The nearest turtle nesting beaches are approximately 30 km from the OA. Therefore, no nesting habitat or flatback	Increased duration of the Activity, increased costs and schedule delays.	**Rejected** – no turtle nesting beaches are within the 20 km light assessment boundary. Adopting this control has no environmental benefit relative to

CM reference	Control measure	Environmental benefit	Potential cost/issues	Evaluation
		hatchling behaviours will be impacted.		hatchling emergence behaviours, as no impact to emerging hatchlings is predicted.
N/A	Manage the timing of the Activity to avoid sensitive periods (administrative control)	Potentially reduce the disturbance of turtle behaviours caused by artificial lighting. The nearest turtle nesting beaches are approximately 30 km from the OA. Therefore, no nesting habitat or flatback hatchling behaviours will be impacted. An internesting buffer for flatback turtles (BIA and habitat critical to the survival) overlaps the OA. However, due to the OA water depths (greater than 40 m), the BIA extending over more than 800 km of coastline, and a lack of foraging habitat, the potential numbers of affected internesting turtles is expected to be limited to a small number of individuals. Flatback turtles may transit the OA in higher numbers during the peak internesting period (June to September), however, do not exhibit discrete nesting/hatching seasons.	High financial costs resulting in schedule delays and potentially a split campaign.	**Rejected** – the OA is located where it is unlikely to cause an impact to turtle nesting or emerging or dispersing hatchlings; therefore, timing the Activity to avoid sensitive periods would not change the potential environmental impacts.
N/A	Change the wavelength of outdoor lights to avoid wavelengths within the peak sensitivity of turtles (substitution control)	Would reduce light emissions to the marine environment. The light modelling predicted that light or light glow will not exceed intensities considered biologically relevant to nesting females or emerging hatchlings at the closest nesting beaches (Pendoley, 2022a).	High cost to change vessel lights. Navigational lighting colours are stipulated by law. Working and egress areas must be lit for health and safety requirements.	**Rejected** – the high financial cost would be grossly disproportionate to negligible environmental benefits (if any). Health and safety considerations, and maritime regulations, dictate lighting requirements.
N/A	Identify highest intensity lights and replace with luminaire types considered appropriate for use near marine turtle nesting habitat (substitution control)	Would reduce light emissions to the marine environment. Existing luminaries are not expected to impact turtles. Light modelling was conducted assuming all vessel lights were on, with no significant effect on overall light emissions identified.	High cost to change vessel lights. Navigational lighting colours are stipulated by law. Working and egress areas must be lit for health and safety requirements.	**Rejected** – the high financial cost would be grossly disproportionate to negligible environmental benefits (if any). Health and safety considerations, and maritime regulations, dictate lighting requirements.
N/A	Limit or exclude night-time operations (elimination control)	Would reduce light emissions to the marine environment.	The DPD will be laid using a continuous assembly pipe-welding installation method. Stopping pipelay at night would result in increased impacts in	**Rejected** – given that the minimal risk of impacts to turtles and seabirds occurring, this control was rejected as the

CM reference	Control measure	Environmental benefit	Potential cost/issues	Evaluation
			other areas (e.g. waste, air emissions) and risks (e.g. vessel collision, and unnecessary fatigue on the pipeline). It would also significantly increase the installation schedule and project costs. A minimal level of artificial lighting would still be required on the vessels on a 24-hour basis for safety reasons.	cost, environmental impacts and safety risks of implementing far exceed the benefit gained.
N/A	Restrict lighting to navigation lights only (administrative control)	Would reduce light emissions to the marine environment.	Working and egress areas must be lit for health and safety requirements.	**Rejected** – Health and safety considerations, and maritime regulations, dictate lighting requirements.
N/A	Use dark, matte surfaces on vessels (substitution control)	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.	**Rejected** – given the short duration of activities, the cost would be grossly disproportionate to negligible environmental benefits (if any). May compromise health and safety in some circumstances.

5.4.4 Environmental impact assessment

Receptor	Consequence level
Light emissions	
Threatened, migratory or local fauna	Sensitive receptors that may be impacted by light emissions include marine turtles, fish at the surface and seabirds. The National Light Pollution Guidelines for Wildlife (DCCEEW, 2023b) recommends a 20 km threshold as a precautionary limit based on observed effects of sky glow on marine turtle hatchlings and fledgling seabirds. The 20 km light assessment boundary intersects the internesting BIA and habitat critical to the survival of the flatback turtle, but does not intersect any other BIA or habitat critical. However, due to the OA water depths (greater than 40 m), the BIA extending across more than 800 km of coastline, and a lack of foraging habitat, the potential numbers of affected internesting turtles is expected to be limited to a small number of individuals. Internesting female turtles are not expected to be impacted by light emissions from either natural or anthropogenic sources, as they do not use light as a cue for this behaviour. Light modelling predicted a potential for behavioural impacts to turtles within 3.3 km of the pipelay vessel, 2.5 km of the construction vessel and 4.5 km cumulative impact (both vessels working together). In addition, the light from the cumulative impact will reduce to below ambient levels within 21.6 km. Therefore, no nesting habitat will be impacted (the closest turtle nesting beach is approximately 25 km distant) or affect flatback hatchling behaviours. 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. Considering the distance from the nearest nesting beach, the density of post-dispersal turtle hatchlings in the OA is considered low. It is considered that the Activity will not compromise the objectives set out in the Recovery Plan for Marine Turtles in Australia 2017–2027 (CoA, 2017b). Fish (including sharks) have been shown to be attracted to artificial light sources, but 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 Activity vessels, but with minor impacts to the local fish population. Therefore, impacts to transient fish will

Receptor	Consequence level
	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. There are no known BIA or nesting habitat for birds within the light assessment boundary. Considering the distance from the nearest wedge-tailed shearwater or noddy breeding colony, the potential density of wedge-tailed shearwater or noddy fledglings in the OA is considered low. Therefore, night-time lighting from the Activity is expected to have a negligible potential to impact on breeding or fledging seabirds. The consequence level for threatened, migratory or local fauna is considered to be II – Minor.
Physical environment or habitat	Not applicable – no impacts to physical environments or habitats from light emissions are expected.
Threatened ecological communities	Not applicable – no threatened ecological communities identified in the area over which light emissions are expected.
Protected areas	Not applicable – the light assessment boundary does not intersect any protected areas.
Socioeconomic receptors	Impacts to fish stock are likely to be limited to localised, temporary behavioural impacts and will not result in significant impacts to fish at the individual or population level. Given the negligible consequence to fish species, subsequent impacts to commercial fishing (Section 3.2.13.1) are not anticipated. Lighting from activity vessels is not expected to cause an impact to other socioeconomic receptors other than to act as a visual cue for avoidance of the area (for safety purposes) by other marine users, including commercial fishers. The consequence level for socioeconomic receptors is considered to be I – Negligible.
Cultural features	An important outcome of Dr Corrigan's research is that no sacred sites or dreamings are shown to be directly impacted by the proposed DPD project footprint, however some marine species are known to be associated with dreamings and songs (Corrigan, 2024). It is anticipated that light emissions are unlikely to affect traditional hunting practices or resources. For assessment of impacts to marine species that are of cultural significance and/or represent a traditional food source for First Nations groups (including marine mammals, marine reptiles, sawfish, sharks, rays and other fish), refer to the assessment for threatened, migratory or local fauna.
Cumulative impacts	
Cumulative light emissions are considered unlikely to occur due to the distance to land (greater than 30 km), the remote location of the OA and the 500 m exclusion zone that will be in force around the pipelay and construction vessels. Offshore lighting in the region is mainly associated with commercial shipping, although commercial fishing and recreational vessels also contribute to offshore lighting. The activity vessels will add to the overall amount of offshore lighting in the region for the duration of the Activity, however cumulative impacts from other marine users are not anticipated. The lighting control measures identified reduce the extent practicable and the potential for impacts to sensitive marine fauna.	
Overall worst-case consequence	II – Minor

5.4.5 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 were reviewed and those adopted are considered appropriate to manage the impacts such that the residual consequence is assessed to be II – Minor. The proposed management controls are in accordance with Santos' risk management criteria and are considered appropriate to reduce impacts to ALARP.

5.4.6 Acceptability evaluation

Is the consequence ranked as I or II?	Yes – maximum consequence from light emissions 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 the risks and impacts consistent with the principles of ecologically sustainable development (ESD)?	Yes – activity was evaluated in accordance with Santos' Offshore Division Environmental Hazard Identification and Assessment Guideline (EA-91-IG-00004), 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 Table 3-14, including: • National Light Pollution Guidelines for Wildlife (DCCEEW, 2023b) • Recovery Plan for Marine Turtles in Australia 2017–2027 (CoA, 2017b) • Wildlife Conservation Plan for Seabirds (CoA, 2020).

	For all the plans identified above, the objectives are achieved by adopting EPO-04 and control measures outlined in Table 5-16, and Santos considers the impacts of light emissions to be not inconsistent with these recovery plans. Recovery plans / conservation advice for other species that may occur in the light assessment boundary do not identify light emissions as a key threat or have explicit relevant objectives or management actions related to light emissions. The light assessment boundary does not overlap any AMP or protected place. The objectives and actions of these publications were considered during impact and risk assessments. The controls outlined in Table 5-16 are not inconsistent with the objectives of the material listed above and Santos considers the impacts of light emissions to be not inconsistent with these objectives.
Are performance outcomes, control measures and associated performance standards consistent with legal and regulatory requirements?	Yes – management measures are consistent with SOLAS and the *Navigation Act 2012* (Cth). Through acceptance of the Coastal Waters CEMP, legislative and regulatory requirements will be met as per Section 1.6.2 of the Coastal Waters CEMP
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 (Appendix A of the Coastal Waters CEMP).
Are performance outcomes, control measures and associated performance standards consistent with industry standards?	Yes – the most recent and comparable EPs accepted by NOPSEMA were reviewed for consistency with the performance outcomes, control measures and associated performance standards proposed in the Coastal Waters CEMP.
Have performance outcomes, control measures and associated performance standards taken into consideration Relevant Person feedback?	Yes – Relevant Person feedback indicated no recommendations for revising the EPO, CMs or EPSs. However, feedback received during the development of other Barossa Gas Project EPs and the Corrigan 2024 Report has been considered and where applicable, additional EPOs, CMs and EPSs (e.g. EPO-14, C6.2.10 and C6.2.12) were adopted.
Are performance standards such that the impact or risk is considered to be ALARP?	Yes – see ALARP assessment conducted, with no additional control measures adopted.

Lighting on activity vessels is industry standard and is required to meet relevant maritime and safety regulations. The potential consequences of the anthropogenic light sources in the OA are considered to be negligible and restricted to short-term behavioural impacts on individual fauna that may be present in the OA during the Activity. The 20 km light assessment boundary intersects the internesting BIA and habitat critical to the survival of the flatback. However due to the OA water depths (greater than 40 m), the BIA extending across more than 800 km of coastline and a lack of foraging habitat, the potential numbers of affected internesting turtles are expected be limited to a small number of individuals. There is predicted to be the potential for behavioural impacts to turtles within 3.3 km of the pipelay vessel, 2.5 km of the construction vessel and 4.5 km cumulative impact (both vessels working together). Therefore, no nesting habitat will be impacted (closest turtle nesting beach is approximately 30 km distant) or flatback hatchling behaviours affected. Light emissions from the activity vessels are unlikely to attract and/or affect the behaviour of large numbers of seabirds and the impact of lighting associated with the Activity to seabirds is considered minor. The potential consequence of light emissions on receptors is assessed as II – Minor. With the control measures in place, including compliance with navigational safety legislation, no significant impacts are expected. Therefore, the impacts of light emissions to the receiving environment are reduced to ALARP and considered acceptable.

5.5 Atmospheric emissions

5.5.1 Description of event

Event	Atmospheric emissions may occur from: • hydrocarbon combustion to operate the activity vessels and helicopters • operation of vessel incinerators. Activity vessels may use ozone-depleting substances (ODS), but in a closed rechargeable refrigeration system—there is no plan to release ODS to the atmosphere.
Extent	Localised: small quantities of generated gaseous emissions will, under normal circumstances, quickly dissipate into the surrounding atmosphere.
Duration	Intermittent vessel emissions for the duration of the Activity (prior to the preservation period) being approximately 1 week in cumulative duration.

5.5.2 Nature and scale of environmental impacts

Potential receptors: physical environment (air quality); threatened, migratory or local fauna (seabirds); socioeconomic receptors; and cultural features.

The potential impacts from air emissions identified above include:

- deterioration of local air quality
- contribution to national GHG levels.

These impacts may in turn have indirect impacts on marine species and the environment to which First Nations people are connected (such as dreaming and totem species including whales, turtles, crocodiles, rays, fish and birds).

The emissions from vessels include non-GHG emissions (such as sulphur oxides [SO_x] and nitrogen oxides [NO_x]) and GHG emissions (such as carbon dioxide [CO_2], methane [CH_4] and nitrous oxide [N_2O]).

Non-GHG 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 unpleasing.

Table 5-17 lists the direct GHG emissions associated with Activity vessels, excluding incineration activities, during the Activity. The emissions associated with vessel-based incineration activities have been excluded from the total estimated direct GHG emissions given the ad-hoc, infrequent use of vessel incinerators over a very short duration and negligible volumes of GHG emissions that these will generate. Emissions from activity vessels were calculated based on forecast fuel usage using the National Greenhouse and Energy Reporting (NGER) Emissions and Energy Threshold Calculator 2022–2023[49]. The total estimated direct GHG emissions from activity vessels is approximately 779 t CO_2-e. The total annual Australian GHG emissions for the year from September 2022 to September 2023 are estimated by the Commonwealth Government to be 459.7 Mt CO_2-e (DCCEEW, 2024k). The direct emissions from the Activity are estimated to be less than 0.0002% of the total annual Australian GHG emissions.

Table 5-17: Estimated direct GHG emissions from Activity vessels (t CO_2-e)

Vessel type[50]	Approximate fuel usage (tonnes)	Conversion to kilolitres (kL)	GHG			Total estimated GHG emissions (t CO_2-e)
			CO_2	CH_4	N_2O	
Pipelay	220	255.8	691	1	4	695
Support and supply	27	31.2	84	0	0	84
Total	**247**	**287**	**775**	**1**	**4**	**779**

There is no material indirect GHG emissions associated with the Activity. Refer to Appendix B2 for additional information.

[49] https://www.cleanenergyregulator.gov.au/NGER/Forms-and-resources/Calculators

[50] *Construction vessels not included as their use not expected to be required in the OA*

In the future Barossa Production Operations EP, Santos will present a GHG (scopes 1 to 3) emissions analysis for the 25-year lifecycle of the Barossa Gas Project, which will inform the environmental assessment of GHG emissions.

The OA is in an offshore environment where there are no other permanent sources of air pollution—the air quality is expected to be nearly pristine. Atmospheric emissions from combustion engines could result in deterioration of local air quality, while direct GHG emissions may cause an incremental increase in global GHG concentrations, subject to numerous other factors and variables.

GHG emissions refers to gases that trap heat within the atmosphere through the absorption of long-wave radiation reflected from the Earth's surface. The emissions of CO_2, N_2O and CH_4, 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 emissions management 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% below 2005 levels by 2030 and the requirement for a multi-year emissions budget from 2021 to 2030, which has been set at 4,353 Mt CO2-e (Climate Change Authority, 2023). They form part of the Nationally Determined Contributions to the United Nations Framework Convention on Climate Change to meet Australia's net zero emissions by 2050 commitment (DCCEEW, 2023d).

Santos' emission reduction targets include a new 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 on developing technologies such as carbon capture and storage and alternative fuels, such as hydrogen and e-methane, as foundations for its decarbonisation pathway.

Potential impacts as a result of climate change have been modelled by the 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 individual species, ecosystems and ecosystem services, such as food and water availability. Within decades, Australia will experience ongoing changes to its weather and climate (CSIRO and Bureau of Meteorology, 2022).

To date, the currently observed global warming and associated anthropogenic climate changes cannot be directly attributed to any one development or activity—they are the result of net global GHG emissions and GHG sinks that have accumulated in the atmosphere since the industrial revolution began in the 1700s.

Therefore, it is not possible to directly attribute any one project or activity, such as the Activity, 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 the Coastal Waters CEMP is framed by the contribution that this petroleum activity will make to national and global atmospheric emissions of GHG. This contribution is small—less than 0.0002% of the annual Australian GHG emissions (2022–2023 data).

Further, the Barossa Development 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 Development do not exceed the applicable baseline.

ODSs are used in closed refrigeration systems. ODSs 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.

5.5.3 Environmental performance outcomes and control measures

The EPO relating to this event is:

- Reduce impacts to air quality (GHG and non-GHG emissions) from combustion engines and incinerators by maintaining atmospheric emissions in accordance with standard maritime practices [EPO-05].

An assessment of the environmental benefits and the potential costs or issues associated with control measures for this activity are described in Table 5-18 to demonstrate the potential impacts from this aspect are ALARP. Control measures that are adopted have associated EPSs and measurement criteria, and are presented in Table 7-2. Rejected control measures have an ALARP evaluation provided to justify their rejection.

Table 5-18: Control measures evaluation for atmospheric emissions

CM reference	Control measure	Environmental benefit	Potential cost/issues	Evaluation
Standard control measures				
C6.5.1	Atmospheric (GHG and non-GHG) emissions from combustion managed in accordance with standard maritime practice (administrative control)	Vessels, as required by vessel class, will comply with the *Navigation Act 2012* (Cth) and Marine Order 97 (MARPOL Annex VI) to meet the following requirements: • use low-sulfur fuel to reduce emissions • hold a valid International Air Pollution Prevention Certificate (or equivalent) • minimise the risk of accidentally releasing ODSs • minimise incinerator emissions.	No additional costs, as this is an industry standard requirement.	**Adopted**
C6.1.1	Activity vessels equipped and crewed in accordance with Australian maritime requirements (administrative control)	Reduces emissions by ensuring contracted vessels are operated, maintained and crewed in accordance with industry standards and regulatory requirements.	No additional costs, as this is an industry standard requirement.	**Adopted**
C6.2.5	Vessel planned maintenance system (administrative control)	Reduces emissions by ensuring vessels are operating within desired operating range.	No additional costs, as this is an industry standard requirement.	**Adopted**
Additional control measures				
C6.1.8	HSE inductions will include environmental requirements and cultural values (administrative control)	Ensures that crew are aware of the stringent Coastal Waters CEMP, Santos and legislative requirements. Ensures personnel are suitably aware of cultural features and values.	Administrative costs to update existing Santos procedure and induction materials and train personnel.	**Adopted**
N/A	No incineration during activities (all waste transported to shore for disposal) (elimination control)	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.	**Rejected** – 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 (administrative control)	Improves air quality by more efficient burning or fuel combustion.	Significant cost in changing vessel equipment.	**Rejected** – cost grossly disproportionate to low environmental benefit (impact rated Negligible).

CM reference	Control measure	Environmental benefit	Potential cost/issues	Evaluation
N/A	Removal of all ODS-containing equipment (elimination control)	Eliminates potential of ODS emissions occurring.	ODS is rarely found on vessels and there is a low potential for ODS releases. If there is ODS-containing equipment (such as refrigerators), it will be managed as per Marine Order 97: Marine Pollution Prevention – Air Pollution.	**Rejected** – based on cost to replace all equipment and the low potential for ODS releases.
N/A	Alternative fuel type selected for vessels (substitution control)	Could reduce pollutants associated with MDO combustion.	Not practically feasible at present. Practical and reliable alternative fuel types (and power sources) have not been identified for the contracted vessels required for this activity.	**Rejected** – not practically feasible at present. The contracted vessels are specialised and have limited availability. The vessels selected will comply with Santos' vessel vetting process.
N/A	Using lower emissions vessels (substitution control)	Reduces total emissions associated with engines.	Not practically feasible at present. The contracted vessels required are specialised and have limited availability. The vessels selected will comply with Santos' vessel vetting process.	**Rejected** – not practically feasible at present. The contracted vessels are specialised and have limited availability. The vessels selected will comply with Santos' vessel vetting process.
N/A	Santos vessel vetting process to include evaluation of vessel emissions and alternative fuels (administrative control)	Potential to reduce emissions associated with vessels by selecting more efficient vessels.	The emissions profile of activity vessels is not practicable as a factor for selection, given the limited vessel availability and limited emission variability between activity vessels currently available for hire. The vessels selected will comply with Santos' vessel vetting process.	**Rejected** – not feasible.
N/A	Reporting of GHG emissions as per the NGER Scheme (administrative control)	This is a regulatory requirement under the NGER Act with which Santos and its contractors must comply.	Cost associated with implementing.	**Adopted** – NGER reporting is a Commonwealth regulatory requirement, hence no control measure has been developed for this requirement.

5.5.4 Environment impact assessment

Receptor	Consequence level
Atmospheric emissions	
Threatened, migratory or local fauna	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. The consequence level for threatened migratory or local fauna (seabirds) is considered to be I – Negligible.
Physical environment or habitat	The activity vessels and other supports will generate atmospheric emissions in the open ocean and offshore waters, enabling emissions to dissipate into the surrounding atmosphere quickly. GHG emissions released during the Activity will account for less than 0.0002% of annual Australian GHG emissions. Given the relatively small quantity, detectable environmental impacts are not predicted. The consequence level for physical environment/habitat is assessed as I – Negligible.
Threatened ecological communities	Not applicable – no threatened ecological communities were identified in the area over which air emissions are expected.
Protected areas	Not applicable – no protected areas over which air emissions are expected.
Socioeconomic receptors	Given the negligible consequence to species, subsequent impacts to socioeconomic receptors are not anticipated. As the Activity occurs in offshore waters, the air quality in coastal towns or settlements will not be affected. The consequence level for socioeconomic receptors is considered to be I – Negligible
Cultural features	For assessment of impacts to marine species of cultural significance, refer to the assessment for threatened, migratory or local fauna. 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.
Cumulative impacts	
Cumulative atmospheric emissions with other marine users are unlikely to be significant. This is based on the following: • atmospheric emissions from vessels result in a localised reduction in air quality in the immediate vicinity of the source and hence are unlikely to overlap with other marine users due to the exclusion zones around the pipelay and construction vessels, and the remoteness of the OA. • the addition of atmospheric emissions from the activities will be a negligible contribution to overall Australian GHG emissions. Therefore, no change to the overall consequence level due to cumulative impacts has resulted.	
Overall worst-case consequence	I – Negligible

5.5.5 Demonstration of as low as reasonably practicable

Atmospheric emissions are largely unavoidable due to operational and health and safety considerations. All reasonably practicable control measures were reviewed and those adopted are considered consistent with maritime/energy 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 Santos' risk management criteria and are considered appropriate to reduce impacts to ALARP.

5.5.6 Acceptability evaluation

Is the consequence ranked as I or II?	Yes – maximum consequence from atmospheric 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 Environmental Hazard Identification and Assessment Guideline (EA-91-IG-00004), 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.

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 –maximum consequence from atmospheric emissions is I – Negligible. The Marine Bioregional Plan for the North Marine Region (CoA, 2012a) includes consideration of the effects of air quality on species. The implementation of EPO-04 and the control measures outlined in Table 5-18 will ensure the atmospheric emissions from the Activity (vessel emissions) will not compromise this conservation effort.
Are performance outcomes, control measures and associated performance standards consistent with legal and regulatory requirements?	Yes – management measures are consistent with the *Climate Change Act 2022* (Cth), *Ozone Protection and Synthetic Greenhouse Gas Management Act 1989* (Cth) (and associated regulations), *Protection of the Sea (Prevention of Pollution from Ships) Act 1983* (Cth) (and associated regulations), and MARPOL VI/Marine Order 97. Through acceptance of the Coastal Waters CEMP, legislative and regulatory requirements will be met as per Section 1.6.2 of the Coastal Waters CEMP.
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 (Appendix A of the Coastal Waters CEMP).
Are performance outcomes, control measures and associated performance standards consistent with industry standards?	Yes – the most recent and comparable EPs accepted by NOPSEMA were reviewed for consistency with the performance outcomes, control measures and associated performance standards proposed in the Coastal Waters CEMP.
Have performance outcomes, control measures and associated performance standards taken into consideration Relevant Person feedback?	Yes – no objections or claims were specifically raised for this Activity. Existing control measures are considered appropriate to reduce impacts to ALARP.
Are performance standards such that the impact or risk is considered to be ALARP?	Yes – ALARP assessment conducted, one additional control measure adopted.

Atmospheric emissions from vessels are permissible under the *Protection of the Sea (Prevention of Pollution from Ships) Act 1983* (Cth), which is enacted in Australian waters by Marine Order 97 (Marine pollution prevention – air pollution) (which also reflects MARPOL Annex VI requirements). This is an internationally accepted standard that is used industry wide, and compliance with Australian Marine Order standards is considered to be an appropriate management measure.

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 is expected to be no substantial change in air quality that may adversely impact the environment and the potential impacts are considered acceptable.

5.6 Vessel and other activity discharges

5.6.1 Description of event

Event	Within NT waters, including the NT Coastal Waters OA, there are restrictions on permissible vessel discharges to the marine environment under the *Navigation Act 2012* (Cth), *Protection of the Sea (Prevention of Pollution from Ships) Act 1983* (Cth) (and subordinate Marine Orders), *Marine Pollution Act 1999* (NT) and *Marine Pollution Regulations 2003* (NT). Collectively, these instruments give effect to various MARPOL Annexes, including Annexes I, II, III, IV and V relating to oil, noxious liquids, harmful packaged substances, sewage and garbage). Within the OA, the following Activity vessel discharges may occur where permitted under relevant legislation: • deck drainage/run-off • cooling water • brine (if a reverse osmosis unit is used for water treatment) • ballast water • bilge water • treated sewage effluent and greywater. **Deck drainage** Drainage water from activity vessels includes rainwater, sea water and washdown water. Such discharge may potentially contain small residual quantities of oil, grease and detergents if present or used on the decks. Assessment of the unplanned spillage of hydrocarbons and other environmentally hazardous liquids is discussed in Section 6. **Treated sewage effluent and greywater** The volume of treated sewage effluent and greywater discharged is directly proportional to the POB number. Up to 30–40 L of sewage/greywater may be generated per person per day. On the basis of the pipelay vessel having an approximate POB number of up to 270, the estimated treated sewage effluent and greywater discharged from the pipelay vessel is up to approximately 10,800 L/day. If a construction vessel is required within the OA (not expected) then, on the basis of an approximate POB of up to 250, the estimated treated sewage effluent and greywater would increase by up to 10,000L/day for those days where the construction vessel was present. **Cooling water** Sea water will be used as a heat exchange medium for cooling machinery engines. Sea water is drawn from the ocean and flows counter current through closed-circuit heat exchangers, transferring heat from engines and machinery to the sea water. The sea water 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. **Brine** Brine generated from the water supply systems on each vessel will be discharged to the ocean at a salinity of approximately 10% higher than sea water. The volume of the discharge depends on the requirement for fresh (or potable) water and will vary between vessels and the POB number. 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 the cleaning process is completed. **Ballast water** Ballast water could potentially be discharged to the marine environment from vessel ballast tanks. Refer to Section 6.2 for the ballast water risk assessment. **Bilge water** While in the OA, vessels may discharge bilge water after treatment of discharge to less than 15 mg/L oil in water content via an approved oily water filtering system. Note: Firefighting foam will not be discharged to sea when testing the firefighting system on vessels within the OA. The other Activity discharge that may occur is grout from grout downline flushing (grout bag contingency option) described in Section 2.5.3.3 of the Coastal Waters CEMP.
Extent	The small volumes of vessel discharges may cause localised nutrient enrichment, organic loading, ecotoxicological effects and increased water temperature and salinity around discharge points and in the direction of the prevailing current. The environment that may be affected by vessel discharges is likely to be within approximately 50 m of the activity vessel and contained within the OA, based on dispersion modelling. If used, grout discharges from the downlines between filling operations (up to 1.5 m^3 of grout per line) will disperse as a fine sediment on the seabed within a few metres of the post-filled grout bags.
Duration	Discharges will occur periodically across the duration of the Activity (prior to the preservation period), being approximately 1 week in cumulative duration, resulting in localised changes to water quality, but water quality conditions will return to normal within minutes to hours after ceasing discharges.

5.6.2 Nature and scale of environmental impacts

Potential receptors: physical environment (water quality, benthic habitats), threatened, migratory or local fauna (marine mammals, marine turtles, rays, sharks and other pelagic fish, and seabirds); socioeconomic and cultural features.

5.6.2.1 Physical environment

Small volumes of vessel discharges will be released to the marine environment and result in a reduction in water quality. Discharges will be temporary (minutes to hours), localised and limited to surface waters. The discharges are expected to disperse and dilute rapidly.

Specifics of potential impacts to water quality from vessel discharges are as follows.

Eutrophication impacts from treated sewage effluent and greywater

Discharges of treated sewage effluent and greywater 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 sulfide, metals and metalloids, surfactants, phthalates and residual chlorine). Increased biochemical oxygen demand on the receiving waters may promote localised elevated levels of phytoplankton due to nutrient inputs and bacterial activity due to organic carbon inputs. This could subsequently impact higher order predators.

However, the discharges are temporary, low volume and dispersion and dilution is expected to be rapid given the deep offshore waters of the OA dominated by high currents. The discharges are expected to disperse rapidly to levels below those which would cause adverse impacts.

The organic components discharged are subject to biodegradation through bacterial action, oxidation and evaporation. In a study of sewage discharge in deep ocean waters, Parnell (2003) 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 and dilution within hours of discharge.

Salinity increases

The desalination of sea water results in a discharge of brine with a slightly elevated salinity (around 10% higher than sea water). On discharge to the sea, the desalination brine, being of greater density than sea water, 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 POB number.

Most marine species can tolerate short-term fluctuations in salinity around 20–30% (Walker and 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 sea water 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 each vessel. However, they all adopt the same discharge design, which permits cooling water to be discharged above the water line to help cool and oxygenate this wastewater stream before it mixes with the surrounding marine environment.

Contamination from releases of bilge water

Discharges of bilge water containing residual oil and grease could result in a localised reduction in water quality with impacts on protected marine fauna and plankton and 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 to reduce OIW content to <15 mg/L. Given that oil and grease residues in bilge water drainage will be in low concentrations, the potential for impact is considered low and would be further reduced by rapid dilution due to the strong currents experienced in the OA.

Toxicity

Discharges from vessels may include typical chemicals used within desalination systems, sewage treatment systems and residues of chemicals 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.

Therefore, toxic environmental effects on environmental receptors along the food chain (plankton, fish, marine reptiles, birds and cetaceans) are not expected in these deep open waters.

Grout discharges

If used, grout discharges will disperse as a fine sediment on the seabed within a few metres of the post-filled grout bags. Grout is composed of cement, sand and water and is on the OSPAR PLONOR list. The fate of any grout released will not impact the sediment quality, nor the seabed biota.

5.6.2.2 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. An internesting buffer for flatback turtles (BIA and habitat critical to the survival) overlaps the OA. Due to the OA water depths (greater than 40 m), the BIA extending across more than 800 km of coastline, and a lack of foraging habitat, the potential numbers of affected internesting turtles is expected to be limited to a small number of individuals. Marine fauna within the OA, some of which may have cultural significance as totems (such as marine mammals, marine reptiles, rays and fish) or cultural food sources, (refer Sections 3.2.14.9 and 3.2.14.10) are likely to be transient. If contact does occur with marine fauna, it will be for a short duration and likely not of sufficient duration to cause a toxic effect.

Discharges may cause changes to behaviour in marine fauna (avoidance or attraction). However, discharges in NT Coastal Waters would be isolated occurrences, so no prolonged influence on fauna behaviour is expected.

5.6.2.3 Cultural features

No First Nations people feedback was provided about potential impacts from vessel discharges to cultural features during consultations for the Activity. The potential impacts to culturally significant marine fauna species (such as dreaming and totem species including marine mammals, marine reptiles, rays, other fish and birds) are assessed in Section 5.6.2.2.

Tiwi clan members raised concerns—during consultation on the D&C EP and in the 2022 Statement of Reasons Requests—regarding potential impacts from the Drilling Activity on totemic species and culturally significant marine species that provide a food source for traditional fishing and hunting. The potential impact to marine fauna is likely to be limited to localised, temporary behavioural impacts and is unlikely to result in significant impacts to marine species at the individual or population level (refer to Section 5.6.2.2). As a result, vessel discharges and other activity discharges are not anticipated to affect traditional hunting practices or resources.

In addition, some Tiwi people informed Santos that impacts to totemic species could also affect Tiwi people by making them sick. First Nations people maintain a continuing spiritual connection with sea country, including marine fauna species with cultural significance, such as totems or as a cultural food source.

5.6.3 Environmental performance outcomes and control measures

The EPOs relating to this event include:

- Reduce impacts to water quality from activity vessel discharges by maintaining discharge streams in accordance with standard maritime practices [EPO-06]
- No significant impacts to cultural features from the Activity [EPO-14].

An assessment of the environmental benefits and the potential costs or issues associated with control measures for this activity are described in Table 5-19 to demonstrate the potential impacts from this aspect are ALARP. Control measures that are adopted have associated EPSs and measurement criteria, and are presented in Table 7-2. Rejected control measures have an ALARP evaluation provided to justify their rejection.

Table 5-19: Control measures evaluation for vessel discharges

CM reference	Control measure	Environmental benefit	Potential cost/issues	Evaluation
Standard control measures				
C6.6.1	Routine discharges of treated bilge will comply with the *Navigation Act 2012* (Cth), *Protection of the Sea (Prevention of Pollution from Ships) Act 1983* (Cth), Marine Order 91 and *Marine Pollution Act 1999* (NT), as applicable (administrative control)	Managing bilge and deck drainage discharges to Commonwealth and NT marine requirements ensures no substantial change in water quality will occur. Ensures vessel oily water is treated and discharged in accordance with MARPOL Annex I (and Marine Order 91: Marine pollution prevention – oil).	MARPOL requirement	**Adopted**
C6.6.2	Routine discharges of treated sewage effluent and grey water, in accordance with the *Navigation Act 2012* (Cth), *Protection of the Sea (Prevention of Pollution from Ships) Act 1983* (Cth) and Marine Order 96 (Marine Pollution Prevention – Sewage), as applicable (administrative control)	Managing treated sewage effluent and grey water discharges to applicable legislative requirements ensures no substantial change in water quality will occur.	MARPOL requirement	**Adopted**
Additional control measures				
C6.1.8	HSE inductions will include environmental requirements and cultural values (administrative control)	Ensures that crew are aware of the stringent Coastal Waters CEMP, Santos and legislative requirements. Ensures personnel are suitably aware of cultural features and values.	Administrative costs to update existing Santos procedure and induction materials and train personnel.	**Adopted**
N/A	Zero discharge of deck water (elimination control)	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).	**Rejected** – safety considerations outweigh the environmental benefit for a remote offshore location. Any discharges of deck water will comply with applicable legislative requirements.
N/A	Zero discharge of bilge water (elimination control)	Would eliminate treated oily water from being discharged to sea	Issues may include vessel stability comprised, potential fire hazard and flooding risk.	**Rejected** – potential safety considerations outweigh the environmental benefit for a remote offshore location. Any discharge of bilge water will comply with applicable legislative requirements.
N/A	Restrict use of desalination plant; or zero discharge of brine water (administrative control)	Would eliminate or reduce brine from being discharged to sea.	Cost associated with transporting freshwater offshore.	**Rejected** – health and safety considerations outweigh the environmental benefit for a remote offshore

CM reference	Control measure	Environmental benefit	Potential cost/issues	Evaluation
			Health risks associated with limited supply of freshwater. Storage of brine would create an additional hazard for working on deck.	location; use of 'water making' system and any discharge of waste brine will comply with applicable legislative requirements.
N/A	Zero discharge of treated sewage effluent and greywater (elimination control)	Would eliminate treated sewage effluent and greywater from being discharged to sea.	The pipelay vessel operates a MARPOL compliant sewage treatment plant and would require major rectification to equip it with holding tanks to support the storage of sewage and greywater associated with the vessel's POB. Other vessels with MARPOL compliant sewage treatment plant engaged for the Activity may be similarly constrained and require rectification	**Rejected** – the cost and effort in rectifying vessels with commensurate storage for the POB is considered disproportionately large compared to the negligible environmental benefit gained.
N/A	Mandatory closed drain system on vessels (administrative control)	Would eliminate untreated deck drainage from being discharged to sea.	Increased cost due to treatment system and vessel modification requirements.	**Rejected** – costs significantly outweigh the environmental benefit given the minor impacts expected from planned discharges.

5.6.4 Environmental impact assessment

Receptor	Consequence level
Vessel discharges	
Physical environment or habitat	Vessel discharges are predicted to quickly dilute and disperse in the offshore environment. Water quality impacts are anticipated to be localised and of short duration. Any effects on water quality are expected to be within the surface waters only and have no effect on seabed receptors. Given the nature of the planned vessel discharges, the limited volumes that could be released to the marine environment, the high levels of dilution and the nature of the marine environment near the OA, the consequence level for physical environment or habitat is considered to be I – Negligible.
Threatened, migratory or local fauna	Sensitive receptors that may be impacted include plankton, fish at sea surface, marine turtles and mammals, and seabirds. Impacts to water quality will be localised and will occur only when the discharges occur (i.e. no sustained impacts), therefore recovery will be measured in hours Consequently, only short-term behavioural impacts are expected with no decrease in local population size, area of occupancy of species, loss or disruption of critical habitat or disruption to the breeding cycle. Given the nature of the planned vessel discharges, the limited volumes that could be released to the marine environment, the high levels of dilution and the nature of the marine environment near the OA, the consequence level for threatened, migratory or local fauna is considered to be I – Negligible.
Threatened ecological communities	Not applicable – no threatened ecological communities identified in the area over which vessel discharges are expected.

Receptor	Consequence level
Protected areas	Not applicable – no protected areas were identified in the area over which vessel discharges are expected.
Socioeconomic receptors	Given the controls in place to manage the vessel discharges in accordance with regulatory requirements, impacts to marine species (including targeted fishery species) are not expected. Given the minor consequence to species, subsequent impacts to socioeconomic receptors including commercial fishing and cultural features are not anticipated. Vessel discharges will be of a relatively small scale and will be highly diluted. Therefore, the consequence to socioeconomic receptors (e.g. commercial fishing) is assessed as I – Negligible.
Cultural Features	An important outcome of Dr Corrigan's research is that no sacred sites or dreamings are shown to be directly impacted by the proposed DPD project footprint, however some marine species are known to be associated with dreamings and songs (Corrigan, 2024). It is anticipated that vessel discharges and other activity discharges are unlikely to affect traditional hunting practices or resources. For potential impacts to marine species of cultural significance or that provide a traditional food source (such as dreaming and totem species including marine mammals, marine reptiles, rays, other fish and birds), refer to the assessment for threatened, migratory or local fauna.
Cumulative impacts	
The offshore location of the OA and the 500 m exclusion zone around the pipelay and construction vessels means that it is unlikely that there will be a cumulative impact with other marine users. Therefore, no change to the overall consequence level due to cumulative vessel discharge impacts can reasonably be expected.	
Overall worst-case consequence	I – Negligible

5.6.5 Demonstration of as low as reasonably practicable

Activity vessels are required to undertake the Activity.

The discharges to the marine environment are consistent with legislative requirements (enacting MARPOL) and considered environmentally acceptable.

All reasonably practicable control measures were 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 Santos' risk management criteria and are considered appropriate to reduce impacts to ALARP.

5.6.6 Acceptability evaluation

Is the consequence ranked as I or II?	Yes – maximum planned vessel discharge consequence is rated 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 Environmental Hazard Identification and Assessment Guideline (EA-91-IG-00004), 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 – The following material published in relation to threatened and migratory species within the OA identifies habitat degradation / modification and pollution as a threat (Table 3-14): **Conservation Advice:** • Conservation Advice for *Balaenoptera physalus* (fin whale) (TSSC, 2015c) • Conservation Advice for *Balaenoptera borealis* (sei whale) (TSSC, 2015b) • Approved Conservation Advice for *Numenius madagascariensis* (Eastern Curlew) (TSSC, 2015f) • Conservation Advice for *Calidris canutus* (red knot) (DCCEEW, 2024c) • Conservation Advice for *Calidris acuminata* (sharp-tailed sandpiper) (DCCEEW, 2024b) **Recovery Plans:** • Recovery Plan for the Grey Nurse Shark (*Carcharias taurus*) (DoE, 2014a) • Recovery Plan for Marine Turtles in Australia 2017–2027 (CoA, 2017b) • Wildlife Conservation Plan for Seabirds (CoA, 2020)

	• Wildlife Conservation Plan for Migratory Shorebirds (CoA, 2015c). Recovery plans / conservation advice for other species that may occur in the OA do not identify habitat degradation / modification or pollution as a key threat or have explicit relevant objectives or management actions. The objectives of these publications were considered during impact and risk assessments. The controls outlined in Table 5-19 are consistent with the objectives of the material listed above. Santos considers the potential impacts from vessel discharges to be consistent with these objectives.
Are performance outcomes, control measures and associated performance standards consistent with legal and regulatory requirements?	Vessel discharges comply with applicable requirements of the *Marine Pollution Act 1999* (NT), *Navigation Act 2012* (Cth), *Protection of the Sea (Prevention of Pollution from Ships) Act 1983* (Cth) and the following Marine Orders:: • Marine Order 91 (Marine pollution prevention – oil) • Marine Order 95 (Marine pollution prevention – garbage) • Marine Order 96 (Marine pollution prevention – sewage). These instruments give effect to MARPOL Annexes I, II, III, IV and V. Vessel discharges are consistent with the general duty of the *Waste Management and Pollution Control Act 1988* (NT) (WMPC Act).
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 (Appendix A of the Coastal Waters CEMP).
Are performance outcomes, control measures and associated performance standards consistent with industry standards?	Yes – the most recent and comparable EPs accepted by NOPSEMA were reviewed for consistency with the performance outcomes, control measures and associated performance standards proposed in the Coastal Waters CEMP.
Have performance outcomes, control measures and associated performance standards taken into consideration Relevant Person feedback?	Yes – Relevant Person feedback was considered and indicated no recommendations for revising the EPO, CMs or EPSs. However, feedback received during the development of other Barossa Gas Project EPs has been considered and EPO-14 was adopted.
Are performance standards such that the impact or risk is considered to be ALARP?	Yes – see ALARP above.

The consequence of activity discharges 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. Unplanned events impact and risk assessment

OPGGS(E)R 2023 Requirements
Section 21. Environmental assessment
Evaluation of environmental impacts and risks (5) The environment plan must include: a. details of the environmental impacts and risks for the activity; and b. an evaluation of all the impacts and risks, appropriate to the nature and scale of each impact or risk; and c. details of the control measures that will be used to reduce the impacts and risks of the activity to ALARP and an acceptable level. (6) To avoid doubt, the evaluation mentioned in paragraph (5)(b) must evaluate all the environmental impacts and risks arising directly or indirectly from: a. all operations of the activity; and b. potential emergency conditions, whether resulting from accident or any other reason. *Environmental performance outcomes and standards* (7) The environment plan must: a. set environmental performance standards for the control measures identified under paragraph (5)(c); and b. set out the environmental performance outcomes against which the performance of the titleholder in protecting the environment is to be measured; and c. include measurement criteria that the titleholder will use to determine whether each environmental performance outcome and environmental performance standard is being met.

The results of the impact and risk assessment process undertaken as per Section 5 of the Coastal Waters CEMP. Unplanned and contingency events associated with the Activity are summarised in Table 6-1. A comprehensive impact and risk assessment for each unplanned event and subsequent control measures proposed by Santos to reduce risk and potential impacts to ALARP and acceptable levels is detailed in the following subsections.

Table 6-1: Environmental risk assessment summary

Coastal Waters CEMP section	Unplanned event	Likelihood	Consequence	Residual risk level
0	Release of solid objects	D – Occasional	II – Minor	Low
6.2	Introduction of invasive marine species	B – Unlikely	IV – Major	Low
6.3	Marine fauna interaction	C – Possible	II – Minor	Low
6.4	Unplanned release: treated sea water	C – Possible	II – Minor	Low
6.5	Unplanned release: minor hydrocarbons/ chemicals	D – Occasional	I – Negligible	Low
6.6	Unplanned release: MDO	B – Unlikely	III – Moderate	Low
6.7	Contingency spill response operations	B – Unlikely	II – Minor	Very Low
6.8	Unplanned release: dry natural gas	B – Unlikely	II – Minor	Very Low

6.1 Release of solid objects

6.1.1 Description of event

Event	Solid objects and particles (solids) can be accidentally released to the marine environment from vessels or during installation activities. These solids may include: • suspended loads • non-hazardous wastes, such as paper, plastics, microplastics and packaging • hazardous wastes, such as batteries, fluorescent tubes, medical wastes and aerosol cans • equipment and materials, such as supplies, hard hats, tools, infrastructure parts or installation aids. Release of these solids may occur as a result of: • operator error or mechanical failure • overfull and/or uncovered bins • incorrectly disposed items • incidents during transfers of waste or supplies • accidentally dropped objects/lost equipment • particles detaching or dislodging from infrastructure.
Extent	The event will only occur within the OA, and all non-buoyant waste material or dropped objects are expected to sink to the seabed and remain within the OA. Buoyant objects could potentially move beyond the OA.
Duration	An unplanned release of solids may occur during the Activity (prior to the preservation period) being approximately 1 week in cumulative duration and impacts may occur until the solid degrades.

6.1.2 Nature and scale of environmental impacts

Potential receptors: physical environment (water quality, benthic habitats); threatened, migratory fauna or local fauna (marine reptiles, whales, fish [including sharks and rays]); socioeconomic receptors; and cultural features (such as totem species and cultural food sources).

6.1.2.1 Physical environment

Release of hazardous solids (e.g. wastes such as batteries) may pollute the immediate receiving environment, leading to detrimental health impacts to marine fauna. Physiological damage can occur through ingestion; or absorption in individual fish, marine mammals, marine reptiles or seabirds.

The area of potential seabed disturbance due to release of a heavier solids would be restricted to the OA (e.g. accidentally dropped equipment). Damage to substrates within the OA and associated infauna and epifauna may occur, but such impact is expected to be restricted to the size of the dropped object. The release of microplastics has the potential to contribute to the overall amount of marine microplastics in the ocean, which can have various impacts on marine fauna as they are absorbed by plants and animals and accumulate in the food chain. However, given the very small amounts that could potentially be released, the consequence of any impacts is considered to be negligible.

The seabed within the OA is devoid of significant bathymetric features, and sediments are predominantly unconsolidated as silty, shelly sand (Figure 3-6) with very sparse (<1%) epibiota (mainly soft corals and crinoids) (RPS, 2023a). The habitat type in the OA is widely distributed, well represented in northern Australia and not regionally significant. Soft sediment benthic habits will not be destroyed, but the communities on and within them (such as epifauna and infauna) will be disturbed by a dropped object; and depressions may remain on the seabed for some time after removal of the dropped object (depressions will gradually infill over time). The sea floor of this bioregion is strongly affected by long-period swells and large internal tides, which can resuspend sediments within the water column and move sediment across the sea floor.

6.1.2.2 Marine fauna – marine mammals, marine reptiles, seabirds, fish and sharks

Solids such as plastics have the potential to affect benthic environments and to harm marine fauna through entanglement or ingestion. Potential impacts to marine fauna that have cultural significance as totems (Section 3.2.14.10) or as cultural food sources (Section 3.2.14.9), could result in reduced First Nations access to food through traditional hunting and fishing, and in accordance with First Nations cultural beliefs, if totemic species (e.g. turtles, whales, dugongs, birds and fish) are impacted by the Activity, some believe this in turn can impact First Nations people and make them sick. Floating, non-biodegradable marine debris has been highlighted as a threat to marine turtles, sharks, seabirds, whales and whale sharks in the relevant recovery plans and approved

conservation advice (see Table 3-14). Marine turtles and seabirds are particularly at risk from entanglement and ingestion.

The recognition of the problem of plastic and microplastic debris in the marine environment is a key aspect of the National Plastics Plan (DAWE, 2021). The National Plastics Plan also includes supporting global action to address marine plastic debris, including the implementation of the Threat Abatement Plan for the Impacts of Marine Debris on the Vertebrate Wildlife of Australia's Coasts and Oceans (DoEE, 2018). The Threat Abatement Plan for the Impacts of Marine Debris on the Vertebrate Wildlife of Australia's Coasts and Oceans (DoEE, 2018) and Wildlife Conservation Plan for Seabirds (CoA, 2020) have specified various recovery actions to help combat this threat. Floating non-biodegradable marine debris has been highlighted as a threat to marine turtles within the Recovery Plan for Marine Turtles in Australia 2017–2027 (CoA, 2017b). Marine turtles may mistake plastics for food—once ingested, plastics can damage internal tissues and inhibit physiological processes, both of which can potentially result in fauna mortality. The Conservation Management Plan for the Blue Whale 2015–2025 (CoA, 2015a) identified marine debris as a threat to cetaceans. The pygmy blue whale may be present within the OA, but they will most likely be transient and/or migratory through the area. Plastics such as microplastics, plastic bags or bottles can cause problems by ingestion or as entanglement in small cetaceans. Entanglement and ingestion of plastics may result in the loss of reproductive fitness or mortality for cetaceans (CoA, 2015a).

Of relevance to the Activity is legislation for preventing garbage disposal from vessels, which Santos implements in accordance with MARPOL Annex V, which is implemented in Australia through the *Marine Pollution Act 1999* (NT), *Protection of the Sea (Prevention of Pollution from Ships) Act 1983* (Cth), the *Navigation Act 2012* (Cth) and Marine Order 95.

6.1.3 Environmental performance outcomes and control measures

The EPOs relating to this event include:

- No loss of equipment/cargo overboard from vessels resulting in a consequence severity greater than Minor [EPO-08]
- No significant impacts to cultural features from the Activity [EPO-14].

An assessment of the environmental benefits and the potential costs or issues associated with control measures for this activity are described in Table 6-2 to demonstrate the potential risks are ALARP. Control measures that are adopted have associated EPSs and measurement criteria, and are presented in Table 7-2. The rejected control measure has an ALARP evaluation provided to justify its rejection.

Table 6-2: Control measures evaluation for release of solid objects

CM reference	Control measure	Environmental benefit	Potential cost/issues	Evaluation
Standard control measures				
C7.1.1	Implement standards and procedures for lifting equipment (administrative control)	Impacts to the environment are reduced by preventing dropped objects and dragged objects during lifting operations. Administrative costs to update induction materials and train personnel.	Cost of implementing procedures.	**Adopted**
C7.1.2	Dropped objects recovered where safe and practicable to do so (administrative control)	Impacts to the 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.	Cost of implementing procedures.	**Adopted**
C7.1.3	Chemicals and hydrocarbons will be managed in accordance with standard maritime practices (administrative control)	Reduces the risk of chemical containers being accidentally dropped to sea by controlling the storage and handling of chemicals.	Cost of implementing procedures.	**Adopted**
C7.1.4	No outboard lifting operations will be completed in Company	"No lifting zones" will include the I-124 radial exclusion zone. Reduces further the potential for	Minimal effort in adding exclusion zone to	**Adopted**

CM reference	Control measure	Environmental benefit	Potential cost/issues	Evaluation
	defined “no lifting zones” which will be identified in navigational systems	dropped objects within the protected Japanese submarine wreck I-124 radial exclusion zone.	existing no-lifting zone layers. No planned lifting in this area.	
Additional control measures				
C6.1.8	HSE inductions will include environmental requirements and cultural values (administrative control)	Ensures that crew are aware of the stringent Coastal Waters CEMP, Santos and legislative requirements. Ensures personnel are suitably aware of cultural features and values.	Administrative costs to update existing Santos procedure and induction materials and train personnel.	**Adopted**
N/A	Eliminate lifting in field (elimination control)	Reduces the risk of dropped objects.	Lifting activities are required to install infrastructure covered under the Coastal Waters CEMP (to the extent this is necessary). Consequently, lifting is an integral activity and cannot be completely eliminated.	**Rejected** – not feasible to eliminate lifting in the field.

6.1.4 Environmental impact and risk assessment

Receptors	• Physical environment (benthic habitats) • Threatened, migratory or local fauna (marine mammals, marine reptiles, fish [including sharks and rays]) • Socioeconomic and cultural features
Consequence	II – Minor

Physical environment (benthic habitats)

An object dropped into the sea can result in localised and short-term damage to the seabed. The extent of the impact to the seabed is limited to the size of the dropped object (e.g. tools, containers and installation equipment); given the size of the equipment used on the activity vessels.

The unplanned release of microplastics has the potential to contribute to the overall amount of marine microplastics in the ocean, which can have various impacts on marine fauna as they are absorbed by plants and animals and accumulate in the food chain. However, given the negligible amounts that may be accidentally released, the overall impact marine microplastic pollution is relatively limited.

Marine invertebrates that may inhabit disturbed soft sediment benthic habitats are expected to occur elsewhere within the OA and surrounds and therefore the disturbance is not expected to affect prey availability, or protected fauna species.

No significant seabed features or biota have been found in the OA. 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. Therefore, the consequence level is considered II – Minor.

Marine fauna – marine mammals, marine reptiles, seabirds, fish and sharks

Marine debris (including plastics and microplastics) is identified as a potential threat to several marine fauna species in relevant recovery plans and conservation advice (Table 3-14). The types of solids and plastics accidentally dropped into the sea are 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.

Microplastics within the ocean come from many sources, and the bioaccumulation potential is high within marine fauna if ingested. Filter feeders ingest substantial amounts of microplastics by directly swallowing ocean water or indirectly by consuming prey (that have microplastics within the body cavity). Given that the very small volume of unplanned microplastics and plastics that could potentially be released to the marine environment is relatively small and the distance of the OA to shorelines and sensitive turtle habitats, it is considered that the consequence of any impacts is considered to be slight. The controls implemented demonstrate that the Activity will be conducted to reduce the release of marine debris and plastic particles; therefore, potential impacts are reduced to ALARP and an acceptable level.

The limited quantities of accidental hazardous/non-hazardous solid releases indicate that, in a worst-case release, fatalities would be limited to individuals and such a release is not expected to decrease the local population size. Therefore, the consequence level is considered II – Minor.

Socioeconomic and cultural features

Given the negligible consequence on species, subsequent risks or significant impacts to socioeconomic receptors (including commercial fish stocks) and cultural features (relating to species with cultural significance) are not anticipated.	
Likelihood	D – Occasional
The proposed control measures will reduce the risk of dropped solids (including plastics), lost equipment or release of hazardous/non-hazardous solid waste to the environment. These control measures will also ensure that legislation for preventing garbage disposal from vessels is adhered to, as recommended by the Threat Abatement Plan for the Impacts of Marine Debris on the Vertebrate Wildlife of Australia's Coasts and Oceans (DoEE, 2018) and supported by the National Plastics Plan (DAWE, 2021). The likelihood of the release of solid occurring over the duration of the Activity is considered 'Occasional' as it has occurred before during other Santos projects. The risk to socioeconomic receptors and cultural features is considered to be low.	
Residual Risk	The residual risk is considered Low.

6.1.5 Demonstration of as low as reasonably practicable

All reasonably practicable control measures were reviewed and those adopted are considered appropriate to manage the residual risk to a Low level. The proposed management controls are in accordance with Santos' risk management criteria and are considered appropriate to reduce the risk to ALARP.

6.1.6 Acceptability evaluation

Is the risk ranked between Very Low and Medium?	Yes – 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 the risks and impacts consistent with the principles of ecologically sustainable development (ESD)?	Yes – activity evaluated in accordance with Santos' Offshore Division Environmental Hazard Identification and Assessment Guideline (EA-91-IG-00004), 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 – controls implemented will minimise the potential impacts from the Activity to species identified in recovery plans and approved conservation advices as having the potential to be impacted by solid objects. The following material published in relation to threatened and migratory species within the OA identifies marine debris as a threat Table 3-14: **Management Plans:** • National Plastics Plan (DAWE, 2021) **Conservation Advice:** • Approved Conservation Advice for *Glyphis garricki* (northern river shark) (TSSC, 2014a) • Conservation Advice for *Rhincodon typus* (whale shark) (TSSC, 2015g) • Approved Conservation Advice for *Dermochelys coriacea* (Leatherback Turtle) (DEWHA, 2008b) **Recovery Plans:** • Threat Abatement Plan for impacts of marine debris on vertebrate wildlife of Australia's coasts and oceans (DoEE, 2018) • Conservation Management Plan for the Blue Whale 2015–2025 (CoA, 2015a) • Recovery Plan for Marine Turtles in Australia 2017–2027 (CoA, 2017b) • Wildlife Conservation Plan for Seabirds (CoA, 2020). Recovery plans / conservation advice for other species that may occur in the OA do not identify marine debris as a key threat or have explicit relevant objectives or management actions related to marine debris. The OA does not intersect any AMP or protected area. The objectives of these publications were considered during impact and risk assessments. The controls outlined in Table 6-2 are consistent with the objectives of the material listed above. Santos considers the Activity is not inconsistent with these objectives.
Are performance outcomes, control measures and associated performance standards consistent with legal and regulatory requirements?	Yes – management measures are consistent with MARPOL Annex V (through the *Protection of the Sea (Prevention of Pollution from Ship) Act 1983* (Cth), the *Navigation Act 2012* (Cth), *Marine Pollution Act 1999* (NT) and Marine Order 95: Marine pollution prevention – garbage), Annex X (IMO Marine Litter Action Plan) and International Maritime Dangerous Goods Code).

	Vessel waste management measures are consistent with the general duty of the *Waste Management and Pollution Control Act 1988* (NT) (WMPC Act). Lifting restrictions consistent with I-124 protected zone declared under the UCH Act. Through acceptance of the Coastal Waters CEMP, legislative and regulatory requirements will be met as per Section 1.6.2 of the Coastal Waters CEMP.
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 (Appendix A of the Coastal Waters CEMP).
Are performance outcomes, control measures and associated performance standards consistent with industry standards?	Yes – the most recent and comparable EPs accepted by NOPSEMA were reviewed for consistency with the performance outcomes, control measures and associated performance standards proposed in the Coastal Waters CEMP.
Have performance outcomes, control measures and associated performance standards taken into consideration Relevant Person feedback?	Yes – Relevant Person feedback was considered and it was determined that the EPO, CMs or EPSs were appropriate to reduce the risk to ALARP. In addition, feedback received during the development of other Barossa Gas Project EPs has been considered where applicable and EPO-14 was adopted.
Are performance standards such that the impact or risk is considered to be ALARP?	Yes – ALARP assessment conducted, with additional control measures adopted.

Accidental solid object releases from vessels are expected to have negligible impacts. The control measures proposed are consistent with applicable actions described in the relevant fauna recovery plans and conservation advice, and management plans. Relevant Persons concerns have been considered and existing control measures were considered ALARP. With the control measures in place to prevent accidental solid object releases, impacts are considered ALARP and environmentally acceptable.

6.2 Introduction of invasive marine species

6.2.1 Description of event

Event	Introduction of invasive marine species (IMS) may occur due to: • biofouling on activity vessels • biofouling on equipment that is routinely submerged in water • discharge of high-risk ballast water. Once established, IMS have the potential to outcompete indigenous species and affect overall native ecosystem function.
Extent	Localised (seabed and water column within the OA) to widespread if successfully translocated to new areas via ocean currents or equipment transit.
Duration	Activity vessels will be present in the OA for a cumulative duration of approximately 1 week. The duration of impacts from any IMS introduced could be temporary to long-term (dependent upon their ability to establish and reproduce).

6.2.2 Nature and scale of environmental impacts

Potential receptors: physical environment (benthic habitat); threatened, migratory, or local fauna (marine mammals, marine turtles, sharks and rays and other fish); socioeconomic (commercial fisheries, other marine users, tourism); and cultural features (such as totem species and cultural food sources).

IMS are non-native marine plants or animals that harm Australia's marine environment, social amenity or industries that use the marine environment, or have the potential to do so if they were to be introduced, established or spread in Australia's marine environment (DAWE, 2018). Most climatically compatible IMS to northern Australia are found in Southeast Asian countries.

Some IMS pose a major threat to economy and social amenity by disrupting ecological processes (DAWE, 2018; Wells et al., 2009). When IMS achieve pest status, they are commonly referred to as introduced marine pests (IMPs). IMPs can cause various adverse effects in a receiving environment, including:

- over-predation of native flora and fauna
- outcompeting native flora and fauna for food
- human illness through released toxins
- depleting viable fishing areas and aquaculture stock
- reducing coastal aesthetics
- damage to marine and industrial equipment and subsea 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. In the 2022 Statement of Reasons Requests, the Tiwi clan members raised their concern regarding traditional hunting of marine species and totem species. First Nations people maintain a continuing spiritual connection with sea country, including marine fauna species with cultural significance, such as totems or as a cultural food source. An important outcome of Dr Corrigan's research is that no sacred sites or dreamings are shown to be directly impacted by the proposed DPD project footprint, although this is not to say that some persons do not have fears that this could be the case in the event of an unplanned event (Corrigan, 2024).

Species of concern are those that are not native to the region, are likely to survive and establish in the region, and that can 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.

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).

Once IMS populations have established, they are difficult to eradicate, 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 various Australian regulatory agencies.

If an IMS is introduced, species have been known to colonise areas outside the areas where they were introduced but this depends on the diversity and extent of suitable habitat for colonisation.

Potential sources for introducing IMS into the OA include biofouling on vessels, including external niches (e.g. propulsion units, steering gear and thruster tunnels) and internal niches (e.g. sea chests, strainers, sea water pipework, anchor cable lockers and bilge spaces). Ballast water is responsible for up to 30% of all marine pest incursions into Australia, while biofouling (the accumulation of aquatic microorganisms, algae, plants and animals on vessel hulls and submerged surfaces) is also considered a significant pathway for the potential introduction and spread of marine pests (DAWE, 2018).

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 being used 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 their growth and survival. 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). Most species introduced to an area outside 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 and recreational boating.

6.2.3 Environmental performance outcomes and control measures

The EPO relating to this event is:

- Prevent the displacement of native marine species as a result of the introduction and establishment of IMS via activity vessels [EPO-09].

An assessment of the environmental benefits and the potential costs or issues associated with control measures for this activity are described in Table 6-3 to demonstrate that potential risks are ALARP. Control measures that are adopted have associated EPSs and measurement criteria, and are presented in Table 7-2. Rejected control measures have an ALARP evaluation provided to justify their rejection.

Table 6-3: Control measures evaluation for introduction of IMS

CM reference	Control measure	Environmental benefit	Potential cost/issues	Evaluation
Standard control measures				
C7.2.1	Vessels equipped with effective anti-fouling coatings (administrative control)	The likelihood of introducing IMS is reduced due to anti-fouling systems compliant with Marine Order 98.	Could lead to potential delays and therefore costs in vessel contracting process due to availability of vessels with appropriate anti-foulant systems.	**Adopted**
C7.2.2	Vessels undertake ballast water management or treatment to achieve low-risk ballast water (administrative control)	The likelihood of introducing IMS via ballasting activities is reduced by implementing the Australian Ballast Water Management requirements (DAWE, 2020a).	Cost associated with reducing the vessel risk to 'low' and implementing procedures.	**Adopted**
C7.2.3	Apply risk-based IMS management for vessels (administrative control)	The likelihood of introducing IMS is reduced by implementing proactive biofouling management options recommended under the Australian Biofouling Management Requirements (DAFF, 2023) and Australian National Biofouling Management Guidance for the Petroleum Production and Exploration Industry (Marine Pest Sectoral Committee, 2009).	Cost associated with implementing procedures and mitigation measures (e.g. dry docking, hull cleaning or additional costs due to inspections). Costs associated with reducing the vessel risk to 'low'.	**Adopted**

CM reference	Control measure	Environmental benefit	Potential cost/issues	Evaluation
C7.2.4	Marine Growth Prevention System (administrative control)	The likelihood of introducing IMS is reduced by preventing vessel marine growth (such as barnacles and mussels).	Cost associated with implementing procedures and implementing the mitigation measures.	**Adopted**
Additional control measures				
C6.1.8	HSE inductions will include environmental requirements and cultural values (administrative control)	Ensures that crew are aware of the stringent Coastal Waters CEMP, Santos and legislative requirements. Ensures personnel are suitably aware of cultural features and values.	Administrative costs to update existing Santos procedure and induction materials and train personnel.	**Adopted**
C6.1.3	The Activity will be undertaken in accordance with Santos HSE management and marine vessel vetting processes (administrative control)	Santos marine vetting process ensures the risk of introducing invasive marine species during activities undertaken by Santos in Australian waters is minimised through by carrying out a Biosecurity Risk Assessment prior to engagement.	Regulatory requirement and therefore the cost is not identified as an issue.	**Adopted**
N/A	Heat treatment of ballast water to eliminate IMS (administrative control)	Would reduce potential for IMS to establish by reducing the potential for IMS present in ballast water.	Compared to traditional ballast treatment (e.g. chemical additive) methods, heat treatment has a higher cost and increased energy consumption. Ballast requirements are adequately managed under Australian Ballast Water Management (DAWE, 2020a) and the International Convention for the Control and Management of Ships' Ballast Water and Sediments to reduce the risk of IMS introduction.	**Rejected** – based on high cost considered disproportionate compared with risk (after application of standard control measures [see above]).
N/A	Contract vessels only operating in local, state/territory or Commonwealth waters to reduce potential for IMS (substitute control)	Reduce potential for IMS to be transported into area since vessels would not have originated elsewhere.	Vessels and equipment suitable for the Activity are not available in 'local' waters.	**Rejected** – 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 before entering field to clean vessel and/or equipment and remove biofouling (administrative control)	Ensures that the risk of IMS being present on vessel or associated equipment is low.	Significant cost (grossly disproportionate to the risk) and would lead to scheduling delays.	**Rejected** – 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.

CM reference	Control measure	Environmental benefit	Potential cost/issues	Evaluation
N/A	Use an alternative ballast system to avoid uptake or discharge of water (substitute control)	Eliminate need for ballast water exchange, therefore decreasing risk of introducing IMS through ballast water.	Vessels suitable for the Activity do not have options for alternative ballast system, therefore would require modification at significant cost.	**Rejected** – costs disproportionately high compared with environment benefit given other controls in place already adequately reduce the risk.
N/A	Do not discharge ballast water (elimination control)	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.	**Rejected** – ballast water exchange is a safety-critical activity for marine operations and discharges of ballast will comply with applicable legislative requirements.

6.2.4 Environmental impact and risk assessment

Receptors	• Physical environment (benthic habitats and primary producers) • Threatened, migratory, or local fauna (marine mammals, marine turtles, fish [including sharks and rays]) • Socioeconomic (commercial fisheries, other marine users and tourism) • Cultural features
Consequence	IV – Major
Physical environment (benthic habitats and primary producers) Within the OA, the water depths range from approximately 40 m to 50 m. The OA does not present a benthic habitat or community structure that is favourable to IMS survival. The seabed within the OA is characterised as silty, shelly sand (Figure 3-6) with very sparse (<1%) epibiota (mainly soft corals and crinoids) (RPS, 2023a). The closest shoal is more than 8 km away from the DPD pipeline route in the OA and Shepparton Shoal is more than 16 km away from the OA. Shepparton Shoal has water depths of 30 m to 50 m which limit the amount of light to the shoal. The consequence level is considered IV – Major.	
Threatened, migratory, or local fauna (marine mammals, marine turtles, fish [including sharks and rays]) IMS, if successfully established, can outcompete native species for food or space, prey on native species or change the nature of the environment. The Wildlife Conservation Plan for Migratory Shorebirds identified IMS from ballast water and hull transport as a threat to migratory shorebirds, particularly if the introduction results in the loss of benthic food sources at important intertidal habitat (CoA, 2015c). The consequence level is considered IV – Major.	
Socioeconomic (commercial fisheries, other marine users and tourism) The introduction of IMS could have a detrimental effect on commercial fisheries, other marine users, tourism and cultural features 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, the consequence level is considered IV – Major.	
Cultural features An important outcome of Dr Corrigan's research is that no sacred sites or dreamings are shown to be directly impacted by the proposed DPD project footprint, although this is not to say that some persons do not have fears that this could be the case in the event of an unplanned event (Corrigan, 2024). For potential impacts to marine species of cultural significance or that provide a traditional food source (i.e. marine mammals, marine turtles, fish [including sharks and rays]), refer to the assessment for threatened, migratory or local fauna.	
Likelihood	B – Unlikely
The pathways for IMS introduction are well known; consequently, standard preventive measures are proposed. The ability for IMS to colonise a habitat depends on several environmental conditions. 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 et al., 2002). IMS are more likely to populate shallower areas with favourable substrates, such as on shoals and reefs. The closest sensitive habitat (shoal) that may provide suitable habitat is more than 8 km away from the DPD pipeline route in the OA and Shepparton Shoal is greater than 16 km from the OA. The OA is distant from coastal habitats, approximately 30 km from Tiwi Islands. With control measures in place to reduce the risk of introduction of IMS, the likelihood of introducing an IMS is considered unlikely.	

Residual Risk	The residual risk is considered Low.

6.2.5 Demonstration of as low as reasonably practicable

There are no alternatives to the use of activity vessels in order to undertake the Activity. The risks from IMS are well understood and, with the proposed control measures, the Activity will comply with relevant regulations and guidelines. All reasonably practicable control measures were reviewed and those adopted are considered appropriate to manage the residual risk to a 'Low' level. The proposed management controls are in accordance with Santos' risk management criteria and are considered appropriate to reduce the risk to ALARP.

6.2.6 Acceptability evaluation

Is the risk ranked between Very Low and Medium?	Yes – 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 the risks and impacts consistent with the principles of ecologically sustainable development (ESD)?	Yes – activity evaluated in accordance with Santos' Offshore Division Environmental Hazard Identification and Assessment Guideline (EA-91-IG-00004), 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 – The Wildlife Conservation Plan for Seabirds (COA, 2020) and Recovery Plan for the Grey Nurse Shark (*Carcharias taurus*) (DoE, 2014a) identified disease, pathogens and invasive species as a threat (Table 3-14). Santos considers the impacts of IMS to be not inconsistent with this Plan. Recovery plans / conservation advice for other species that may occur in the OA do not identify invasive species or disease as a key threat or have explicit relevant objectives or management actions related to invasive species or disease. The OA does not intersect any AMP. The objectives and actions of this Plan were considered during impact and risk assessments. The controls outlined in Table 6-3 are not inconsistent with the objectives of the material listed above and Santos considers the risk of introducing IMS to be not inconsistent with these objectives.
Are performance outcomes, control measures and associated performance standards consistent with legal and regulatory requirements?	Yes – management measures are consistent with the *Biosecurity Act 2015* (Cth), Australian Ballast Water Requirements: Version 8 (DAWE, 2020a), Australian biofouling management requirements (DAFF, 2023), Offshore Installations – Biosecurity Guide (DAFF, 2023a), International Convention for the Control and Management of Ships' Ballast Water and Sediments, Marine Order 98 (Marine pollution – anti-fouling systems), IMO Guidelines for the Control and Management of Ships' Biofouling to Minimize the Transfer of Invasive Aquatic Species (2011) and National Biofouling Management Guidance for the Petroleum Production and Exploration Industry (Marine Pest Sectoral Committee, 2009). Through acceptance of the Coastal Waters CEMP, legislative and regulatory requirements will be met as per Section 1.6.2 of the Coastal Waters CEMP
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 (Appendix A of the Coastal Waters CEMP).
Are performance outcomes, control measures and associated performance standards consistent with industry standards?	Yes – the most recent and comparable EPs were reviewed for consistency with the performance outcomes, control measures and associated performance standards proposed in the Coastal Waters CEMP.
Have performance outcomes, control measures and associated performance standards taken into consideration Relevant Person feedback?	Yes – no objections or claims raised by Relevant Persons during consultation of the Coastal Waters CEMP or the GEP EP relating specifically to potential introduction of IMS.
Are performance standards such that the impact or risk is considered to be ALARP?	Yes – ALARP assessment conducted, with additional control measures adopted.

The mobilisation of activity vessels and equipment to undertake offshore petroleum activities is industry standard practice, and the IMS risks are well understood and subject to regulation. The activity vessels and equipment that are internationally mobilised will meet Australian biosecurity clearance requirements, and the proposed control measures are consistent with Australian biofouling management requirements (DAFF, 2023), Australian Ballast Water Requirements: Version 8 (DAWE, 2020a) and National Biofouling Management Guidance for the Petroleum Production and Exploration Industry (Marine Pest Sectoral Committee, 2009).

Application of the proposed control measures and adherence to legislation and regulations reduce the likelihood of introducing IMS into the OA, and the dispersive offshore location in the OA reduces the probability of successful establishment in the unlikely event of introduction.

No Relevant Persons concerns have been raised regarding this aspect, and the proposed controls will reduce the residual level of risk to Low and ALARP. Therefore, the residual risk associated with IMS is considered by Santos to be environmentally acceptable.

6.3 Marine fauna interaction

6.3.1 Description of event

Event	There is the potential for Activity vessels and other support (e.g. helicopters/ROVs) to interact with marine fauna, including potential strike or collision, potentially resulting in severe injury or mortality in the worst case. Activity vessel speeds are slow due to operational requirements and will also be limited to ≤8 knots within the OA. The pipelay vessel will be restricted to approximately 1 knot during pipelay activities, with the vessel moving forward in nominal 12 m steps during installation.
Extent	Within the OA.
Duration	Activity vessels will be present in the OA for a cumulative duration of approximately 1 week which represents the time unplanned marine fauna interactions with vessels and other support vessels could occur.

6.3.2 Nature and scale of environmental impacts

Potential receptors: threatened, migratory fauna or local fauna (marine mammals, marine turtles, whale sharks, seabirds); socioeconomic receptors (tourism, recreation) and cultural features (such as totem species and cultural food sources).

Marine fauna in surface waters that are most at risk from vessel collision include marine mammals, marine turtles, whale sharks and birds. Consultation has identified that some marine fauna may have cultural significance. There are no breeding, feeding, aggregation or migration BIAs. There is one internesting habitat for the flatback turtle which extends more than 800 km of NT coastline; however, the OA does not provide suitable internesting or foraging habitat for turtles, given the distance to the nesting beaches and water depths exceed 40 m.

The pipelay vessel will be travelling at approximately 1 knot (2-3 km per day); therefore, it is effectively immobile and will not pose a vessel collision risk to marine fauna. The potential risk of a collision with marine fauna is directly related to the abundance of marine fauna and number of vessels in the OA, and the actual likelihood of a collision occurring is also influenced by vessel speed.

Vessel speed has been demonstrated to be a key factor in relation to collision with marine fauna, particularly cetaceans and turtles, with faster moving vessels posing a greater collision risk than slower vessels (Hazel et al., 2009; Jensen and Silber, 2004; Laist et al., 2001; CoA, 2017b). Laist et al. (2001) suggest the most severe and lethal injuries to cetaceans are caused by vessels travelling at 14 knots or faster. Turtles will typically avoid vessels by rapidly diving, however, their ability to respond varies greatly depending on the speed of the vessel. Hazel (2009) reported that the number of turtles that fled vessels decreased significantly as vessel speed increases. Turtles are also adapted to detect sound in water (Popper et al., 2014) and will generally move from anthropogenic noise generating sources, including vessels, within their detection range (pers. comm. M. Guinea, Charles Darwin University, 2015). Although collisions with marine fauna can happen anywhere in Australian waters, the risk of collision is greater in breeding areas and along seasonal migration routes. Collision risk also increases in shallower waters where a vessel has less under-keel clearance, leaving an animal less room to avoid the vessel (AMSA, 2023).

The behaviour of the individual may also influence the potential for a collision with a vessel. For example, it has been suggested that individual whales engaged in feeding, mating or nursing behaviours may be more vulnerable to vessel collision as they are distracted by these activities and consequently less aware of their surroundings (Laist et al., 2001). A study on the behavioural responses of blue whales to vessels showed limited behavioural response when being approached by vessels (McKenna et al., 2015, cited in DoEE, 2016).

Vessel or anthropogenic disturbance are identified as potential threats to several marine species in relevant recovery plans and conservation advice (Table 3-14). Marine fauna interactions are recorded and reported by Santos as described in Section 8.8 of the Coastal Waters CEMP.

6.3.2.1 Marine mammals

The Approved Conservation Advice for *Megaptera novaeangliae* (humpback whale) (TSSC, 2015c) indicates that humpback whales are one of the most frequently reported whale species involved in vessel strikes worldwide (Laist et al., 2001; Jensen and Silber, 2004). This observation is supported by Australian studies referenced in the National Strategy for Reducing Vessel Strike on Cetaceans and other Marine Megafauna (CoA, 2017). Increased vessel numbers (Silber and Bettridge, 2012) are not only a threat to humpback whales in relation to vessel strikes but also in relation to disturbance and displacement from key habitats. Although there may be individual humpback whales within the OA, the primary migratory route for humpback whales is near the Kimberley coastline and up to Camden Sound, located more than 710 km south-west of the OA. Therefore, it is unlikely that activity vessels will interact with this species.

Similarly, vessel strike is also recognised by the Conservation Advice for *Balaenoptera borealis* (sei whale) (TSSC, 2015b), Conservation Advice for *Balaenoptera physalus* (fin whale) (TSSC, 2015c) and Conservation Management Plan for the Blue Whale 2015–2025 (CoA, 2015a). The blue, sei and fin whales have a wide distribution throughout offshore waters and, therefore, may pass through the OA in low numbers. Vessel speed has been demonstrated to be a key factor in relation to collision with marine fauna, particularly cetaceans, with faster-moving vessels posing a greater collision risk than slower vessels (Laist et.al., 2001; Jensen and Silber, 2003; Hazel, 2009). Laist et al. (2001) suggest that the most severe and lethal injuries to cetaceans are caused by vessels travelling at 14 knots or faster. However, considering the relatively slow vessel speeds within the OA and the mobility of whale species, it is unlikely that activity vessels will adversely interact with any individuals.

Collisions between vessels and cetaceans are most frequent on continental shelf areas where high vessel traffic and cetacean habitat occur simultaneously (Simmonds et al., 2004). There have been recorded instances of cetacean deaths as a result of vessel collisions in Australian waters (e.g. a Bryde's whale in Bass Strait in 1992) (Simmonds et al., 2004), although the data indicate 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 the National Strategy for Reducing Vessel Strike on Cetaceans and other Marine Megafauna (CoA, 2017), most reported vessel collisions for whales in Australian waters between 1990 and 2015 have occurred along eastern or south-eastern Australia, with no reported incidents in NT waters. 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).

Whales' reactions to approaching vessels are variable. Some species remain motionless when close to a vessel, while others are known to be curious and often approach slow-moving or stationary vessels, although they generally do not approach and sometimes avoid faster-moving vessels (Richardson et al., 1995).

While the PMST identified that dugongs or dugong habitat may occur in the OA, dugongs prefer shallow tidal and subtidal seagrass meadows less than 10 m deep, and therefore interaction is expected to be unlikely within the OA, which is ~30 km from the nearest shoreline and >40 m deep, and limited to transiting individuals (Cardno, 2015).

Dolphins (Australian snubfin dolphin, Australian humpback, spotted bottlenose) may transit through the OA; therefore, collisions between activity vessels and dolphin species are possible. However, collisions with dolphins are very infrequent due to the high mobility of these smaller cetaceans, allowing them to avoid vessels. The closest dolphin BIA is the Australian humpback dolphin (breeding), greater than 37 km from the OA. It is noted that dolphins are naturally inquisitive marine mammals, some of which are often attracted to vessels underway (e.g. commonly 'bow ride' with vessels).

There are no known BIAs (including breeding or migration) for cetaceans within the OA, 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.

6.3.2.2 Marine reptiles

The Recovery Plan for Marine Turtles in Australia 2017–2027 recognises increased vessel traffic as one of several key impacts on marine turtles (CoA, 2017b), with vessel disturbance posing a risk to flatback turtles. The plan also notes that while a vessel strike can be fatal for an individual turtle, vessels strike (as a standalone threat) has not been shown to cause declines at a population or stock level and have considered vessel disturbance to be of minor consequence to turtle populations in the NT (DoEE, 2017). Marine turtle mortality due to vessel strike was identified as an issue in Queensland waters in the Recovery Plan for Marine Turtles in Australia 2017–2027 (CoA, 2017b). However, turtles appear to be more vulnerable to vessel strike in areas of high urban population where incidents with recreational vessel are higher. The approved Conservation Advice for *Dermochelys coriacea* (Leatherback Turtle) (DEWHA, 2008b) listed boat strike as a threat. Turtles spend relatively limited (3 to 6%) time at the surface, with dive times generally lasting 15 to 60 minutes (Milton and Lutz, 2003; cited in Woodside Energy Limited, 2014). Marine turtles are highly mobile and, given the low speeds of activity vessels, are likely to be able to move from an area where there are vessels. Marine turtles make extensive migrations through the broader region; and it is possible individual turtles of any of the region's species may be encountered in the OA; however, the OA does not contain any significant feeding, breeding or aggregation areas for marine turtles.

There is an internesting BIA for flatback turtles within the OA, which may increase the number of individuals from June to September. Olive ridley turtles are likely to have an increase in the number of individuals from April to August. These periods increase the risk of vessel strikes. The Recovery Plan for Marine Turtles in Australia 2017–2027 defines a 60 km internesting buffer around the Tiwi Islands, which also intersects the OA. Other turtles, such as green, hawksbill, and loggerhead, may also be within the OA. Internesting olive ridley and flatback turtles are expected to be concentrated in relatively shallow coastal waters (<30 m deep) around nesting beaches. Benthic habitat within the 30 m isobath around the Tiwi Islands is broadly represented and the OA exceeds a water depth of 30 m, ranging from 40–50 m.

The pipelay vessel will lay pipe at very low speeds (<1 knot) with a negligible risk of colliding with marine fauna during this activity. Support and supply vessel for the activity will maintain speeds of ≤8 knots within the OA and as such the risk of vessel strike is strongly reduced. The risk of coming into contact with turtles is low as turtles are expected to dive or move away from the activity vessels. Consequently, the likelihood of a vessel strike and injury/mortality to individual turtles within the OA is considered unlikely. The Recovery Plan for Marine Turtles in Australia 2017–2027 notes that while a vessel strike can be fatal for an individual turtle, vessel strikes (as a standalone threat) have not been shown to cause declines at a population or stock level and have considered vessel disturbance to be of minor consequence to turtle populations in the NT (CoA, 2017b).

Individual sea snakes and crocodiles may transit through the OA. If a vessel strike was to occur, it is unlikely to threaten the overall viability of either population.

6.3.2.3 Sharks, rays and other fish

Most sawfish, sharks, rays and other fish identified as potentially occurring within the OA are not considered at risk of vessel strike as they largely occur on or near the seabed and are not expected to come to the surface, except the giant manta ray and whale shark.

The giant manta ray is oceanic and known to feed on plankton, so it may occasionally be close to the sea surface. However, ~73% of its diet is from deep water sources (Burgess et al., 2016). The giant manta ray is not expected to come to the surface within the OA frequently and is highly mobile (therefore able to avoid vessels). Therefore, vessel collisions with giant manta rays are considered improbable.

The whale shark BIA does not overlap the OA and therefore significant numbers are not expected to be encountered. Conservation Advice for *Rhincodon typus* (whale shark) (TSSC, 2015g) states that vessel strike from large vessels is a threat to whale sharks. Whale sharks are at risk from vessel strikes when feeding at the surface or in shallow waters (where options to dive are limited). Whale sharks have been shown to spend approximately 25% of their time less than 2 m from the surface and more than 40% of their time in the upper 15 m of the water column (Wilson et al., 2006; Gleiss et al., 2013). The OA does not overlap known whale shark foraging areas, and whale shark presence may be transitory and of a short duration. No constraints within the OA (e.g. shallow water or shorelines) would prevent whale sharks from moving away from vessels. Vessel speed has been demonstrated to be a key factor in relation to collision with marine fauna, with faster-moving vessels posing a greater collision risk than slower vessels (Laist et.al., 2001; Jensen and Silber, 2003; Hazel, 2009).

Whale sharks, other pelagic fishes, and demersal fishes, are likely to exhibit a short-term avoidance to vessels and ROVs. This is likely be initiated through the vibrations and underwater noise emitted from these activities (Section 5.1) rather than the physical presence. Such avoidance is likely to be temporary but will further reduce the potential for collisions to occur.

6.3.2.4 Birds

The OA has no bird BIAs, but several protected species of seabirds and migratory birds may occur at times within the OA (Table 3-12). Birds may opportunistically rest on a vessel and may be attracted to activity vessels due to lighting and vessel discharges such as macerated food waste. The Wildlife Conservation Plan for Migratory Shorebirds suggest that disturbance from human activities to shorebirds may compromise energy reserved for migration (CoA, 2015c). Although seabirds may be attracted to activity vessels due to increased feeding opportunities, these behavioural changes are unlikely to alter population dynamics or significantly change the habitat use of birds due to the very short duration of the Activity. The Conservation Advice for *Calidris canutus* (red knot) (DCCEEW, 2024c) indicates that anthropogenic disturbance is a threat, but it relates to disturbance of important sites.

The risk of bird collision with helicopter operations is an ongoing concern for the safety of flights to and from pipelay and construction vessels. The consequence of a helicopter bird strike is related to seasonal distribution, body mass, flocking behaviour, and flight behaviour, while the probability of a strike is related to the abundance of different bird species on or near the vessels. Helicopter noise is expected to elicit a behavioural response in birds to avoid a collision and given the relatively low speeds of helicopters, while flying during take-off or landing, a helicopter strike is unlikely.

6.3.2.5 Cultural features

No First Nations people feedback was provided about potential marine fauna interactions during consultation for the Coastal Waters CEMP. An important outcome of Dr Corrigan's research is that no sacred sites or dreamings are shown to be directly impacted by the proposed DPD project footprint, although this is not to say that some persons do not have fears that this could be the case in the event of an unplanned event (Corrigan, 2024). In the 2022 Statement of Reasons Requests, the Tiwi clan members raised their concern regarding traditional hunting of marine species and totem species. The First Nations people maintain a continuing spiritual connection with sea country, including caring for sea country and access to cultural food sources. Sections 6.3.2.1 to 6.3.2.4 assess the

potential impacts to marine species, including culturally significant fauna such as dreaming and totem species, including marine mammals (e.g. whales, dolphins, dugongs), marine reptiles (e.g. turtles, crocodiles), sharks, rays, other fish and birds. The potential impact to marine fauna is likely to be limited to transiting individuals and is unlikely to result in significant impacts to marine species at the individual or population level (refer to Sections 6.3.2.1 to 6.3.2.4). As a result, marine fauna interaction is not anticipated to affect traditional hunting practices or resources.

Information was provided by Tiwi clients of the EDO during the D&C EP consultation 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.

6.3.3 Environmental performance outcomes and control measures

The EPOs relating to this event include:

- Zero incidents of injury/mortality of cetaceans/marine reptiles from collision with activity vessels [EPO-10]
- No significant impacts to cultural features from the Activity [EPO-14].

An assessment of the environmental benefits and the potential costs or issues associated with control measures for this activity are described in Table 6-4 to demonstrate that potential risks are ALARP. Control measures that are adopted have associated EPSs and measurement criteria, and are presented in Table 7-2. Rejected control measures have an ALARP evaluation provided to justify their rejection.

Table 6-4: Control measures evaluation for marine fauna interaction

CM reference	Control measure	Environmental benefit	Potential cost/issues	Evaluation
Standard control measures				
C6.3.1	Apply Santos' Protected Marine Fauna Interaction and Sighting Procedure (EA-91-II-00003) to vessel and helicopter activities when in the vicinity of cetaceans and turtles (isolation control)	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 (excluding vessels which are unable to alter path while performing operations), and helicopters can increase distances from sighted fauna if required. Reduces the potential impacts to culturally significant marine species, including totemic species, such as marine turtles and marine mammals.	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.	**Adopted**

CM reference	Control measure	Environmental benefit	Potential cost/issues	Evaluation
Additional control measures				
C6.1.5	Vessel speed restrictions (substitute control)	Reduces consequence of collisions (causing harm) and likelihood as fauna have longer to detect and avoid the vessel by restricting vessel speeds in the OA to 8 knots or less. Reduces the potential impacts to culturally significant marine species, including totemic species, such as marine turtles and marine mammals.	Administrative costs to update existing Santos procedure and induction materials and train personnel.	**Adopted**
C6.1.8	HSE inductions will include environmental requirements and cultural values (administrative control)	Ensures that crew and helicopter operators are aware of the stringent Coastal Waters CEMP, Santos and legislative requirements. Ensures personnel as suitably aware of cultural features and values.	Administrative costs to update existing Santos procedure and induction materials and train personnel.	**Adopted**
C6.3.2	A crew member trained in marine fauna observations (MFO) will be present on the pipelay and construction vessel bridge at all times during daylight hours and will continuously monitor and record marine fauna present in the caution zone (administrative control)	Improved ability to spot and identify marine fauna.	Operational costs to adhere to training crew members as MFOs and implementation.	**Adopted**
N/A	Avoid operating during the peak internesting period for the flatback and olive ridley turtles (elimination control)	Potential to avoid a period with higher turtle activity to reduce the likelihood of disturbance.	Potential to have schedule and cost implications.	**Rejected** – The olive ridley and flatback turtles nesting seasons on Bathurst Island do not have distinct nesting seasons and instead have low-level nesting year-round, with a peak nesting/hatchling period of June to September (for flatback turtles) and April–August (for olive ridley turtles). In addition, the OA does not provide suitable internesting or

CM reference	Control measure	Environmental benefit	Potential cost/issues	Evaluation
				foraging habitat and therefore activities are unlikely to displace or interrupt biological behaviours. Hence, implementing seasonal control will have negligible environmental benefits.
N/A	Activities will only occur during daylight hours (elimination control)	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 operations as halting operations overnight could have pipeline fatigue implications that may reduce the pipeline integrity. In addition, it would increase the Activity duration resulting in significant financial costs. No other maritime industry has such a restriction.	**Rejected** – The high financial cost and pipeline integrity implications would be grossly disproportionate to negligible environmental benefits.

6.3.4 Environmental impact and risk assessment

Receptors	• Threatened, migratory or local fauna (marine mammals, marine reptiles, sharks and seabirds) • Socioeconomic (commercial fisheries, other marine users and tourism) • Cultural features
Consequence	II – Minor
If a vessel or helicopter collides with marine fauna, including seabirds, there is the potential for individual animal injury or death. The number of receptors present at the OA is expected to be limited to a small number of transient individuals. Injury or death to individual animals would be highly undesirable, but it would represent a small proportion of any local population, and any change in population size would likely be within the range of natural variation. The consequence level is considered II – Minor. Given the minor consequence on species, subsequent risks or significant impacts to socioeconomic receptors (including tourism and recreation) and cultural features relating to species with cultural significance are not anticipated.	
Likelihood	C – Possible
There are no breeding, feeding, aggregation or migration BIAs. There is one internesting habitat for the flatback turtle which extends more than 800 km of NT coastline; however, as the OA does not provide suitable internesting or foraging habitat for turtles, given the distance to the nesting beaches and water depths exceed 40 m, it is likely limited to individuals transiting the OA. In addition, marine fauna tend to move away from vessels and helicopters. The control measure, C6.1.5, restricts all activity vessels within the OA to ≤8 knots. Furthermore, the pipelay vessel will travel at very low speeds (<1 knot),while laying pipe and hence this vessel will not pose any credible risk of marine fauna injury during pipelay activities. The control measure, C6.3, requires the Santos procedure for interacting with marine fauna (EA-91-II-00003) reduces vessel speed further and introduces cautionary zones where fauna are sighted by the vessel master or crew who act as MFO. As the water depths exceed 40 m within the OA, the collision risk is reduced by providing under-keel clearance and enabling the fauna to avoid vessels. The likelihood of marine fauna interaction resulting in injury or mortality is considered possible.	
Residual Risk	The residual risk is considered Low

6.3.5 Demonstration of as low as reasonably practicable

No alternative options to using vessels, ROVs and helicopters are possible for undertaking the Activity.

All reasonably practicable control measures were reviewed and those adopted are considered appropriate to manage the residual risk to a Low level. The proposed management controls are in accordance with Santos' risk management criteria and are considered appropriate to reduce the risk to ALARP.

6.3.6 Acceptability evaluation

Is the risk ranked between Very Low and Medium?	Yes – maximum marine fauna interaction residual risk ranking is Low.
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 Environmental Hazard Identification and Assessment Guideline (EA-91-IG-00004), 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 – The following material published in relation to threatened and migratory species within the OA identifies vessel collision or anthropogenic disturbance as a threat Table 3-14: **Conservation Advice:** • Conservation Advice for *Balaenoptera borealis* (sei whale) (TSSC, 2015b) • Conservation Advice for *Balaenoptera physalus* (fin whale) (TSSC, 2015c) • Conservation Advice for *Calidris canutus* (red knot) (DCCEEW, 2024c) • Conservation Advice for *Rhincodon typus* (whale shark) (TSSC, 2015g) • Approved Conservation Advice for *Dermochelys coriacea* (Leatherback Turtle) (DEWHA, 2008b) **Management Plans:** • National Strategy for Reducing Vessel Strike on Cetaceans and other Marine Megafauna (CoA, 2017) • Conservation Management Plan for the Blue Whale 2015–2025 (CoA, 2015a) identifies vessel collisions as a threat to blue whales: 'Action A4: minimising vessel collisions by ensuring the risk of vessel strikes on blue whales is considered when assessing actions that increase vessel traffic in areas where blue whales occur and, if required appropriate mitigation measures are implemented; and ensure all vessel strike incidents are reported in the National Ship Strike database'. The adoption of EPO-10, C6.1.5 and C6.3.1 reduces potential impacts, hence is considered not inconsistent with the objectives of this management plan. • Recovery Plan for Marine Turtles in Australia 2017–2027 (CoA, 2017b) • Wildlife Conservation Plan for Seabirds (CoA, 2020) • Wildlife Conservation Plan for Migratory Shorebirds (CoA, 2015c). For all the recovery plans identified above, the objectives are achieved by adopting EPO-10 and control measures outlines in Table 6-4, Santos considers the impacts of marine fauna interaction to be not inconsistent with these recovery plans. Recovery plans / conservation advice for other species that may occur in the OA do not identify vessel or anthropogenic disturbance as a key threat or have explicit relevant objectives or management actions related to vessel or anthropogenic disturbance. The OA does not intersect any AMP or protected area. The objectives and actions of these publications were considered during impact and risk assessments. The controls outlined in Table 6-4 are not inconsistent with the objectives of the material listed above and Santos considers the risk of marine fauna interactions to be not inconsistent with these objectives.
Are performance outcomes, control measures and associated performance standards consistent with legal and regulatory requirements?	Yes – management measures are consistent with EPBC Regulations Part 8. Through acceptance of the Coastal Waters CEMP, legislative and regulatory requirements will be met as per Section 1.6.2 of the Coastal Waters CEMP.
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 (Appendix A of the Coastal Waters CEMP).
Are performance outcomes, control measures and associated performance standards consistent with industry standards?	Yes – the most recent and comparable EPs accepted by NOPSEMA were reviewed for consistency with the performance outcomes, control measures and associated performance standards proposed in the Coastal Waters CEMP.

Have performance outcomes, control measures and associated performance standards taken into consideration Relevant Person feedback?	Yes – Relevant feedback relating to potential marine fauna interaction has been considered. Existing control measures are considered adequate to reduce the risk to ALARP. Given the proximity of the GEP OA and DPD operational area in Commonwealth waters (where activities are covered by the Commonwealth Waters DPD EP), feedback received for these activities has been considered and where applicable an additional EPO, CMs and EPSs (e.g. EPO-14 and C6.3.2) were adopted.
Are performance standards such that the impact or risk is considered to be ALARP?	Yes – ALARP assessment conducted, with additional control measures adopted.

Activity vessels must move to undertake the Activity. The possibility of vessel strike is a well understood risk for maritime operations, including for commercial shipping and fishing. Vessel movements will comply with all relevant maritime standards and regulations, including EPBC Regulations to minimise risks to marine fauna. Application of the proposed management controls and adherence to regulations reduces the likelihood of vessel interactions with marine fauna. Although the potential exists for a collision to occur, it is considered a C – possible scenario. As part of Santos' reporting requirements for the Activity, if an impact to cetaceans did occur in the OA, it will be reported in the National Ship Strike database (see Table 8-6 of the Coastal Waters CEMP). With application of the proposed control measures, the potential impacts and risks to threatened fauna will be managed consistent with relevant recovery plans and approved conservation advice. Relevant Person feedback for the Coastal Waters CEMP and other Barossa Project EPs relating to potential marine fauna interaction has been considered and additional EPOs, CMs and EPSs were adopted. Therefore, the impact is considered to be ALARP and environmentally acceptable.

6.4 Unplanned release: treated sea water

6.4.1 Description of event

Event	If an unplanned wet-buckle event was to occur during pipeline installation, the pipeline would potentially require contingency preservation by flooding the pipeline with treated seawater followed by dewatering (discharge) of the treated seawater. This could occur anywhere along the pipeline length, including within the OA. The maximum volume of treated seawater that would be dewatered within the OA from this process would be at the boundary of NT and Commonwealth waters. This volume is calculated to be approximately 43,332 m^3.
Extent	The treated seawater discharge is predicted to disperse rapidly with plume movement driven by cyclical tidal movements. The extent of dispersion and dilution has been modelled for a contingency dewatering discharge of 43,332 m^3 at the boundary of NT and Commonwealth waters (Section 6.4.2.4).
Duration	The expected duration of a dewatering discharge at the boundary of NT and Commonwealth waters is ~70 hours. Water quality changes are predicted to recover within a very short period (<24 hours) immediately following release.

6.4.1.1 Treatment chemicals

As detailed in Section 2.11 of the Coastal Waters CEMP, all chemicals that are planned for discharge to the environment will be selected in accordance with a chemical selection process (see Section 2.11 of the Coastal Waters CEMP) to ensure that environmentally acceptable products are used or the risks can be demonstrated to be ALARP from the use of other chemicals.

The chemically treated sea water is a mixture of filtered seawater and hydrotest mixture product which includes biocides (to prevent biofouling on the internal surfaces), an oxygen scavenger and corrosion inhibitor (to control corrosion of the pipeline). A description of hydrotest mixture product components is provided below. The hydrotest mixture product will be Hydrosure, Roemex Hydro 3 or a similar product rated as Gold through the OCNS CHARM rating or which has a pseudo CHARM Gold rating (refer to Section Section 2.11 of the Coastal Waters CEMP) An assessment determined that Hydrosure and Roemex Hydro 3 can be used interchangeably as their chemical composition and concentration profile is similar and they are rated as Gold using CHARM through OCNS or pseudo-CHARM rated as Gold (see Section Section 2.11 of the Coastal Waters CEMP). For the purposes of this risk assessment, Australian marine species toxicity data for Hydrosure 0-3670R were used (see Table 6-5).

The nominal dosage rate of the hydrotest mixture product will be 350 ppm. Due to tolerances in the chemical dosing equipment, and other operational constraints, the dosing rate at specific points along the pipeline will fluctuate either side of this value. To conservatively assess the predicted impacts from activity discharges, a concentration of 400 ppm has been modelled to provide for these tolerances in the dosage system.

Biocide

The biocide is an alkyl dimethyl benzyl ammonium chloride (ADBAC), which is a mixture of alkylbenzyl dimethylammonium chlorides of various alkyl chain lengths. It is a nitrogenous cationic surface-acting agent belonging to the quaternary ammonium group. The mechanism of microbicidal action is thought to be due to disruption of intermolecular interactions that cause dissociation of cellular membrane bilayers. This compromises cellular permeability controls and induces leakage of cellular contents.

ADBAC is reported to have a half-life of between 8 and 15 days in sea water and is considered highly biodegradable, which indicates that its potential persistence in marine water and sediments is unlikely.

Bioconcentration factor testing reported values for fish of 79 L/kg (CEFAS, 2017). Substances with a bioconcentration factor below 1,000 L/kg are considered to not bioconcentrate (Champion Technologies, 2013).

Industry alternatives to ADBAC are glutaraldehyde and tetrakis (hydroxymethyl) phosphonium sulfate. These alternatives were evaluated as more toxic to the marine environment and rejected.

Oxygen scavenger

The oxygen scavenger contains ammonium bisulfite (NH_4HSO_3), a pale-yellow liquid with a pungent sulfur smell. It reacts with oxygen through a chemical reaction, forming harmless byproducts like ammonium sulfate and water, eliminating oxygen from the environment to migrate corrosive effects. Ammonium bisulfite is OSPAR PLONOR listed so poses little or no risk to the receiving marine environment. It has a low aquatic toxicity with LC50/EC50 > 100 mg/L and being an inorganic salt, the biodegradability and bioaccumulation potential tests are not applicable.

Solvents/ corrosion inhibitors

Dipropylene glycol methyl ether and ethylene glycol are organic compounds used in various industrial products, including paints, pastes, dyes, resins, brake fluids, inks, and cosmetics. Both chemicals are non-toxic to aquatic

organisms (LC50/EC50 > 1000 mg/L), readily biodegradable (> 60% in 28 days, OECD Method 306) and non-bioaccumulative (Log Pow < 3, OECD Method 117).

6.4.2 Nature and scale of environmental impacts

Potential receptors: physical environment (water and sediment quality, benthic habitats); threatened, migratory or local fauna; socioeconomic receptors and cultural features.

6.4.2.1 Ecotoxicity

Table 6-5 lists whole effluent testing results for Hydrosure 0-3670R which is considered representative for Hydro-3 or another hydrotest mixture product selected using the assessment process outlined in Section 2.11 of the Coastal Waters CEMP. Testing was undertaken according to protocols recommended by the Australian and New Zealand Guidelines (ANZG) (2000) and included five species, including locally-relevant species, from a range of trophic levels (primary producer, herbivore and carnivore). The no observable effect concentration (NOEC) thresholds (the highest concentration for which no effect on the organism was observed) were derived from ecotoxicology tests whereby organisms were exposed for periods between 48 and 96 hrs (Table 6-5). Results show that NOECs ranged from 0.13 ppm for the crustacean to 12.5 ppm for the fish. In general, simpler life forms (algae and species in their larval stage) exhibited higher sensitivity compared to more complex life forms such as fish.

The statistical package BurrliOZ V2.0 was used to analyse the ecotoxicity data for Hydrosure 0-3670-R. The NOEC values were used as the statistical endpoints from the single species ecotoxicity testing for estimation of the species sensitivity distribution (SSD), fitted using BurrliOZ.

Table 6-6 lists species protection levels calculated from the SSD of the NOECs and the dilutions to achieve NOEC species protection concentrations (PC80%, PC90%, PC95% and PC99%) based on a dosage of 400 ppm of hydrotest mixture product.

For long-term continuous discharges (e.g. sewage outfalls), ANZG (2018) recommend that the 99% species protection concentrations (PC99%) should be applied to develop environmental criterion for high-conservation ecosystems. For chemicals with negligible potential for bioaccumulation, the 95% level of species protection (PC95%) may also be applied.

Table 6-5: Ecotoxicological testing results for Hydrosure 0-3670R

Species	Test	Type	EC_{10} ppm	EC_{50} ppm	LOEC ppm	NOEC ppm
Nitzschia closterium (algae)	72-hour growth inhibition	Chronic	1.5 *	3.3 (3.0–3.58)	2.50	1.30
Saccostrea echinata (mollusc)	48-hour larval abnormality	Chronic	0.29 (0.24–0.33)	0.54 (0.52–0.56)	0.50	0.250
Heliocidaris tuberculata (echinoderm)	72-hour larval development	Chronic	1.30 (1.27–1.32)	1.71 (1.70–1.74)	2.50	1.25
Melita plumulosa (crustacean)#	96-hour acute toxicity	Acute	0.08 (0.04–0.11)	0.14 (0.10–0.16)	0.25	0.13
Lates calcarifer (fish)#	96-hour acute toxicity	Acute	13.5 (12.3–18.0)	17.5 (17.1–18.0)	25.0	12.5

Source: Chevron (2015)
**95% confidence limits are not reliable; numbers in brackets represent the 95% fiducial limits.*
 # Toxicity test is defined as an acute test.

Table 6-6: Species protection concentrations and required dilutions for Hydrosure 0-3670R based on the NOEC from whole effluent toxicity testing

Species protection level	NOEC threshold (ppm)	Dilutions required to achieve the NOEC threshold based on Hydrosure dosing concentration of 400 ppm
PC99%	0.06	1:6,667
PC95%	0.10	1:4,000
PC90%	0.15	1:2,667
PC80%	0.23	1:1,739

Source: Chevron (2015)

6.4.2.2 Biodegradation and bioaccumulation potential

The hydrotest mixture product used (Hydrosure, Hydro-3 or an alternative) will have a CHARM rating of Gold through OCNS or will be pseudo-CHARM rated through Santos' chemical assessment process (refer Section 2.11 of the Coastal Waters CEMP). The CHARM model assesses the biodegradation and bioaccumulation potential of a product as well as ecotoxicity data to calculate a hazard quotient (HQ). A lower toxicity, lower bioaccumulation potential and higher biodegradation potential (lower persistence) results in a lower HQ (refer Section 2.11 of the Coastal Waters CEMP). The Gold rating is the lowest band on the HQ scale and indicates products that are least environmentally hazardous. The mixture is considered biodegradable with negligible potential for bioaccumulation.

6.4.2.3 Dispersion Modelling

The volume of treated seawater that may be discharged from contingency dewatering in the OA is up to approximately 43,332.5 m^3 at the NT waters/ Commonwealth waters boundary, i.e. ~KP23. A dispersion modelling study was undertaken by RPS (2024) for this discharge which is estimated to last 69.9 hours. The concentration of the chemical treatment was modelled at 400 ppm; however, the target dosage rate is 350 ppm, so the modelling results are considered conservative. The modelling was undertaken based on the treated sea water having the same water temperature and salinity as the surrounding sea water (28.0°C and 34.4 psu respectively) and therefore being neutrally buoyant.

The physical mixing of the chemically treated water discharge is divided into two distinct zones: the near-field (modelled using CORMIX) and the far-field (modelled using MUDMAP).

Near-field modelling

The near-field zone involves the initial mixing of the treated seawater, influenced primarily by the plume's initial momentum and the static current conditions as it enters the marine environment. Table 6-7 summarises the discharge characteristics used.

Table 6-7: Summary of treated sea water discharge model parameters (RPS, 2024)

Parameter	Value/design
Flow rate (m^3/hr)	619.9
Internal diameter of outlet pipe (inches)	4
Number of outlets	3
Outlet orientation	Vertical upwards at 45°
Discharge height above the seabed (m)	2
Water depth at discharge (m)	48
Discharge temperature (°C)	28.0 – same as ambient
Discharge salinity (psu)	34.4 – same as ambient

A 10-year dataset of ocean and tidal currents was compiled and statistically analysed to determine the 5^{th}, 50^{th} and 95^{th} percentile current speeds at varying depths (Table 6-8) for input to the near-field model to reflect contrasting mixing and advection cases:

- 5^{th} percentile - weak current speed with low mixing and slow advection (5% of the time the currents will be below the identified speed)

- 50th percentile - medium current speed with moderate mixing and advection (50% of the time the currents will be below the identified speed)
- 95th percentile - strong current speed with high mixing and rapid advection to nearby areas (95% of the time the currents will be below the identified speed).

The weak ambient currents (0.06 m/s) constitute the worst–case mixing conditions for the treated sea water release.

Table 6-8: Adopted annual seabed static current adjacent to the release location

5th percentile - Weak current speed (m/s)	50th percentile - Medium current speed (m/s)	95th percentile - Strong current speed (m/s)
0.06	0.35	0.82

Far-field modelling

Once the near-field assessment is complete, the focus shifts to the far-field zone where the transport and mixing of the chemical treatment are driven by ambient currents. Far-field modelling expands on the near-field work by allowing the time-varying nature of currents to be included and for the potential for localised build-up when current speeds are low (e.g., at the turning of the tide) and possible recirculation of the plume. In this case, concentrations near the discharge point can be increased due to the discharge plume mixing with the remnant plume from an earlier time. This may be a potential source of episodic increases in pollutant concentrations in the receiving waters. Table 6-9 summarises the modelling parameters used for the near-field modelling.

Table 6-9: Summary of the chemical treatment characteristics used for the far-field modelling

Parameter	Value/design
Total volume of treated seawater released (m^3)	43,332.5
Duration of release (hours)	69.9
Simulated period (hours)	84.4
Chemical treatment initial concentration (ppm)	400
Hindcast data period	2010 - 2019
Seasons	Summer (October to March) Transitional (April to September) Winter (May to August)

Twenty five simulations were run for each season (3), amounting to 75 simulations in total. Each simulation was consistent in terms of discharge rate, location and configuration, but commenced at different times to capture a diverse range of current conditions. This approach ensured a thorough assessment of how the chemical treatment concentrations would mix and disperse under various conditions.

For each simulation, the maximum concentrations through the water column were calculated at 10-minute intervals within each 30 m x 30 m grid cell. The concentrations for each simulation and grid cell were then ordered from lowest to highest values, and the 50th and 95th percentile values were determined.

Calculating the 50th and 95th percentiles is a standard method for assessing the impact of dispersing plumes, capturing both typical and more extreme conditions in the data set and gives a more balanced view. Specifically:

- the 50th percentile indicates that, for half of the simulations, the concentrations within the grid cell will be below this value, and for the other half, they will be above it.
- the 95th percentile shows that, for 95% of the simulations, the concentrations in the grid cell will be below this threshold.

These concentrations assume a background concentration of zero for the chemical treatment in the receiving waters and no biodegradation of the chemical treatment during the simulation, but biodegradation will occur.

After completing all 75 far-field simulations, the outputs were consolidated and analysed to generate annual-based results. These results were then used to determine the maximum distances required for the chemical treatment to reach the lower No Observable Effects Concentration (NOEC) protection level of 99% (PC99%) threshold of 0.06 ppm.

6.4.2.4 Dispersion Modelling Results

The near-field results showed that the treated sea water would initially shoot upward at a 45º angle due to the port orientation and the high exit velocities. The initial mixing that takes place will largely be due to the high exit velocities. Once the plume lost its momentum, the neutrally buoyant plume is predicted to travel laterally and disperse with the currents with the centreline of the plume settling between 11 and 22 m above the seabed.

The dominant role of tides in shaping the local currents is evident in the results, as the modelled plume bends and changes direction from north-west to south-east during the flood tide currents. The predicted concentrations during this period exhibit a decreasing trend as the distance from the release location increases.

To assess the extent of toxicity effects associated with the modelled discharge plume, results from Whole of Effluent Toxicity testing for Hydrosure 0-3670R (Chevron, 2015), refer Table 6-5 and Table 6-6, were applied. The predicted treated seawater concentrations from the modelling have been compared to NOEC threshold concentrations associated with various levels of species protection as shown in Table 6-6.

Figure 6-1 illustrates the annualised predicted extent of the chemical treatment concentrations for the combined 75 discharge simulations at KP23.2 release location (boundary of NT and Commonwealth waters), representing 50th percentile or “typical conditions” and Figure 6-2 Illustrates the annualised predicted extent for the 95th percentile or “extreme conditions”.

These figures depict the predicted concentrations in an aerial plan view, although the plume was predominantly located within 20 m above the seabed. Furthermore, these figures reveal that the plume predominantly aligns along the northwest-southeast axis, consistent with the prevailing current directions adjacent to the release location.

Table 6-10 summarizes the maximum distances required to achieve the NOEC at the 50th and 95th percentile statistics.

The maximum distances from the release location to reach the PC99% of 0.06 ppm were 8.68 km for the 50th percentile and 14.68 km for the 95th percentile concentrations.

There was no exposure predicted to Shepparton Shoal and given the plume is primarily tidally driven, there is not exposure predicted to the unnamed shoal 6 km south of the OA.

The modelling results also indicated that the chemical treatment concentrations did not exceed any NOEC species protection thresholds at any location 14.5 hours after the cessation of the discharge.

The results presented in Figure 6-1 and Figure 6-2 show the combined (annualised) spatial distribution of treated seawater concentrations over the discharge period (and for an additional 14.5 hours post-discharge) but do not provide information on expected exposure times (i.e. the duration of time for which concentrations above NOEC levels persist within the model grid cells). Within the nearfield mixing zone, immediately surrounding the discharge location (nominally within 30 m of the discharge location), exposure above NOEC concentrations is expected to persist throughout the discharge. Beyond this nearfield mixing zone, exposure times are expected to comparatively short with exposure to treated seawater occurring periodically throughout the tidal cycle as the strong tidal currents alternate the direction of the plume between a predominantly northwest and southeast direction.

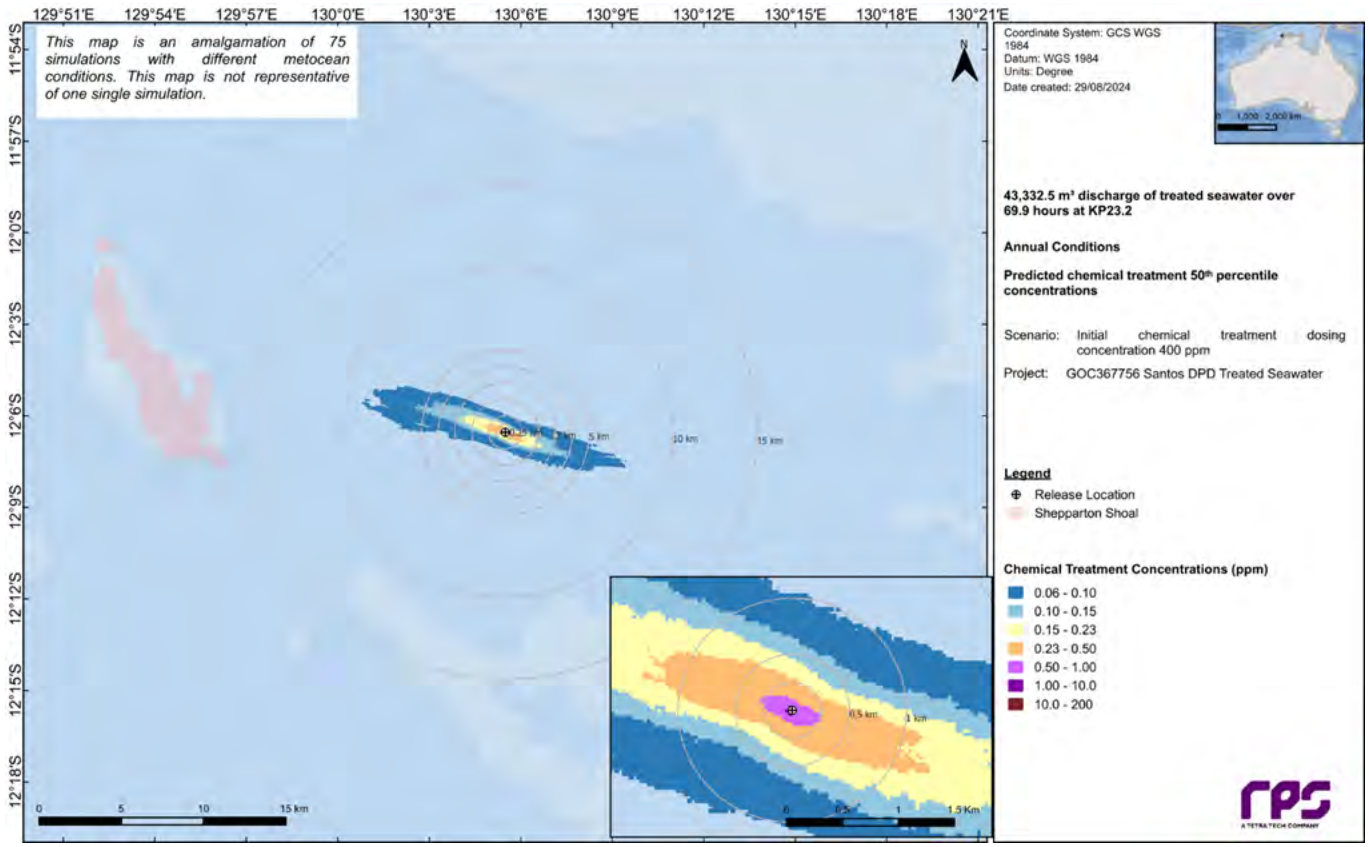

Figure 6-1: Predicted extent of the chemical treatment concentrations from the discharge at the KP23.2 release location, representing 50th percentile or "typical conditions". The annualised results were derived by consolidating all 75 discharge simulations.

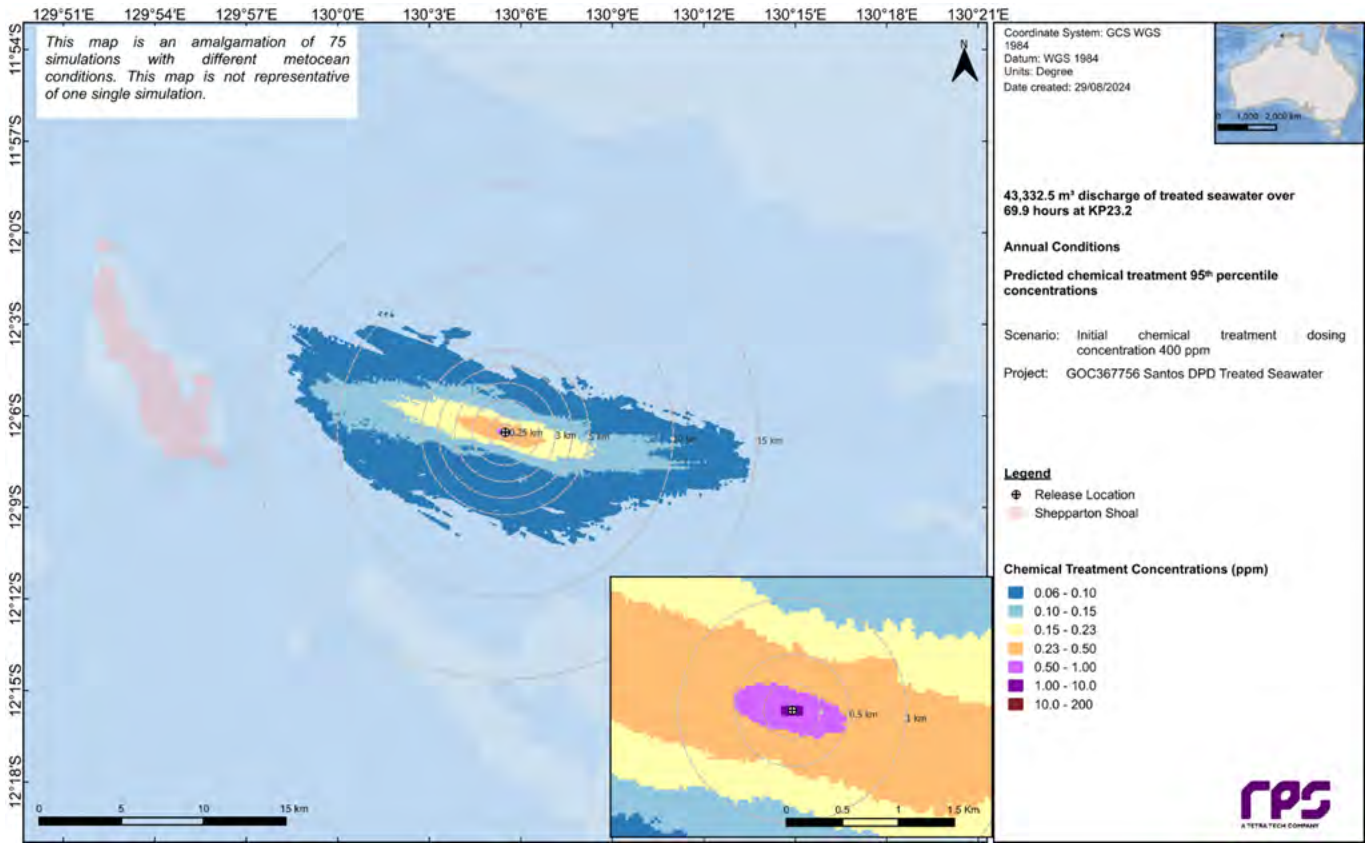

Figure 6-2: Predicted extent of the chemical treatment concentrations from the discharge at the KP23.2 release location, representing 95th percentile or "extreme conditions". The annualised results were derived by consolidating all 75 discharge simulations.

Table 6-10: Maximum distances from release location at KP23.2 to achieve the chemical treatment thresholds for the 50th and 95th statistics. These distances were derived by consolidating all 75 discharge simulations to generate annual-based results

Initial chemical dosing (ppm)	Species protection level	Thresholds (ppm)	Maximum distance (km) from the release location to the threshold based on the 50th percentile statistics	Maximum distance (km) from the release location to the threshold based on the 95th = percentile statistics	Minimum distance from Shepparton Shoal (km) based on the 95th percentile statistics
400	PC99%	0.06	8.68	14.68	4.65
	PC95%	0.10	6.17	12.20	5.87
	PC90%	0.15	2.86	7.61	9.88
	PC80%	0.23	1.38	3.41	13.63

6.4.2.5 Water quality

RPS (2024) modelling predicted a maximum distance from the release location to the PC99% NOEC threshold of 0.06 ppm were 8.68 km for the 50th percentile and 14.68 km for the 95th percentile concentrations.

It is important to note that the modelled results presented are considered conservative, as the treated seawater discharge concentration was set at a dosage rate of 400 ppm instead of the expected dosage rate of 350 ppm and did not consider degradation of the mixture through time which would occur within the pipeline prior to discharge, reducing the concentration discharged. As a result, it is anticipated that the expected initial discharge concentrations of the hydrotest mixture will be less than those modelled.

The contingency release of treated sea water would result in a localised (confined to the plume) and temporary (approximately 3 days) minor reduction in water quality (above NOEC levels), with exposure to treated seawater above NOEC levels, beyond the nearfield mixing zone, occurring temporarily at locations intersected by the plume as it is moved by alternating tidal currents. It is important to note that the NOEC levels are based on ecotoxicity testing where organisms were continuously exposed to a concentration of treated seawater for periods of 48 to 96 hours (2 to 4 days) (Table 6-5). Other than within the nearfield mixing zone, NOEC concentrations persisting over these timescales is not predicted to occur.

The modelling predicted (based on the 75 simulations run) that no remnant of the discharge plume would persist above NOEC levels greater than 14.5 hours following cessation of discharge. At the discharge location, NOEC levels were not observed to persist greater than 1 hour following cessation of discharge.

The hydrotest treatment mixture are inherently biodegradable with low potential for bioaccumulation (refer Section 6.4.2.2). For these reasons, and the short duration of the contingency discharge, no persistent effects on water quality and marine organisms is expected from the discharge.

6.4.2.6 Plankton

Plankton drifting past the outlet at the time of discharge may be exposed to concentrations above those that could elicit an effect. However, dilution of the plumes is rapid and the exposure concentration travelling with the organism will continually reduce. Plankton are widely distributed in the ocean and regenerate rapidly and, in the context of their lifecycle, impacts will be short term and negligible.

6.4.2.7 Sediment quality

Sediments are unlikely to be impacted as the neutrally-buoyant treated seawater will be discharged through an arrangement orientated to promote dispersion away from the seabed as far as practicable and the modelling predicts the plume was predominantly located within 20 m above the seabed. The chemicals that will be used are inherently biodegradable with low potential for bioaccumulation and therefore there is a low potential for persistence within sediments.

6.4.2.8 Other communities – benthic communities

No protected benthic habitats were identified that have the potential to be exposed to the treated sea water plumes. The seabed within the OA consists of predominantly bare sediment with sparse filter feeders with a low abundance and diversity of infauna and are unlikely to be impacted as pipeline dewatering will be through an arrangement orientated to promote dispersion away from the seabed as far as practicable and the modelling predicts the plume

was predominantly located within 20 m above the seabed. 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.

There was no exposure predicted to Shepparton Shoal and given the plume is primarily tidally driven along a northwest-southeast axis, there is not exposure predicted to the unnamed shoal 6 km south of the OA. Furthermore, as presented in Section 6.4.2.5, the modelling is considered conservative due to a higher concentration modelled than the planned dosage rate and the modelling did not consider degradation of the hydrotest mixture through time within the pipeline prior to release. Consequently, impact to benthic communities is not expected and the impact is assessed as acceptable given it is a one-off and a contingency only activity.

6.4.2.9 Marine mammals, marine reptiles, sharks and rays, other pelagic and demersal fish

Marine fauna within the OA, some of which have cultural significance as totems (Section 3.2.14.10) or cultural food sources (Section 3.2.14.9), are likely to be transient. If present, marine fauna could pass through the plumes. Exposure will be at low concentrations and for a short duration. The biocide chemical in the discharged treated sea water shows toxicity to marine life, with the effects greater on simpler life forms. This is illustrated in the ecotoxicological data in which the NOEC for a fish species is 12.5 ppm (time-weighted average) compared to 1.3 ppm for algae (Table 6-5). Modelling demonstrated that concentrations within the plume vary both temporally and spatially, rarely exceeding instantaneous concentrations of 10 ppm and those concentrations were limited to within 30 m of the discharge site, noting that the concentration to be discharged will be less than that modelled.

The flatback internesting BIA and habitat critical to the survival of flatback turtles overlaps the possible discharge location. However, as internesting flatbacks rarely frequent water depths greater than 30 m (water depth at the discharge location is 48 m), turtles are likely to be limited to transiting individuals near the discharge location. If a turtle or other mobile transiting marine species is in the vicinity, it is predicted that exposure concentrations would unlikely elicit an effect. Mobile marine species are expected to either avoid turbid stretches of water or pass through with no significant impacts. No aggregation areas for marine mammals, sawfish, sharks, rays or other fish were identified near the discharge location.

With controls in place, impacts to threatened and migratory species and totem species are predicted to be minor and therefore impacts and risks are deemed acceptable.

6.4.2.10 Cultural features

No First Nations people feedback was provided about potential impacts from activity discharges to cultural features during consultations for this Activity. The potential impacts to culturally significant marine fauna species (such as dreaming and totem species including marine mammals, marine reptiles, sawfish, sharks, rays or other fish) are assessed in Section 6.4.2.9.

Tiwi clan members raised concerns—during consultation on the D&C EP and in the 2022 Statement of Reasons Requests—regarding potential impacts from the D&C Activity on dreaming and totemic species and culturally significant marine species that provide a food source for traditional fishing and hunting.

The potential impact to marine fauna is likely to be limited to localised and temporary and is unlikely to result in significant impacts to marine species at the individual or population level (refer to Section 6.4.2.9). As a result, an unplanned release of treated seawater is not anticipated to affect traditional hunting practices or resources.

In addition, some Tiwi people informed Santos that impacts to totemic species could also affect Tiwi people by making them sick. The potential impacts to culturally significant marine fauna species (such as dreaming and totem species including turtles, marine mammals, fish and rays) are assessed in Section 6.4.2.9.

6.4.3 Environmental performance outcomes and control measures

The EPOs relating to this event is:

- No impacts to the marine environment from contingency pipeline discharges (following wet-buckle event) resulting in a consequence severity greater than Minor [EPO-07]
- No significant impacts to cultural features from the Activity [EPO-14].
- Zero unplanned releases of chemicals to the marine environment [EPO-11]

An assessment of the environmental benefits and the potential costs or issues associated with control measures for this activity are described in Table 6-11 to demonstrate that potential risks are ALARP. Control measures that are adopted have associated EPSs and measurement criteria, and are presented in Table 7-2. Rejected control measures have an ALARP evaluation provided to justify their rejection.

Table 6-11: Control measures evaluation for unplanned treated sea water release

CM reference	Control measure	Environmental benefit	Potential cost/issues	Evaluation
Standard control measures				
C7.4.1	Apply a chemical selection procedure for all chemicals planned to be discharged (administrative control)	Under the procedure, CHARM-rated chemicals managed under the OCNS, or OSPAR PLONOR list, or chemicals risk assessed by Santos and deemed environmentally acceptable, will be selected (Section 2.11 of the Coastal Waters CEMP).	Cost of implementing procedures. Range of chemicals reduced with potentially higher costs for alternative products.	**Adopted**
C7.4.2	Contractor contingency pipeline preservation procedure and specification (administrative control)	This control is effective in reducing potential impacts from contingency pipeline preservation activities by: • selecting a seawater treatment product that is Gold rated through OCNS CHARM rating or through a pseudo CHARM rating , which is recognised as the least environmentally hazardous chemical rating • calculating the chemical treatment dosage to result in the discharge concentration not exceeding 400ppm • metering of water and chemical injection volumes during flooding and dewatering activities	Cost of implementing procedures.	**Adopted**
Additional control measures				
C7.4.3	Pipeline installation procedure (administrative control)	This control effectively reduces the likelihood of a wet buckle occurring, hence preventing unplanned treated sea water releases.	Cost of implementing procedures.	**Adopted**
C7.4.4	In the unlikely event that the pipeline requires contingency filling and subsequent dewatering of treated	Promotes dispersion (reduces chemical concentration in surrounding environment).	Cost/effort in engineering and/or manipulating valve orientation. Constrained by	**Adopted**

CM reference	Control measure	Environmental benefit	Potential cost/issues	Evaluation
	seawater in response to a wet buckle event and prolonged repair, pipeline dewatering of treated seawater will be discharged via an arrangement orientated to promote dispersion and direct discharge away from seabed as far as practicable (engineering control)	Reduces potential for sediment/seabed impacts.	specifications of pipeline recovery tool.	
C7.4.5	In the unlikely event that the pipeline requires contingency filling and subsequent dewatering of treated seawater in response to a wet buckle event and prolonged repair, water quality monitoring at the discharge location will be conducted to confirm the concentration and dispersion of treatment chemicals (administrative control)	Confirms dilution of discharge and validity of modelling. Consistent with Environmental Approval (EP2022/022-001)[51]	Cost/effort in planning and implementing water quality monitoring.	**Adopted**
C6.2.3	DGPS for pipelay vessel to maintain accurate vessel position during installation (administrative control)	The control is effective in ensuring vessels, in combination with DP systems, are positioned with high accuracy. This ensures the pipeline is installed along the desired route. The proposed pipeline route has been designed to avoid sensitive benthic features and minimise the requirement for span rectification.	Costs are expected as part of standard procedure.	**Adopted**
N/A	Omission of preservation activities (no addition of treatment chemicals to pipeline) following wet-buckle event (elimination control)	This would eliminate any potential treated seawater impacts from the contingency activities.	Preservation may be required to control the potential for corrosion of the pipeline. In addition, potential loss of subsea infrastructure integrity could possibly lead to a larger environmental incident after commissioning.	**Rejected** – not considered feasible from a technical and risk perspective.

[51] *Condition 7.2 of Environmental Approval (EP2022/022-001) under the* Environment Protection Act 2019 *(NT) states that: The approval holder must ensure that any contingency discharge of hydrotest fluid is undertaken in a manner and at a rate such that marine water quality, within a 40 m radius of the discharge location, returns to ambient levels within 12 hours of cessation of discharge.*

6.4.4 Environmental impact and risk assessment

Receptors	• Physical environment (water and sediment quality, benthic habitat) • Threatened, migratory or local fauna (marine mammals, marine reptiles, fish [including sharks and rays]) • Socioeconomic (commercial fishing) • Cultural features
Consequence	II – Minor

Physical environment or habitat

The seabed near the discharge location consists of predominantly bare sediment with sparse filter feeders with a low abundance and diversity of infauna. The modelling predicted a maximum distances from the release location to reach the PC99% of 0.06 ppm were 8.68 km for the 50th percentile and 14.68 km for the 95th percentile concentrations. For the LC50 of 1 ppm, the maximum distances reduced to 0.06 km for the 50th percentile and 0.11 km for the 95th percentile concentrations. Concentrations above the PC99% NOEC threshold of 0.06 ppm were not predicted to reach nearby shoals.

Given the temporary (within hours to days) minor reduction in water quality, water depth and that the chemicals are inherently biodegradable with low potential for bioaccumulation, it is reasonable to conclude that no substantial change in the benthic communities and water quality is anticipated from activity discharges and therefore the impact is assessed as acceptable given this is a one-off activity.

The consequence level for physical environment or habitat is considered to be II – Minor.

Threatened, migratory or local fauna

The seabed near the discharge location consists of predominantly bare sediment with sparse filter feeders with a low abundance and diversity of infauna. It is predicted that there is likely to be no to negligible impact to the seabed or closest shoal from activity discharges. Mobile transiting marine species are expected to pass through the small discharge plumes with no significant impacts. The toxicity of the discharged chemicals is considered low and the potential for bioaccumulation of any toxic compounds is minor given the low volumes discharged. As with all chemicals selected for use in offshore activities by Santos, the chemicals chosen will be low aquatic toxicity (e.g. EC50/LC50 >100 ppm), low bioaccumulation potential (e.g. Log Pow <3) and readily biodegradable (e.g. more than 60% in 28 days, OECD 306), thus reducing the likelihood of any significant impacts.

Marine fauna species within the vicinity of the discharge location are likely to be transient. If discharge contact does occur with any marine fauna, it will be for a short duration due to the rapid dispersion of the small plumes and the transient fauna movement—exposure time may not be long enough 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 the species. Therefore, no long-term impacts to the 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 the protected matters species is expected.

Fish (including some sharks and rays) may forage in the soft sediments for marine invertebrates. If discharge contact does occur with fish, it will be for a short duration due to the rapid dispersion of the small plumes and the transient fauna movement—exposure time may not be long enough to cause a toxic effect. Given the low toxicity of chemicals used in the contingency dewatering, there are no significant impacts expected to threatened and migratory fauna, and the consequence level for threatened, migratory or local fauna is considered to be II – Minor.

Threatened ecological communities

Not applicable – no threatened ecological communities were identified in the area over which discharges are expected.

Protected

Not applicable – no protected areas were identified in the area over which discharges are expected.

Socioeconomic receptors

There is limited activity by commercial fishers, recreation and tourism that overlap the OA. Activity discharges will be discharged for a short period (nominally 1-2 days) to enhance rapid dispersion. Contact to discharges will also be limited to transient fauna individuals where exposure time will unlikely cause a toxic effect. Given the negligible consequence to species, subsequent impacts to socioeconomic receptors are not anticipated.

The consequence level for the socioeconomic receptors is considered to be II – Minor.

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.

Likelihood	C – Possible

The proposed control measures will reduce the risk of an unplanned treated sea water release. The likelihood of an unplanned release of treated seawater event occurring is considered C – Possible.

Residual Risk	The residual risk is considered Low.

6.4.5 Demonstration of as low as reasonably practicable

All reasonably practicable control measures were reviewed and those adopted are considered appropriate to manage the residual risk to a Low level. The proposed management controls are in accordance with Santos' risk management criteria and are considered appropriate to reduce the risk to ALARP.

6.4.6 Acceptability evaluation

Is the risk ranked between Very Low and 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 the risks and impacts consistent with the principles of ecologically sustainable development (ESD)?	Yes – activity evaluated in accordance with Santos' Offshore Division Environmental Hazard Identification and Assessment Guideline (EA-91-IG-00004), 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 – The following material published in relation to threatened and migratory species within the OA identifies pollution as a threat (Table 3-14): **Conservation Advice:** • Conservation Advice for *Balaenoptera physalus* (fin whale) (TSSC, 2015c) • Conservation Advice for *Balaenoptera borealis* (sei whale) (TSSC, 2015b) • Approved Conservation Advice for *Numenius madagascariensis* (Eastern Curlew) (TSSC, 2015f) • Conservation Advice for *Calidris canutus* (red knot) (DCCEEW, 2024c) • Conservation Advice for *Calidris acuminata* (sharp-tailed sandpiper) (DCCEEW, 2024b) **Recovery Plans:** • Recovery Plan for the Grey Nurse Shark (*Carcharias taurus*) (DoE, 2014a) • Recovery Plan for Marine Turtles in Australia 2017–2027 (CoA, 2017b) • Wildlife Conservation Plan for Seabirds (CoA, 2020) • Wildlife Conservation Plan for Migratory Shorebirds (CoA, 2015c). Recovery plans / conservation advice for other species that may occur in the OA do not identify habitat degradation / modification or pollution as a key threat or have explicit relevant objectives or management actions. The objectives of these publications were considered during impact and risk assessments. The Activity is not inconsistent with these objectives. The EPO-11 and the control measures outlined in Table 6-11 are not inconsistent with the objectives of the material listed above. Santos considers the impacts unplanned treated sea water release due to a wet buckle event is not inconsistent with these objectives.
Are performance outcomes, control measures and associated performance standards consistent with legal and regulatory requirements?	Contingency treated seawater management measures are consistent with the general duty of the *Waste Management and Pollution Control Act 1988* (NT) (WMPC Act). Through acceptance of the Coastal Waters CEMP, legislative and regulatory requirements will be met as per Section 1.6.2 of the Coastal Waters CEMP
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 (Appendix A of the Coastal Waters CEMP).
Are performance outcomes, control measures and associated performance standards consistent with industry standards?	Yes – the most recent and comparable EPs accepted by NOPSEMA were reviewed for consistency with the performance outcomes, control measures and associated performance standards proposed in the Coastal Waters CEMP.
Have performance outcomes, control measures and associated performance standards taken into consideration Relevant Person feedback?	Yes – Relevant feedback relating to a potential unplanned treated seawater release has been considered and the existing control measures are considered sufficient to reduce the risk to ALARP.
Are performance standards such that the impact or risk is considered to be ALARP?	Yes – ALARP assessment conducted, with additional control measures adopted.

Relevant Person concerns were considered regarding this aspect, and the proposed controls will reduce the residual level of risk to Low and ALARP. Therefore, the residual risk associated with the accidental release of treated seawater is considered by Santos to be acceptable.

6.5 Unplanned release: minor hydrocarbons and chemicals

6.5.1 Description of event

Event	Vessels undertaking activities will routinely have a range of chemicals and hydrocarbons onboard, including: • fuel for portable/deck equipment • hydraulic fluid • paints and lubricants • miscellaneous chemicals (e.g. cleaning fluids). An accidental release of minor volumes of chemicals and hydrocarbon liquids into the marine environment has the potential to occur from: • mechanical failure of equipment, such as tank or pipework failure • inadequate handling and storage • insufficient fastening or inadequate bunding • firefighting foam released during an unplanned incident. A release of non-hydrocarbon liquids or chemicals may result in impacts to water quality and hence sensitive environmental receptors.
Extent	Small spills may occur when the chemicals or hydrocarbons are in use or from leaks within the storage area and can potentially be released into the marine environment. The maximum volume of chemicals that could be released during routine operations is likely to be incidental and minor, with bunding in place to retain substances in the event of a leak. Operational experience indicates typical minor spill volumes are <10 L. Dilution from discharges in open waters is rapid, with 1 in 1,000 dilution usually occurring within 30 minutes (Costello and Read, 1994). If the spill is not contained on deck, a release to the marine environment would likely disperse rapidly within the OA. Hydraulic fluid is used in various equipment, such as A-frames, cranes, ROVs and winches. Failure of hydraulic lines may result in the loss of hydraulic fluid to the environment. Operational experience indicates typical volumes released due to hydraulic line failure are <20 L. In the event of a fire emergency, firefighting foam will be used, which would then be discharged directly overboard or through deck drainage systems. 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 event and contained within the OA.
Duration	The duration of the impact is limited (minutes to hours) to the time the released chemical or hydrocarbon takes to disperse to below harmful concentrations.

6.5.2 Nature and scale of environmental impacts

Potential receptors: physical environment (water quality); threatened, migratory or local fauna (marine mammals, marine reptiles, fish [including sharks and rays] and birds); socioeconomic; and cultural features.

Hydraulic fluids and lubricating fluids behave similarly to MDO when spilt in the marine environment (see Section 6.6 for information on MDO behaviour in the marine environment). 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. Lubricating oils are more viscous and so their rate of spread from a spill would be slightly slower.

6.5.2.1 Physical environment

Minor volumes of chemicals or hydrocarbons released to the marine environment may lead to contamination of the water column near 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 limited 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 shoals (>8 km distant from the pipeline route in the OA) are not expected. There are no emergent or intertidal habitats that could be impacted by a surface spill, with nearest shorelines approximately 30 km away.

6.5.2.2 Threatened, migratory or local fauna

Changes to water quality could potentially lead to short-term impacts on transiting marine fauna (e.g. pelagic fish [including sharks], marine mammals, marine reptiles and seabirds), some of which may have cultural significance as totems or cultural food sources. Only low numbers of animals are expected to be encountered in the OA.

Recovery plans and conservation advice for numerous protected species identify marine pollution and contamination impacts as threats to the species.

Small chemical and hydrocarbon spills are unlikely to have widespread ecological effects on threatened or migratory fauna, given the nature of the chemicals and hydrocarbons onboard, the limited and small volumes that could be released, and the dispersive nature of the open-ocean environment of the OA. 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 any accidentally released hydrocarbons is considered unlikely given the expected limited and small potential volumes and short exposure times.

The recovery plan for Marine Turtles in Australia 2017–2027 (CoA, 2017b) identified pollution as a threat. However, pollution sources were primarily related to agricultural, terrestrial industrial and domestic sources. The accidental minor chemical and hydrocarbons releases are expected to be of very short duration and localised with no to negligible persistence in the environment.

6.5.2.3 Cultural features

No First Nations people feedback was provided about potential impacts from a minor unplanned release to cultural features during the Coastal Waters CEMP or other Barossa Gas Project EP consultations. In accordance with First Nations people cultural beliefs, if totemic species (e.g. turtles, fish, marine mammals and birds) are impacted by the Activity some believe this in turn can impact First Nations people and make them sick. The potential impacts to culturally significant marine fauna species (such as dreaming and totem species including marine mammals, turtles, fish and birds) are assessed in Section 6.5.2.2.

6.5.3 Environmental performance outcomes and control measures

The EPO relating to this event is:

- Zero unplanned release of minor volumes of chemicals and hydrocarbons to the marine environment [EPO-12].

An assessment of the environmental benefits and the potential costs or issues associated with control measures for this activity are described in Table 6-12 to demonstrate that potential risks are ALARP. Control measures that are adopted have associated EPSs and measurement criteria, and are presented in Table 7-2. Rejected control measures have an ALARP evaluation provided to justify their rejection.

Table 6-12: Control measures evaluation for unplanned release: minor

CM reference	Control measure	Environmental benefit	Potential cost/issues	Evaluation
Standard control measures				
C6.1.1	Activity vessels equipped and crewed in accordance with Australian maritime requirements (administrative control)	Ensures contracted vessels are operated, maintained and crewed in accordance with industry standards and regulatory requirements.	Costs associated with personnel time in checking vessel.	**Adopted**
C6.2.5	Vessel planned maintenance system (administrative control)	Reduces leaks from the vessel equipment as it will be operating within its parameters.	Operational costs and labour or access requirements for undertaking maintenance.	**Adopted**
C7.1.3	Chemicals and hydrocarbons will be managed in accordance with standard maritime practices (administrative control)	Reduces the risk of accidental discharge to sea by controlling the storage, handling and clean-up of chemicals.	Cost of implementing procedures.	**Adopted**
C7.5.1	Chemical and hydrocarbon storage areas designed to contain leaks and spills (isolation control)	Reduces the risk of accidental discharge to sea by controlling the storage hydrocarbons.	Cost of implementing procedures.	**Adopted**

CM reference	Control measure	Environmental benefit	Potential cost/issues	Evaluation
C7.5.3	Spill clean-up kits available in high-risk areas (protective control)	Reduces the risk of spills and leaks to sea by controlling the clean-up of minor spills.	Cost of implementing procedures.	**Adopted**
C7.5.4	No perfluorinated sulfonate (PFAS) or perfluorooctane sulfonate (PFOS) will be used in firefighting foam (administrative control)	PFAS and PFOS are persistent, bioaccumulate, and have adverse health effects on humans and wildlife. Safer and environmentally friendly alternatives are available, and efforts are being made to reduce their use and release into the environment.	Cost of implementing procedures.	**Adopted**
C7.5.5	ROV operations undertaken in accordance with good industry practice (administrative control)	Maintenance and pre-deployment inspection on ROV completed as scheduled to reduce the risk of hydraulic fluid releases to the marine environment.	Cost of implementing procedures.	**Adopted**
C7.5.6	Vessel spill response plans (administrative control)	Implements onboard response plans to deal with unplanned hydrocarbon releases and spills quickly and efficiently to reduce impacts to the marine environment.	Administrative costs of demonstrating vessel contractor compliance (e.g. Santos personnel to confirm that a Shipboard Oil Pollution Emergency Plan [SOPEP]/Shipboard marine pollution emergency plan [SMPEP] is in place).	**Adopted**
C7.5.7	Helicopter refuelling procedure (administrative control)	Minimises risk of pollution to ALARP during hydrocarbon transfers to helicopters.	Personnel costs associated with ensuring procedures are in place and implemented during fuel transfers.	**Adopted**
Additional control measures				
C6.1.8	HSE inductions will include environmental requirements and cultural values (administrative control)	Ensures that crew are aware of the stringent Coastal Waters CEMP, Santos and legislative requirements.	Administrative costs to update existing Santos procedure and induction materials and train personnel.	**Adopted**
N/A	Eliminate ROV activities (elimination control)	Eliminates accidental hydrocarbon releases to the marine environment due to equipment failure.	ROVs contain minimal hydrocarbons (<5 L of hydraulic fluid) and as they are inspected and maintained, the risk of failure is very low. Using ROVs in the installation and pre-commissioning activities reduces seabed disturbance, length of time in field, safety and environmental risks.	**Rejected** – not technically or environmentally feasible to eliminate ROV activities. Hydrocarbon releases due to ROV failure has a very low risk and is considered sufficiently managed under ROV inspection and maintenance procedures (refer C7.5.5).
N/A	ROVs to use biodegradable hydraulic fluids only (substitution control)	Using a biodegradable hydraulic fluid reduces potential spill impacts as the oil is less	ROVs contain minimal hydrocarbons (<5 L of hydraulic fluid) that is likely to be a synthetic blend base	**Rejected** – based on the cost to replace or modify the ROVs. The synthetic blend base oil

CM reference	Control measure	Environmental benefit	Potential cost/issues	Evaluation
		persistent in the marine environment.	oil (inherently biodegradable). ROVs are inspected and maintained, and the risk of failure is considered very low.	that may be released due to ROV failure has a very low risk and is considered sufficiently managed under ROV inspection and maintenance procedures (refer to C7.5.5).

6.5.4 Environmental impact and risk assessment

Receptors	• Physical environment (water quality) • Threatened, migratory or local fauna (marine mammals, marine reptiles, fish [including sharks and rays] and birds) • Socioeconomic (commercial fishing, tourism and recreation) • Cultural features
Consequence	I – Negligible
If a chemical is spilt, the largest spill would likely be less than 10 L. Impacts to water quality would be expected to be very short-term and localised given the limited volumes that could be spilled. Due to the dispersive nature of the ocean environment and water depths within the OA, impacts to benthic habitats, including Shepparton Shoal are not predicted. The water foaming agents in aqueous film forming foam (AFFF) may be harmful to marine organisms. Most of these foams have high oxygen demand and the toxicity of the detergents, solvents and other components in the foams may result in adverse effects to marine organisms. However, these effects are greatly diminished in the offshore marine environment due to the natural dilution from wind, wave and currents. The release of these foams is restricted to an emergency event. If a minor hydrocarbon spill occurs, the quantities would likely be limited to 20 L. The small volumes, dilution and dispersion from natural weathering processes such as ocean currents and evaporation are such that spills will be limited in area and duration. The susceptibility of marine fauna to hydrocarbons depends on hydrocarbon type and exposure duration; however, given that exposures would be limited in extent and duration, exposure to marine fauna from this potential hazard is considered very low. The small volumes of worst-case discharges are such that the potential for impacts to receptors will decline rapidly with time and distance at the sea surface. Harmful effects are not expected to the benthic community due to the water depths. Near the sea surface, fish can detect and avoid contact with surface slicks and, as a result, fish mortalities rarely occur in open waters from surface spills (Kennish, 1997; Scholz et al., 1992). Therefore, pelagic fish species (e.g. sharks) are generally not highly susceptible to impacts from hydrocarbon spills. In offshore waters near the release point, pelagic fish are at risk of exposure to the more toxic aromatic components of the hydrocarbons. However, pelagic fish in offshore waters are highly mobile; therefore, it is unlikely they would be exposed to toxic components for long periods in this spill scenario. Components with higher toxicity would also rapidly evaporate and concentrations would significantly diminish with distance from the spill site, limiting the potential area of impact. Marine pollution is identified as potential threats to several marine fauna species (that may be present in the OA) in relevant recovery plans and conservation advice (Table 3-13) and to MNES (DAWE, 2022b). Given the negligible consequence on the physical environment or species, subsequent impacts to socioeconomic receptors (including commercial fishing, tourism and recreation) and cultural features are not anticipated. A very small (less than 20 L) chemical or 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 may be detectable, it is expected that a spill of this nature would result in I – Negligible consequence.	
Likelihood	D – Occasional
The likelihood of releasing minor volumes of chemicals (<10 L) or hydrocarbons (<20 L) to the environment during routine operations is considered D – Occasional.	
Residual Risk	The residual risk is considered Low.

6.5.5 Demonstration of as low as reasonably practicable

Storing and using chemicals, hydraulic and lubricating oils/fluids for equipment and machinery, including for ROV operations, is required to undertake the Activity, so their removal from the Activity is not viable.

All reasonably practicable control measures were reviewed and those adopted are considered appropriate to manage the residual risk to a Low level. The proposed management controls are in accordance with Santos' risk management criteria and are considered appropriate to reduce the risk to ALARP.

6.5.6 Acceptability evaluation

Is the risk ranked between Very Low and 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 the risks and impacts consistent with the principles of ecologically sustainable development (ESD)?	Yes – activity evaluated in accordance with Santos' Offshore Division Environmental Hazard Identification and Assessment Guideline (EA-91-IG-00004), 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 pollution as a threat to marine fauna, negligible impacts are predicted for this Activity.
Are performance outcomes, control measures and associated performance standards consistent with legal and regulatory requirements?	Yes – management measures are consistent with *Protection of the Sea (Prevention of Pollution from Ships) Act 1983* (Cth), *Navigation Act 2012 (Cth), Marine Pollution Act 1999* (NT), MARPOL Annex V and Marine Order 91 (Marine pollution prevention – oil). Through acceptance of the Coastal Waters CEMP, legislative and regulatory requirements will be met as per Section 1.6.2 of the Coastal Waters CEMP
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 (Appendix A of the Coastal Waters CEMP).
Are performance outcomes, control measures and associated performance standards consistent with industry standards?	Yes – the most recent and comparable EPs accepted by NOPSEMA were reviewed for consistency with the performance outcomes, control measures and associated performance standards proposed in the Coastal Waters CEMP.
Have performance outcomes, control measures and associated performance standards taken into consideration Relevant Person feedback?	Yes – no objections or claims were raised regarding a potential minor release.
Are performance standards such that the impact or risk is considered to be ALARP?	Yes – ALARP assessment conducted, with additional control measures adopted.

No Relevant Person concerns have been raised regarding this aspect, and the proposed controls will reduce the residual level of risk to Low and ALARP. Therefore, the residual risk associated with the accidental release of minor volumes of chemicals and hydrocarbons is considered by Santos to be acceptable.

6.6 Unplanned release: MDO

6.6.1 Description of event

Event	**Worst-case credible MDO release** A credible worst-case release scenario of MDO to the marine environment could be a collision between 2 activity vessels or an activity vessel and a third party. A collision could rupture a fuel tank at the sea surface resulting in the release of MDO to sea. A vessel collision could occur due to factors such as human error, poor navigation, vessel equipment failure or poor weather. 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 50% of the largest single fuel tank volume if protected by a double–hull or the largest single unprotected fuel tank volume. A typical pipelay vessel, such as *Audacia*, has a 1,118 m^3 MDO fuel tank with double–hull wing protection equivalent and hence a spill scenario volume of is 559 m^3. This is considered the largest spill scenario volume across the activity vessel fleet. Santos took a conservative approach and used a larger MDO volume of 700 m^3 for this assessment, based on a previously modelled scenario by RPS (2021b). **Bunkering incident** Also considered in this section is a much smaller volume refuelling incident (fuel hose failure or rupture, coupling failure or tank overfilling) where vessel or helicopter fuel bunkering would need to be stopped manually. Fuel released before pumping stops and fuel remaining in the transfer line may be released to the environment. Spill volumes were determined from transfer hose inventory and spill prevention measures, including 'dry-break' or 'breakaway' couplings, rapid shutdown of fuel pumps and spill response preparedness, with 10 m^3 considered to be the maximum volume that could be released from the hose before shutdown.
Extent	Spill trajectory modelling calculated from amalgamating 300 spill simulations (RPS, 2021b) predicted that there was some probability of a 700 m^3 MDO release extending as follows: • moderate exposure thresholds: – probability of shoreline accumulation was highest during summer conditions (maximum probability of 5%) with transitional and winter seasons with a maximum of 1%. No shoreline accumulation occurred at high exposure values. – surface oil was predicted to occur within 40 km east south-east of the release location – entrained oil (1-hour time-step, high exposure value) was predicted to occur within 135 km of the release location – dissolved hydrocarbons (1-hour time-step) were predicted within approximately 23 km of the release location. • low exposure thresholds: – probability of shoreline accumulation was highest during summer conditions (maximum probability of 43%) with transitional (16%) and winter seasons (2%). – surface oil was predicted to occur within 85.8 km west from the release location. The modelling does not take into consideration any of the spill prevention, mitigation and response capabilities that would be implemented in response to the spill.
Duration	A 700 m^3 release of MDO was modelled for a release over 6 hours. MDO is expected to weather quickly through evaporation and dispersion and is unlikely to persist in the environment. Modelling over 6 hours was applied to the model settings in order to be consistent with the GEP EP spill modelling. This approach is considered conservative as most contemporary models use an instantaneous duration (1-hr time step) (NOPSEMA, 2019).

6.6.2 Nature and scale of environmental impacts

Potential receptors: physical environment (water quality, shoals and banks, benthic habitats), threatened or migratory fauna (marine mammals, marine reptiles, fish [including sharks and rays] and birds), protected areas (AMPs and KEFs), socioeconomic receptors (fisheries, tourism, recreation and other third-party operators); and cultural features (including Native Title, ILUAs, sacred sites and sea country).

A hydrocarbon release will cause a decline in water quality and may cause chemical (e.g. toxicity) 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 release depends on the magnitude of the release (i.e. extent, duration), prevailing weather conditions and sensitivity of the receptor. The nature and scale of a hydrocarbon release is described throughout this section for a vessel collision scenario, given smaller hydrocarbon releases (from refuelling) will impact a smaller area than a vessel collision.

6.6.2.1 Stochastic spill dispersion modelling

The MDO spill modelling assessed the fate of the released hydrocarbons and their potential impact upon the environment. The subsections below summarise the findings of the modelling.

Modelled MDO

MDO is a group II light-persistent fuel used in the maritime industry (ITOPF, 2022). The classification is based on the MDP specific gravity in combination with relevant boiling point ranges. It has a low viscosity (4 cP), which indicates that this hydrocarbon will spread quickly when spilt at sea. MDO will have a thin to low thickness level on the sea surface, which increases the rate of evaporation. Table 6-13 lists the MDO characteristics used in the modelling.

Table 6-13: Characteristics of MDO

Density at 25 °C (kg/m³)	API gravity	Viscosity at 25 °C (cP)	Component boiling point (°C) % of total			
			Volatile (%) <180	Semi-volatile (%) 180–265	Low volatility (%) 265–380	Residual (%) >380
829	37.6	4	6	35	54	5

Source: RPS, 2023c

Hydrocarbon fate and weathering

MDO is characterised by a high percentage of volatile components (95%), which will evaporate when on the sea surface over several days, depending upon the prevailing conditions. It also contains 5% persistent hydrocarbons, which will not evaporate, though will decay over time (Table 6-13). The heavier components of MDO tend to become entrained into the upper water column as oil droplets in the presence of breaking waves and moderate winds (i.e. >12 knots) but can refloat to the surface if these energies abate. Entrained MDO is largely concentrated in surface waters (0–10 m deep) (RPS, 2023c).

Generally, the mass balance forecast under calm-wind speeds predicts that approximately 36% of the MDO will evaporate within 24 hours. The majority of the remaining MDO on the sea surface will weather at a slower rate due to being comprised of the longer-chain compounds with higher boiling points. Evaporation of the residual compounds will slow significantly, and then be subject to biological and photochemical degradation (RPS, 2023c). Under variable-wind speeds where the winds are of greater strength on average, MDO entrainment is predicted to increase. Generally, after approximately 24 hours, approximately 80% of the MDO is forecast to have entrained and a further 15% is forecast to have evaporated, leaving only a small proportion on the water surface (<1%) (RPS, 2023c). The residual compounds will tend to remain entrained beneath the surface under conditions that generate wind waves (approximately >6 m/s).

International Tanker Owners Pollution Federation (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:

- 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.
- evaporation rate will increase in warmer air and sea temperatures.
- 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.

Modelling methods

The modelling was done in several stages. Firstly, the tidal currents for the region were generated using the RPS ocean/coastal model, HYDROMAP. Secondly, large-scale ocean currents were obtained from a large-scale ocean model for the same region and combined with tidal currents. The hybrid ocean/coastal model was used to describe the total water movement within the region. Finally, the 2013–2017 current and local wind data were used as inputs in the oil spill model (SIMAP) to simulate the drift, spread, weathering and fate of the spilt hydrocarbon. The model considered the fates described above in Hydrocarbon Fate and Weathering.

Exposure probabilities were determined using a stochastic modelling approach, which aggregates the behaviour of multiple random spill simulations for each of the 3 representative seasons (wet, dry and a transitional period). Each simulated spill starts at a different time of day to ensure that the predicted transport and weathering of each spill trajectory was subjected to varying wind and current conditions. A total of 100 model runs were conducted for each season, with the total stochastic dataset comprising 300 model runs for the release location.

The model results were combined to summarise each season to determine the annualised potential exposure to the surrounding waters, shorelines and sensitive receptors based on the thresholds outlined in the NOPSEMA Oil Spill Modelling Bulletin (NOPSEMA, 2019). This output does not represent the potential behaviour of a single spill (which would have a much smaller area of effect); instead, it indicates the probability of any given area of the sea being contacted by hydrocarbons at a particular concentration (see Table 6-15). It is important to note that some model settings were conservatively applied in order to be consistent with the GEP EP spill modelling approach such as the release duration and spill volume. Table 6-14 summarises the model settings and assumptions.

Table 6-14: Summary of model settings and assumptions for the vessel collision scenario

Parameter	Scenario
Scenario description	A fuel tank rupture caused by a vessel collision
Location	Commonwealth/NT waters boundary (refer to The OA (presented in Figure 1-1) is defined as a 2,000 m buffer either side of the DPD pipeline route between the TSB (where NT Coastal Waters commence) and the outer limit of NT Coastal Waters (i.e. the boundary of NT and Commonwealth waters). The distance between the TSB and the boundary of NT Coastal Waters and Commonwealth waters is approximately 5.5 km (3 Nm); the reason the distance of DPD pipeline to be laid in NT Coastal Waters is greater than this is because the pipeline is proposed to be laid diagonally through NT Coastal Waters. To allow for localised re-routing, there is a 250 m allowance on either side of the DPD pipeline route, if required. The OA encompasses the installation of the DPD pipeline and supporting infrastructure (if required) in NT Coastal Waters, as well as the Activity vessel movements. The locations for activities along the DPD pipeline are described using 'kilometre points' (KP), where KP0 is the beginning of the pipeline from the end of the pipeline (pipeline end termination point; PLET) in Commonwealth waters. KPs increase shoreward along the DPD pipeline route. The DPD pipeline KPs end at KP122.687 at the beach valve at the DLNG Facility (in NT jurisdiction). The section of the DPD pipeline to be installed in NT Coastal Waters will be installed within the boundaries of Coastal and Territorial Waters Licence (NTC/PL5). Table 2-2 lists the coordinates and KPs of the limits of the DPD pipeline route within the NT Coastal Waters. Table 2-2 for coordinates)
Number of randomly selected spill start times	300 total (100 per season)
Oil type	MDO
Spill volume*	700 m^3
Release duration**	6 hours
Simulation length	50 days

**Noting, largest spill scenario volume across the Activity vessel fleet is 559 m^3.*

Hydrocarbon exposure thresholds

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 the Coastal Waters CEMP are provided in Table 3-1.

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 6-15 to Table 6-16. 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 DPD (NT Waters) OPEP (BAS-210 0026)).

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 spill scenario. These are called moderate exposure values (defined by the

MEVA; Table 6-15) and illustrated in Figure 6-8. The spatial extent of the high exposure values are contained within the MEVA boundary. 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.

The low exposure values (Table 3-1) are used as a predictive tool to set the outer boundaries of the EMBA from the worst-case spill scenario shown in Figure 3-2. This results in a highly conservative and comprehensive basis to plan and prepare for spill response, particularly scientific monitoring. 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. The low exposure values for surface and shoreline accumulation (Table 6-16) are used as a predictive tool to approximate a range of potential socioeconomic effects (visual amenity may be affected) and the predicted maximum spatial extent is illustrated in Figure 6-7.

Table 6-15: Moderate exposure value areas (MEVA) thresholds

Exposure zone	Threshold	Justification
Surface hydrocarbon		
Moderate exposure (10–25 g/m²)	10 g/m²	Ecological impact has been estimated to occur at 10 g/m² (a film thickness of approximately 10 µm or 0.01 mm) as this level of oiling has been observed to mortally impact birds and other wildlife associated with the water surface (French et al., 1996; French-McCay, 2009). This approximates the lower limit for harmful exposures to birds and marine mammals. Contact within this exposure zone may result in impacts to the marine environment and therefore was used to define the MEVA.
Entrained hydrocarbon		
High exposure (100–500 ppb)	100 ppb/over 1 hour	The 100 ppb threshold is considered conservative in terms of potential for toxicity effects leading to mortality for sensitive mature individuals and early life stages of species. This threshold indicates a potential zone of acute exposure, which is more meaningful over shorter exposure durations. The 100 ppb threshold contact within this exposure zone may result in impacts to the marine environment. The high exposure for entrained hydrocarbons was used to define the MEVA.
Dissolved aromatic hydrocarbon		
Moderate exposure (50–100 ppb)	50 ppb/over 1 hour	A conservative threshold of 50 ppb was chosen as it was more likely to indicate potentially harmful exposure to fixed habitats over short exposure durations (French-McCay, 2002). Contact within this exposure zone may result in impacts to the marine environment. This level may have potential toxic effects, particularly sublethal effects to sensitive species.
Shoreline accumulation		
Moderate accumulation (100–1,000 g/m²)	100 g/m²	Accumulated hydrocarbons above 100 g/m² may coat an animal in the intertidal range and likely impact its survival and reproductive ability (affected animals include invertebrates, marine mammals, marine reptiles and shorebirds). This threshold is the minimum thickness that can be cleaned up that does not inhibit the potential for recovery. The 100 g/m² threshold was selected to define the moderate accumulation zone and threshold for adverse shoreline accumulation. Accumulation on shorelines above this threshold may result in impacts to the marine environment.

Table 6-16: Socioeconomic exposure thresholds

Exposure zone	Threshold	Justification
Surface hydrocarbons		
Low exposure	1 g/m²	It is recognised that a lower surface oil concentration of 1 g/m^2 (equivalent to a thickness of 0.001 mm or 1 ml of oil per m^2) is visible as a rainbow sheen on the sea surface. Although this is lower than the threshold for ecological impacts, it may be relevant to socioeconomic receptors and has been used as the exposure value to define the spatial extent of the environment that might be contacted from surface hydrocarbons.
Shoreline accumulation		
Low accumulation (10–100 g/m²)	10 g/m²	An accumulated concentration of oil above 10 g/m^2 on shorelines is considered to represent a level of socioeconomic effect (NOPSEMA, 2019). This equates to 10 mL (or 2 teaspoons) of oil per m^2. This may result in a 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, 2005, 2006).

Modelling results

The regional currents are dominated by tidal and wind-driven currents, which vary according to the season. These will influence the direction that the hydrocarbons (entrained and surface) travel in a particular season.

Modelling results predict that surface hydrocarbons may extend up to 40 km east-southeast during wet season conditions above moderate exposure value (10 g/m^2). The maximum extent at the high exposure threshold (>25 g/m^2) from the release location was 27.5 km (north-west). The maximum extent at the low exposure threshold (1 g/m^2) from the release location was up to 86 km (west).

The maximum probability of shoreline accumulation was 5% during summer conditions, and 1% during the transitional and winter seasons above moderate exposure value (100 g/m^2) with a minimum time of 5.29 days before shoreline contact was predicted during winter conditions. Vernon Islands (3%), Melville Island (1%) and Cox Finniss (1%) were also predicted to have shoreline accumulation during the summer season only. The maximum probability of shoreline accumulation was 43% during summer conditions, and 16% during the transitional and 2% during winter seasons above low exposure value (10 g/m^2) with a minimum time of 4 days before shoreline contact was predicted during winter conditions.

Entrained hydrocarbons above moderate exposure value (100 ppb, 1 hour) may extend up to 127.3 km (summer), 82.6 km (winter) and 134.5 km (transitional) from the release location. Dissolved aromatics above moderate exposure value (50 ppb) were predicted to extend up to approximately 23 km in summer, 24.3 km winter and 11.2 km (transitional).

6.6.2.2 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 the maximum volume of ashore and longest shoreline contacted.

Maximum volume of MDO ashore

From the 300 simulations, the spill starting at 5 pm on 25 February 2016 during the wet season conditions was identified to cause the greatest volume of oil ashore.

Figure 6-3 shows the hydrocarbon exposure on the sea surface and maximum shoreline loading for the identified spill simulation over the 50-day simulation. Figure 6-4 illustrates the fates and weathering graph for the spill simulation (RPS, 2021b). By the end of the simulation, approximately 605 m^3 (86% of the total release volume) and 58 m^3 (8%) of the MDO was predicted to have evaporated and decayed, respectively, while approximately 22 m^3 (3%) was predicted to remain in the water column. Additionally, at the end of the simulation, 2 m^3 (0.3%) remained on the water surface and 12 m^3 (2%) was predicted to remain ashore. The maximum volume of MDO ashore modelled:

- maximum distance (at or above 10 g/m² threshold) of 42.5 km east of the release location was predicted
- initial shoreline contact was predicted to occur 9.5 days after commencement of the release
- shoreline accumulation (at or above 10 g/m² threshold) was predicted for regions east and south-east of the release location, specifically along the shorelines adjacent to Fanny Bay, Shoal Bay Coastal Reserve, Gunn Point, South West Vernon Island and Tapa Bay, Shoal Bay, Ida Bay, respectively
- shoreline accumulation (at or above 100 g/m² threshold) was predicted at the shoreline north of Tapa Bay
- no shoreline accumulation at or above 1,000 g/m² threshold.

Longest shoreline contacted

From the 300 simulations, the spill starting at 7 pm on 23 May 2016 during the dry season conditions was identified to cause the longest stretch of shoreline contacted by hydrocarbons (RPS, 2021b).

Figure 6-5 shows the hydrocarbon exposure on the sea surface and maximum shoreline loading for the identified spill simulation over the 50-day simulation.

Figure 6-6 illustrates the fates and weathering graph for the spill simulation (RPS, 2021b). By the end of the simulation, approximately 605 m^3 (86% of the total release volume) and 58 m^3 (8%) of the oil was predicted to have evaporated and decayed, respectively, while approximately 26 m^3 (4%) was predicted to remain in the water column. Additionally, at the end of the simulation 1 m^3 (0.1%) remained on the water surface and 8 m^3 (1%) was predicted to remain ashore. For the longest shoreline contacted modelled:

- surface hydrocarbon exposure (at or above 1 g/m² threshold) was predicted to occur north from the release location and immediately adjacent to Cape Fourcroy and the neighbouring southern shorelines of Bathurst Island

- surface hydrocarbon exposure (at or above 10 g/m² threshold) was predicted to occur predominantly north of the release location at maximum distances of 26.7 km
- initial shoreline contact was predicted to occur 3.7 days after commencement of the release
- shoreline accumulation (at or above 10 g/m² and 100 g/m² thresholds) was predicted for the south-western shoreline of Bathurst Island
- no shoreline accumulation at or above 1,000 g/m² threshold.

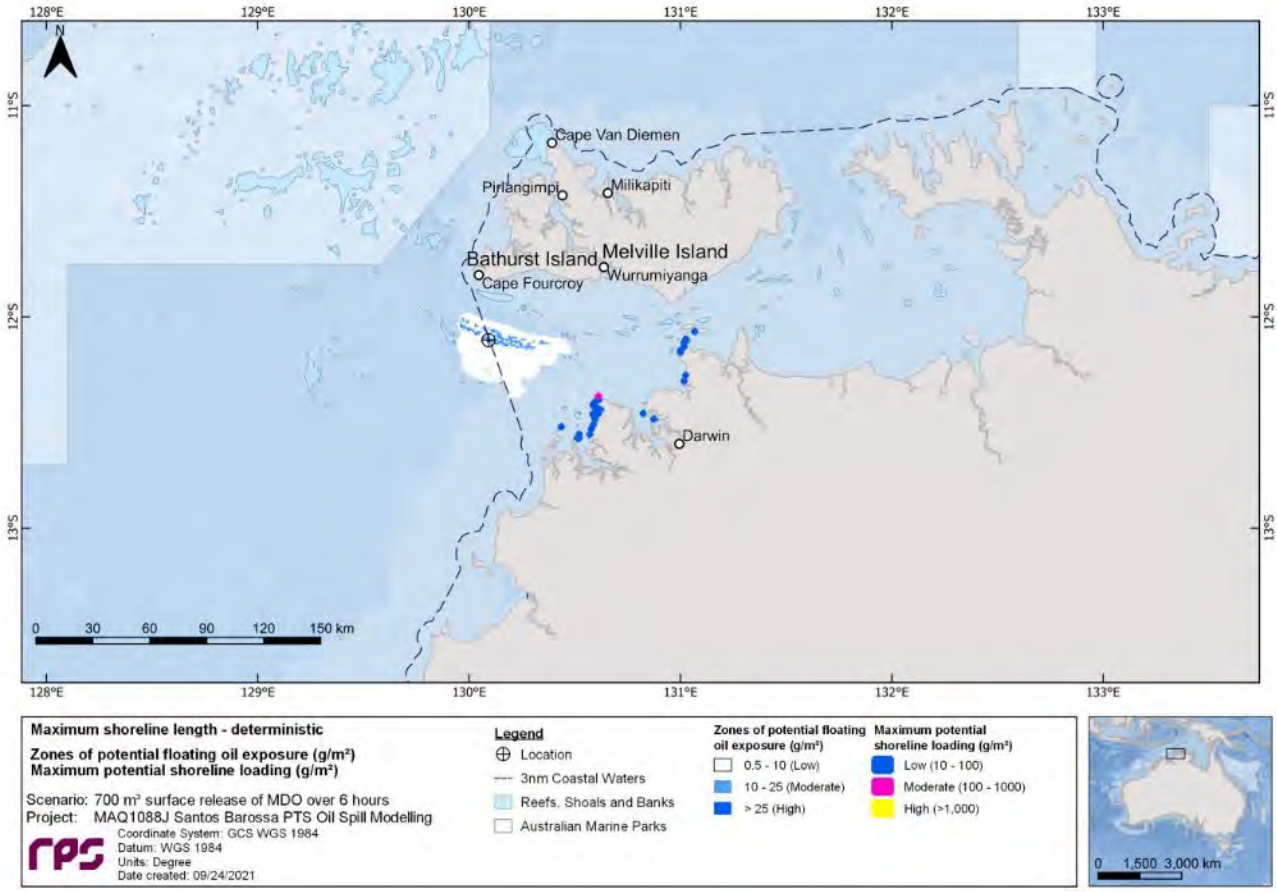

Figure 6-3: Floating oil (surface) exposure and maximum shoreline loading over 50-days for the greatest volume of oil ashore simulation from all 300 simulations

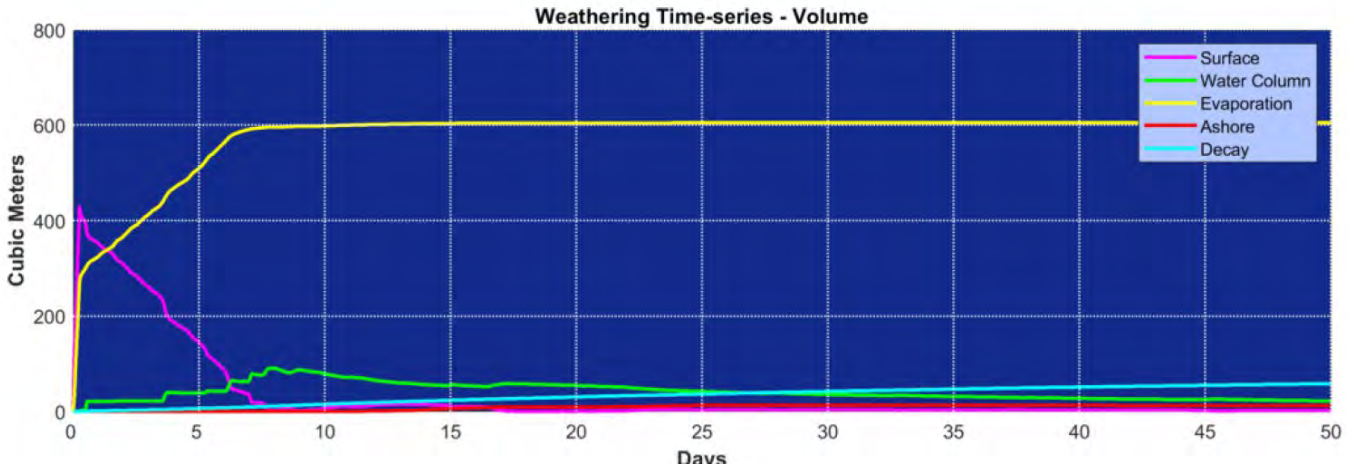

Figure 6-4: Predicted weathering and fates for the greatest volume ashore simulation from all 300 simulations (RPS, 2021b)

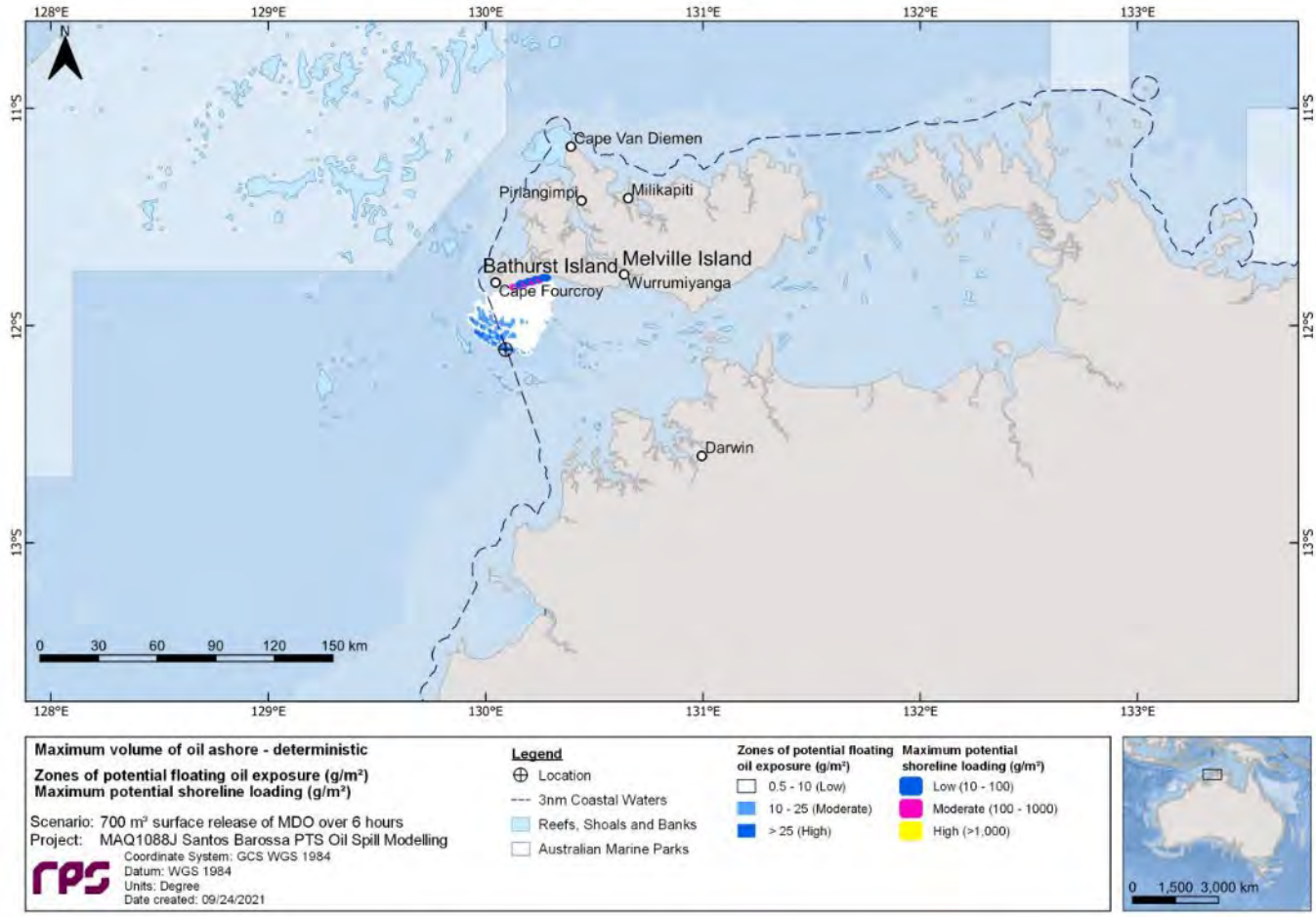

Figure 6-5: Floating oil (surface) exposure and maximum shoreline loading over 50-days for the longest stretch of shoreline contacted by hydrocarbon simulation from all 300 simulations

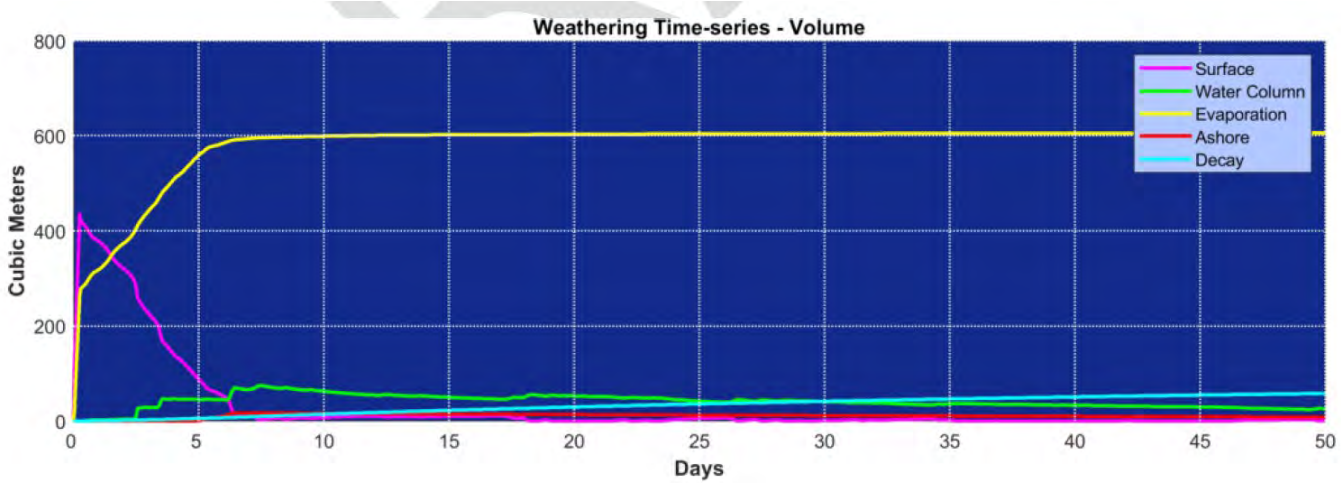

Figure 6-6: Predicted weathering and fates for the longest stretch of shoreline contact simulation from all 300 simulations (RPS, 2021b)

6.6.2.3 Potential hydrocarbon impact pathways and nature and scale of impact

To help inform the hydrocarbon spill risk assessment receptors within the EMBA, potential impact pathways have been defined (Table 6-17). The potential impact pathways consider physical and chemical pathways. Physical pathways include contact from surface hydrocarbons, accumulated shoreline hydrocarbons, or entrained hydrocarbon droplets. Table 6-17 summarises the chemical pathways (e.g. ingestion, inhalation or contact) from any hydrocarbon phase and used to inform the risk assessment.

Table 6-17: 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.
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. External contact and adsorption across exposed tissues and cellular membranes. Uptake of dissolved aromatic hydrocarbons 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 other 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 dissolved aromatic hydrocarbons across cellular	Mortality. Cell damage. Flesh taint. Reduced metabolic capacity. Reduced immune response. Disease. Reduced growth.

Receptor	Physical pathway	Potential impacts	Chemical pathway	Potential impacts
			membranes (for example, gills).	Reduced reproductive output. Reduced egg/larval success. Growth abnormalities. Behavioural disruption.
Birds (seabirds and shorebirds)	Contact with the surface 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: • physical restriction of flight and swimming movement • mortality • hypothermia/impairing the waterproofing of feathers • disruption to feeding/ starvation • disruption to breeding • disruption to migration.	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 surface 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: • 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 hatchling success. Reduced reproductive output. Growth abnormalities. Behavioural disruption.
Marine mammals	Coating of feeding apparatus in some species (baleen whales) from exposure to surface 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	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.

Receptor	Physical pathway	Potential impacts	Chemical pathway	Potential impacts
		• behavioural disruption.		Growth abnormalities. Behavioural disruption.
Plankton	Coating of feeding apparatus. Reduced mobility and capacity for oxygen exchange.	Mortality. Behavioural disruption (for example, reduced mobility).	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 currents.	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.
Protected areas	Coating of benthic habitats and marine fauna/flora within protected areas as discussed in rows above.	Mortality, injury or behavioural disruption to marine biota. Impairment of habitats within protected areas. Reduction in the quality of the marine environment within protected areas. Environmental value of protected areas is degraded.	Impacts to flora and fauna, as discussed in rows above.	Mortality, injury or behavioural disruption to marine biota. Impairment of habitats within protected areas. Reduced growth of benthic habitats. Reduction in the quality of the marine environment within protected areas. Environmental value of protected areas is degraded.
Socioeconomic environment (commercial and recreational fisheries, recreation & tourism, shipping, defence)	Presence of hydrocarbon residue in the water, which may filter down to sediments or continue to biodegrade on the surface. Presence of weathered hydrocarbon on the shoreline.	Degradation of UCH sites. Disruption to tourism, recreation, shipping, defence or energy industry activities. Displacement of commercial or recreational fishing. Reduction in natural resources.	Impacts to water quality, sediment quality, flora and fauna, as discussed in rows above.	Mortality, injury or behavioural disruption to marine fauna relevant to commercial and recreational fisheries or to tourism. Loss or degradation of habitats within protected areas. Reduced growth of benthic habitats. Reduction in the quality of the marine and shoreline environment within protected areas. Socio-economic value of protected areas is degraded.

Receptor	Physical pathway	Potential impacts	Chemical pathway	Potential impacts
Cultural features (native title, ILUAs, IPAs, sacred sites, marine parks, cultural fishing, hunting and gathering, marine fauna representing totemic species or species associated with dreamings and sea country)	Presence of hydrocarbon residue in the water, which may filter down to sediments or continue to biodegrade on the surface. Presence of weathered hydrocarbon on the shoreline.	Hydrocarbons may be present in areas with cultural features (e.g. ILUAs, IPAs, sacred sites, marine parks, cultural fishing, hunting and gathering and sea country). Displacement of traditional uses of environment. Reduction in natural resources with cultural significance.	Impacts to water quality, sediment quality, flora and fauna, as discussed in rows above.	Mortality, injury or behavioural disruption to marine fauna. In accordance with First Nations people cultural beliefs, if totemic species (e.g. turtles, fish, marine mammals and birds) are impacted by the Activity some believe this in turn can impact First Nations people and make them sick. The potential impacts to culturally significant marine fauna species (such as dreaming and totem species including marine mammals, marine reptiles, fish and birds) are assessed separately above. Loss or degradation of habitats of cultural value. Reduction in the quality of the marine and shoreline environment, including environment with cultural significance. Cultural value of cultural features is degraded.

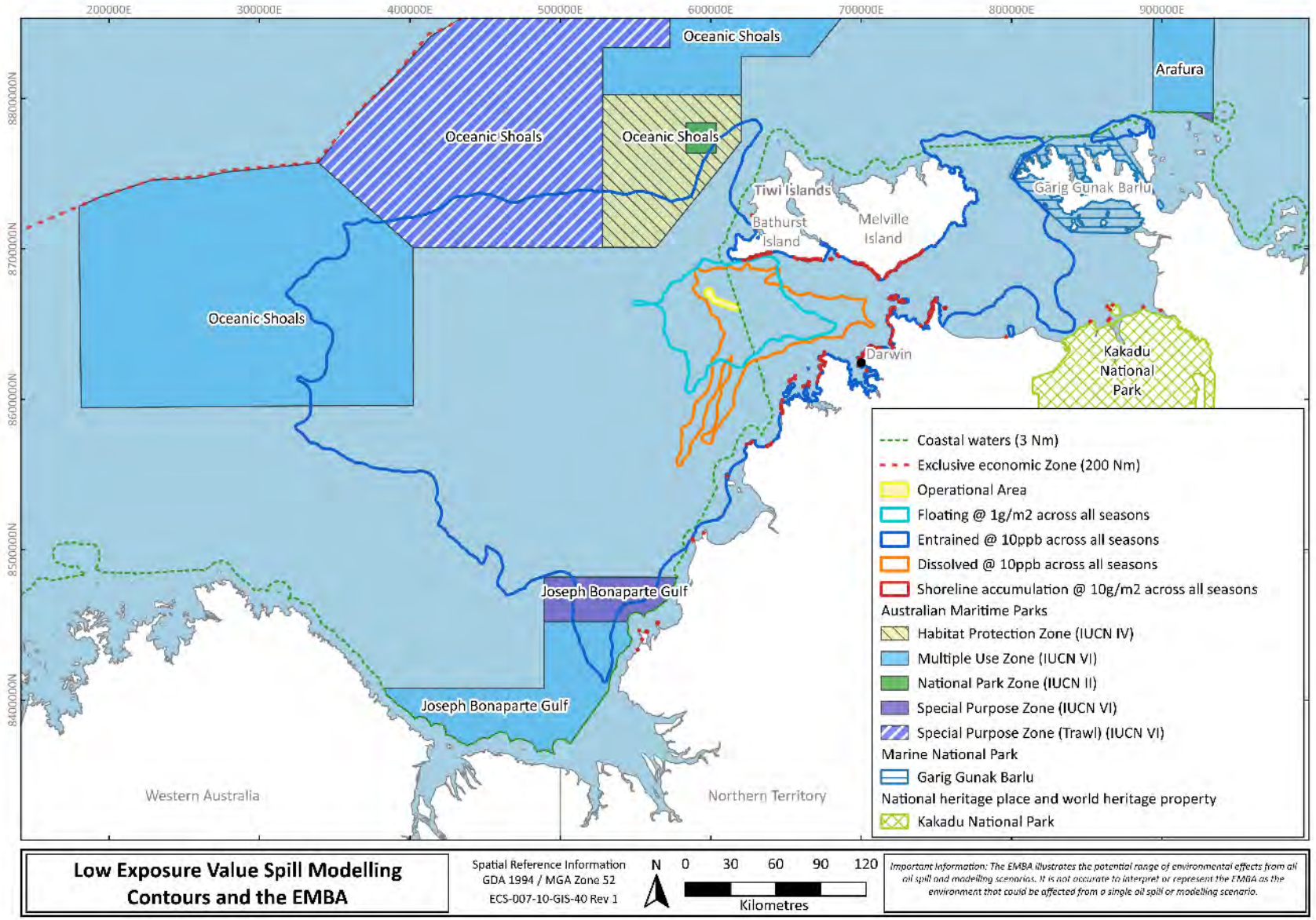

Figure 6-7: Low exposure threshold spill modelling contours and sensitive receptors, derived from all 300 spill simulations

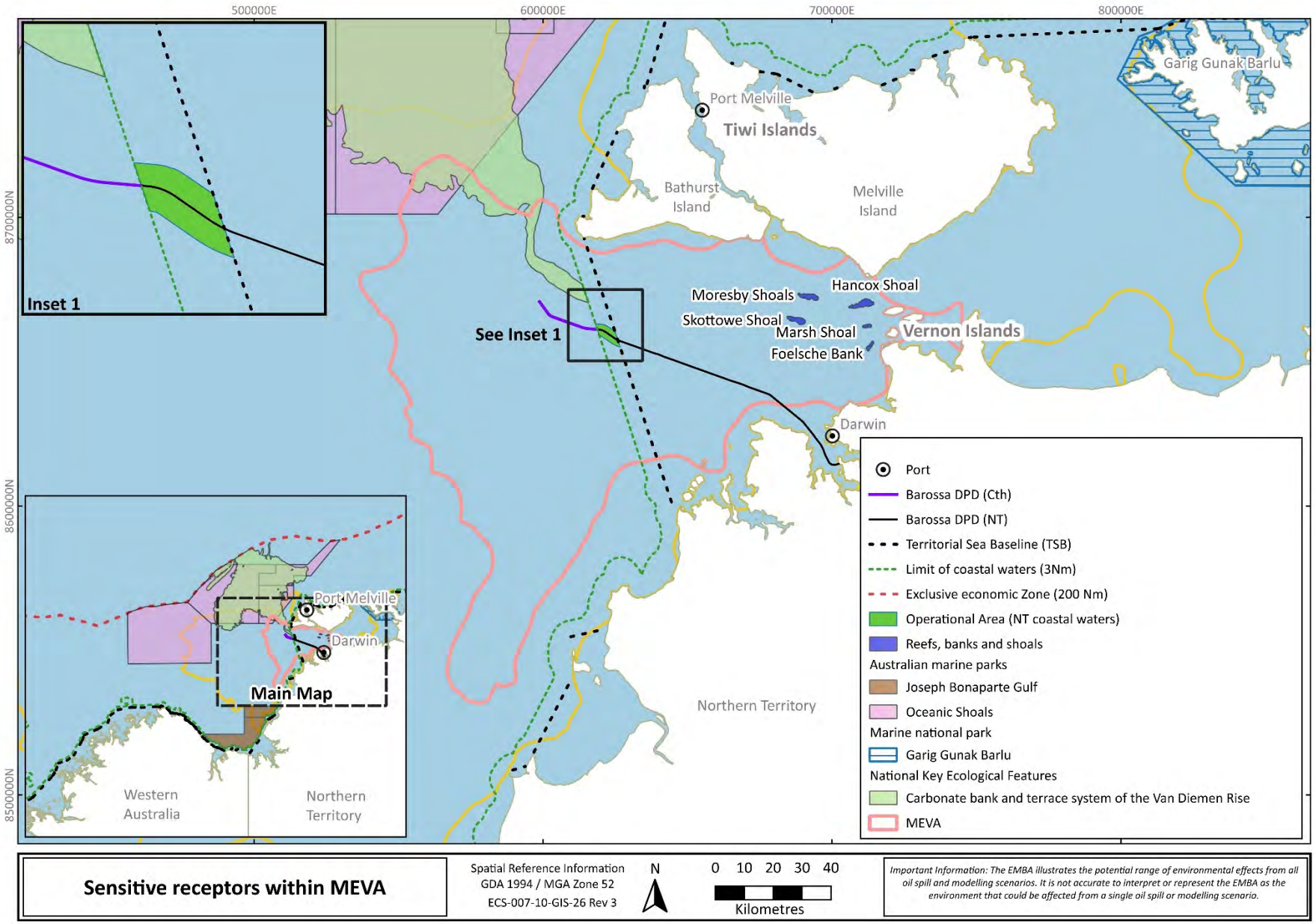

Figure 6-8: Sensitive receptors contacted by moderate exposure values, derived from all 300 spill simulations

6.6.3 Environmental performance outcomes and control measures

The EPOs relating to this event include:

- No MDO release to the marine environment [EPO-13]
- No significant impacts to cultural features from the Activity [EPO-14].

An assessment of the environmental benefits and the potential costs or issues associated with control measures for this activity are described in Table 6-18 to demonstrate that potential risks are ALARP. Control measures that are adopted have associated EPSs and measurement criteria, and are presented in Table 7-2. 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 DPD (NT Waters) OPEP (BAS-210 0026). The OPEP contains an evaluation of oil spill preparedness arrangements to demonstrate that oil spills will be mitigated to ALARP.

Table 6-18: Control measures evaluation for hydrocarbon release – MDO

CM reference	Control measure	Environmental benefit	Potential cost/issues	Evaluation
Standard control measures				
C6.1.1	Activity vessels equipped and crewed in accordance with Australian maritime requirements (administrative control)	Ensures contracted vessels are operated, maintained and crewed in accordance with industry standards and regulatory requirements. Ensures vessels meet Marine Assurance Standards to reduce the likelihood of vessel collision (such as minimum and working lighting for maritime safety).	Costs associated with personnel time in checking vessel.	**Adopted**
C6.1.2	Undertake consultation with Relevant Persons (including applicable notifications) (administrative control)	Alerts other marine users to the presence of: • activity vessels and the relatively slow speed and restricted manoeuvrability of these vessels • 500 m exclusion zone around the installation vessels thus reducing the likelihood of vessel collision.	Limited additional costs to Santos. Stakeholders' time required to review consultation material and communicate with Santos.	**Adopted**
C6.1.3	The Activity will be undertaken in accordance with Santos HSE management and marine vessel vetting processes (administrative control)	Santos marine vetting process, thus reducing the potential for interaction and collision.	Cost associated with implementing procedures.	**Adopted**
C6.1.5	Vessel speed restrictions within the operational area (substitution control)	Vessel speeds within the OA will be limited to ≤8 knots to reduce the consequence of vessel-to-vessel collision impacts. Reduces the potential impacts to culturally significant marine	Administrative costs to update existing Santos procedure and induction materials and train personnel.	**Adopted**

CM reference	Control measure	Environmental benefit	Potential cost/issues	Evaluation
		species, including totemic species, such as marine turtles and marine mammals.		
C6.1.6	One vessel will act as a surveillance vessel within the immediate vicinity of the pipelay vessel during pipelay (administrative control)	A vessel will be in the immediate vicinity of the pipelay vessel to act as a surveillance and intervention vessel. The vessel will mitigate potential interactions between the pipelay vessel and other marine users and hence reduce the likelihood of a collision.	Cost associated with implementing procedures.	**Adopted**
C6.2.5	Vessel planned maintenance system (administrative control)	Reduces risk of vessel collision and refuelling incidents because equipment is operating within planned maintenance requirements.	Operational costs and labour or access requirements of undertaking maintenance.	**Adopted**
C7.5.6	Vessel spill response plans (administrative control)	Implements onboard response plans to deal with unplanned hydrocarbon releases quickly and efficiently to reduce impacts to the marine environment.	Administrative costs of preparing documents. Generally undertaken by vessel contractor so time for Santos personnel to confirm and check SOPEP/ SMPEP in place. Administrative costs of demonstrating vessel contractor compliance (e.g. Santos personnel to confirm that a SOPEP/SMPEP is in place).	**Adopted**
C7.6.1	No IFO or HFO will be used in activity vessels (elimination control)	Using MDO rather than a 'heavier' fuel type reduces potential spill impacts as MDO is less persistent in the marine environment.	Additional assurance costs of ensuring vessels are using the required fuel.	**Adopted**
C7.6.2	Accepted OPEP (administrative control)	Implements response plans to deal with an unplanned hydrocarbon release quickly and efficiently to reduce impacts to the marine environment.	Personnel and administrative costs associated with preparing documents, ongoing management (spill response exercises) and implementation of OPEP.	**Adopted**
C7.6.3	Vessel-specific bunkering procedures and equipment consistent with Santos marine vessel vetting requirements (administrative control)	Minimises risk of pollution to ALARP during refuelling.	Personnel costs associated with ensuring procedures are in place and implemented during refuelling.	**Adopted**
Additional control measures				
C6.1.8	HSE inductions will include environmental requirements and cultural values (administrative control)	Ensures that crew are aware of the stringent Coastal Waters CEMP, Santos and legislative requirements.	Administrative costs to update existing Santos procedure and induction materials and train personnel.	**Adopted**

CM reference	Control measure	Environmental benefit	Potential cost/issues	Evaluation
N/A	No fuel bunkering via hose (elimination control)	Removes spill risk from hose operations.	Cost associated with transfer of MDO via drums or containers and introduction of new risks related to dropped objects and vessel transfers. Not possible to modify vessel to allow additional fuel storage.	**Rejected** – eliminating bunkering via hoses introduces new risks related to dropped objects and vessel transfers. The bunkering method is consistent with industry and maritime practices.
N/A	Bunkering only during daylight hours	Increases the likelihood of visually detecting a leak as sheens are more visible under sunlight.	Cost associated with delaying bunkering activities so that the process occurs only in daylight hours.	**Rejected** - Bunkering operations are typically completed during daylight hours; however, circumstances may occur where bunkering is required during darkness (e.g., large volume transfers at slow rates or when bunkering is safer to perform at night due to prevailing metocean conditions). However, bunkering will typically commence in daylight hours. Following implementation of the selected existing controls, the risk reduction associated with prohibiting bunkering during darkness is considered to be negligible. The cost of implementing the control is considered to be grossly disproportionate to the reduction in risk. The control has not been adopted.
N/A	Require all support vessels involved in the Activity to be double hulled (administration control)	Reduces the likelihood of a loss of hydrocarbon inventory minimising potential environmental impact.	Vessels are subject to availability and must meet Santos' standards during activities; requirement of a double hull on vessels would limit the number available to Santos; also, high cost to require vessels to be refitted with double hulls.	**Rejected** – large costs associated with vessel selection and having an activity schedule determined by vessel availability is considered to be grossly disproportionate compared to the low

CM reference	Control measure	Environmental benefit	Potential cost/issues	Evaluation
				risk of a vessel collision or large MDO release.
N/A	Reduce the fuel volume on pipelay vessel to reduce the risk of an MDO spill resulting in shoreline accumulation (elimination control)	Reduces the risk of consequences to sacred sites on coastlines. Reduces the potential impacts to culturally significant marine species, including totemic species, such as marine turtles and marine. Supports the maintenance of cultural features and heritage values.	Reducing the fuel capacity will significantly increase the risk to operational reliability (e.g. vessel position loss) and safety (e.g. maintenance of critical emergency fuel reserves to enable the vessel to seek shelter during adverse weather conditions, such as cyclones). In addition, it will also increase the frequency of bunkering activities. Furthermore, the RPS modelling (2021b) is based on a worst-case 700 m^3 scenario which is ~20% more fuel than the largest spill scenario volume and does not consider control measures that are in place.	**Rejected** – maintaining critical emergency fuel reserves are required to meet stringent HSE requirements. In addition, reducing the fuel volume of activity vessels will increase the frequency of bunkering activities, thereby increasing the risk associated with increased vessel movements and bunkering activities.

6.6.4 Environmental impact and risk assessment

Receptors	• Physical environment and habitats – water quality; and benthic communities and habitats • Threatened, migratory or local fauna – plankton; invertebrates; marine mammals; marine reptiles; fish (including sharks and rays); and seabirds • Protected areas – marine parks; KEFs; national heritage place; world heritage property; and wetlands of international and national importance • Socioeconomic – commercial, recreational and traditional fisheries; recreation and tourism; and energy industry • Cultural features
Consequence	III – Moderate

The consequence assessment for each receptor category is summarised below.

Water quality

It is likely that water quality will be reduced at the location of the release due to hydrocarbon contamination; however, such impacts would be temporary and highly localised due to the rapid weathering of the released MDO in the open offshore location. Stochastic modelling results predict that entrained oil concentrations exceeding 100 ppb (at or above moderate threshold levels) may extend up to 134.5 km from the release location.

Benthic communities and habitats

Benthic communities, such as macrofauna and infauna (e.g. filter feeders, brittle stars, crustaceans, polychaetes and molluscs) and benthic primary producers (e.g. macroalgae, seagrass and corals) are vulnerable to hydrocarbons (surface and entrained).

Modelling predicted that some shallow shoals and banks (e.g. the top of the shoal is within the top 10 m of the water column) may be contacted by entrained hydrocarbons above impact values (100 ppb, 1 hour) at a low probability (1–5%). These include Hancox Shoal, Moresby Shoals, Skottowe Shoal, Marsh Shoal and Foelsche Bank. The maximum concentration predicted is 168 ppm at Foelsche Bank. These banks and shoals are expected to be characterised by sparse to medium-density filter feeders based on surveys of similar inshore banks and shoals. Filter feeders are particularly susceptible as they directly ingest hydrocarbons while feeding; this may cause mortality or sub-lethal impacts such as alteration in respiration rates, decreases in filter-feeding activity and reduced growth rates due to biochemical effects (Keesing and Edgar, 2016). Lethal and sub-lethal effects to filter feeders from hydrocarbons include mortality and changes in population recruitment, growth and reproduction, leading to changes in community composition and structure (Wei et al., 2012). However, the communities are expected to recover as the hydrocarbon concentration decreases and weathers.

There is the potential for intertidal primary producers such as mangroves, seagrasses and corals to be impacted by spilled hydrocarbons. These are present along much of the coastline. The modelling results predicted that Bathurst Island was the only receptor where potential shoreline contact above impact exposure value (100 g/m^2) during all 3 seasons was predicted, at low probabilities (1–5%), and the minimum time before moderate shoreline accumulation was 5.29 days during winter

conditions. The maximum length of Bathurst Island shoreline exposure predicted is up to 6 km. Vernon Islands (3%), Melville Island (1%) and Cox Finniss (1%) were predicted to experience shoreline accumulation during the summer season only. Hence a worst-case spill may only credibly impact a relatively small portion of the coastline, including any associated primary producer habitats.

Mangrove habitat and associated mud flats are widely represented along the Tiwi Islands coastline. Hydrocarbon coating of prop roots of mangroves can occur from surface hydrocarbons when they are deposited on the aerial roots. Hydrocarbons deposited on the aerial roots can block the pores used by the plants to breathe or interfere with the trees' salt balance resulting in sub-lethal and potentially lethal effects. Mangroves can also be impacted by entrained aromatic hydrocarbons that may adhere to sediment particles. In low-energy environments such as mangroves, deposited sediment-bound hydrocarbons are unlikely to be removed naturally by wave action and may be deposited in layers by successive tides (NOAA, 2014). Given the low portion of persistent hydrocarbon in MDO, hydrocarbons in mangrove environments are not expected to persist long-term.

Tidal mudflats, like mangroves, are a low-energy environment and are, therefore, susceptible to potential impacts from persistent surface or stranded hydrocarbons. Hydrocarbons in contaminated sediments can persist for years and significantly impact benthic infauna and their dependent migratory shorebird populations (Duke and Burns, 2003). Saenger (1994) noted that mudflats were the most severely affected habitat 2 years after the Gulf War spill, with no sign of living epibiota. However, the hydrocarbon type in the Gulf was crude oil with a larger fraction of persistent components, compared to MDO. Given the low persistent hydrocarbons in MDO, the persistence of hydrocarbons is expected to be short-term.

Seagrasses in the subtidal and intertidal zones have different degrees of exposure to hydrocarbon spills. Subtidal seagrass is generally considered much less vulnerable to surface hydrocarbon spills than intertidal seagrass, primarily because freshly spilled hydrocarbons float under most circumstances. Dean et al. (1998) found that hydrocarbons mainly affect flowering. Therefore, species that can spread through apical meristem growth (growth at the tips of the root) are not as affected (such as *Zostera*, *Halodule* and *Halophila* species).

Potential impacts may include smothering or coating, although these impacts are more commonly associated with IFO-180/HFO (note: vessels are prohibited from carrying IFO-180/HFO during the Activity).

MDO tends to entrain within the water column, which can lead to seagrass coming into contact with or absorbing the water-soluble fraction. Contact and absorption have the potential to reduce photosynthesis and tolerance to other stress factors (Runcie et al., 2010; Taylor and Rasheed, 2011). Seagrass in the intertidal zone, such as that of the Tiwi Islands, is particularly vulnerable as it may come into direct contact with surface hydrocarbons and entrained components, which can smother and kill seagrasses if it coats their leaves and stems (Taylor and Rasheed, 2011). This conclusion is supported by Howard et al. (1989), who noted that surface hydrocarbon spills that become stranded on the seagrass and smother it during the rise and fall of the tide could result in reduced growth rates, blackened leaves and mortality. Wilson and Ralph (2011) concluded that long-term impacts to seagrass are unlikely unless hydrocarbon is retained within the seagrass meadow for a sustained duration.

The shoreline habitats are expected to recover as the hydrocarbon evaporates (95% within several days) and degrades. Only a portion of the shoreline (6 km based on the worst-case deterministic model run) is predicted to be affected with a low probability (5%) of occurring. Therefore, impacts at the regional benthic community distribution or population level are considered unlikely.

Water soluble hydrocarbon fractions associated with surface slicks also cause high coral mortality (Shigenaka, 2001) via direct physical contact of hydrocarbon droplets with sensitive coral species (such as the branching coral species). Inter-tidal and shallow water corals may be impacted by surface and entrained hydrocarbons. Impacts may include increased mortality and sub-lethal effects such as changes in feeding, bleaching (loss of zooxanthellae), and increased mucous production, resulting in reduced growth rates and impaired reproduction (Negri and Heyward, 2000). The habitat around the Tiwi Islands is restricted to coastal reef areas and inter-tidal platforms. Given the patchy distribution of inter-tidal and shallow water corals and the non-persistent nature of the hydrocarbon, impacts to corals in the event of an MDO release are expected to be restricted to sub-lethal impacts.

Marine fauna

Plankton

Plankton communities may be impacted by a hydrocarbon release, particularly entrained fractions. Toxic effects from exposure to entrained hydrocarbons may cause impacts such as blocked filter feeding organs and impacts resulting from ingesting hydrocarbons. Modelling of the credible release scenario predicts that entrained hydrocarbons above impact thresholds are expected to be highly localised around the release location. Given the high productivity of planktonic communities and the nature and scale of the credible release, these impacts are expected to be temporary and highly localised to the release location.

Pelagic and demersal fish communities (including sharks and rays)

Fish mortalities are rarely observed to occur as a result of hydrocarbon releases (ITOPF, 2011). This has generally been attributed to the possibility that pelagic fish can detect and avoid surface waters underneath hydrocarbon releases by swimming into deeper water or away from the affected areas. Fish that have been exposed to dissolved aromatic hydrocarbons are capable of eliminating the toxicants once in clean water, thus individuals exposed to a release are likely to recover (King et al., 1996). Where fish mortalities have been recorded, the releases (resulting from the groundings of the *Amoco Cadiz* [1978] and *Florida* [1969] tankers, which were significantly bigger than the worst-case credible release scenario considered in the Coastal Waters CEMP) occurred in sheltered bays, which limited the ability of fish to access clean water and eliminate toxicants. Given the nature and scale of the credible release scenario and the open-ocean environment of the credible release location, impacts to pelagic and demersal fish are expected to be highly localised and temporary.

Marine mammals

The MEVA intersects a breeding BIA for the Indo-Pacific humpback dolphin near Darwin Harbour. Although no migration routes exist within the MEVA, marine mammals are highly mobile and known to transit through the region. Studies and field observations suggest that marine mammals may be able to detect and avoid hydrocarbon slicks (Geraci and St Aubin, 1988). Marine mammals are vulnerable to the effects of surface hydrocarbons because they must surface to breathe. Direct contact with surface slicks and inhalation of vapours may irritate eyes, airways and lungs. Lethal or sublethal effects will depend on the concentration of the hydrocarbons and the length of exposure. In addition, heavily oiled areas can reduce reproductive rates, as monitored during the Barataria Bay bottlenose dolphins after the Macondo oil spill in 2010 (Lane et al., 2015).

Approximately 40% of the MDO is predicted to evaporate within 24 hours, with 75% evaporated over several days, depending on the prevailing conditions limiting the persistence on the sea surface. Because spilt MDO is expected to disperse and weather rapidly, the potential for impacts to marine mammals will be concentrated around the release location and limited to individuals. No population-level impacts are expected.

Marine reptiles

Internesting BIAs and habitat critical to the survival of flatback and olive ridley turtles and foraging BIAs for the green and olive ridley turtles intersect the MEVA. A hydrocarbon spill above impact thresholds in these areas may impact biologically important behaviours. Turtle nesting in the region occurs year-round, peaking from April to September. A spill during these months may impact a portion of the population. However, the protracted nature of the breeding season means that a spill will not credibly impact a large portion of the population. Approximately 260 km of sandy beaches surround the Tiwi Islands, many of which are documented to host turtle nesting. It is important to acknowledge that turtles have a strong affinity for specific nesting beaches and are unlikely to relocate to an alternative beach if their preferred nesting site is affected by hydrocarbons. Deterministic modelling predicts that the longest length of oiled shoreline at the moderate exposure threshold was 6 km with a low probability (5%) of occurring. At the end of this modelling simulation (50 days), only 1% of the total MDO volume remained ashore. No high (>1,000 g/m^2) shoreline exposure was predicted during the model simulation. Therefore, even considering the longest length of oiled shoreline predicted by the model, it will not have a significant impact on the nesting turtle population, and the duration of the impact will be limited.

Turtle nests are also typically located above the high water mark, typically the highest point along the shoreline that stranded oil will reach. Direct contact between turtle eggs and the stranded hydrocarbons is very unlikely. Nesting females and hatchlings emerging from nests may be exposed to stranded hydrocarbons when moving on nesting beaches, potentially resulting in contamination. Exposure may result in light oiling of nesting females and hatchlings, subsequently leading to sub-lethal effects such as skin irritation; no mortality is expected. Given the non-persistent nature of MDO and low levels of hydrocarbons potentially stranding on shorelines, the potential for impacts to nesting turtles, egg clutches and hatchlings on beaches is considered low.

Marine turtles are susceptible to the effects of hydrocarbon spills during all life stages (NOAA, 2010). They are frequently in contact with the sea surface and show little avoidance behaviour in response to the presence of surface hydrocarbons, which makes them vulnerable to coating and inhalation of toxic vapours. Contact with surface slicks or entrained hydrocarbon can therefore result in hydrocarbon adherence to body surfaces (Gagnon and Rawson, 2010), causing irritation of mucous membranes in the nose, throat and eyes and leading to inflammation and infection (NOAA, 2010). Oiling can also irritate and injure skin, most evident on vulnerable areas such as the neck and flippers (Lutcavage et al., 1995). Given the non-persistent nature of the hydrocarbons and the expected rapid weathering of surface hydrocarbons in the tropical environment, the timeframe during which turtles may be exposed to hydrocarbons above impact thresholds is of a short duration. The spatial extent of the MEVA, and the wide distribution of turtle species in the region, indicates that population-scale impacts are considered unlikely.

No EPBC Act listed threatened sea snakes are known to be present within the MEVA; however, low numbers of EPBC Act listed marine sea snake species may occur around shallow banks and shoals. In addition, crocodiles may also transit the MEVA. Sea snakes and crocodiles may be vulnerable to hydrocarbon spills due to their need to surface to breathe and may spend time at the sea surface to bask in the sun. However, little information is available to describe the effects of hydrocarbon spills on sea snakes and crocodiles.

Seabirds and migratory shorebirds

The Wildlife Conservation Plan for Seabirds (CoA, 2020) identified pollution as a threat to seabirds and their habitats. As outlined in the Wildlife Conservation Plan for Seabirds (CoA, 2020), one of the objectives is to enhance contingency plans to prevent and respond to environmental emergencies that impact seabirds and their habitats, which is adopted in the C7.6.2 (refer to Table 6-18).

Seabirds and migratory shorebirds are particularly vulnerable to contact with surface hydrocarbons. Physical contact of seabirds with surface slicks is by several exposure pathways, primarily immersion, ingestion and inhalation. Contact with hydrocarbons may result in plumage fouling and hypothermia (loss of thermoregulation) (Hassan and Javed, 2011), decreased buoyancy and potential to drown, inability to fly or feed, anaemia, pneumonia, and irritation of eyes, skin, nasal cavities and mouths (AMSA, 2015; ITOPF, 2011) and result in mortality due to oiling of feathers or hydrocarbon ingestion. Longer-term exposure effects that may potentially impact seabird populations include a loss of reproductive success (loss of breeding adults) and malformation of eggs or chicks (AMSA, 2015).

A hydrocarbon spill may result in surface slicks above impact thresholds in foraging habitats for seabirds. Typically, seabird distributions are concentrated around islands—hydrocarbons in and near nesting/roosting areas may increase the number of seabirds impacted. The MEVA does not intersect any bird BIA (including nesting/roosting areas). The closest bird BIA is the crested tern BIA around Seagull Island (outside of the EMBA), which is near the Tiwi Islands (approximately 90 km north of the OA). Given the nature and scale of the credible hydrocarbon release, the potential for impacts to birds is expected to be temporary (hours to days). Stranded hydrocarbons may come into contact with wading shorebirds, potentially resulting in oiling. Given the relatively low likelihood of shoreline accumulation above the moderate impact threshold, contact of this nature is considered very unlikely to occur. As seabirds nest above the high water mark, direct contact to nests, eggs or hatchlings by stranded hydrocarbons is not expected to occur.

Protected Areas

National Heritage Place and World Heritage Property

Modelling predicted no potential for surface oil or dissolved hydrocarbon exposure to any national heritage place or world heritage property. In addition, the modelling also predicted no shoreline accumulation at impact exposure values (100 g/m^2). Stochastic modelling predicted a very low probability (2%) of shoreline accumulation at low exposure values (10 g/m^2) to Kakadu National Park (national heritage place, world heritage property, wetlands of international and national importance). The minimum time before exposure is over 30 days with a maximum volume of 2.3 m^3. Therefore, it is considered very unlikely that any visual amenity or negative socioeconomic impact may potentially occur.

Similarly, the modelling predicts no moderate exposure thresholds for any hydrocarbon phase to Finniss Floodplain and Fog Bay Systems (wetlands of national importance). Finniss Floodplain and Fog Bay System forms part of the approximately 200 km Cox-Finniss shoreline receptor. During the summer season, Cox-Finniss shoreline receptor predicted a 14% probability that shoreline accumulation may occur at low exposure thresholds after approximately 7 days, potentially impacting up 19 km of the 200 km (<10%) with a peak volume of less than 9 m^3. Therefore, it is unlikely that there will be any visual amenity or negative socioeconomic impact within the smaller area of the Finniss Floodplain and Fog Bay Systems.

Marine Parks

As outlined above, a hydrocarbon spill has the potential to impact water quality and a range of biological receptors. These environmental values are contained within the Oceanic Shoals Marine Park. Impacts to environmental values within these protected areas may diminish the Oceanic Shoals Marine Park's value. However, given the nature and scale of the credible spill scenario, such impacts are considered unlikely. Modelling predicted no potential for surface oil or dissolved hydrocarbon exposure and a 3% probability of entrained hydrocarbons (above thresholds) at the Oceanic Shoals Marine Park.

KEFs

The open waters above the seabed KEF, Carbonate bank and terrace system of the Van Diemen Rise overlap the MEVA. Impacts to this seabed KEF and the values of the KEF are considered to be negligible, given their location on the seabed and the surface nature of the releases in which the concentration of the entrained hydrocarbons is highest in the upper water column (RPS, 2021b).

Socioeconomic (fisheries, tourism, recreation, and other third-party operators)

There is the potential for hydrocarbons to temporarily disrupt fishing activities (traditional, recreational and commercial), and tourism and recreation activities if the surface, shoreline or entrained hydrocarbon moves through frequented 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 MDO 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 hydrocarbon release may also temporarily displace activities such as fishing, tourism and recreation from within sections of the MEVA. This displacement would be localised and short-term (days). A hydrocarbon release may result in tainting of fished species. This could potentially result in commercial fishers being unable to sell their catch, which may result in a loss of income or other fishers unable to eat their catch. Spilt hydrocarbons may also contaminate fishing gear, which may require cleaning.

Shoreline and nearshore tourism and recreational activities could also be affected by reducing the water quality and aesthetic appeal, however this is likely to be limited to a short duration.

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 from within sections of the MEVA. This displacement can reasonably be expected to be localised and short-term (days).

On the basis of the above assessment, an MDO release has the potential to impact an array of environmental and socioeconomic receptors, with the highest consequence considered to be III – Moderate.

Cultural features

An important outcome of Dr Corrigan's research is that no sacred sites or dreamings are shown to be directly impacted by the proposed DPD project footprint, although this is not to say that some persons do not have fears that this could be the case in the event of an unplanned event (Corrigan, 2024).

In the event of an unplanned MDO release during the wet season, shoreline oil accumulation was predicted to occur with receptors from the NT mainland (South Alligator, Litchfield and Cox-Finnis) and NT islands (e.g. Tiwi Islands and Vernon Islands) at low thresholds above 10% probability. During the transitional season, shoreline oil accumulation was predicted with Vernon Islands and no shoreline contact was predicted during the dry season at low thresholds above 10% probability. These shorelines have possible associations with cultural values (e.g. ILUAs; sacred sites [registered, recorded, or not]; marine parks and sea country). In the 2022 Statement of Reasons Requests, the Tiwi clan members raised their concern regarding traditional hunting of marine species and totem species. The First Nations people maintain a continuing spiritual connection with sea country, including caring for sea country and access to cultural food sources. Potential impacts to cultural features from a hydrocarbon spill may also include a decline in traditional food sources or mortality of fauna with cultural significance. The potential impacts to culturally significant marine fauna species (such as dreaming and totem species including marine mammals, marine reptiles, fish and birds) are assessed separately above. Modelling predicted no potential for surface oil or shoreline contact with the Croker Island native title determination. Modelling predicted shoreline contact with the Larrakia native title determination at low thresholds at a low probability (6%) and a peak of 5 m^3 on the shoreline. Low thresholds equate to approximately 2 teaspoons of oil per m^2 of shoreline. Note that the RPS modelling was based on a larger maximum fuel tank volume than that of any activity vessel and does not take into account any mitigation and management controls, including oil spill response. Santos will notify relevant FNCCs and clan groups, in the event that a MDO release has the potential to impact their coastal areas. Table 8-6 of the Coastal Waters CEMP and Table 5-1 of DPD (NT Waters) OPEP (BAS-210 0026) outline the spill notification requirements to FNCCs and clan groups.

Likelihood	B – Unlikely
A worst-case MDO release resulting from a vessel collision is unlikely to have widespread ecological effects given the nature of the hydrocarbons on board, the finite volumes that could be released, control measures in place, the water depth and the transient nature of marine fauna in this area. Long-term impacts resulting in complete habitat loss or degradation are not considered likely given the control measures proposed to prevent releases; therefore, the Activity will be conducted in a manner that is considered acceptable. The likelihood of an MDO release occurring due to vessel collision or refuelling is limited given the set of mitigation and management controls in place. Consequently, the likelihood of a vessel collision releasing hydrocarbons to the environment, is considered to be unlikely.	
Residual Risk	The residual risk is considered Low.

6.6.5 Demonstration of as low as reasonably practicable

Using vessels is integral to the Activity, and therefore the associated risk of unplanned hydrocarbon releases cannot be completely eliminated.

All reasonably practicable control measures were reviewed, and those adopted are considered appropriate to manage the residual risk to a Low level. The proposed management controls are in accordance with Santos' risk management criteria and are considered appropriate to reduce the risk to ALARP.

In terms of spill response activities, Santos will implement oil spill response as specified within the DPD (NT Waters) OPEP (BAS-210 0026). The OPEP includes a detailed ALARP assessment on the adequacy of arrangements available to support spill response strategies and control measures.

6.6.6 Acceptability evaluation

Is the risk ranked between Very Low and 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 the risks and impacts consistent with the principles of ecologically sustainable development (ESD)?	Yes – activity evaluated in accordance with Santos' Offshore Division Environmental Hazard Identification and Assessment Guideline (EA-91-IG-00004), 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 – The following material published in relation to threatened and migratory species within the EMBA identifies habitat degradation / modification, pollution or oil spills as a threat (Table 3-14): **Conservation Advice:** • Approved Conservation Advice for *Calidris ferruginea* (Curlew Sandpiper) (TSSC, 2015e) • Approved Conservation Advice for *Dermochelys coriacea* (Leatherback Turtle) (DEWHA, 2008b) • Approved Conservation Advice for *Glyphis garricki* (northern river shark) (TSSC, 2014a) • Approved Conservation Advice for *Glyphis glyphis* (speartooth shark) (DoE, 2014) • Approved Conservation Advice for Green Sawfish (DEWHA, 2008a) • Approved Conservation Advice for *Numenius madagascariensis* (Eastern Curlew) (TSSC, 2015f) • Approved Conservation Advice for *Pristis clavata* (Dwarf Sawfish) (DEWHA, 2009) • Approved Conservation Advice for *Pristis pristis* (Largetooth Sawfish) (TSSC, 2014b) • Approved Conservation Advice for *Rostratula australis* (Australian painted snipe) (TSSC, 2013) • National Recovery Plan for the Australian Painted Snipe (*Rostratula australis*) (DCCEEW, 2022a) • Conservation Advice *Calidris tenuirostris* (great knot) (DCCEEW, 2024d) • Conservation Advice *Charadrius leschenaultii* (Greater sand plover) (TSSC, 2016)

	• Conservation Advice *Charadrius mongolus* (Lesser Sand Plover, Mongolian Plover) (TSSC, 2016d) • Conservation Advice for *Arenaria interpres* (ruddy turnstone) (DCCEEW, 2024a) • Conservation Advice for *Balaenoptera borealis* (sei whale) (TSSC, 2015b) • Conservation Advice for *Balaenoptera physalus* (fin whale) (TSSC, 2015c) • Conservation Advice for *Calidris acuminata* (sharp-tailed sandpiper) (DCCEEW, 2024b) • Conservation Advice for *Calidris acuminata* (sharp-tailed sandpiper) (DCCEEW, 2024b) • Conservation Advice for *Calidris canutus* (red knot) (DCCEEW, 2024c) • Conservation Advice for *Limnodromus semipalmatus* (Asian dowitcher) (DCCEEW, 2024f) • Conservation Advice for *Limosa limosa* (black-tailed godwit) (DCCEEW, 2024e) • Conservation Advice for *Pluvialis squatarola* (grey plover) (DCCEEW, 2024g) • Conservation Advice for *Rhincodon typus* (whale shark) (TSSC, 2015g) • Conservation Advice for *Tringa nebularia* (common greenshank) (DCCEEW, 2024h) • Conservation Advice for *Xenus cinereus* (terek sandpiper) (DCCEEW, 2024i) • Conservation Advice *Limosa lapponica baueri* (Bar-tailed godwit [western Alaska]) (TSSC, 2016a) **Recovery Plans:** • Sawfish and River Sharks Multispecies Recovery Plan (CoA, 2015b) • Recovery Plan for the Grey Nurse Shark (*Carcharias taurus*) (DoE, 2014a) • Recovery Plan for the White Shark (*Carcharodon carcharias*) (DSEWPaC, 2013) • Conservation Management Plan for the Blue Whale 2015–2025 (CoA, 2015a) • Recovery Plan for Marine Turtles in Australia 2017–2027 (CoA, 2017b) • Wildlife Conservation Plan for Migratory Shorebirds (CoA, 2015c) • Wildlife Conservation Plan for Seabirds (CoA, 2020). Recovery plans / conservation advice for other species that may occur in the MEVA do not identify pollution or habitat degradation / modification as a key threat or have explicit relevant objectives or management actions. AMP zoning principles and objectives were also considered for the Marine Bioregional Plan for the North Marine Region (CoA, 2012a). The Activity is not inconsistent with these objectives. The objectives of these publications were considered during impact and risk assessments. The controls outlined in Table 6-18 are consistent with the objectives of the material listed above. Santos considers the impacts of hydrocarbon release from vessel collision to be not inconsistent with these objectives.
Are performance outcomes, control measures and associated performance standards consistent with legal and regulatory requirements?	Yes – management measures are consistent with Commonwealth Acts and Marine Orders: *Marine Safety (Domestic Commercial Vessel) National Law Act 2012* (Cth) and *Navigation Act 2012* (Cth), Marine Order 30: Prevention of Collisions and Marine Order 21: Safety of Navigation and Emergency Procedures. Through acceptance of the Coastal Waters CEMP, legislative and regulatory requirements will be met as per Section 1.6.2 of the Coastal Waters CEMP.
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 (Appendix A of the Coastal Waters CEMP).
Are performance outcomes, control measures and associated performance standards consistent with industry standards?	Yes – the most recent and comparable EPs accepted by NOPSEMA were reviewed for consistency with the performance outcomes, control measures and associated performance standards proposed in the Coastal Waters CEMP.

Have performance outcomes, control measures and associated performance standards taken into consideration Relevant Person feedback?	Yes - Relevant feedback relating to a potential unplanned release of MDO has been considered and the existing control measures are considered adequate to reduce the risk to ALARP. Santos will notify all Relevant Persons who have requested notification in the event of a spill. As a result, the OPEP and Table 8-6 of the Coastal Waters CEMP have also been updated to reflect additional requests for notifications in the event of a spill.
Are performance standards such that the impact or risk is considered to be ALARP?	Yes – ALARP assessment conducted, with additional control measures adopted.

The potential impacts and risks from vessel collision resulting in hydrocarbon (MDO) releases are well understood, and the activities will be managed in accordance with relevant legislation and standards. With the implementation of industry standards, Relevant Persons initiated and activity-specific control measures to reduce the likelihood of a vessel collision (and minimise impacts), the residual risk is assessed to be low and ALARP. Relevant Persons' concerns have been addressed regarding this hazard. Therefore, it is considered that the proposed control measures will reduce the risk of impact from an MDO release to a level that is acceptable.

6.7 Contingency 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 DPD (NT Waters) OPEP (BAS-210 0026). An environmental assessment of these spill response strategies was conducted, as detailed below.

An environmental assessment of the hydrocarbon spill scenarios considered for this activity and relevant to spill response operations is provided in Section 6.6.

6.7.1 Description of event

Event	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 using a net environmental benefit analysis (NEBA). Spill response will be under the direction of the relevant control agency, as defined in the DPD (NT Waters) OPEP (BAS-210 0026), 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 and applicable response planning thresholds considered to be appropriate for the worst-case spill scenarios identified for the Activity and detailed in the DPD (NT Waters) OPEP (BAS-210 0026) and comprise: • source control • monitor and evaluate • mechanical dispersion • shoreline protection and deflection • shoreline clean-up • oiled wildlife response • scientific monitoring • waste management. Response strategies are intended to reduce the environmental consequences of a hydrocarbon spill, but 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 when implementing spill response strategies can also result in environmental harm beyond that caused by the spill.
Extent	Extent of spill. Spill response could occur anywhere within the EMBA for the worst-case spill scenarios, as per response planning thresholds (Refer to Section 6.2 of the DPD (NT Waters) OPEP (BAS-210 0026).
Duration	The total duration of the spill response effort will exceed the duration of the worst-case spill—persistence of the oil in the environment and the requirement to remove this oil and/or monitor impacts and recovery to sensitive receptors adds to the time. The DPD (NT Waters) OPEP (BAS-210 0026) further details the likely duration of specific response strategies.

6.7.2 Nature and scale of environmental impacts

Noise emissions	
Spill response operations will involve aircraft and vessels, which will generate noise both offshore and in nearshore locations within the EMBA.	
Potential receptors	• Threatened, migratory or local fauna • Protected areas • Socioeconomic receptors
Underwater noise from vessels may potentially impact marine fauna, such as fish (including commercial species), marine reptiles and marine mammals. Section 5.3 details potential noise emission impacts from vessels and helicopters. Cetaceans and turtles have been identified as the key concern for vessel noise. There is a known dolphin breeding BIA and internesting BIAs and habitat critical to the survival of flatback and olive ridley turtles and foraging BIAs for the green and olive ridley turtles intersecting the MEVA. Vessels may also need to enter marine parks and other areas used for tourism, commercial and recreational fishing, and traditional purposes.	
Light emissions	
Spill response operations will involve vessels which are required, at a minimum, to display navigational lighting. Vessels may operate near shoreline areas during spill response operations. Spill response activities may also involve onshore operations including vehicle use and temporary camps, both of which may require lighting.	

Potential receptors	• Threatened, migratory or local fauna • Protected areas • Socioeconomic receptors

Lighting may cause behavioural changes to fish, mammals, birds and marine turtles that can have a heightened consequence during key life cycle activities, such as turtle nesting and hatching. Turtles and birds, which includes threatened and migratory fauna (Table 3-12), have been identified as key fauna susceptible to lighting impacts. Section 5.4 further details the nature and scale of light emission impacts. Lighting can cause disorientation in flying birds, disrupting resting and breeding behaviours.

Turtle BIAs for internesting and foraging are located in the Joseph Bonaparte Gulf and Tiwi Islands surrounds. There is also habitat critical to the survival of olive ridley and flatback turtles within the MEVA. During nesting and hatching seasons, lighting may cause behavioural impacts to turtles including aborted nesting attempts and misorientation of newly hatched turtles, which may increase mortality rates. Because of impacts to fauna, lighting has the potential to impact supported industries such as tourism and indirect impacts on the values of protected areas.

Atmospheric emissions

Using fuels to power vessel engines, generators and mobile equipment during spill response operations will result in emissions of GHGs, such as CO_2, CH_4 and N_2O, along with non-GHGs such as SO_x and NO_x. Emissions will result in a localised decrease in air quality.

Potential receptors	• Threatened, migratory or local fauna • Physical environment or habitat (air quality) • Socioeconomic receptors

Atmospheric emissions from spill response equipment will be localised, and using mobile equipment, vessels and vehicles is not considered to create emissions on a scale where noticeable impacts would be predicted. Emissions may occur in protected areas; however, the scale of the impact relative to potential oil spill impacts is considered negligible.

Operational discharges and waste

Operational discharges include routine discharges from vessels used during spill response, dependent on location of activities (Commonwealth or NT coastal or internal waters) and associated regulatory (e.g. MARPOL) restrictions, such as:

- deck drainage
- putrescible waste and sewage/greywater
- cooling water from operating engines
- bilge water
- ballast water
- brine discharge.

Other specific spill response waste creation may occur, including:

- cleaning of oily equipment, vessels and vehicles
- sewage and putrescible and municipal waste at offshore staging sites
- creation, storage, transport and disposal of oily waste and contaminated organics.

The discharge of wastes created during the course of contingency spill response operations will comply with applicable legislative requirements.

Potential receptors	• Threatened, migratory or local fauna • Physical environment or habitat • Protected areas • Socioeconomic receptors

Operational discharges from vessels may create a localised and temporary reduction in marine water quality. Depending on the nature of the discharge, effects may include nutrient enrichment, toxicity, and temperature and salinity increases (refer Section 5.6). Discharge could potentially occur adjacent to marine communities, such as corals, seagrass and macroalgae, and in protected areas (i.e. receptors anywhere within the EMBA), which support a more diverse faunal community; however, discharges are still expected to be localised and temporary.

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.

Sewage and putrescible and non-putrescible 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.

Physical presence and disturbance

Moving and operating vessels during spill response operations has the potential to disturb the physical environment and marine habitats and fauna (e.g. vessel strike, behavioural changes), which may occur within protected areas. Disturbance

may also impact socioeconomic values of an area. Vessel movement could potentially introduce IMS (attached as biofouling) to nearshore areas, while vehicle and equipment movement could spread non-indigenous flora and fauna. Oiled wildlife response activities may also involve deliberately disturbing (hazing), capturing, handling, cleaning, rehabilitating, transporting and releasing wildlife, which could lead to additional impacts to wildlife.	
Potential receptors	• Threatened, migratory and local fauna • Physical environment or habitat • Protected areas • Socioeconomic receptors
Vessel use may disturb benthic communities, including corals, seagrass and macroalgae. Impacts to habitats and communities from vessels include damage through deploying anchors and mooring lines, and from grounding. Vessel use in shallow coastal waters also increases the chance of contact with, or physical disturbance of, marine fauna such as turtles and dugongs. Booms create a physical barrier on the water surface that has the potential to injure or entangle passing surface-breathing or -feeding marine fauna. Oiled wildlife response may include hazing, capturing, handling, cleaning, rehabilitating, transporting, cleaning and releasing wildlife susceptible to oiling, such as birds and marine turtles. Although oiled wildlife response is aimed at having a net benefit, poor responses can potentially create additional stress and exacerbate impacts from oiling, interfere with life cycle processes, hamper recovery and, in the worst instance, increase levels of mortality. Impacts from IMS are described in Section 6.2 and are not described further in this section. Disturbance to marine habitat, and the potential for disrupting culturally sensitive areas, may occur within protected areas (e.g. AMPs).	
Disruption to other users of marine and coastal areas and townships	
Spill response operations may involve using vessels and equipment in areas used by the general public or industry in Australia and potentially Indonesia. Mobilising spill response personnel into forward operating bases may also place increased demands on local accommodation and other businesses.	
Potential receptors	• Socioeconomic receptors • Cultural features
Using vessels in the offshore and nearshore environment and undertaking spill response operations may exclude the general public, cultural uses (e.g. access to cultural food resources and capability to care for sea country), commercial industries (e.g. fishing, tourism, energy), or come within proximity to known sacred sites (for example on Tiwi Islands). As well as limiting access, this may potentially impact revenue with respect to commercial businesses. Mobilising 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.	

6.7.3 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 described in Table 6-19 to demonstrate that the potential impacts from this aspect are ALARP. Additional control measures that are more specific to spill response are presented in the DPD (NT Waters) OPEP (BAS-210 0026).

Control measures that are adopted have associated EPSs and measurement criteria, which are presented in the relevant strategy sections of the DPD (NT Waters) OPEP (BAS-210 0026).

Table 6-19: Control measures evaluation for spill response operations

CM reference	Control measure	Environmental benefit	Potential cost/issues	Evaluation
C6.3.1	Apply Santos' Protected Marine Fauna Interaction and Sighting Procedure (EA-91-II-00003) to vessel and helicopter activities when in the vicinity of cetaceans and turtles (isolation control)	see Table 6-4	see Table 6-4	**Adopted** – see Table 6-4
C7.4.1	Apply a chemical selection procedure for all chemicals planned to be discharged (administrative control)	see Table 6-11	see Table 6-11	**Adopted** – see Table 6-11
C6.1.1	Activity vessels equipped and crewed in accordance with Australian maritime	see Table 5-2	see Table 5-2	**Adopted** – see Table 5-2

CM reference	Control measure	Environmental benefit	Potential cost/issues	Evaluation
	requirements (administrative control)			
C6.5.1	Atmospheric (GHG and non-GHG) emissions from combustion managed in accordance with standard maritime practice. (administrative control)	see Table 5-18	see Table 5-18	**Adopted** – see Table 5-18
C6.6.1	Routine discharges of treated bilge will comply with the *Navigation Act 2012* (Cth), *Protection of the Sea (Prevention of Pollution from Ships) Act 1983* (Cth), Marine Order 91 and *Marine Pollution Act 1999* (NT), as applicable (administrative control)	see Table 5-19	see Table 5-19	**Adopted** – see Table 5-19
C6.6.2	Routine discharges of treated sewage effluent and grey water, in accordance with the *Navigation Act 2012* (Cth), *Protection of the Sea (Prevention of Pollution from Ships) Act 1983* (Cth) and Marine Order 96 (Marine Pollution Prevention – Sewage), as applicable (administrative control)	see Table 5-19	see Table 5-19	**Adopted** – see Table 5-19
C6.1.2	Undertake stakeholder engagement (after an accidental spill event), including applicable notifications (administrative control)	Promotes awareness and reduces potential impacts from response to socioeconomic activities.	Minimal cost in relation to overall effort/costs in managing incident.	**Adopted** – considered a standard control for incident management.

6.7.4 Environmental impact and risk assessment

Receptor	Consequence level
Spill response operations – noise emissions	
• Threatened, migratory or local fauna • Protected areas • Socioeconomic receptors	The receptors considered most sensitive to vessel noise are marine turtles, whale sharks, dolphins and whales. However, by adopting control measures to limit close interaction with protected fauna (i.e. Protected Marine Fauna Interaction and Sighting Procedure [EA-91-II-00003]), only temporary behavioural disturbance is expected, with a consequence of I – Negligible.
Consequence	I – Negligible
Likelihood	B – Unlikely
Residual Risk	Very Low
Spill response operations – light emissions	
• Threatened, migratory or local fauna • Protected areas • Socioeconomic receptors	The receptors considered most sensitive to lighting from vessel operations are seabirds, shorebirds and marine turtles. Because there are 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.
Consequence	I – Negligible
Likelihood	B – Unlikely

Receptor	Consequence level
Residual Risk	Very Low
Spill response operations – atmospheric emissions	
• Threatened, migratory or local fauna • Physical environment or habitat • Socioeconomic receptors	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. Because of the localised and low level of emissions, impacts to protected area values, physical environment and socioeconomic receptors are predicted to be I – Negligible.
Consequence	I – Negligible
Likelihood	B – Unlikely
Residual Risk	Very Low
Spill response operations – operational discharges and waste	
• Threatened, migratory or local fauna • Physical environment or habitat • Socioeconomic receptors	Activity 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, by adopting regulatory requirements for vessel discharges, which prevent discharges close to shorelines, discharges will have a negligible potential to impact to habitats, fauna or protected area values. Washing vessels and equipment will take place only in defined offshore hot zones thus preventing impacts to shallow habitats. Sewage, putrescible waste and municipal waste generated onshore will be stored and disposed of at approved locations. Storing, transporting and disposing 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 hydrocarbon contamination spreading or leaching. Operational discharges from spill response operations are expected to be II – Minor.
Consequence	II – Minor
Likelihood	B – Unlikely
Residual Risk	Very Low
Spill response operations – physical presence and disturbance	
• Threatened, migratory or local fauna • Physical environment or habitat • Protected areas • Socioeconomic receptors	Using vessels has the potential to disturb benthic habitats, including sensitive shoal habitats such as corals and macroalgae, and seagrass meadows. A review of shallow water habitats, and of bathymetry, and establishing demarcated areas for access and anchoring will reduce the level of impact to I – Negligible. These habitats or environments are likely to contain values of the protected area they occur in, and therefore the impact to the protected areas from physical disturbance is considered II – Minor. The main direct disturbance to fauna would be hazing, capturing, handling, transporting, cleaning and releasing the 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 Minor consequence following compliance with Santos' Wildlife Framework Plan (SO-91-BI-20014) and the NT Oil Spill Contingency Plan (DOTMS, 2014). This impact is considered II – Minor.
Consequence	II – Minor
Likelihood	B – Unlikely
Residual Risk	Very Low
Spill response operations – disruption to other users of marine and coastal areas and townships	
• Socioeconomic receptors • Cultural features	Using vessels in the offshore environment and for spill response activities may exclude the general public, cultural uses (e.g. access to cultural food resources and capability to care for sea country) and commercial industries (e.g. fishing, tourism), or come within proximity to known sacred sites (for example on Tiwi Islands). It should be noted that vessel based response activities will be limited to areas where oil is present at high thresholds, and response activities outside of this area would include less obtrusive measures such as monitoring and surveillance and scientific monitoring. Note: This is distinct from the socioeconomic impact of a spill itself. With control measures applied, it is considered that the additional impact of spill response activities on affected industries would be II – Minor.

Receptor	Consequence level
Consequence	II – Minor
Likelihood	B – Unlikely
Residual Risk	Very Low

The spill response activities could be within an area that may overlap with cultural features. These cultural features (refer to Section 3.2.14) will be considered through the NEBA process described in the DPD (NT Waters) OPEP (BAS-210 0026).

6.7.5 Demonstration of as low as reasonably practicable

A NEBA is the primary tool used during spill response to evaluate response strategies—the goal is to select 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. Effectively, the NEBA will determine whether an environmental benefit will be achieved by 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 the Coastal Waters CEMP 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 and nearshore waters using vessels and aircraft. The greatest potential for additional impacts from implementing spill response is considered to be on wildlife 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 were reviewed and those adopted are considered appropriate to manage the impacts such that the residual risk is assessed to be Very Low. The proposed control measures are in accordance with Santos' risk management criteria and are considered appropriate to reduce impacts to ALARP.

6.7.6 Acceptability evaluation

Is the risk ranked between Very Low and Medium?	Yes – the highest ranking residual risk is Very Low.
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 Environmental Hazard Identification and Assessment Guideline (EA-91-IG-00004), 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 – The following material published in relation to threatened and migratory species within the EMBA identifies habitat degradation / modification, pollution or oil spills as a threat (Table 3-14): **Conservation Advice:** • Approved Conservation Advice for *Calidris ferruginea* (Curlew Sandpiper) (TSSC, 2015e) • Approved Conservation Advice for *Dermochelys coriacea* (Leatherback Turtle) (DEWHA, 2008b) • Approved Conservation Advice for *Glyphis garricki* (northern river shark) (TSSC, 2014a) • Approved Conservation Advice for *Glyphis glyphis* (speartooth shark) (DoE, 2014) • Approved Conservation Advice for Green Sawfish (DEWHA, 2008a) • Approved Conservation Advice for *Numenius madagascariensis* (Eastern Curlew) (TSSC, 2015f) • Approved Conservation Advice for *Pristis clavata* (Dwarf Sawfish) (DEWHA, 2009) • Approved Conservation Advice for *Pristis pristis* (Largetooth Sawfish) (TSSC, 2014b)

	• Approved Conservation Advice for *Rostratula australis* (Australian painted snipe) (TSSC, 2013) • National Recovery Plan for the Australian Painted Snipe (*Rostratula australis*) (DCCEEW, 2022a) • Conservation Advice *Calidris tenuirostris* (great knot) (DCCEEW, 2024d) • Conservation Advice *Charadrius leschenaultii* (Greater sand plover) (TSSC, 2016) • Conservation Advice *Charadrius mongolus* (Lesser Sand Plover, Mongolian Plover) (TSSC, 2016d) • Conservation Advice for *Arenaria interpres* (ruddy turnstone) (DCCEEW, 2024a) • Conservation Advice for *Balaenoptera borealis* (sei whale) (TSSC, 2015b) • Conservation Advice for *Balaenoptera physalus* (fin whale) (TSSC, 2015c) • Conservation Advice for *Calidris acuminata* (sharp-tailed sandpiper) (DCCEEW, 2024b) • Conservation Advice for *Calidris acuminata* (sharp-tailed sandpiper) (DCCEEW, 2024b) • Conservation Advice for *Calidris canutus* (red knot) (DCCEEW, 2024c) • Conservation Advice for *Limnodromus semipalmatus* (Asian dowitcher) (DCCEEW, 2024f) • Conservation Advice for *Limosa limosa* (black-tailed godwit) (DCCEEW, 2024e) • Conservation Advice for *Pluvialis squatarola* (grey plover) (DCCEEW, 2024g) • Conservation Advice for *Rhincodon typus* (whale shark) (TSSC, 2015g) • Conservation Advice for *Tringa nebularia* (common greenshank) (DCCEEW, 2024h) • Conservation Advice for *Xenus cinereus* (terek sandpiper) (DCCEEW, 2024i) • Conservation Advice *Limosa lapponica baueri* (Bar-tailed godwit [western Alaska]) (TSSC, 2016a) **Recovery Plans:** • Sawfish and River Sharks Multispecies Recovery Plan (CoA, 2015b) • Recovery Plan for the Grey Nurse Shark (*Carcharias taurus*) (DoE, 2014a) • Recovery Plan for the White Shark (*Carcharodon carcharias*) (DSEWPaC, 2013) • Conservation Management Plan for the Blue Whale 2015–2025 (CoA, 2015a) • Recovery Plan for Marine Turtles in Australia 2017–2027 (CoA, 2017b) • Wildlife Conservation Plan for Migratory Shorebirds (CoA, 2015c) • Wildlife Conservation Plan for Seabirds (CoA, 2020). Recovery plans / conservation advice for other species that may occur in the EMBA do not identify pollution or habitat degradation / modification as a key threat or have explicit relevant objectives or management actions. AMP zoning principles and objectives were also considered for Marine Bioregional Plan for the North Marine Region (CoA, 2012a) and Marine Bioregional Plan for the North-West Marine Region (CoA, 2012b) such as conservation values of the identified protection priorities (Section 3.2.11.2), including the Joseph Bonaparte AMP and Oceanic Shoals AMP. Management is consistent with the zoning of the AMPs, in that risks have been reduced to ALARP, e.g. implementing spill response activities will limit impacts, thus conserving the marine park values (described in Section 1.6 of the Coastal Waters CEMP and Table 3-10). The activity is consistent with these objectives. The objectives of these publications were considered during impact and risk assessments. The Activity and controls outlined in Table 6-19 are not inconsistent with the objectives of the material listed above.

Are performance outcomes, control measures and associated performance standards consistent with legal and regulatory requirements?	Yes – spill response management is consistent with the National Plan for Maritime Environmental Emergencies (AMSA, 2020), and other legislation identified in Sections 5 and 6. Through acceptance of the Coastal Waters CEMP, legislative and regulatory requirements will be met as per Section 1.6.2 of the Coastal Waters CEMP
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 (Appendix A of the Coastal Waters CEMP).
Are performance outcomes, control measures and associated performance standards consistent with industry standards?	Yes – the most recent and comparable EPs accepted by NOPSEMA were reviewed for consistency with the performance outcomes, control measures and associated performance standards proposed in the Coastal Waters CEMP.
Have performance outcomes, control measures and associated performance standards taken into consideration Relevant Person feedback?	Yes – During any spill response, a close working relationship with relevant regulatory bodies (e.g. AMSA, DEPWS, NT Department of Transport Marine Safety [DOTMS]) will occur; thus, there will be ongoing, coordinated engagement with Relevant Persons on the acceptability of response operations. Relevant Persons listed in Table 4-7, whose functions, interests or activities are considered at risk due to the event, will be included in the list of stakeholders who will be notified under Santos' incident management process during the response operations. Wildlife response will be conducted in accordance with Santos' Wildlife Framework Plan (SO-91-BI-20014), the NT Oil Spill Contingency Plan (DOTMS, 2014), and any future NT oiled wildlife response plans developed. Subject to the availability and the participation of the Tiwi Islands Ranger Groups, Santos will continue to undertake training with the Tiwi Islands Ranger Groups prior to the Activity and provide additional on the job training post-spill to additional personnel (if required).
Are performance standards such that the impact or risk is considered to be ALARP?	Yes – ALARP assessment conducted, with additional control measures adopted.

The implementation of spill response activities to reduce the potential impacts from a spill are required by legislation. The spill response options selected have been demonstrated to show a net environmental benefit, are standard industry practice and are consistent with relevant standards and guidelines, including the National Plan for Maritime Environmental Emergencies (AMSA, 2020). No concerns from Relevant Persons have been raised regarding response activities and the controls proposed reduce the consequences of the potential impacts to minor and ALARP. The controls used during spill response activities are considered to reduce additional impacts and risks to an acceptable level.

6.8 Unplanned release: dry natural gas

6.8.1 Description of event

Event	If, during lifting operations associated with the Activity, an object (equipment or infrastructure) was dropped onto the Bayu-Undan pipeline there is potential for damage to the pipeline and a leak of dry gas. The DPD pipeline route within the OA, along which lifting activities will take place, is approximately 140 m away from the Bayu-Undan pipeline at its closest point and over 1.5 km away at its furthest point. Given this separation, there is a low likelihood of a dropped object impacting the Bayu-Undan pipeline in the OA. The scale of the Bayu-Undan pipeline leak is dependent on the nature of the rupture. Small 'pinhole' leaks will result in a stream of bubbles which may dissolve before reaching the surface. A major rupture (e.g. catastrophic failure) would have the potential to release a volume 151,000 m^3 of dry gas forming a large plume in the water column and dispersing into the atmosphere. A catastrophic failure is considered to be the worst-case credible release from the Bayu-Undan pipeline. As the Bayu-Undan pipeline transports dry natural gas with no liquid phase hydrocarbons, a loss of containment would not release any liquid phase hydrocarbons to the environment. Given that the contents of the pipeline consist entirely of dehydrated gas, condensation of gas phase components upon release is not expected due to the pressure and temperature differential between the pipeline contents and the receiving environment.
Extent	The dry natural gas within the Bayu-Undan pipeline is contained at a relatively high pressure of up to 180 barg. The extent of a leak from the Bayu-Undan pipeline would depend on the nature of the rupture and expected to be limited to within hundreds of metres of the rupture location. Small 'pinhole' leaks may result in a stream of bubbles that could dissolve before reaching the surface.
Duration	Potentially harmful concentrations are limited to a very short period (days) immediately following the release.

Dry natural gas

The Bayu-Undan pipeline contains dry natural gas that is predominantly methane (~79%), carbon dioxide (6%), hydrogen sulphide (0.004%) and 10% volatile organic compounds (Santos, 2022). However, the gas composition can vary. Physical properties indicate that dry natural gas is highly flammable and will volatilise from the aquatic environment rapidly. It is noted that in practice, acute and chronic effects would not typically be observed (Shell, 2019).

6.8.2 Nature and scale of environmental impacts

Potential receptors: physical environment (water and air quality); threatened, migratory or local fauna (marine mammals, marine reptiles, sharks and rays, other fish, and birds); socioeconomic (other marine users); and cultural features.

6.8.2.1 Physical environment

The seabed near the existing Bayu-Undan pipeline within the OA is characterised as featureless silty, shelly sand (Figure 3-6), with very sparse (<1%) epibiota (mainly soft corals and crinoids) (RPS, 2023a). Any seabed disturbance impacts (e.g. scouring) are expected to be limited to the immediate vicinity of a pipeline leak. Given the mobile nature of sediments and high current speeds, the seabed is expected to return to near its original state over time – no substantial changes to seabed features are anticipated.

The existing Bayu-Undan pipeline within the OA is in an offshore environment with no other permanent sources of air or water pollution—the air quality is expected to be nearly pristine. A pipeline leak and subsequent release of dry natural gas potentially could result in a localised and short–term reduction in water and air quality. The plume is likely to move towards the surface as methane (the main component of dry natural gas) is lighter than air, with some gas becoming dissolved in seawater as the plume rises. Any dissolved gas in the water column is expected to disperse rapidly. A worst-case rupture has the potential to form a minor gas cloud, which would rapidly disperse into the atmosphere. Potential changes to water and air quality are expected to be limited to within hundreds of meters of the rupture site and short term (within days).

6.8.2.2 Threatened, migratory or local fauna (marine mammals, marine reptiles, sharks and rays, other fish, and birds)

Due to the limited solubility of the gas and waters depths, seabed disturbance impacts (e.g. scouring) are expected to be limited to the immediate vicinity of a pipeline rupture. Transient fauna are likely to avoid the water turbulence which would be caused in the event of a rupture. A gas cloud may potentially impact air-breathing fauna, such as marine mammals, reptiles, and birds. Animals in the immediate vicinity of the release may be at risk of asphyxiation, potentially resulting in death. However, marine mammals, turtles and birds are very unlikely to be

affected, given the rapid gas dispersion into the atmosphere. This potential effect would be highly localised (within 500 m) with a short duration and rapidly dispersed within the environment.

The recovery plan for Marine Turtles in Australia 2017–2027 (CoA, 2017b) identified pollution as a threat. However, pollution sources were primarily related to agricultural, terrestrial industrial and domestic sources. The accidental chemical releases are expected to be of very short duration and localised extent with no persistence in the environment.

6.8.2.3 Socioeconomic

A dry natural gas cloud could form an explosive mix that, if ignited, results in injury/death and property damage. A gas cloud could risk the health and safety of other users, such as fishers (traditional and commercial), tourism and recreational users. All marine users will be excluded from the construction vessel 500 m exclusion zone; therefore, will not be within 500 m of the event if it occurs. In addition, an unplanned release would enact an emergency response plan to advise other marine users of the hazard.

6.8.2.4 Cultural features

First Nations people feedback was provided about potential impacts from an unplanned dry natural gas release to cultural features during the Coastal Waters CEMP consultations. An important outcome of Dr Corrigan's research is that no sacred sites or dreamings are shown to be directly impacted by the proposed DPD project footprint, although this is not to say that some persons do not have fears that this could be the case in the event of an unplanned event (Corrigan, 2024).

In the 2022 Statement of Reasons Requests, the Tiwi clan members raised their concern regarding traditional hunting of marine species and totem species. The First Nations people maintain a continuing spiritual connection with sea country, including caring for sea country and access to cultural food sources. The potential impact to marine fauna is likely to be limited to transiting individuals and is unlikely to result in significant impacts to marine species at the individual or population level (refer to Section 6.8.2.2). As a result, unplanned release of dry natural gas is not anticipated to affect traditional hunting practices or resources.

In accordance with First Nations people cultural beliefs, if totemic species (e.g. turtles) are impacted by the Activity some believe this in turn can impact First Nations people and make them sick. The potential impacts to culturally significant marine fauna species (such as dreaming and totem species including marine mammals, turtles, and birds) are assessed in Section 6.8.2.2.

6.8.3 Environmental performance outcomes and control measures

The EPO relating to this event is:

- No releases of gas from the Bayu-Undan pipeline to the environment as a result of impact/drag or dropped object from the Activity [EPO-16].

An assessment of the environmental benefits and the potential costs or issues associated with control measures for this activity are described in Table 6-20 to demonstrate that potential risks are ALARP. Control measures that are adopted have associated EPSs and measurement criteria, and are presented in Table 7-2. Rejected control measures have an ALARP evaluation provided to justify their rejection.

Table 6-20: Control measures evaluation for unplanned release: dry natural gas

CM reference	Control measure	Environmental benefit	Potential cost/issues	Evaluation
Standard control measures				
C7.1.1	Implement standards and procedures for lifting equipment (administrative control)	Reduces the chance of a dropped suspended load. Load-bearing lifting equipment engineering standards and appropriate lifting procedures factor in technical and environmental variables to minimize the risk of losing control of a suspended load.	Cost of implementing the procedure.	**Adopted**
Additional control measures				
C6.1.8	HSE inductions will include	Ensures that crew are aware of the stringent Coastal	Administrative costs to update	**Adopted**

CM reference	Control measure	Environmental benefit	Potential cost/issues	Evaluation
	environmental requirements and cultural values (administrative control)	Waters CEMP, Santos and legislative requirements.	existing Santos procedure and induction materials and train personnel.	
C7.8.1	Implement procedures (including no lift zones in navigational systems) for lifting adjacent to live infrastructure (administrative control)	Reduces the chance of a dropped suspended load. Load-bearing lifting equipment engineering standards and appropriate lifting procedures factor in technical and environmental variables to minimize the risk of losing control of a suspended load.	Cost of implementing the procedure.	**Adopted**
N/A	Eliminate lifting in the operational area (elimination control)	Reduces the risk of dropped objects.	Lifting is an essential activity for installation activities.	**Rejected** – not feasible to eliminate lifting in the field.

6.8.4 Environmental impact and risk assessment

Receptors	• Physical environment (water quality, air quality) • Threatened, migratory or local fauna (marine mammals, marine reptiles, sharks, rays, other fish, and birds) • Socioeconomic (commercial fishing, traditional fishing, tourism, recreation, shipping and defence) • Cultural features
Consequence	II – Minor
Impacts to water and air quality would be expected, but due to the dispersive nature of the ocean environment and water depths, impacts are expected to be short-term and localised. A dry natural gas release is unlikely to have widespread ecological effects, given the nature of the product, short duration and the limited volume that could be released, and the transient nature of marine fauna in this area. This unplanned event is not considered to have the potential for significant impacts to marine fauna species at the population level. Potential impacts to the physical environment (water and air quality) and marine fauna are considered to be II – Minor. Given the 500 m exclusion zone that will be in force around the construction vessel, subsequent impacts to socioeconomic receptors including commercial fishing and other marine users are not anticipated. For assessment of impacts to marine species of cultural significance, refer to the above paragraphs.	
Likelihood	B – Unlikely
A pipeline rupture incident caused by installation activities with the control measures in place is considered to be unlikely.	
Residual Risk	The residual risk is considered Very Low.

6.8.5 Demonstration of as low as reasonably practicable

A thorough set of controls has been proposed to minimise the risk of damage to the existing Bayu-Undan pipeline and subsequent environmental consequences should they occur.

All reasonably practicable control measures were reviewed and those adopted are considered appropriate to manage the residual risk to a Very Low level. The proposed management controls are in accordance with Santos' risk management criteria and are considered appropriate to reduce the risk to ALARP.

6.8.6 Acceptability evaluation

Is the risk ranked between Very Low and Medium?	Yes – residual risk is ranked Very Low.
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 Environmental Hazard Identification and Assessment Guideline (EA-91-IG-00004), 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 pollution as a threat to marine fauna, significant impacts are not predicted for this Activity.
Are performance outcomes, control measures and associated performance standards consistent with legal and regulatory requirements?	Yes – Relevant legislative requirements and standard industry practices have been applied to control the risk. Through acceptance of the Coastal Waters CEMP, legislative and regulatory requirements will be met as per Section 1.6 2 of the Coastal Waters CEMP.
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 (Appendix A of the Coastal Waters CEMP).
Are performance outcomes, control measures and associated performance standards consistent with industry standards?	Yes – the most recent and comparable EPs accepted by NOPSEMA were reviewed for consistency with the performance outcomes, control measures and associated performance standards proposed in the Coastal Waters CEMP.
Have performance outcomes, control measures and associated performance standards taken into consideration Relevant Person feedback?	Yes – Relevant feedback relating to a potential unplanned dry natural gas release has been considered and the existing control measures are considered adequate to reduce the risk to ALARP.
Are performance standards such that the impact or risk is considered to be ALARP?	Yes – ALARP assessment conducted, with additional control measures adopted.

Relevant Persons' concerns have been addressed regarding this aspect, and the proposed controls will reduce the residual risk to Very Low and ALARP. Therefore, Santos considers the residual risk associated with the unplanned dry natural gas release to be reduced to an acceptable level.

7. Environmental performance outcomes

To ensure environmental risks and impacts will be of an acceptable level, EPOs have been defined and are listed in Table 7-1. These outcomes will be achieved by implementing the identified control measures to the defined EPSs, noting some control measures are applicable to multiple EPOs.

Table 7-1: Environmental performance outcomes

Reference	Environmental performance outcomes
EPO-01	No significant[52] impacts to other marine users.
EPO-02	Seabed disturbance limited to planned activities and defined locations within the OA.
EPO-03	No significant[52] impacts to marine fauna from noise emissions.
EPO-04	No significant[52] impacts to marine fauna from lighting emissions.
EPO-05	Reduce impacts to air quality (GHG and non-GHG emissions) from combustion engines and incinerators by maintaining atmospheric emissions in accordance with standard maritime practices.
EPO-06	Reduce impacts to water quality from activity vessel discharges by maintaining discharge streams in accordance with standard maritime practices.
EPO-07	No impacts to the marine environment from contingency pipeline discharges (following wet-buckle event) resulting in a consequence severity greater than Minor[53].
EPO-08	No loss of equipment/cargo overboard from vessels resulting in a consequence severity greater than Minor[53].
EPO-09	Prevent the displacement of native marine species as a result of the introduction and establishment of IMS via activity vessels.
EPO-10	Zero incidents of injury/mortality of cetaceans/marine reptiles from collision with activity vessels.
EPO-11	Zero unplanned release of chemicals to the marine environment.
EPO-12	Zero unplanned release of minor volumes of chemicals and hydrocarbons to the marine environment.
EPO-13	No MDO release to the marine environment.
EPO-14	No significant[52] impacts to cultural features from the Activity.
EPO-15	No impacts to underwater cultural heritage from the Activity.
EPO-16	No releases of gas from the Bayu-Undan pipeline to the environment as a result of impact/drag or dropped object from the Activity.

7.1 Control measures and performance standards

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 7-2. Measurement criteria outlining how compliance with the control measure and the expected environmental performance could be evidenced are also listed.

All control measures, EPSs and associated measurement criteria relating to oil spill preparedness and response operations are detailed in the DPD (NT Waters) OPEP (BAS-210 0026).

[52] *'Significant' is defined as 'an impact which is important, notable, or of consequence, having regard to its context or intensity. Whether or not an action is likely to have a significant impact depends upon the sensitivity, value, and quality of the environment which is impacted, and upon the intensity, duration, magnitude and geographic extent of the impacts'. This definition is taken from DoE, 2013.*

[53] *Minor is defined as 'detectable but insignificant change to local population, industry or ecosystem factors' as in Table 5-2.*

Table 7-2: Control measures and environmental performance standards

EPO reference (Table 7-1)	Control measure	Environmental performance standard	Measurement criteria
EPO1	C6.1.1 Activity vessels equipped and crewed in accordance with Australian maritime requirements	EPS6.1.1.1 Vessels will be equipped and crewed in accordance with the *Navigation Act 2012* (Cth) (as applicable for vessel size, type and class), including implementing: • Marine Order 21 (Safety and emergency procedures), including: – safety measures such as manning and watchkeeping. • Marine Order 27 (Safety of navigation and radio equipment), including: – radio equipment and communications – navigation safety measures and equipment – danger, urgency and distress signals and messages. • Marine Order 30 (Prevention of Collisions), including: – lights and signals as applicable to vessel class per COLREGS requirements. • Marine Order 71 (Masters and Deck Officers), including: – all master, mate and watchkeeper officer duties undertaken by crew certified as applicable to vessel class per STCW requirements.	MC6.1.1.1.1 A Minimum Safe Manning Certificate is in place and identifies minimum crew qualifications to meet the STCW requirements (as applicable for vessel size, type and class).
			MC6.1.1.1.2 Records of Santos marine vessel vetting process (as applicable for vessel size, type and class) to demonstrate the following: • Global Maritime Distress and Safety System (GMDSS) radio logbook maintained • radio equipment available, working and tested at regular intervals • electronic and paper based charts are available on the bridge.
			MC6.1.1.1.3 A Vessel Cargo Ship Safety Equipment Certificate demonstrates the vessel has lights, shapes and means of making sound signals and distress signals in accordance with COLREGS requirements (as applicable for vessel size, type and class).
			MC6.1.1.1.4 Records of vessel crew STCW qualifications align with the Minimum Safe Manning Certificate (as applicable for vessel size, type and class).
			MC6.1.1.1.5 Non-compliance with relevant Marine Orders 21, 27, 30 and 71 and corrective action undertaken documented (as applicable for vessel size, type and class).
	C6.1.2 Undertake consultation with Relevant Persons (including applicable notifications)	EPS6.1.2.1 Consultation with relevant stakeholders will be undertaken in accordance with Relevant Persons consultation plan.	MC6.1.2.1.1 Consultation records demonstrate implementation of a Relevant Persons consultation plan.
		EPS6.1.2.2 AHO Notice to Mariners and AMSA maritime safety information (MSI) will be notified prior to relevant DPD installation activities.	MC6.1.2.2.1 Records demonstrate AHO and AMSA MSI provided sufficient information to generate Notice to Mariners prior to relevant DPD activities.
		EPS6.1.2.3 Infrastructure will be clearly marked on Australian nautical charts published by the AHO.	MC6.1.2.3.1 Evidence of transmittal of subsea infrastructure installed as part of the activities described in the Coastal Waters CEMP to AHO.
		EPS6.1.2.4 Establish a 500 m exclusion zone around the pipelay and construction vessels.	MC6.1.2.4.1 Records demonstrate that the AHO and AMSA MSI were notified that the Notice to Mariners is to include a 500 m exclusion zone around the pipelay and construction vessels.
	C6.1.3 The Activity will be undertaken in accordance with Santos HSE management and marine vessel vetting processes	EPS6.1.3.1 Vessels selected and onboarded in accordance with Santos' Offshore Marine Assurance Procedure (SO-91-ZH-10001) and Santos' Marine Offshore Assurance Criteria (1530-045-STN-0001) to ensure contracted vessels are operated, maintained and crewed in accordance with Santos and industry standards, and regulatory requirements.	MC6.1.3.1.1 Completed documentation in accordance with Santos' Offshore Marine Assurance Procedure (SO-91-ZH-10001).
	C6.1.5 Vessel speed restrictions	EPS6.1.5.1 Vessel speeds within the operational area will be limited to 8 knots or less.	MC6.1.5.1.1 Project induction material includes an environmental requirements section that details speed limit requirements.
			MC6.1.5.1.2 Induction records confirm all project personnel have completed the project induction.
	C6.1.6 One vessel will act as a surveillance vessel within the immediate vicinity of the pipelay vessel during pipelay	EPS6.1.6.1 An activity vessel will remain in proximity to the pipelay vessel to act as a surveillance vessel during pipelay.	MC6.1.6.1.1 Vessel daily reports record activities aligned with EPS6.1.6.1 requirements.
	C6.1.7 Communications plan will be implemented for engagement prior to and during the Activity	EPS6.1.7.1 Communications plan will be implemented for engagement with marine users.	MC6.1.7.1.1 Consultation records demonstrate implementation of a communications plan.
	C6.1.8	EPS6.1.8.1 All project personnel will attend HSE inductions which will include environmental requirements as required by the Coastal Waters CEMP.	MC6.1.8.1.1 Records demonstrate all project personnel have attended the Activity HSE Induction.

EPO reference (Table 7-1)	Control measure	Environmental performance standard	Measurement criteria
	HSE inductions will include environmental requirements and cultural values and cultural values		
EPO-02	C6.2.1 Confirmation of DPD route prior to and during installation	EPS6.2.1.1 DPD route to be surveyed and confirmed prior to installation.	MC6.2.1.1.1 Records confirm pre-lay DPD route survey completed.
		EPS6.2.1.2 DPD position to be continuously verified during installation.	MC6.2.1.2.1 Records confirm the pipeline as-laid survey completed.
	C6.2.2 DP pipelay vessel will be used for installation of the pipeline	EPS6.2.2.1 Pipelay vessel will always use DP during pipelay operations.	MC6.2.2.1.1 Records confirm vessel specification for the pipelay vessel include DP.
	C6.2.3 DGPS for pipelay vessel to maintain accurate vessel position during installation	EPS6.2.3.1 Pipelay vessel will always use DGPS during pipelay operations.	MC6.2.3.1.1 Records confirm DGPS equipped pipelay vessel is contracted for the Activity.
	C6.2.5 Vessel planned maintenance system	EPS6.2.5.1 Documented maintenance program is in place for equipment including DP systems, engines and machinery on vessels that provides a status on the maintenance of equipment.	MC6.2.5.1.1 Records from Santos vessel vetting process confirm planned maintenance system schedule adhered to.
	C6.2.6 Span correction procedures to be developed, if required	EPS6.2.6.1 Span-specific procedures for all span rectifications include: • pre-lay span method selection • provision for real-time monitoring of span rectification activities • post-lay rectification inspection of spans.	MC6.2.6.1.1 A copy of a span rectification procedure (or similar) demonstrating alignment to the EPS6.2.6.1 requirements.
	C6.2.7 Project vessels will use DP where required with no planned vessel anchoring within the OA, within the Habitat Protection Zones (IUCN IV) – Zone 2 of Oceanic Shoals Marine Park or in named banks or shoals	EPS6.2.7.1 No anchoring of activity vessels (unless in an emergency) within the: • OA • Habitat Protection Zones (IUCN IV) – Zone 2 of Oceanic Shoals Marine Park • named banks or shoals.	MC6.2.7.1.1 Project induction material includes an environmental requirements section that details that no anchoring (unless in an emergency) is permitted within OA, Habitat Protection Zones (IUCN IV) – Zone 2 of Oceanic Shoals Marine Park or named banks or shoals.
			MC6.2.7.1.2 Induction records confirm all project personnel have completed the project induction.
	C6.2.8 Establish a subsea infrastructure inventory	EPS6.2.8.1 Establish and maintain a comprehensive and accurate inventory of subsea infrastructure and locations.	MC6.2.8.1.1 Subsea infrastructure inventory records.
			MC6.2.8.1.2 Survey reports with installed infrastructure locations.
	C6.2.9 CHMP, including protocols for maritime underwater cultural heritage	EPS6.2.9.1 A CHMP will be in place prior to the commencement of the Activity and will include: • cultural heritage induction requirements for site personnel • an internal heritage clearance process prior to construction activities • procedures for anchoring and establishment of exclusions zones • procedures to mitigate risks to unexpected maritime heritage objects, including a stop work protocol. An unexpected finds protocol (Appendix 4 of the CHMP) will be provided to contractor roles relevant to its implementation and implemented should an unexpected maritime archaeology find be encountered to minimise impacts to heritage and cultural objects and values. This protocol is to include: • unexpected finds, stop work triggers and notification procedures • object recognition sheet • reporting methods and procedures • artefact collection and curation policies.	MC6.2.9.1.1 A copy of the induction presentation aligns with CHMP induction requirements.
			MC6.2.9.1.2 Induction records confirm all project personnel have completed the project induction.
			MC6.2.9.1.3 Notification and heritage response records align with EPS6.2.9.1 requirements.
	C6.2.11 CHMP, including protocols for First Nations cultural heritage	EPS6.2.11.1 A CHMP will be in place prior to the commencement of the Activity and will include: • cultural heritage induction requirements for site personnel • an internal heritage clearance process prior to construction activities • procedures for anchoring and establishment of exclusions zones • procedures to mitigate risks to unexpected maritime heritage objects, including a stop work protocol.	MC6.2.11.1.1 A copy of the induction presentation aligns with CHMP induction requirements.
			MC6.2.11.1.2 Induction records confirm all project personnel have completed the project induction.
			MC6.2.11.1.3

EPO reference (Table 7-1)	Control measure	Environmental performance standard	Measurement criteria
		An unexpected finds protocol (Appendix 5 of the CHMP) will be provided to contractor roles relevant to its implementation and implemented should an unexpected First Nations find be encountered to minimise impacts to heritage and cultural objects and values. This protocol is to include: • unexpected finds, stop work triggers and notification procedures • object recognition sheet • reporting methods and procedures • artefact collection and curation policies.	Notification and heritage response records align with EPS6.2.9.1 requirements.
	Refer to C6.1.8 (HSE inductions will include environmental requirements and cultural values)		
EPO-03	C6.3.1 Apply Santos' Protected Marine Fauna Interaction and Sighting Procedure (EA-91-II-00003) to vessel and helicopter activities when in the vicinity of cetaceans and turtles	EPS6.3.1.1 Vessel(s) comply with Santos' Protected Marine Fauna Interaction and Sighting Procedure (EA-91-II-00003) for marine fauna interaction, which ensures compliance with Part 8 of EPBC Regulations 2000 for cetaceans, and provides other controls for minimising the risk of collision with marine fauna.	MC6.3.1.1.1 Recorded marine fauna observations demonstrate adherence to Santos' Protected Marine Fauna Interaction and Sighting Procedure (EA-91-II-00003)
			MC6.3.1.1.2 Induction records confirm marine fauna interaction and sighting procedure, specifically marine fauna caution zones and controls for minimising the risk of collision with marine fauna, is communicated to all personnel prior to mobilisation.
		EPS6.3.1.2 Any vessel strikes with cetaceans will be reported in the National Ship Strike database.	MC6.3.1.2.1 Contractor incident reports will include evidence of reporting to the National Ship Strike Database (for vessel strike with cetacean incidents.
		EPS6.3.1.3 Helicopter contractor procedures comply with Santos' Protected Marine Fauna Interaction and Sighting Procedure (EA-91-II-00003) for marine fauna interaction, which ensures compliance with Part 8 of the EPBC Regulations 2000 for cetaceans, and provides other controls for minimising interaction with marine fauna.	MC6.3.1.3.1 Helicopter contractor procedures align with Santos' Protected Marine Fauna Interaction and Sighting Procedure (EA 91 II 00003).
			MC6.3.1.3.2 Induction records confirm marine fauna interaction and sighting procedure, specifically marine fauna caution zones and controls for minimising the risk of collision with marine fauna, is communicated to helicopter operators.
	C6.3.2 A crew member trained in marine fauna observations (MFO) will be present on the pipelay and construction vessel bridge at all times during daylight hours and will continuously monitor and record marine fauna present in the caution zone	EPS6.3.2.1 Personnel trained in MFO present on the pipelay and construction vessels during daylight hours, including one crew member with MFO training on the bridge at all times and will continuously monitor and record marine fauna present in accordance with condition 2b of EPBC 2022/09372 and Part 8 of EPBC Regulations 2000.	MC6.3.2.1.1 Records confirm that one crew member that is a trained MFO is on the bridge at all times during daylight hours on the pipelay and construction vessel.
	C6.3.3 Helicopter planned maintenance system	EPS6.3.3.1 Documented maintenance program is in place for helicopters used on the Activity.	MC6.3.3.1.1 Records confirm a maintenance program is in place and adhered to for helicopters used on the Activity.
	Refer to C6.1.1 (Activity vessels equipped and crewed in accordance with Australian maritime requirements)		
	Refer to C6.1.8 (HSE inductions will include environmental requirements and cultural values)		
	Refer to C6.2.5 (Vessel planned maintenance system)		
EPO-04	C6.4.1 The pipelay vessel will have an enclosed pipe welding deck	EPS6.4.1.1 The pipelay vessel shall have an enclosed pipe welding deck to shield light emissions.	MC6.4.1.1.1 Pipelay vessel specification records verify an enclosed pipe welding deck present.
	C6.4.2 Vessel searchlights will only be operated in an emergency	EPS6.4.2.1 Vessel searchlights shall only be operated in an emergency.	MC6.4.2.1.1 Training and induction records for Vessel Masters detail that search lights are to be operated only in an emergency.

EPO reference (Table 7-1)	Control measure	Environmental performance standard	Measurement criteria
			MC6.4.2.1.2 Visual observations confirm that search light is not illuminated during routine pipelay activities.
	C6.4.3 Lighting will be used as required for safe work conditions and navigational purposes. HSE induction to crew includes minimising light emissions from vessel during night hours where possible.	EPS6.4.3.1 Vessel navigation lighting and equipment is compliant with COLREGS/Marine Orders 30: Prevention of Collisions, Marine Orders 21: Safety of Navigation and Emergency Procedures, *Navigation Act 2012* (Cth) and Chapter 5 of the International Convention on the Safety of Life at Sea (SOLAS Convention). Work lighting will be the minimum required to maintain safe working conditions for all areas where the crew are operating on the deck.	MC6.4.3.1.1 Vessel certification confirms compliance with applicable regulations.
			MC6.4.3.1.2 Records demonstrate all project personnel have attended the Activity HSE Induction that includes minimising light emissions.
	Refer to C6.1.8 (HSE inductions will include environmental requirements and cultural values)		
	C6.4.4 Shielding, where practicable, and/or orienting operational lights (excluding navigational lighting) on vessels to limit light spill to the environment	EPS6.4.4.1 Operational lights (excluding navigational lighting) on vessels are shielded where practicable and/or orientated to limit light spill to the environment.	MC6.4.4.1.1 Vessel Masters, and relevant crew from relevant vessels complete the vessel Masters Awareness training to make them aware of the Project lighting requirements.
			MC6.4.4.1.2 Induction records matched against crew lists that demonstrates all personnel have completed the induction.
			MC6.4.4.1.3 Vessel execution inspections confirm that operational lights (excluding navigational lighting) on vessels are shielded where practicable and/or orientated to limit light spill to the environment.
	C6.4.5 Housekeeping measures will be adopted, including requiring all crew to keep shutters on windows closed at night, and switching off unnecessary lighting, to limit light emissions from vessels	EPS6.4.5.1 Housekeeping measures will be adopted, including requiring all crew to keep shutters on windows closed at night, to limit light emissions from vessels.	Refer to MC6.4.4.1.1 and MC6.4.4.1.2.
			MC6.4.5.1.1 Vessel execution inspections confirm that housekeeping to limit light emissions from vessels, such as shutters on windows being closed at night, are in place to minimise light spill from vessels.
EPO-05	C6.5.1 Atmospheric (GHG and non-GHG) emissions from combustion managed in accordance with standard maritime practice	EPS6.5.1.1 Vessels to use only IMO 2020 low sulfur standard MGO or MDO compliant fuel in accordance with MARPOL Annex VI.	MC6.5.1.1.1 Fuel bunkering records and/or relevant purchase records.
		EPS6.5.1.2 Ship Energy Efficiency Management Plan, as relevant to vessel size, type and class.	MC6.5.1.2.1 A copy of the Ship Energy Efficiency Management Plan.
		EPS6.5.1.3 Pursuant to MARPOL Annex VI, vessels will maintain a current International Air Pollution Prevention (IAPP) Certificate and/or Engine IAPP Certificate and/or International Energy Efficiency (IEE) Certificate (or equivalent), as relevant to vessel class and type, which certifies that measures are in place to prevent ODS emissions, and reduce NO_x, SO_x, and incineration emissions during the Activity.	MC6.5.1.3.1 A copy of a current IAPP Certificate (as relevant to vessel class and type).
			MC6.5.1.3.2 A copy of a current Engine IAPP Certificate (or supporting technical file for all of its applicable diesel engines, as relevant to vessel class and type).
			MC6.5.1.3.3 A copy of a current IEE Certificate (or equivalent, as relevant to vessel class and type).
		EPS6.5.1.4 ODS managed in accordance with MARPOL Annex VI to reduce the risk of an accidental release of ODS to air.	MC6.5.1.4.1 A copy of the current and maintained ODS Record Book or recording system.
		EPS6.5.1.5 Incineration is carried out in accordance with MARPOL Annex VI.	MC6.5.1.5.1 Records of an IMO type approval certificate for each incinerator in use, demonstrating the incinerator is designed for operation within the limits of Regulation 16 of MARPOL Annex VI.
		EPS6.5.1.6 Waste from incineration managed in accordance with MARPOL Annex VI.	MC6.5.1.6.1 A copy of the completed Garbage Record Book or official recording system that captures incinerate waste records.

EPO reference (Table 7-1)	Control measure	Environmental performance standard	Measurement criteria
	Refer to C6.1.1 (Activity vessels equipped and crewed in accordance with Australian maritime requirements)		
	Refer to C6.2.5 (Vessel planned maintenance system)		
	Refer to C6.1.8 (HSE inductions will include environmental requirements and cultural values)		
EPO-06	C6.6.1 Routine discharges of treated bilge water will comply with the *Navigation Act 2012* (Cth), *Protection of the Sea (Prevention of Pollution from Ships) Act 1983* (Cth), Marine Order 91 and *Marine Pollution Act 1999* (NT), as applicable (administrative control)	EPS6.6.1.1 Machinery space bilge/oily water shall have IMO approved oil filtering equipment (oil/water separator) with an on-line monitoring device to measure Oil in Water (OIW) content to be less than 15 ppm prior to discharge.	MC6.6.1.1.1 Supplement to the International Oil Pollution Prevention Certificate that indicates that the vessel has an approved oil / water separator with online monitoring calibrated to discharge at less than 15 ppm OIW, as relevant to relevant to vessel class and type.
		EPS6.6.1.2 A deck drainage system capable of controlling the content of discharges for areas of high risk of fuel/oil/grease or hazardous chemical contamination.	MC6.6.1.2.1 Records demonstrating that all potential spill sources have appropriate secondary containment capable of controlling discharges of hazardous liquids, particularly high risk areas where of fuel/oil/grease or hazardous chemicals have the potential to enter the marine environment.
		EPS6.6.1.3 Waste oil storage is available.	MC6.6.1.3.1 Records demonstrating waste oil storage is available with suitable containment measures.
		EPS6.6.1.4 Have a valid International Oil Pollution Prevention (IOPP) Certificate, as relevant to vessel class and type.	MC6.6.1.4.1 A copy of a current International Oil Pollution Prevention (IOPP) Certificate, as relevant to vessel class and type.
		EPS6.6.1.5 Maintain an Oil Record Book.	MC6.6.1.5.1 Evidence of a current and maintained Oil Record Book.
		Refer to EPS7.5.6.1 (Vessels have and implement a SOPEP (or equivalent) pursuant to MARPOL Annex I.)	
	C6.6.2 Routine discharges of treated sewage effluent and grey water, in accordance with the *Navigation Act 2012* (Cth), *Protection of the Sea (Prevention of Pollution from Ships) Act 1983* (Cth) and Marine Order 96 (Marine Pollution Prevention – Sewage), as applicable (administrative control)	EPS6.6.2.1 Valid International Sewage Pollution Prevention (ISPP) Certificate (as relevant to vessel class and type) that details the vessel has a: • MARPOL approved sewage treatment plant; and/or • sewage comminuting and disinfecting system; and/or • sewage holding tank sized appropriately to contain all generated waste (black and grey water), as appropriate for any discharges proposed in a specific area.	MC6.6.2.1.1 A copy of valid ISPP Certificate demonstrating the vessel has a MARPOL approved sewage treatment plant (as relevant to relevant to vessel class and type).
			MC6.6.2.1.2 Where the vessel does not have a MARPOL approved sewage treatment plant, records of sewage treated using an approved comminuted and disinfecting system are maintained in an Official Log Book (or similar) that records discharge locations and volumes and verifies that discharge occurred at a distance of more than 3 NM from the nearest land.
			MC6.6.2.1.3 Where the vessel does not have a MARPOL approved sewage treatment plant, records of sewage not comminuted or disinfected are maintained in an Official Log Book (or similar) that records discharge locations and volumes and verifies that discharge occurred at a distance of more than 12 NM from the nearest land.
	Refer to C6.1.8 (HSE inductions will include environmental requirements and cultural values)		
EPO-07	C7.4.1 Apply a chemical selection procedure for all chemicals planned to be discharged	EPS7.4.1.1 Chemicals planned to be discharged to sea are Gold/Silver/D or E rated through OCNS, or PLONOR substances listed by OSPAR, or have a complete risk assessment so that only environmentally acceptable products are used. (excluding contingency pipeline preservation treatment chemical – refer C7.4.2)	MC7.4.1.1.1 Records demonstrate the chemical selection procedure has been implemented for all relevant chemicals.
	C7.4.2 Contractor contingency pipeline preservation procedure and specification	EPS7.4.2.1 Contractor contingency pipeline preservation procedure and specification will include: • treatment chemicals selected will be Gold (OCNS) or pseudo CHARM rated Gold • calculate the chemical treatment dosage to result in the discharge concentration not exceeding 400ppm • metering of water and chemical injection volumes during flooding and dewatering activities.	MC7.4.2.1.1 A copy of the contractor contingency pipeline preservation procedure and specification are aligned with requirements listed in EPS7.4.2.1.
			MC7.4.2.1.2 Records demonstrate the chemical selection procedure was implemented for all relevant chemicals.
			MC7.4.2.1.3

EPO reference (Table 7-1)	Control measure	Environmental performance standard	Measurement criteria
			Records demonstrate that the chemical treatment product selected is a Gold (OCNS) or pseudo CHARM rated Gold.
			MC7.4.2.1.4 Records demonstrate that water and chemical injection volumes are measured for flooding and dewatering activities.
	C7.4.3 Pipeline installation procedure	EPS7.4.3.1 The contractor will have an installation procedure which will include: • DP alarm systems to indicate vessel position loss • minimum tensioner alarms to ensure pipeline catenary is maintained • visual monitoring of DPD relative to stinger.	MC7.4.3.1.1 The pipeline installation procedure (or similar) details EPS7.4.3.1 requirements.
	C7.4.4 In the unlikely event that the pipeline requires contingency filling and subsequent dewatering of treated seawater in response to a wet buckle event and prolonged repair, pipeline dewatering will be discharged via an arrangement orientated to promote dispersion and direct discharge away from seabed as far as practicable.	EPS7.4.4.1 Pipeline dewatering of treated seawater, if required, will be through an arrangement orientated to promote dispersion and direct discharge away from seabed as far as practicable.	MC7.4.4.1.1 Evidence of discharge arrangement orientated to promote dispersion and direct discharge away from seabed as far as practicable.
	C7.4.5 In the unlikely event that the pipeline requires contingency filling and subsequent dewatering of treated seawater in response to a wet buckle event and prolonged repair, water quality monitoring at the discharge location will be conducted to confirm the concentration and dispersion of treatment chemicals	EPS7.4.5.1 Water quality monitoring at the discharge location will be conducted to validate the dispersion plume forecast modelling and confirm the concentration and dispersion of treatment chemicals in line with Environmental Approval (EP2022/022-001) requirements[54].	MC7.4.5.1.1 Water quality monitoring records verify that the concentration at sampling sites are consistent with the concentration predicted by dispersion modelling and confirms the concentration and dispersion of treatment chemicals is in line with Environmental Approval (EP2022/022-001) requirements.
	Refer to C6.2.3 (DGPS for pipelay vessel to maintain accurate vessel position during installation)		
EPO-08	C7.1.1 Implement standards and procedures for lifting equipment	EPS7.1.1.1 Pipelay and construction vessels crane and lifting operations procedures include controls to reduce the risk of unplanned or dropped objects entering the marine environment and prevent uncontrolled or dragged objects: • lifting equipment certification and inspection • lifting crew competencies • heavy-lift procedures • preventive maintenance on cranes • weather considerations.	MC7.1.1.1.1 The pipelay and construction vessel's crane and lifting operations procedures align with EPS7.1.1.1 requirements.
	C7.1.2 Dropped objects recovered where safe and practicable to do so	EPS7.1.2.1 For all dropped objects, the incident documentation will detail the following: • assessment of environmental risk • assessment to recover the object, where safe and practicable to do so • outcomes of the recovery.	MC7.1.2.1.1 Incident documentation details considerations and outcomes of recovery of dropped objects.
	C7.1.3 Chemicals and hydrocarbons will be managed in accordance with standard maritime practices	EPS7.1.3.1 Chemicals and hydrocarbons managed in accordance with SDS in relation to safe handling and storage, spill response and emergency procedures, and disposal considerations.	MC7.1.3.1.1 Records of contractor vessel audits and/or inspections demonstrate compliance with chemical and hydrocarbon storage and handling requirements.
			MC7.1.3.1.2 Accidental loss of chemicals overboard contained in incident documents.
		EPS7.1.3.2	MC7.1.3.2.1

[54] *Condition 7.2 of Environmental Approval (EP2022/022-001) under the* Environment Protection Act 2019 *(NT) states that: The approval holder must ensure that any contingency discharge of hydrotest fluid is undertaken in a manner and at a rate such that marine water quality, within a 40 m radius of the discharge location, returns to ambient levels within 12 hours of cessation of discharge.*

EPO reference (Table 7-1)	Control measure	Environmental performance standard	Measurement criteria
		SDS available for all chemicals to help identify hazards and to manage chemicals.	Completed vessel inspection checklist aligned with the EPS7.1.3.2 requirements.
	C7.1.4 No outboard lifting operations will be completed in Company defined “no lifting zones” which will be identified in navigational systems	EPS7.1.4.1 No lift zones provided by Santos (inclusive of the I-124 radial exclusion zone and Bayu-Undan pipeline exclusion zone) are included on the navigation systems of all Activity vessels conducting overboard lifts.	MC7.1.4.1.1 Evidence that drawings and shapefiles (showing no lift zones) provided by Santos are included on the navigation systems of all vessels conducting overboard lifts.
		EPS7.1.4.2 Vessel masters and relevant crew from relevant vessels (those engaged in construction) complete the vessel Masters Awareness training to make them aware of the no lifting zones	MC7.1.4.2.1 Induction records show Vessel masters and relevant crew from relevant vessels (those engaged in construction) have completed the vessel Masters Awareness training.
	Refer to C6.1.8 (HSE inductions will include environmental requirements and cultural values)		
EPO-09	C7.2.1 Vessels equipped with effective anti-fouling coatings	EPS7.2.1.1 Vessels will have a suitable anti-fouling coating in accordance with the *Protection of the Sea (Harmful Anti-fouling Systems) Act 2006* (Cth) (as applicable for vessel size, type and class), including: • Marine Order 98 (Marine Pollution – Anti-fouling Systems) including (as required by vessel class): – a valid International Anti-fouling System Certificate.	MC7.2.1.1.1 A copy of an approved International Anti-fouling System Certificate.
	C7.2.2 Vessels undertake ballast water management or treatment to achieve low-risk ballast water	EPS7.2.2.1 Ballast water discharges will comply with the Australian Ballast Water Management Requirements (DAWE, 2020a), which implements the requirements of the *Biosecurity Act 2015* (Cth) and the International Convention for the Control and Management of Ships’ Ballast Water and Sediments (as appropriate for vessel class).	MC7.2.2.1.1 Records demonstrating a Ballast Water Management Plan (electronic or in hard copy) is in place.
			MC7.2.2.1.2 Records demonstrating a ballast water record system (electronic or in hard copy) is maintained.
			MC7.2.2.1.3 An International Ballast Water Management Certificate is in place and demonstrates the principal ballast water management method is in accordance with D-2 standards.
			MC7.2.2.1.4 If the vessel cannot demonstrate it meets D-2 standards, records of ballast water discharge logs confirm no discharge within 12 nautical miles of coastlines including any ports.
			MC7.2.2.1.5 A Biosecurity Status Document showing an approved ballast status (for vessels arriving from international locations) or a low risk exemption through a domestic ballast water risk assessment (for domestic vessels).
	C7.2.3 Apply risk-based IMS management for vessels	EPS7.2.3.1 Vessels will comply with the Australian Biofouling Management Requirements (DAFF, 2023) (as appropriate to class), including: • vessels equipped with a Biofouling Management Plan • vessels maintain a Biofouling Record Book.	MC7.2.3.1.1 Vessels equipped with a Biofouling Management Plan.
			MC7.2.3.1.2 Vessels maintain a Biofouling Record Book.
		EPS7.2.3.2 Vessels mobilised to the OA from international or domestic waters will comply with the Australian National Biofouling Management Guidance for the Petroleum Production and Exploration Industry (Marine Pest Sectoral Committee, 2009): • completion of IMS Risk Assessment, which includes submission of evidence that demonstrates the implementation of mitigation measures to reduce risk (using either the Vessel Check system or as described in Australian National Biofouling Management Guidance for the Petroleum Production and Exploration Industry ([Marine Pest Sectoral Committee, 2009]) • only vessels classified as a low-level risk used on the project.	MC7.2.3.2.1 Records demonstrate compliance with the Australian National Biofouling Management Guidance for the Petroleum Production and Exploration Industry (Marine Pest Sectoral Committee, 2009), including: • completion of IMS Risk Assessment, which includes submission of evidence that demonstrates the implementation of mitigation measures to reduce risk (using either the Vessel Check system or as described in Australian National Biofouling Management Guidance for the Petroleum Production and Exploration Industry [Marine Pest Sectoral Committee, 2009]) that classifies the vessel as low risk.
	C7.2.4 Marine Growth Prevention System	EPS7.2.4.1 Vessels will have a marine growth prevention system or appropriate manual treatment systems.	MC7.2.4.1.1 Records of quarantine management system process demonstrate vessels have a marine growth prevention system or appropriate manual treatment systems.

EPO reference (Table 7-1)	Control measure	Environmental performance standard	Measurement criteria
	Refer to C6.1.3 (The Activity will be undertaken in accordance with Santos HSE management and marine vessel vetting processes)		
	Refer to C6.1.8 (HSE inductions will include environmental requirements and cultural values)		
EPO-10	Refer to C6.1.5 (Vessel speed restrictions)		
	Refer to C6.1.8 (HSE inductions will include environmental requirements and cultural values)		
	Refer to C6.3.1 (Apply Santos' Protected Marine Fauna Interaction and Sighting Procedure (EA-91-II-00003) to vessel and helicopter activities when in the vicinity of cetaceans and turtles)		
	Refer to C6.3.2 (A crew member trained in marine fauna observations (MFO) will be present on the pipelay and construction vessel bridge at all times during daylight hours and will continuously monitor and record marine fauna present in the caution zone)		
EPO-11	Refer to C7.4.3 (Pipeline installation procedure)		
	Refer to C6.2.3 (DGPS for pipelay vessel to maintain accurate vessel position during installation)		
	Refer to C7.4.1 (Apply a chemical selection procedure for all chemicals planned to be discharged)		
	Refer to C7.4.2 (Contractor contingency pipeline preservation procedure)		
EPO-12	C7.5.1 Chemical and hydrocarbon storage areas designed to contain leaks and spills	EPS7.5.1.1 Selection of vessel contractor is subject to Santos marine vessel vetting processes, specifically: • appropriate procedures for storage (e.g. bunding), labelling (including SDS available) and handling of chemicals and hydrocarbons • completion of vessel OVID/CMID/Santos approved inspection and report • implementation of a permit to work or equivalent authorisation process (e.g. job safety analysis) for bunkering.	MC7.5.1.1.1 A copy of chemical procedures (or similar) that include storage (e.g. bunding), labelling (including SDS available) and handling of chemicals and hydrocarbons. MC7.5.1.1.2 Records of contractor vessel OVID/CMID/Santos approved inspection.
	C7.5.3 Spill clean-up kits available in high-risk areas	EPS7.5.3.1 Selection of vessel contractor is subject to Santos marine vessel vetting processes, specifically spill kits stocked and ready for use by trained personnel.	MC7.5.3.1.1 Contractor vessel audit process confirm spill kits stocked and ready for use.
	C7.5.4 No PFAS or PFOS will be used in firefighting foam.	EPS7.5.4.1 Fire-fighting foams shall be free of PFAS and PFOS.	MC7.5.4.1.1 SDS for firefighting foam to confirm no PFAS or PFOS.
	C7.5.5 ROV operations undertaken in accordance with good industry practice.	EPS7.5.5.1 Preventive maintenance on ROV completed as scheduled to reduce the risk of hydraulic fluid releases to sea.	MC7.5.5.1.1 Vessel contractor written verification demonstrates compliance with planned maintenance system.
		EPS7.5.5.2 ROV pre-mobilisation audit completed to reduce the risk of hydraulic fluid releases to sea.	MC7.5.5.2.1 Records of a pre-mobilisation audit for ROV operations.
	C7.5.6	EPS7.5.6.1	MC7.5.6.1.1

EPO reference (Table 7-1)	Control measure	Environmental performance standard	Measurement criteria
	Vessel spill response plans	Vessels have and implement a SOPEP (or equivalent) pursuant to MARPOL Annex I.	Approved SOPEP (or equivalent) in place.
			MC7.5.6.1.2 Spill details contained in incident documentation.
		EPS7.5.6.2 Spill response exercises conducted in accordance with SOPEP to ensure personnel are prepared.	MC7.5.6.2.1 Spill exercise records or evidence of a spill exercise aligned with the EPS7.5.6.2 requirements.
	C7.5.7 Helicopter refuelling procedure	EPS7.5.7.1 Helicopter refuelling procedures to include: • completed permit to work and/or job safety analysis for the Activity • continual visual monitoring of gauges, hoses, fittings and the sea surface during the Activity • hose and fittings checks before starting the Activity • weather conditions to be assessed before the Activity.	MC7.5.7.1.1 Refuelling procedure aligned with EPS7.5.7.1 requirements.
	Refer to C6.1.1 (Activity vessels equipped and crewed in accordance with Australian maritime requirements)		
	Refer to C6.1.8 (HSE inductions will include environmental requirements and cultural values)		
	Refer to C6.2.5 (Vessel planned maintenance system).		
	Refer to C7.1.3 (Chemicals and hydrocarbons will be managed in accordance with standard maritime practices)		
EPO-13	C7.6.1 No IFO or HFO will be used in activity vessels	EPS7.6.1.1 Vessel tanks to be free of HFO or IFO.	MC7.6.1.1.1 A copy of vessel contracts stating vessel tanks to be free of HFO or IFO.
	C7.6.2 Accepted DPD (NT Waters) OPEP	EPS7.6.2.1 In the event of an oil spill to sea, DPD (NT Waters) OPEP (BAS-210 0026) requirements will be implemented to mitigate environmental impacts.	MC7.6.2.1.1 Completed incident documentation demonstrating the use of the DPD (NT Waters) OPEP (BAS-210 0026).
	C7.6.3 Vessel-specific bunkering procedures and equipment consistent with Santos marine vessel vetting requirements	EPS7.6.3.1 Santos will confirm vessel bunkering procedures include: • defined roles and responsibilities – bunkering to be undertaken by trained staff • use of bunkering hoses that have quick connection couplings • visual inspection of hose prior to bunkering to confirm they are in good condition and correct valve line up • assessment of weather and sea state • testing of emergency shutdown mechanism on the transfer pumps • established communication protocols between vessel master and personnel responsible for monitoring tank levels, leaks and overflows during bunkering operations • continual visual monitoring during MDO transfers of hoses, connections and tank levels to detect leaks and prevent overflows during bunkering operations.	MC7.6.3.1.1 The vessel's refuelling procedure aligned with the EPS7.6.3.1 requirements.
	Refer to C6.1.1 (Activity vessels equipped and crewed in accordance with Australian maritime requirements)		
	Refer to C6.1.2 (Undertake consultation with Relevant Persons [including applicable notifications])		
	Refer to C6.1.3 (The Activity will be undertaken in accordance with Santos HSE management and marine vessel vetting processes)		
	Refer to C6.1.5 (Vessel speed restrictions)		

EPO reference (Table 7-1)	Control measure	Environmental performance standard	Measurement criteria
	Refer to C6.1.6 (One vessel will act as a surveillance vessel within the immediate vicinity of the pipelay vessel during pipelay)		
	Refer to C6.1.8 (HSE inductions will include environmental requirements and cultural values)		
	Refer to C6.2.5 (Vessel planned maintenance system)		
	Refer to C7.5.6 (Vessel spill response plans)		
EPO-14	C6.2.10 Cultural heritage training and cultural ceremony	EPS6.2.6.1 • Cultural training completed by all site-based workforce (Santos employees and contractors) by end of their first rotation offshore. • Cultural heritage monitors to provide an introduction to the Activity to the seas and any First Nations spiritual beings at commencement of the Activity.	MC6.2.6.1.1 Progress reporting as part of the Coastal Waters CEMP Annual Environmental Performance Report.
	C6.2.12 First Nations cultural heritage monitor in the field, subject to availability of the cultural heritage monitor	EPS6.2.12.1 A First Nations cultural heritage monitor in the field to provide guidance and advice on the protection and maintenance of cultural and spiritual places and activities throughout the pipelay and pre-commissioning activities (subject to the availability of a cultural heritage monitor).	MC6.2.12.1.1 Records of correspondence with relevant First Nations groups that the opportunity has been provided. MC6.2.12.1.2 Progress reporting as part of the EP Annual Environmental Performance Report.
	Refer to C6.1.5 (Vessel speed restrictions)		
	Refer to C6.1.8 (HSE inductions will include environmental requirements and cultural values)		
	Refer to C6.2.3		
	Refer to C6.2.11 (CHMP)		
	Refer to C6.3.2 (A crew member trained in marine fauna observations (MFO) will be present on the pipelay and construction vessel bridge at all times during daylight hours and will continuously monitor and record marine fauna present in the caution zone)		
	Refer C6.7.1 (Apply a chemical selection procedure for all chemicals planned to be discharged)		
	Refer C7.4.1 to C7.4.6		
EPO-15	Refer to C6.2.1 (Confirmation of DPD route prior to and during installation)		
	Refer to C6.2.9 (CHMP)		
	Refer to C6.2.11 (CHMP)		
	Refer to C6.2.12 (Create opportunity for a First Nations cultural heritage monitor in the field, subject to availability of the First Nations cultural heritage monitor)		
EPO-16	C7.8.1 Implement procedures (including no lift zones in navigational systems) for lifting adjacent to live infrastructure	EPS7.8.1.1 Santos will confirm the vessel procedures for lifting adjacent to live infrastructure include: that the vessel is offset from the Bayu-Undan pipeline (outside of lift exclusion zones) objects are slowly ‘walked’ to the target location at a reduced height above the seabed survey system and no lift exclusion zones.	MC7.8.1.1.1 A copy of the procedures for lifting adjacent to live infrastructure aligned with the EPS7.8.1.1 requirements.

EPO reference (Table 7-1)	Control measure	Environmental performance standard	Measurement criteria
	Refer to C6.1.8 (HSE inductions will include environmental requirements and cultural values)		

8. Audits and inspections

8.1 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) and the Barossa Project Environmental Compliance Assurance Plan (BAA-200 0635) (referred to as ECAP).

The ECAP outlines a process that enables the planning, collection and verification of environmental assurance evidence across the life of the Activity to measure compliance against the EPOs, EPSs, and measurement criteria for the Coastal Waters CEMP. Table 8-1 lists the key assurance activities under the ECAP that will be undertaken prior to and during the Activity.

Assurance and audit findings may include opportunities for improvement and non-conformances. Audit non-conformances are managed as described in Section 8.3.

In addition to Santos' assurance and auditing requirements, conditions 26-29 of DPD Project EPBC Act approval (EPBC 2022/09372) requires an independent audit to be undertaken at three years after the commencement of the Action, as defined in the approval (which includes construction of the DPD pipeline, as well as its subsequent operation (refer to Table 8-6 of the Coastal Waters CEMP).

Table 8-1: Key assurance activities under the ECAP

ECAP activity	Timing / frequency	Details
Environmental compliance register development	Once, following acceptance of the Coastal Waters CEMP and prior to commencement of the activities.	Identifies all applicable environmental requirements within the Coastal Waters CEMP (EPOs, EPSs, measurement criteria, notifications) and apply verification controls, timing and tasks to each environmental performance and notification requirement.
Pre-start audit	Once, prior to commencement of the activities.	An audit of all stakeholders (project team, contractors) responsible for meeting the Coastal Waters CEMP environmental requirements (EPOs, EPSs, measurement criteria, notifications). Allows Santos to communicate expectations for evidence provision, reporting frequencies and risk management controls.
Vessel pre-mobilisation inspection	All vessels, prior to mobilisation to the OA.	Environmental pre-mobilisation inspections examine a vessel's level of mobilisation readiness against environmental requirements within the Coastal Waters CEMP (EPOs, EPSs, measurement criteria, notifications) prior to commencing work on the Activity.
Vessel execution inspection	As per Section 8.2	Environmental execution inspections examine a vessel's performance against environmental requirements within the Coastal Waters CEMP (EPOs, EPSs, measurement criteria, notifications) that are either implemented continuously, repetitively or over a long period of time, or can only be assessed once the Activity has commenced.

8.2 Inspections

HSE inspections will be conducted at the following frequency to identify hazards, incidents and nonconformances with the Coastal Waters CEMP:

- pipelay and construction vessels – minimum weekly
- support and supply vessels – minimum monthly

These inspections will also check compliance against a selection of the EPOs and EPSs of the Coastal Waters CEMP (Table 7-2) and inform end-of-activity reporting (Table 8-6 of the Coastal Waters CEMP).

8.3 Nonconformance management

Coastal Waters CEMP 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.

8.4 Continuous improvement

For the Coastal Waters CEMP, 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 8.5).

This may result in a review of the Coastal Waters CEMP, with changes applied in accordance with Section 8.9.2 of the Coastal Waters CEMP.

Identified continuous improvement opportunities will be assessed in accordance with the MoC process so that any potential changes to the Coastal Waters CEMP or DPD (NT Waters) OPEP (BAS-210 0026) are managed in accordance with the OPGGS(E)R and in a controlled manner.

8.5 Monitoring and recording emissions and discharges

Discharges to the marine environment associated with this Activity in NT Coastal Waters will be recorded and controlled in accordance with applicable legislation and regulatory requirements.

Santos and vessel contractors will maintain records so that emissions and discharges can be determined or estimated. Such records will be maintained for 5 years. Contractors must 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 8-2.

Table 8-2: Monitoring of emissions and discharges

Discharge/emission	Parameter	Quantitative record
Air emissions	Fuel volume	GHG calculations based on measured fuel use in accordance with NGER reporting requirements
Ballast water	Volume and location	Ballast water log
Contingency treated seawater discharge (wetbuckle event)	Volume, concentration and location	Treated seawater dosage and discharge records
Bilge water	Volume and location	Oil record book
Treated sewage effluent and greywater	Volume and location	Estimated based on POB and days on location
Unplanned discharge of: • solid objects • hazardous liquids	Volume	DITT recordable or reportable incident reports as per Table 8-6 of the Coastal Waters CEMP
Unplanned hydrocarbon release	Volume	DITT recordable or reportable incident reports as per Table 8-6 of the Coastal Waters CEMP

9. Emergency preparedness and response

Vessels must have and must implement incident response plans, such as an emergency response plan and a SMPEP or SOPEP. Regular incident response drills and exercises (e.g. as defined in an emergency response plan, SMPEP or SOPEP) will be performed to refresh the crew in using equipment and implementing incident response procedures.

The DPD (NT Waters) OPEP (BAS-210 0026) is a stand-alone document that details spill management arrangements, including the Santos incident management structure.

The DPD (NT Waters) 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 DPD (NT Waters) OPEP in the event of a hydrocarbon spill. The DPD (NT Waters) OPEP details how Santos will prepare and respond to a spill event and meets the requirement of the OPGGS(E)R, including to addresses the requirements of section 22(8)-(14) inclusive.

9.1 Evaluation of Applicable Response Strategies (OPEP)

Based on the nature and scale of the credible spill scenarios and spill modelling results outlined in Section 4.1 and 4.3 of the DPD (NT Waters) OPEP, the following spill response strategies have been assessed as potentially applicable for combatting a spill from the Activity in NT waters (Table 9-1).

Note, the information contained in Table 9-1 has been developed by Santos for preparedness purposes. The relevant Control Agency (NT DEPWS or Darwin Port) will ultimately determine the strategies and controls to be implemented.

Table 9-1: Evaluation of applicable spill response strategies

OSR Strategy	Tactic	Applicability and Designated Primary (1) or Secondary (2) Response Strategy	Considerations
Source Control	Spill kits	✓ 1	Relevant for containing spills that may arise onboard a vessel.
	Secondary containment	✓ 1	Relevant for spills that may arise due to stored hydrocarbons, and from spills arising from machinery and equipment on board a vessel. Bunded areas will contain spilled hydrocarbons reducing the potential for a spill escaping to marine waters. Where applicable open deck drainage will be closed to prevent hydrocarbon draining into the marine environment.
	Shipboard Oil Pollution Emergency Plan	✓ 1	MARPOL requirement for applicable vessels. In the event a vessel hydrocarbon storage tank is ruptured, applicable strategies for reducing the volume of hydrocarbon releases will be contained within the vessel SOPEP. This may include securing fuel via transfer to another storage area onboard the vessel, transfer to another vessel, or through pumping in water to affected tank to create a water cushion (tank water bottom). Trimming the vessel may also be used to avoid further damage to intact tanks. These actions will aim to minimise the volume of fuel spilled.
In-Situ Burning	Controlled burning of oil spill	×	Not applicable to MDO spills due to inability to contain MDO making it very difficult to maintain necessary slick thickness for ignition and sustained burning. In addition, in-situ burning is not normally considered as an acceptable response strategy due to the atmospheric emissions created.
Monitor and Evaluate Plan (Operational Monitoring)	Vessel surveillance	✓ 1	Provides real-time information on spill trajectory and behaviour (e.g. weathering). Informs implementation of other response strategies. Vessel personnel may not be trained observers. Vessel observers on leaking vessel may not have capacity to observe oil during emergency response procedure implementation. Constrained to daylight. Limited to visual range from the vessel. Limited capacity to evaluate possible interactions with sensitive receptors.
	Aerial surveillance	✓ 1	Provides real-time information on spill trajectory and behaviour (e.g. weathering). May identify environmental sensitivities impacted or at risk of impact (e.g. seabird aggregations, other users such as fishers). Provides information on the effectiveness of response strategies. Informs implementation of other response strategies.
	Tracking buoys	✓ 1	Can be implemented rapidly.

OSR Strategy	Tactic	Applicability and Designated Primary (1) or Secondary (2) Response Strategy	Considerations
			Can provide indication of near-surface entrained/dissolved hydrocarbons (most other monitor and evaluate techniques rely on the hydrocarbon being on the surface or shoreline).
	Trajectory Modelling	✓ 1	Can be implemented rapidly. Predictive – provides estimate of where the oil may go, which can be used to prepare and implement other responses. No additional field personnel required. Not constrained by weather conditions. Can predict floating, entrained, dissolved and stranded hydrocarbon fractions. May not be accurate. Requires in-field calibration.
	Satellite Imagery	✓ 1	Can work under large range of weather conditions (e.g. night-time, cloud cover, etc.). Mobilisation restricted to image availability. Requires processing. May return false positives.
	Hydrocarbon characterisation	✓ 1	Can be used to verify spill source and weathering.
	Operational Water Quality Monitoring	✓ 1	Surface and subsurface water quality monitoring (which may include fluorometry surveys) used to determine the presence, location and distribution of the surface oil, entrained oil and dissolved aromatic hydrocarbon components of a spill and validate the spill fate modelling predictions.
	Shoreline Clean-up Assessment	✓ 1	Provides information on shoreline oiling (state of the oil, extent of pollution, etc). Can provide information on amenability of shoreline response options (e.g. clean-up, protect and deflect). Provides information on status of impacts to sensitive receptors. Considerable health & safety considerations. Requires trained observers. Constrained to daylight. Delayed response time.
Chemical dispersion	Vessel Application	×	MDO does not contain persistent hydrocarbons and has high natural spreading, dispersion and evaporation rates in the marine environment. Dispersant use is not advised on light distillate fuels such as MDO as these oils will evaporate and naturally disperse quite rapidly under most conditions (IPIECA-IOGP, 2016a).
	Aerial Application	×	

OSR Strategy	Tactic	Applicability and Designated Primary (1) or Secondary (2) Response Strategy	Considerations
			Therefore, considering the rapid evaporation rates of MDO (Appendix A of the OPEP BAS-210 0026), the tendency to naturally disperse and the remoteness of the spill location, the addition of chemical dispersants would have little to no net environmental benefit whilst potentially increasing localised toxicity in the water column.
Offshore Containment and Recovery	Use of offshore booms/ skimmers or other collection techniques deployed from vessel/s to contain and collect oil	×	Not suitable for MDO given its rapid weathering nature. MDO spreads quickly to a thin film, making recovery via skimmers difficult and ineffective. The ability to contain and recover rapidly weathering hydrocarbons on the sea surface is extremely limited due the very low viscosity of MDO.
Mechanical Dispersion	Vessel prop- washing	✓ 2	Safety is a key factor and slicks with potential for high volatile organic compound (VOC) emissions are not suitable for mechanical dispersion. Mechanical dispersion may be applicable for the localised entrainment of surface oil but is not considered to have a significant effect on removing oil from the surface. Mechanical dispersion will entrain surface oil into the top layer of the water column. The aim of mechanical dispersion is to reduce the concentration of oil floating at the surface, which could potentially contact receptors at the sea surface (e.g., seabirds) or shoreline receptors (e.g. mangroves). Once dispersed in the water column, the smaller droplet sizes enhance the biodegradation process. MDO is a light oil that can be easily dispersed in the water column by running vessels through the plume and using propeller turbulence to break up the slick. The potential disadvantage of mechanical dispersion is that it could temporarily increase the concentration of entrained and dissolved oil near submerged shallow water receptors (e.g. corals, seagrass, macroalgae). This is most likely in shallow water (a few metres deep). The suitability of mechanical dispersion as a response measure would consider the prevailing environmental conditions (it mimics the action of wave-induced entrainment so is most beneficial in calm conditions) and the type, proximity and depth (as applicable) of sensitivities in the area. Mechanical dispersion will be considered for petroleum activity sourced spills at the discretion of the on-scene commander/IMT or by the relevant control agency. It is unlikely that vessels would be specifically allocated for mechanical dispersion; however, vessels undertaking primary strategies may be used opportunistically.
Protection and Deflection	Booming in nearshore waters and at shorelines	✓ 1	Considered if operational monitoring shows or predicts contact with sensitive shorelines. Modelling shows high probability of contact with shorelines and some shoreline accumulation >100 g/m^2. Shoreline protection and deflection activities can result in physical disturbance to intertidal and shoreline habitats. This strategy is considered to be a secondary response strategy where it is safe and practical to implement and where priority protection areas are at risk of impact from MDO.

OSR Strategy	Tactic	Applicability and Designated Primary (1) or Secondary (2) Response Strategy	Considerations
			This strategy is a primary response strategy where it is safe and practical to implement and where priority protection areas are at risk of impact from MDO. Note: *This strategy for marine diesel may not be executed in certain sensitive areas due to the propensity of hydrocarbons to evaporate and disperse naturally, and the risk of damage from spill responders entering these sensitive areas. Therefore, this strategy would only be carried out in these areas for this hydrocarbon type if operational NEBA shows a clear benefit.*
Shoreline clean-up	Activities include physical removal, surf washing, flushing, bioremediation, natural dispersion	✓ 1	Considered if operational monitoring shows or predicts contact with sensitive shorelines. Modelling shows high probability of contact with shorelines and some shoreline accumulation >100 g/m^2. Shoreline clean-up activities can result in physical disturbance to shoreline habitats. This strategy is a primary response strategy where it is safe and practical to implement and where protection priority areas are at risk of impacts from MDO. Note: *This strategy for marine diesel may not be executed in certain sensitive areas due to the propensity of hydrocarbons to evaporate and disperse naturally, and the risk of damage from spill responders entering these sensitive areas. Therefore, this strategy would only be carried out in these areas for this hydrocarbon type if operational NEBA shows a clear benefit.*
Oiled wildlife response	Activities include hazing, pre-emptive capture, oiled wildlife capture, cleaning and rehabilitation	✓ 1	Can be used to deter and protect wildlife from contact with oil. Mainly applicable for marine and coastal fauna (e.g. birds) where oil is present at the sea surface or accumulated at coastlines. Surveillance can be carried out as a part of the fauna specific operational monitoring. Wildlife may become desensitised to hazing method. Hazing may impact upon animals (e.g. stress, disturb important behaviours such as nesting or foraging). Permitting requirements for hazing and pre-emptive capture.
Scientific Monitoring	The monitoring of environmental receptors to determine the level of impact and recovery from the oil spill and associated response activities	✓ 1	Monitoring activities include: water and sediment quality biota of shorelines (sandy beaches, rocky shores and intertidal mudflats) mangrove monitoring benthic habitat monitoring (seagrass, algae, corals, non-coral benthic filter feeders) seabirds and shorebirds marine megafauna (incl. whale sharks and mammals) marine reptiles (incl. turtles) seafood quality

OSR Strategy	Tactic	Applicability and Designated Primary (1) or Secondary (2) Response Strategy	Considerations
			fish, fisheries and aquaculture The type and extent of scientific monitoring will depend upon the nature and scale of oil contact to sensitive receptor locations as determined through operational monitoring. Pre-defined initiation criteria exist for scientific monitoring plans associated with marine and coastal sensitivities.

10. Post acceptance consultation implementation strategy

Post-acceptance consultation activities for the Coastal Waters CEMP will be principally supported by Santos' existing regional relationships with those organisations whose functions, interests and activities may be affected by the Activity.

Santos recognises and respects the preference of relevant government authorities and other relevant interested persons and organisations to determine the frequency and method of updates, in addition to the written quarterly updates outlined in this strategy below.

10.1 First Nations people and groups

Santos will undertake consultation over the life of the Activity with First Nations representative organisations.

Santos will provide quarterly written activity updates via land councils and Aboriginal Corporations, specifically to:

- GDA
- KLC
- LNAC
- LDC
- NLC
- TLC
- Wickham Point Deed liaison committee
- Quarterly written Activity updates will also be provided to:
    - Tiwi Clan Trustees for each Clan via TLC
    - First Nations Consultative Committees via Committee Chairs

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.

Representative bodies provide for regular, culturally appropriate engagement, including processes for dissemination of information to First Nations Elders, cultural leaders and communities in a manner that is readily accessible and culturally appropriate.

10.2 Local governments, communities and industry

As part of Santos' community engagement efforts for the broader Barossa Gas Project, Santos will provide quarterly written activity updates to regional local government and associated communities.

Santos will also provide quarterly written activity updates to the commercial fishing industry, which is the industry most likely to be affected by proposed activities. Santos will provide quarterly written activity updates to those representative organisations whose membership are most likely to be affected, specifically to NPFI.

10.3 Post-acceptance consultation implementation strategy – approach

Santos will provide to those organisations identified above quarterly written updates on the Activity covered by the Coastal Waters CEMP. The updates will also be posted on Santos' website, with notifications to registered/subscribed interested parties.

Activity notifications and reports will be made in accordance with Table 8-6 of the Coastal Waters CEMP. The notifications and reports are based on legislative requirements, standing arrangements with particular Relevant

Persons, Relevant Persons' requests for notification made during OPGGS(E)R section 25 consultation or as otherwise deemed appropriate by Santos.

Santos will apply the regional engagement model to consider the preferences of relevant government authorities and other relevant interested persons and organisations when determining the frequency and method of additional updates.

A community lead for each region (e.g. NT Community Affairs Manager) oversees the development and implementation of engagement related plans, such as community investment plan and provision of information updates on Santos activities. A core aim is to build long term relationships with key local stakeholders through regular engagement.

The regional engagement model is bespoke for each area so it can incorporate the preferences of local stakeholders. For example, the NT model includes the use of a Darwin shopfront which is open to the public and a NT based First Nations Engagement Adviser. These plans also consider the community commitments (e.g. post Coastal Waters CEMP engagement) for each region. For example, the NT model includes quarterly meetings with Larrakia people through the Wickham Point Deed liaison committee.

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 the Coastal Waters CEMP, as in force at the time, Santos will apply its MoC process outlined in Section 8.9.2 of the Coastal Waters CEMP.

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.