Bonaparte Carbon Capture and Storage Project

Application Number: **03282** Commencement Date: **18/12/2025** Status: **Locked**

1. About the project

1.1 Project details

1.1.1 Project title *

Bonaparte Carbon Capture and Storage Project

1.1.2 Project industry type *

Energy Generation and Supply (non-renewable)

1.1.3 Project industry sub-type

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1.1.4 Estimated start date *

01/05/2028

1.1.4 Estimated end date *

01/06/2061

1.2 Proposed Action details

1.2.1 Provide an overview of the proposed action, including all proposed activities. *

BCCS Project overview

The proposed Bonaparte Carbon Capture and Storage Project (BCCS Project) has the potential to sequester CO_2 to an offshore geological carbon storage site within the G-7-AP permit area over a period of approximately 30 years. The G-7-AP permit area is located within Commonwealth waters, west of Darwin in the Petrel sub-basin, within the Joseph Bonaparte Gulf. CO_2 would be transported via a pipeline of up to 22-inch diameter from the onshore inlet station on Middle Arm in the Northern Territory to the injection area in the G-7-AP permit area in Commonwealth waters. The CO_2 emissions which the Project is proposed to sequester are those arising from a range of industrial facilities in the region.

Development of the infrastructure proposed in this referral is planned to be performed in phases. The initial development is planned to consist of infrastructure that provides the ability to transport and sequester CO_2 at a rate of up to 8 MT per annum (mtpa). Subsequent development phase(s) are planned to increase the annual capacity of the system to a total of approximately 10 mtpa. Considering the 30 year design life of the proposed transport and injection facilities, the project facilities have the potential to sequester up to a total of 300 MT of CO_2.

Key components of the proposed Project are summarised as follows:

- Wells: Up to six injection wells drilled in phases, including wellheads and Christmas trees (four planned wells and two contingency wells).
- Other infield subsea infrastructure: One subsea manifold with provision for temporary subsea pig receiver. Infield pipelines and associated connection structures, spools and jumpers connecting the injection wells to the manifold and CO_2 transport pipeline.
- CO_2 transport pipeline: An up to 22-inch diameter carbon steel CO_2 transport pipeline with a total length of approximately 260 km between the onshore inlet station and the storage formation in the G-7-AP permit area.
- Subsea power and fibre optic cables: A subsea power and fibre optic cable is proposed to be installed adjacent to the CO_2 transport pipeline along the entire route, with an approximately 50 to 100 m offset. The cable would terminate in multiple subsea nodes, which would facilitate connection to each of the injection wells via distribution structures and additional infield cables. To provide redundancy, a back-up cable may also be installed from the onshore inlet station, through the shore crossing and within Darwin Harbour.
- Onshore infrastructure: Onshore inlet station located on Middle Arm Peninsula next to the existing Ichthys gas export pipeline (GEP) beach valve precinct; the station would receive, amalgamate, filter, and meter CO_2 from customers for export via the CO_2 transport pipeline. The onshore inlet station would include provisions for potential future booster pumps. The onshore infrastructure includes an approximate 1.2km long section of the CO_2 transport pipeline between the onshore inlet station and the shore crossing into Darwin Harbour.

The scope of the BCCS Project includes the following activities:

- Geophysical and geotechnical pipeline and subsea surveys.
- Drilling and completion activities of up to six injection wells (four planned wells and two contingency wells).
- Installation and commissioning of an up to 22-inch carbon steel CO_2 transport pipeline extending ~260 km in length between the onshore inlet station and the saline aquifer storage formation in G-7-AP.
- Installation and commissioning of supporting subsea infrastructure in G-7-AP such as wellheads, Christmas trees, a manifold and associated infield pipelines and umbilicals.
- Installation and commissioning of a subsea power and fibre optic cable, proposed to be located adjacent to the CO_2 transport pipeline along the entire route, with a 50 to 100 m offset. To provide redundancy, a back-up cable may also be installed through the shore crossing into Darwin Harbour.

- Construction, testing and commissioning of an onshore inlet station located on Middle Arm Peninsula next to the existing Ichthys gas export pipeline (GEP) beach valve precinct; the station will receive, amalgamate, filter, and meter CO_2 from customers for export via the CO_2 transport pipeline.
- Operation and maintenance of the subsea and onshore infrastructure.
- Well integrity management and CO_2 monitoring.
- Decommissioning of all infrastructure installed as part of the BCCS Project.

Activities associated with the generation of CO_2 and the development of onshore infrastructure to connect third party CO_2 streams to the Project onshore inlet station (i.e. where the CO_2 is gathered/received) are outside the scope of this referral and would be subject to separate approvals.

A detailed description of the BCCS Project is provided within the ***Attachment A: Bonaparte Carbon Capture and Storage (CCS) Project - Supporting Information Document (Section 3)***. The Project area is presented in ***Section 1, Figure 1-1*** of ***Attachment A***.

Project area

The “Project area” extends over 250 km east to west from the onshore inlet station in the Northern Territory (NT) to the G-7-AP permit area and crosses NT and Commonwealth jurisdictions. The Project covers the area from the onshore inlet station (adjacent to the existing Ichthys GEP beach valve station) on the Middle Arm Peninsula in Darwin, to the geological storage formation located below the seabed in Commonwealth waters of the Joseph Bonaparte Gulf (refer to ***Attachment A (Figure 1-1)***).

The “Project footprint” describes the area where disturbance (i.e. ground disturbance, clearing, etc.) would occur.

The Project footprint is discussed in terms of the following smaller areas:

- Onshore development area (ODA): the area encompasses the onshore inlet station footprint and the corridor of the onshore portion of the CO_2 transport pipeline (approximately 1.2 km) and cabling, which extends from the onshore inlet station to the low water mark (LWM) in Darwin Harbour. The onshore inlet station is proposed to be situated adjacent to the existing Ichthys GEP beach valve precinct and occupy approximately 1.5 ha of permanent infrastructure. In addition to the permanent infrastructure, approximately 2.5 ha will be used for temporary construction laydown and associated activities.
- Pipeline development area (PDA): the area encompassing the CO_2 transport pipeline corridor commencing from the LWM in Darwin Harbour through to the infield development area, covering the potential pipeline routes currently under investigation. Given the large span of the PDA and the segregation of activities specific to certain regions, the PDA discussion is further split in this referral into the nearshore PDA and the offshore PDA (refer to ***Attachment A (Figure 1-1)***). The subsea power and fibre optic cable(s) would also run through the PDA.
- Dredge spoil disposal ground (DSDG): the area is located to the north of Darwin Harbour, within the Beagle Gulf, approximately 12km north-west of Lee Point.
- Infield development area (IDA): refers to the area at the offshore CO_2 storage site within the G-7-AP permit area where the following activities are proposed: drilling of CO_2 injection wells, installation of subsea infrastructure, CO_2 injection and storage operations, monitoring and maintenance activities (as required) and supporting activities.

Project schedule

Subject to receipt of all relevant regulatory and project approvals, the indicative timeframe for the proposed Project is as follows:

- commencement of site works in 2028
- ready for start-up (RFSU) / ready for injection and commencement of operations to occur in 2031
- operational lifespan of approximately 30 years, followed by ongoing plume monitoring and decommissioning activities.

An indicative Project schedule covering the is presented in ***Section 3.4*** of ***Attachment A***.

1.2.2 Is the project action part of a staged development or related to other actions or proposals in the region?

Yes

1.2.3 Is the proposed action the first stage of a staged development (or a larger project)?

No

1.2.4 Related referral(s)

EPBC Number	Project Title
2025/10366	Ichthys Carbon Capture and Storage Project
2025/10273	Ichthys LNG Acid Gas Removal Unit (AGRU) Upgrade & Carbon Capture Storage (CCS) Preparedness Project

1.2.5 Provide information about the staged development (or relevant larger project).

A detailed description of the relationship of the Bonaparte CCS Project with other related proposed actions is presented within ***Attachment A: Bonaparte Carbon Capture and Storage (CCS) Project - Supporting Information Document (Section 1.4.1 and Appendix A).*** A summary of the relationship is provided below.

Ichthys LNG AGRU Upgrade and CCS Preparedness Project

Activities to support decarbonisation of the Ichthys LNG facility:

- construction and cold commissioning of a CO_2 compression and export system (CCES; compression, dehydration modules and auxiliary infrastructure) within the Ichthys LNG facility boundaries.
- construction of a CO_2 pipeline within the Ichthys LNG facility boundaries.
- construction and cold commissioning of supplementary power infrastructure and cabling within the Ichthys LNG facility boundary to allow for future import of green power sourced from a third-party.

Activities required to support Ichthys LNG facility routine operations:

- upgrades to existing AGRUs to allow for the introduction of Plover gas as approved under the Ichthys LNG Project (EPBC 2008/4208).

Ichthys CCS Project

Activities required to support Ichthys LNG facility decarbonisation:

- construction of 12 km CO_2 export pipeline on Middle Arm. The CO_2 export pipeline comprised of two sections, with one section designed to provide flow of CO_2 in either direction to accommodate the two storage options being considered.
- commissioning of entire CO_2 pipeline (pipeline components within the Ichthys LNG facility and on Middle Arm peninsula).
- construction and commissioning of two pipeline tie-in stations on Middle Arm Peninsula (in proximity to the existing Darwin LNG facility and proposed Bonaparte CCS Project inlet station).
- hot commissioning of Ichthys LNG facility CCES assets.
- operations of all Ichthys CCS enabling infrastructure (located on both Middle Arm peninsula and within the Ichthys LNG facility).
- construction, commissioning and operations of a supplementary power intake sub-station and cabling on Middle Arm
- hot commissioning and operations of supplementary power infrastructure and cabling within the Ichthys LNG facility.

Activities required to support Ichthys LNG facility routine operations:

- hot commissioning of and operations of upgraded AGRUs.
- the acid gas incinerators would be removed from operational service once the CCS system is performing as planned.

These projects are both being executed by INPEX on behalf of Ichthys LNG Pty Ltd (an incorporated joint venture). The delegated operator for the projects is INPEX Operations Australia Pty Ltd. These referrals were submitted with EPBC reference numbers 2025/10273 and 2025/10366.

The submission of separate referrals is appropriate because:

- the Projects are owned by different Joint Venturers and would be managed separately by those Joint Venturers
- commercial agreements must be formed between the Projects and are unlikely to be exclusive for either Joint Venturers
- there are clear geographical boundaries between the Projects
- between the referrals, any significant impacts of the proposed actions are, or would be assessed; and

- all referrals have considered the potential impacts of the proposed action, and collectively they consider cumulative impacts.

The projects have been submitted as separate referrals, for the reasons outlined above, as it is not feasible to incorporate them into a single referral. This approach ensures the Minister is able to consider the whole project and potential impacts of each action, including consideration of their cumulative impacts, in accordance with the intent of Section 74(a) of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and the EPBC Act Policy Statement Stage Developments - Split referrals: Section 74(A) of the EPBC Act.

1.2.6 What Commonwealth or state legislation, planning frameworks or policy documents are relevant to the proposed action, and how are they relevant? *

A detailed description of Commonwealth and Northern Territory legislation applicable and their relevance to the Bonaparte Carbon Capture and Storage Project is presented within the ***Attachment A: Bonaparte Carbon Capture and Storage (CCS) Project - Supporting Information Document (Section 2)***. A summary of key relevant legislation is provided below.

Primary approvals:

- *Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth)
- *Environment Protection Act 2019* (Northern Territory)

Secondary approvals:

- *Offshore Petroleum and Greenhouse Gas Storage Act 2006* (Commonwealth), and the following regulations:
    - Offshore Petroleum and Greenhouse Gas (Environment) Regulations 2023
    - Offshore Petroleum and Greenhouse Gas Storage (Resource Management and Administration) Regulations 2011
    - Offshore Petroleum and Greenhouse Gas Storage (Greenhouse Gas Injection and Storage) Regulations 2023
- *Environment Protection (Sea Dumping) Act 1981* (Commonwealth)
- *Energy Pipelines Act 1981* (Northern Territory)
- *Petroleum (Submerged Lands) Act 1981* (Northern Territory)
- *Planning Act 1999* (Northern Territory)
- *Water Act 1992* (Northern Territory)

Other relevant legislation:

- *Australian Maritime Safety Authority Act 1990* (Commonwealth)
- *Biosecurity Act 2015* (Commonwealth)
- *Navigation Act 2012* (Commonwealth)
- *Protection of the Sea (Prevention of Pollution from Ships) Act 1983* (Commonwealth)
- *Underwater Cultural Heritage Act 2018* (Commonwealth)
- *Dangerous Goods Act 1998* (Northern Territory)
- *Heritage Act 2011* (Northern Territory)
- *Marine Pollution Act 1999* (Northern Territory)
- *Northern Territory Aboriginal Sacred Sites Act 1989* (Northern Territory)
- *Ports Management Act 2015* (Northern Territory)
- *Waste Management and Pollution Control Act 1998* (Northern Territory)

INPEX submitted a Section 146N application to the Minister of Environment on 23 February 2026 for a determination that 146D(2) of the EPBC Act does not apply in relation to a part of the Bonaparte CCS Project that is a component of the whole Bonaparte CCS Project. The application was approved by the Minister allowing INPEX to refer the Bonaparte CCS Project as a single action under Part 7 and, if determined a ‘controlled action’, assessed under Part 8 of the EPBC Act (**Attachment A *(Section 1.2.1)***).

1.2.7 Describe any public consultation that has been, is being or will be undertaken regarding the project area, including with Indigenous stakeholders. Attach any completed consultation documentations, if relevant. *

INPEX believes effective stakeholder consultation is essential in maximising the safety of Company and Contractor personnel, and the community; and in establishing, building and maintaining community support and trust. INPEX works closely with identified stakeholders to provide integrated, timely and effective information to the community and provide mechanisms for feedback and response.

INPEX's approach to integrated stakeholder consultation is based on five key principles:

- regular personal contact with key stakeholders
- consistent, timely, coordinated and responsive communication across all stakeholder groups
- upfront communication about issues and impacts
- easily accessible information; and
- ongoing monitoring and improvement.

A stakeholder engagement plan has been prepared to meet the regulatory requirements for consultation under the EPBC Act (Cwlth) and the NT *Environment Protection Act 2019* (EP Act), and subordinate legislation (refer to ***Attachment E: Bonaparte Carbon Capture and Storage (CCS) - Stakeholder Engagement Plan***).

An overview of INPEX's approach to stakeholder consultation, the stakeholder consultation undertaken to inform the development of approval applications, and the ongoing stakeholder consultation activities that would be undertaken throughout the execution of the Project is described in ***Attachment A: Bonaparte Carbon Capture and Storage (CCS) Project - Supporting Information Document (Section 5 and Appendix B)***.

A complete stakeholder register will be kept, outlining stakeholders who were consulted during the pre-referral stage and any relevant information that was provided to them for consideration. Where feedback was received a summary of this and how it has been considered is provided in **Attachment A *(Section 5.2, Table 5-1)***.

1.3.1 Identity: Referring party

Privacy Notice:

Personal information means information or an opinion about an identified individual, or an individual who is reasonably identifiable.

By completing and submitting this form, you consent to the collection of all personal information contained in this form. If you are providing the personal information of other individuals in this form, please ensure you have their consent before doing so.

The Department of Climate Change, Energy, the Environment and Water (the department) collects your personal information (as defined by the Privacy Act 1988) through this platform for the purposes of enabling the department to consider your submission and contact you in relation to your submission. If you fail to provide some or all of the personal information requested on this platform (name and email address), the department will be unable to contact you to seek further information (if required) and subsequently may impact the consideration given to your submission.

Personal information may be disclosed to other Australian government agencies, persons or organisations where necessary for the above purposes, provided the disclosure is consistent with relevant laws, in particular the Privacy Act 1988 (Privacy Act). Your personal information will be used and stored in accordance with the Australian Privacy Principles.

See our Privacy Policy to learn more about accessing or correcting personal information or making a complaint.

Alternatively, email us at privacy@dcceew.gov.au.

☑ **Confirm that you have read and understand this Privacy Notice ***

1.3.1.1 Is Referring party an organisation or business? *

Yes

Referring party organisation details

ABN/ACN	48150217262
Organisation name	INPEX OPERATIONS AUSTRALIA PTY LTD
Organisation address	Level 22, 100 St Georges Terrace PERTH WA 6000

Referring party details

Name	Obelia Akerman
Job title	Environmental Team Lead Approvals and Compliance
Phone	08 62136000
Email	obelia.akerman@inpex.com.au
Address	Level 22 100 St Georges Terrace, Perth WA, 6000

1.3.2 Identity: Person proposing to take the action

1.3.2.1 Are the Person proposing to take the action details the same as the Referring party details? *

No

1.3.2.2 Is Person proposing to take the action an organisation or business? *

Yes

Person proposing to take the action organisation details

ABN/ACN	48150217262
Organisation name	INPEX OPERATIONS AUSTRALIA PTY LTD
Organisation address	6000 WA

Person proposing to take the action details

Name	Christopher Justin Wilson
Job title	Director
Phone	+61 8 6213 6000
Email	chrisj.wilson@inpex.com.au
Address	Level 22, 100 St Georges Terrace PERTH WA 6000

1.3.2.14 Are you proposing the action as part of a Joint Venture? *

Yes

Joint Venture Name	Business Address	ABN/ACN	Responsible Person	Email
INPEX Browse E&P Pty Ltd	Level 22, 100 St Georges Terrace Perth WA 6000	61165711017	Steven Ovenden	enquiries@inpex.com.au
TotalEnergies CCS Australia Pty Ltd	600 Bourke Street Melbourne VIC 3000	59657689364	Simon McMahon	simon.mcmahon@totalenergies.com
Woodside Energy Ltd	11 Mount St Perth WA 6000	63005482986	Andrew Nicholls	andrew.nicholls@woodside.com

1.3.2.15 Are you proposing the action as part of a Trust? *

No

1.3.2.17 Describe the Person proposing the action's history of responsible environmental management including details of any proceedings under a Commonwealth, State or Territory law for the protection of the environment or the conservation and sustainable use of natural resources against the Person proposing to take the action. *

INPEX Operations Australia Pty Ltd (IOAPL) acts as the delegated operator for INPEX's operated Australian projects across various titles and in different joint ventures. IOAPL is committed to meeting all its regulatory obligations with the prescribed legislation. IOAPL has not been subject of proceedings from environmental regulatory agencies, either past or present, under a Commonwealth or State law for the protection of the environment or the conservation and sustainable use of natural resource.

IOAPL confirms to the best of its information, knowledge and belief, the following incidences of noncompliance related to the Ichthys project:

- On 2 April 2019, IOAPL was issued with one infringement notice for contravening condition 8 of EPBC 2008/4208. The infringement notice related to the evaporation of wastewater containing PFAS (firefighting foam). INPEX paid the infringement.
- On 15 July 2013, IOAPL was issued with one infringement notice for contravening condition 10 and 15 of EPBC 2008/4208. The infringement notice related to the release of spoil outside the designated spoil disposal area. INPEX paid the infringement and recovered it from VOA (dredging contractor).
- On 4 September 2019, IOAPL was issued with four infringements under the Waste Management and Pollution Control Act 1998 s30(2), s30(3) and s39(2). The infringement related to the boiling of wastewater containing PFAS (firefighting foam). INPEX paid the infringements.

The Bonaparte CCS Assessment Joint Venture has not been subject of proceedings from environmental regulatory agencies, either past or present, under a Commonwealth or State law for the protection of the environment or the conservation and sustainable use of natural resource.

1.3.2.18 If the person proposing to take the action is a corporation, provide details of the corporation's environmental policy and planning framework

NPEX's Business Management System (BMS) is a comprehensive, integrated system that includes standards and procedures necessary for the management of health, safety and environment (HSE) risks. Activities to manage HSE risks are planned, implemented, verified and reviewed under an iterative "plan, do, check, act" (PDCA) cycle. The PDCA cycle enables INPEX to ensure that processes are adequately resourced and managed and that opportunities for improvement are determined and acted on.

INPEX environmental performance is achieved through strong visible leadership, commitment and accountability at all levels of the organisation. Leadership includes defining performance targets and providing structures and resources to meet them. Achieving high levels of HSE performance is defined within the highest levels of management system documents (policies) and is cascaded through subsidiary documents.

The INPEX health, safety, security, environment and quality policy (Refer to ***Attachment B: INPEX Health, Safety, Security, Environment and Quality Policy***) sets the direction and minimum expectations for environmental performance and is implemented through the standards and procedures of the BMS. The policy solidifies this commitment and states the minimum expectations for environmental performance. The policy applies to all INPEX controlled activities in Australia. All personnel, including contractors, are required to comply with the policy.

1.3.3 Identity: Proposed designated proponent

1.3.3.1 Are the Proposed designated proponent details the same as the Person proposing to take the action? *

Yes

Proposed designated proponent organisation details

ABN/ACN	48150217262
Organisation name	INPEX OPERATIONS AUSTRALIA PTY LTD
Organisation address	6000 WA

Proposed designated proponent details

Name	Christopher Justin Wilson
Job title	Director
Phone	+61 8 6213 6000
Email	chrisj.wilson@inpex.com.au
Address	Level 22, 100 St Georges Terrace PERTH WA 6000

1.3.4 Identity: Summary of allocation

Confirmed Referring party's identity

The Referring party is the person preparing the information in this referral.

ABN/ACN	48150217262
Organisation name	INPEX OPERATIONS AUSTRALIA PTY LTD
Organisation address	Level 22, 100 St Georges Terrace PERTH WA 6000
Representative's name	Obelia Akerman
Representative's job title	Environmental Team Lead Approvals and Compliance
Phone	08 62136000
Email	obelia.akerman@inpex.com.au
Address	Level 22 100 St Georges Terrace, Perth WA, 6000

Confirmed Person proposing to take the action's identity

The Person proposing to take the action is the individual, business, government agency or trustee that will be responsible for the proposed action.

ABN/ACN	48150217262
Organisation name	INPEX OPERATIONS AUSTRALIA PTY LTD
Organisation address	6000 WA
Representative's name	Christopher Justin Wilson
Representative's job title	Director
Phone	+61 8 6213 6000
Email	chrisj.wilson@inpex.com.au
Address	Level 22, 100 St Georges Terrace PERTH WA 6000

Confirmed Proposed designated proponent's identity

The Person proposing to take the action is the individual or organisation proposed to be responsible for meeting the requirements of the EPBC Act during the assessment process, if the Minister decides that this project is a controlled action.

Same as Person proposing to take the action information.

1.4 Payment details: Payment exemption and fee waiver

1.4.1 Do you qualify for an exemption from fees under EPBC Regulation 5.23 (1) (a)? *

No

1.4.3 Have you applied for or been granted a waiver for full or partial fees under Regulation 5.21A? *

No

1.4.5 Are you going to apply for a waiver of full or partial fees under EPBC Regulation 5.21A?

No

1.4.7 Has the department issued you with a credit note? *

No

1.4.9 Would you like to add a purchase order number to your invoice? *

No

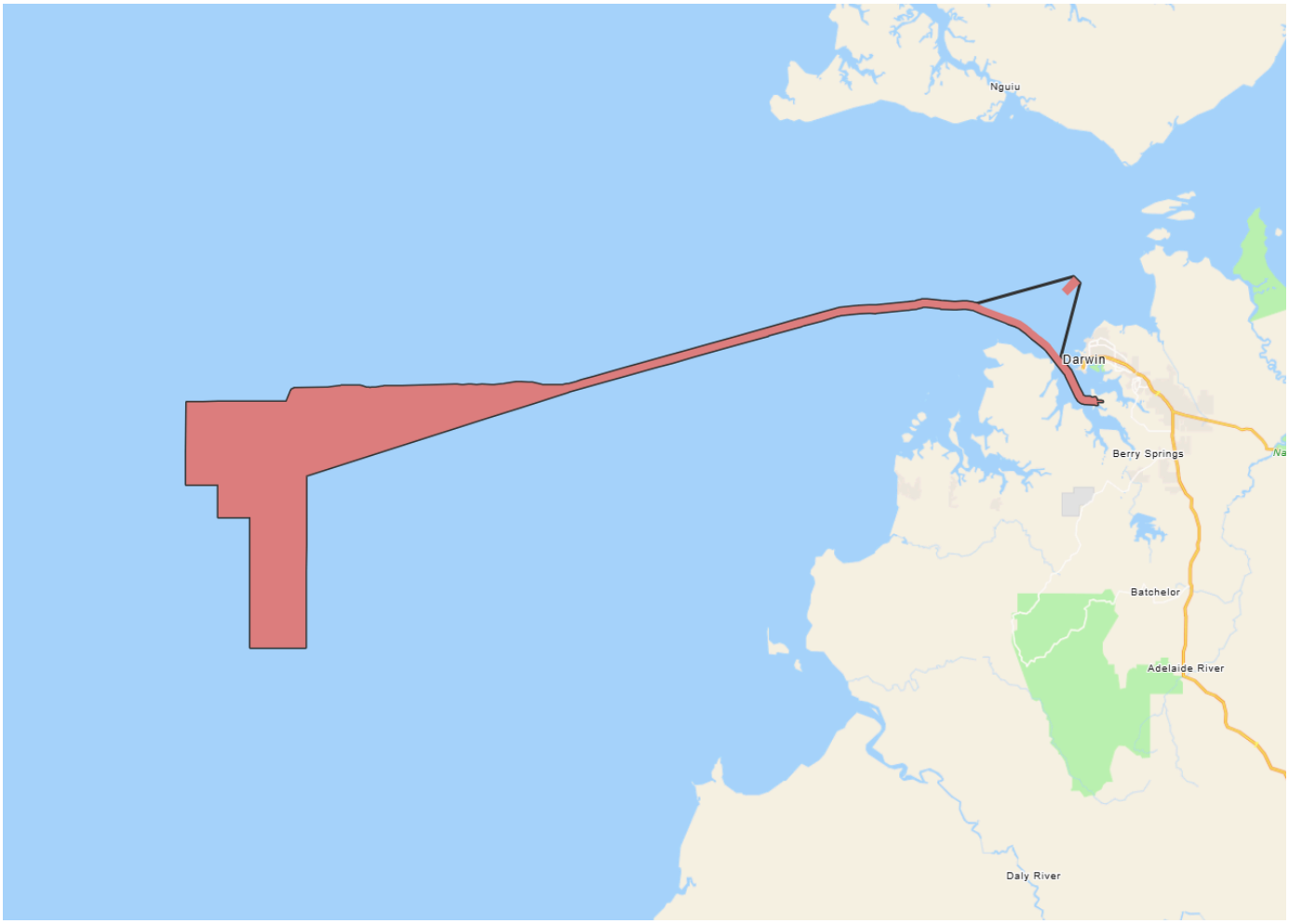
1.4 Payment details: Payment allocation

1.4.11 Who would you like to allocate as the entity responsible for payment? *

Proposed designated proponent

2. Location

2.1 Project footprint



Project Area: 323396.72 Ha **Disturbance Footprint:** 296619.43 Ha

2.2 Footprint details

2.2.1 What is the address of the proposed action? *

Starting at Middle Arm Peninsula (NT) extending 250km west into the Joseph Bonaparte Gulf

2.2.2 Where is the primary jurisdiction of the proposed action? *

Commonwealth Marine

2.2.3 Is there a secondary jurisdiction for this proposed action? *

Yes

2.2.4 Where is the secondary jurisdiction of the proposed action? *

Northern Territory

2.2.5 What is the tenure of the action area relevant to the project area? *

Commonwealth

Infield Development Area - the Bonaparte CCS joint venture parties hold greenhouse gas assessment permit G-7-AP. A pipeline licence will be required for the Infield Development Area and offshore Pipeline Development Area, and a greenhouse gas injection licence will be required from the Infield Development Area under the *Offshore Petroleum and Greenhouse Gas Storage Act 2006* and Offshore Petroleum and Greenhouse Gas Storage (Greenhouse Gas Injection and Storage) Regulations 2023.

Northern Territory

Nearshore Pipeline Development Area - INPEX will be required to obtain a pipeline licence under the *Energy Pipelines Act 1981 and Petroleum (Submerged Lands) Act 1981.*

The Onshore Development Area will be within freehold land Section 1896. A portion of the Onshore Development Area will be within crown land Section 1813, and a portion will be within freehold Section 1958.

3. Existing environment

3.1 Physical description

3.1.1 Describe the current condition of the project area’s environment.

Location

Infield Development Area (IDA)

The IDA is located in Commonwealth waters within the G-7-AP permit area approximately 120 km north-west of the Northern Territory (NT) coastline at its closest point, and approximately 226 km west-south-west of Darwin. Water depths in the IDA range from approximately 80 to 105 m (refer to ***Attachment A: Bonaparte Carbon Capture and Storage (CCS) Project - Supporting Information Document (Section 1, Figure 1-1)***).

Pipeline Development Area (PDA)

The PDA runs in an east-west orientation, originating at the onshore inlet station on Middle Arm Peninsula crossing NT coastal waters before reaching Commonwealth waters of northern Joseph Bonaparte Gulf.

The nearshore and offshore PDA (as defined below) include a two km wide pipeline installation area, incorporating a corridor one km either side of the pipeline centreline.

Offshore PDA

The offshore PDA covers the pipeline and the SPFO cable route options in Commonwealth waters of the NT coastal waters limit and spans approximately 170 km to the IDA. Water depth ranges from approximately 30 m at the coastal water limits to approximately 100 m in offshore waters (refer to ***Attachment A (Section 1, Figure 1-1***)).

Nearshore PDA

The nearshore PDA extends from the low water mark (LWM) to the limit of NT coastal waters, crossing through Darwin Harbour and the Beagle Gulf (refer to ***Attachment A (Section 1, Figure 1-1***)). Water depths in this area range from 0 to 43 m.

The nearshore PDA is in proximity to coastal communities of Darwin Harbour, including Bladin Point, Cox Peninsula and Darwin city centre. It is located approximately 6.5 km south of Darwin city centre.

The Darwin coastal region is of mixed land use and urban development, in an area of high shipping traffic and industrial sector infrastructure.

Dredge spoil disposal ground (DSDG)

The DSDG is located to the north of Darwin Harbour, within the Beagle Gulf, approximately 12 km north-west of Lee Point (refer to ***Attachment A (Section 1, Figure 1-1***)). It is located approximately 14 km from the nearshore PDA (at its closest point) in water depths between 15 m and 20 m below LAT (lowest astronomical tide).

Onshore Development Area (ODA)

The ODA is located on the Middle Arm Peninsula in Darwin Harbour between the proposed onshore inlet station near Wickham Point Road to the western border of the shore crossing area (refer to ***Attachment A (Section 3.5.1, Figure 3-1)***). The ODA is located approximately 8km northeast from the nearest residential zone of Palmerston and approximately 10 km south-east of Darwin CBD, across Darwin harbour waters.

Middle Arm Peninsula lies within the Litchfield Council region. The ODA covers land zoned under the NT planning scheme as future development. Surrounding land is mostly zoned as conservation, development and main road.

The existing Santos operated Darwin LNG processing and export facility is located on the west side of the Peninsula on Wickham Point.

Current Condition

Offshore project area (includes IDA, PDA offshore and nearshore and DSDG)

The sea floor gradient remains relatively consistent throughout the IDA and offshore PDA, however the area is known to consist of shallow paleochannels, low-lying ridges and fields of shallow pockmarks. The seabed in the IDA and offshore PDA is predominantly composed of coarse shell fragment, sand and silt with sparse coverage of heterotrophic filter feeders. The coastal morphology of the Darwin region is dominated by estuarine and rocky intertidal environments, with extensive mangrove communities and mud flats found in the inner Harbour. Darwin Harbour is a large ria (drowned river valley) system flanked by shoreline platforms and subtidal flats (Nicholas et al. 2019; Siwabessy et al. 2016).

While parts of the Darwin Harbour channel seabed are comprised of bedrock, most areas of Darwin Harbour are dominated by unconsolidated sediment forming a range of features including mud flats, ripples and sub-aqueous dunes (Nicholas et al. 2019). Elongate sand bodies are present seaward of Darwin Harbour and are suggestive of ongoing sediment transport out of Darwin Harbour (Nicholas et al. 2019).

The offshore project area has previously had activities occur within it:

- IDA has had geophysical and geotechnical surveys undertaken followed by drilling and evaluation of two exploration wells.
- Offshore and nearshore PDA follow the existing Ichthys GEP that is a pre-disturbed area.
- Nearshore PDA within Darwin Harbour lies directly adjacent to the Ichthys GEP, Bayu Undan GEP and Darwin pipeline duplication
- Darwin Port operations consist of marine traffic of non-commercial vessels (e.g. recreational anglers) and trading vessels, including commercial ships carrying cargo and passengers, industry vessels such as supply vessels and anchor handling tug supply vessels, tankers and bulk-cargo vessels.
- DSDG is the same area that was utilised in the Ichthys GEP project for acid sulfate soil disposal

The offshore project area is utilising areas that have previously been disturbed and are not pristine, untouched areas.

The physical and biological environment of the offshore project area are further described within ***Attachment A (Section 4.3 and Section 4.4).***

Onshore Development Area (ODA)

The ODA area lies within the Darwin Coastal Bioregion, which is characterised by mangroves, monsoon vine forest and tall open eucalypt forest. Much of the ODA has been previously cleared during the construction of the Ichthys GEP, however mangrove rehabilitation efforts have been undertaken in the area since 2014 to revegetate the 1.6 ha clearing. Where possible existing cleared and previously rehabilitated areas would be utilised; however additional mangrove habitat that has not been previously cleared may be cleared with the final area dependent on the temporary construction corridor chosen.

Wickham Point Road and Channel Island Road are public access roads providing entry to the industrial premises, with associated parallel utility corridors. Designated areas within the existing Ichthys GEP corridor and cadastral boundary of Section 1896 would be used for topsoil storage, acid sulphate soils (ASS) treatment and access roads.

The ODA is an area that has been previously disturbed by the existing Ichthys GEP and is not a pristine, untouched area.

The physical and biological environment of the onshore project area are further described within ***Attachment A (Section 4.3 and Section 4.5).***

3.1.2 Describe any existing or proposed uses for the project area.

Existing land use and infrastructure

The Project area is located within the Middle Arm Precinct, which provides an area for transmission of utilities, particularly gas.

Wickham Point Road and Channel Island Road are public access roads providing entry to the industrial premises, with associated parallel utility corridors. Designated areas within the existing Ichthys GEP corridor and cadastral boundary of Section 1896 would be used for topsoil storage, acid sulphate soils (ASS) treatment and access roads.

Current land uses of Middle Arm Peninsula in the vicinity of the Project area are described below:

- Ichthys LNG (operator is INPEX) - 4 km north-east of onshore Project area
- Dawin LNG (operator is Santos) - 200 m north of nearshore PDA
- Channel Island Power Station (operator is Territory Generation) - 1 km south of nearshore PDA
- Weddel Power Station (operator is Territory Generation) - 8 km south-east of onshore Project area
- Bladin Village (operator is Trepang Services Pty Ltd) - 4 km south-east of onshore Project area
- Darwin Aquaculture Centre (operator is NT Government) - 1 km south of nearshore PDA

Commonwealth-managed fisheries

There are four Commonwealth-managed fisheries that have management areas that overlap the Project area. Of the four fisheries, only the Northern Prawn Fishery data shows historical active fishing effort in the Project area (refer to ***Attachment A: Bonaparte Carbon Capture and Storage (CCS) Project - Supporting Information Document (Section 4.8.2, Table 4-18, Figure 4-20)***).

State-managed fisheries

The main fisheries that operate in the Project area are the NT Offshore Net and Line Fishery, NT Demersal Fishery and NT Spanish Mackerel Fishery (refer to ***Attachment A (Section 4.8.2, Table 4-18, Figure 4-21, Figure 4-23, Figure 4-24)***).

Commonwealth and State managed fisheries are further described within ***Attachment A (Section 4.8.2).***

Pearling and aquaculture

No aquaculture licenses have been identified within the Project area. A number of pearl oyster (Pinctada maxima) farms operate throughout NT waters; however, the nearest farms are located approximately 30 km north of the offshore PDA in open ocean, and approximately 30 km south-west of the nearshore PDA in Bynoe Harbour.

Defence areas and UXOs

Onshore

The ODA does not overlap any defence areas or unexploded ordinance (UXO); however, there are several defence training areas and bases in the Darwin area, including:

- Larrakeyah Barracks (9 km north-west of the onshore Project area)
- Robertson Barracks (10 km north-east of the onshore Project area)
- Naval base HMAS Coonawarra (9 km north-west of the onshore Project area)
- Defence Establishment Berrimah (8 km north of the onshore Project area)
- RAAF Base Darwin (11 km north of the onshore Project area).

Nearshore

The PDA (nearshore and offshore) intersect the North Australian Exercise Area (NAXA) Defence Training Area. Two shipwrecks (USAT Mauna Loa and USAT Meigs (refer to ***Attachment A (Section 4.7.2)***) with known ordinance payloads exist within Darwin Harbour and are within close proximity to the proposed

pipeline route. Due to the number of undiscovered wrecks that may exist within Darwin Harbour and the extensive bombing of Darwin which occurred during World War ll, there is the potential for undiscovered UXOs to exist throughout the nearshore PDA.

Offshore

The IDA and PDA overlaps with practice and training areas that comprise the NAXA, a maritime military zone administered by the Australian Defence Force, as well as restricted airspace (refer to ***Attachment A (Figure 4-27)***). The NAXA is used by the Royal Australian Air Force and the Royal Australian Navy for military operations including live weapons and missile firings.

UXO may be present on and in the sea floor of the Project area. According to the Defence UXO Database, the offshore PDA is located within a former air-to-air weapons range (shared boundary with the Defence training area (refer to ***Attachment A (Figure 4-27)***) and may be affected by UXOs (Department of Defence 2022). A search of the Department of Defence's UXO map confirmed three areas of potential UXO exist within the Project area, categorised as follows (Department of Defence 2022):

- 1111 – Darwin Area. This area was a former air-to-air weapons range. (UXO Category: Other)
- 1110 Darwin Area. This area was a former air-to-air weapons range. (UXO Category: Other)
- 1091 – Timor Sea. This area was used for Naval Gunnery during the 1980's (UXO Category: Other)

The EPBC Act Protected Matters database search identified the Darwin Naval Base (70041) and Larrakeyah Barracks (70061) as Commonwealth land overlapping with the nearshore PDA.

Defence areas and UXOs are further described within ***Attachment A (Section 4.8.4).***

Shipping and Navigation

Darwin Port, located in Darwin Harbour in the NT, is a major service centre for the mining and energy sectors. Darwin Port operations consist of marine traffic of non-commercial vessels (e.g. recreational anglers) and trading vessels, including commercial ships carrying cargo and passengers, industry vessels such as supply vessels and anchor handling tug supply vessels, tankers and bulk-cargo vessels. The project area intersects areas of high shipping traffic and vessel traffic predominantly avoids the IDA with vessels passing east/west between Darwin and the northern Kimberley coastline (refer to ***Attachment A (Figure 4-28)***).

Shipping and navigation are further described within ***Attachment A (Section 4.8.5).***

Petroleum and GHG infrastructure

There are a number of operating petroleum production facilities in proximity to the IDA with the closest production facility located approximately 83 km south (ENI Blacktip). Both the INPEX Ichthys GEP, Bayu Undan GEP and Darwin pipeline duplication lie directly adjacent to the nearshore PDA within Darwin Harbour. In addition to petroleum activities, GHG assessment permit G-11-AP (Santos Offshore Pty Ltd) is located 36 km west of the IDA.

The onshore Project area is in proximity to existing industries on Middle Arm Peninsula, notably the Ichthys LNG and Darwin LNG plants and their associated infrastructure.

Petroleum and GHG infrastructure are further described within ***Attachment A (Section 4.8.6, Figure 4-29, Table 4-19 and Table 4-20).***

Tourism and recreation

Most recreational and tourism activities in the region occur predominantly in State/Territory waters adjacent to population centres, such as Darwin. Tourism in the region typically peaks during dry season (May to October), which includes activities such as recreational fishing, diving, snorkelling, wildlife watching and boating.

The IDA and Offshore PDA are unlikely to support high levels of tourism and recreational activities.

The Nearshore PDA intersects Darwin Harbour, which supports a range of recreational maritime uses including fishing, boating and sailing. Boat ramps in proximity to the Nearshore PDA include Channel Island, Palmerston and East Arm.

Tourism and recreation are further described within ***Attachment A (Section 4.8.7).***

Telecommunications

The North-West Cable System (NWCS) overlaps with approximately 11 km of the nearshore PDA within Darwin Harbour (refer to ***Attachment A (Figure 4-30)***). The NWCS is a purpose-built, submarine fibre cable system designed to serve Australia's onshore and offshore resources industry. The NWCS has been providing connectivity (high-speed data and voice communication services) to INPEX's Ichthys facility since 2017 when the NWCS became operational.

An additional four subsea cables are proposed and may be located in proximity to the Project area: Project Waterworth, Hawaiki Nui 1, Bosun and the Asia Connect Cable System.

3.1.3 Describe any outstanding natural features and/or any other important or unique values that applies to the project area.

Indigenous Protected Areas

No Indigenous Protected Areas, as defined in the Australia's National Reserve System, are either located within or adjacent to the Project area.

Australian Marine Parks (AMPs)

No AMPs are located within 20km of the Project area (refer to ***Attachment A: Bonaparte Carbon Capture and Storage (CCS) Project - Supporting Information Document (Figure 4-2)***). The G-7-AP permit area overlaps marginally with the Oceanic Shoals AMP.

Northern Territory protected areas

No NT protected areas overlap the Project area. There are a number of NT parks in the region (refer to ***Attachment A (Figure 4-3)***). The Channel Island Leprosarium and Reefs (100 m south of the nearshore PDA) have been declared and are protected under the Heritage Act 2011 (Northern Territory) for their unique position and species diversity in a large ria (drowned river valley) system characterised by stressors (high turbidity, currents, sedimentation and depressions in salinity) that are not normally considered conducive to coral growth or presence.

NT protected areas in proximity to the Project area:

- Casuarina Coastal Reserve (IUCN Category - V (Protected landscape or seascape)) 15 km north of onshore Project area
- Charles Darwin National Park (IUCN Category - V (Protected landscape or seascape)) 6 km north of onshore Project area
- Holmes Jungle Nature Park (IUCN Category - V (Protected landscape or seascape)) 12 km north-east of onshore Project area
- Knuckey Lagoons Conservation Reserve (IUCN Category - IV (Habitat or species management area)) 9 km north-east of onshore Project area
- Howard Spring Nature Park (IUCN Category - V (Protected landscape or seascape)) 14 km east-northeast of onshore Project area
- Howard Spring Hunting Reserve (IUCN Category - VI (Protected area with sustainable use of natural resources)) 16 km east-northeast of onshore Project area

The nearshore PDA overlaps the Charles Point Wide Reef Fish Protected Area (RFPA), intended to prevent the overfishing of golden snapper, black jewfish and other vulnerable reef species. The nearshore PDA is also in proximity to Lorna Shoals RFPA, also established to reduce the impact of ongoing catch and allow rejuvenation of stocks. No fishing activities are permitted within RFPAs.

Northern Territory protected areas are further described within ***Attachment A (Section 4.2.3).***

Significant wetlands

One nationally important wetland (NIW) the Port Darwin NIW has been identified to overlap the nearshore PDA (refer to ***Attachment A (Figure 4-4)***).

No Ramsar wetlands occur within the Project area. The two nearest Ramsar wetlands to the Project area are Kakadu National Park and Cobourg Peninsula. Kakadu National Park lies 108 km east of the onshore Project area at the closest point. Just north of Kakadu National Park is the Cobourg Peninsula, 164 km north-east of the onshore Project area.

Significant wetlands are further described within ***Attachment A (Section 4.2.4).***

Key Ecological Features

The Pinnacles of the Bonaparte Basin KEF is located approximately 14 km north-west of the IDA at the closest point (refer to ***Attachment A (Figure 4-5)***). This KEF consists of an area containing limestone pinnacles, up to 50 m high (above the surrounding seabed) and is located in the western Joseph Bonaparte

Gulf on the mid-to-outer edge of the shelf.

3.1.4 Describe the gradient (or depth range if action is to be taken in a marine area) relevant to the project area.

Infield Development Area (IDA)

Water depths in the IDA range from approximately 80 m to 105 m. The majority of the IDA is composed of relatively flat to gently sloping sea floor. The sea floor gradient remains relatively consistent throughout the IDA, however pinnacles exist in Joseph Bonaparte Gulf, with the nearest feature located approximately 14 km north-west of the IDA at its closest point.

Pipeline Development Area (PDA) - offshore

The seabed in the offshore component of the PDA ranges from approximately 33 m at the State waters boundary to 99 m at the IDA (Commonwealth waters). The offshore component of the PDA is composed of similar morphology and bathymetry to that of the IDA.

Pipeline Development Area (PDA) - nearshore

The seabed in the nearshore component of the PDA range from approximately 0 m at the LAT to 43 m. The nearshore component of the PDA lies within Darwin Harbour, where most of the mapped area has water depths between 5 m and 30 m, with the exception of larger depressions within estuarine channels. The seabed is composed of a suite of geomorphological features, but is dominated by a large main tidal channel mostly composed of mud flats, ripples and sub-aqueous dunes.

Dredge Spoil Disposal Ground (DSDG)

The DSDG is located approximately 14 km from the nearshore pipeline development area (at its closest point) in water depths between 15 m and 20 m below LAT.

ODA

The Middle Arm Peninsula is relatively flat bordered by the waters of Darwin Harbour, with topography that slopes downward toward the ocean at East Arm and Middle Arm waterways.

Bathymetry of the IDA, PDA (offshore and nearshore) are shown in ***Attachment A: Bonaparte Carbon Capture and Storage (CCS) Project - Supporting Information Document (Section 4.3.3, Figure 4-7 and Figure 4-8).***

3.2 Flora and fauna

3.2.1 Describe the flora and fauna within the affected area and attach any investigations of surveys if applicable.

A search of the EPBC Act PMST for each component of the Project (refer to ***Attachment C: Bonaparte Carbon Capture and Storage (CCS) Project - PMST (Part 1, Part 2, Part 3, Part 4 and Part 5)*** revealed a combined total of 109 “listed threatened and migratory” species comprising eight seabirds, 35 shorebirds and 13 land birds, 11 marine mammals, 10 terrestrial mammals, seven marine reptiles, four terrestrial reptiles, one amphibian, 15 fish, shark and ray species and five plant species. A likelihood of occurrence assessment (refer to ***Attachment D: Bonaparte Carbon Capture and Storage (CCS) Project - Likelihood of Occurrence Assessments***) has been undertaken to determine the species taken through to the preliminary assessment of potential significant impacts on MNES

Fauna

Avifauna

The Project area is located within what is known as the East Asian-Australasian Flyway. Twelve shorebird species have been recorded within the Middle Arm Peninsula. Of the 12 species recorded, seven migratory shorebird species are currently listed under the EPBC Act or TPWC Act, including:

- far eastern curlew (critically endangered)
- bar-tailed godwit (endangered)
- common greenshank (endangered)
- greater sand plover (vulnerable)
- grey plover (vulnerable)
- sharp-tailed sandpiper (vulnerable)
- terek sandpiper (vulnerable).

Shorebird count data for Middle Arm between 2018 and 2022 is presented in ***Attachment A: Bonaparte Carbon Capture and Storage (CCS) Project - Supporting Information Document (Section 4.6.6, Figure 4-14).***

There are no biologically important areas (BIAs) for marine avifauna within the Project area. In addition to seven species of seabirds, 36 species of shorebirds are potentially present within the Project area. These species may migrate through the Project area to wetland habitats on the mainland and/or larger coastal islands.

EPBC Act-listed Threatened and Migratory marine avifauna species predicted to occur within the Project area and further information is provided in ***Attachment A (Section 4.6.6 - Avifauna-marine, Table 4-6).***

EPBC Act-listed Threatened and Migratory terrestrial avifauna species predicted to occur within the Project area and further information is provided in ***Attachment A (Section 4.6.6 - Avifauna-terrestrial, Table 4-7).***

Mammals

Three breeding BIAs for marine mammals were identified as occurring within the nearshore PDA; Australian snubfin dolphin (*Orcaella heinsohni*), Australian humpback dolphin (*Sousa sahulensis*) and Spotted bottlenose dolphin (*Tursiops aduncus*). The BIAs are within the nearshore PDA; and these species represent important populations in region.

A list of EPBC Act-listed Threatened and Migratory marine mammal species predicted to occur within the Project area and further information is provided in ***Attachment A (Section 4.6.6 - Mammals-marine, Table 4-8 and Table 4-9).***

Three terrestrial mammal species have a likelihood of occuring in the Onshore Development Area (ODA); Bare-rumped sheath-tailed bat *(Saccolaimus saccolaimus nudicluniatus)*, Black-footed tree-rat *(Mesembriomys gouldii gouldii)* and Northern brushtail possum *(Trichosurus vulpecula arnhemensis).*

A list of EPBC Act-listed Threatened and Migratory terrestrial mammal species predicted to occur within the Project area and further information is provided in ***Attachment A (Section 4.6.6 - Mammals-terrestrial, Table 4-10).***

Reptiles

The EPBC Act Protected Matters database search (refer to ***Attachment C***) identified salt-water crocodiles (*Crocodylus porosus*) and six species of marine turtle that may occur within the Project area: the green turtle (*Chelonia mydas*), loggerhead turtle (*Caretta caretta*), leatherback turtle (*Dermochelys coriacea*), flatback turtle (*Natator depressus*), hawksbill turtle (*Eretmochelys imbricate*) and olive ridley turtle (*Lepidochelys olivacea*).

Two marine turtle foraging BIAs relating to green and olive ridley turtles overlap the Project area and an internesting BIA for flatback turtles also overlaps with the Project area near Melville Island and Cobourg Peninsula, as well as a habitat critical to the survival of marine turtles for nesting flatback turtles overlapping the PDA (offshore and nearshore). The nearest known nesting sites for flatback turtles are located at Mandorah (500 m west of nearshore PDA) and Casuarina Beach (18 km north of nearshore PDA).

A list of EPBC Act-listed Threatened and Migratory, BIAs and habitat critical to marine reptile species predicted to occur within the Project area and further information is provided in ***Attachment A (Section 4.6.6 - Reptiles-marine, Table 4-11, Table 4-12, Table 4-13).***

Two terrestrial reptiles and amphibian species have a likelihood of occuring in the ODA; Mitchell's water monitor *(Varanus mitchelli)* and Northern blue-tongued skink *(Tiliqua scincoides intermedia).*

A list of EPBC Act-listed Threatened and Migratory terrestrial reptile and amphibian species predicted to occur within the Project area and further information is provided in ***Attachment A (Section 4.6.6 - Reptiles and amphibians-terrestrial, Table 4-14).***

Fish, sharks and rays

Darwin Harbour, within the nearshore Project area, supports an abundance of both resident benthic and transient pelagic fish species with 415 species documented. There are no BIAs for fishes and sharks within the Project area. A list of EPBC Act-listed Threatened and Migratory fish, shark and ray species predicted to occur within the Project area and further information is provided in ***Attachment A (Section 4.6.6 - Fish, sharks and ray, Table 4-15).***

Plants

Five threatened plant species were identified within the ODA: *Atalaya brevialata*, *Stylidium ensatum* (a triggerplant), *Typhonium praetermissum, Typhonium sp. Cox Peninsula (S. Nicholas 15/12/1999)* and *Typhonium taylorii.* All of these species have been assessed as unlikely to occur within the Project area

A list of EPBC Act-listed Threatened and Migratory plant species predicted to occur within the Project area is provided in ***Attachment A (Section 4.6.6 - Plants, Table 4-16).***

Flora

Nearshore and offshore

Seagrass monitoring undertaken for the Ichthys Nearshore Environmental Monitoring Plan identified large seagrass beds along the Darwin coastal region between Fannie Bay and Lee Point, and smaller isolated patches at Woods Inlet and off Charles Point along the Cox Peninsula.

Known localities of macroalgae communities are East Point Reef and Weed Reef. Marine habitat investigations by URS (INPEX 2010) recorded a sparse though diverse macroalgal community on the rubble covered pavement at Weed Reef, which included browns (*Sargassum* and *Padina* spp.), foliose reds (*Laurencia* spp.), greens (*Caulerpa*, *Ulva* and *Udotea* spp.) and calcareous greens (*Halimeda* spp.) (INPEX 2010).

Soft substrates, which make up the largest habitat within Darwin Harbour, consist mainly of muds and fine sand and are found in front of (i.e. seaward of) mangroves and in intertidal and subtidal areas between the hard substrates and the main drainage channels.

Further information is provided in ***Attachment A (Section 4.4.1).***

Onshore

The ODA lies within the Darwin Coastal Bioregion, which is characterised by mangroves, monsoon vine forest and tall open eucalypt forest. Much of the ODA has been previously cleared during the construction of the Ichthys GEP, however mangrove rehabilitation efforts have been undertaken in the area since 2014 to revegetate the 1.6 ha clearing.

The mangrove community types recorded in the ODA include (refer to ***Attachment A (Section 4.5.1, Figure 4-10)***):

- *Sonneratia* woodland
- shoreline forest
- *Avicienna*/*Ceriops* open forest
- mixed hinterland closed forest.

There are no EPBC Act listed threatened ecological communities (refer to ***Attachment C Part 4***) in the vicinity of the OA. The mangrove communities and the monsoon vine forest within the ODA are considered to have high conservation value in Darwin Harbour for biological and cultural reasons, and as such are Significant Vegetation. Significant vegetation types recorded on Middle Arm Peninsula include:

- mangrove communities
- monsoon vine forest / vine thicket
- wetlands
- riparian vegetation
- sandsheet heath
- old-growth forest supporting large, hollow-bearing trees.

Further information is provided in ***Attachment A (Section 4.5.1, Figure 4-10).***

Mangroves

Mangroves in the Darwin Harbour area constitute approximately 44% of the mangrove communities in the Darwin Coastal Bioregion and about 5% of the total mangrove area of the NT, with 80% of these mangroves found in the “inner” Harbour between Sadgroves Creek and Mandorah (INPEX 2010).

The distribution of mangrove communities in Darwin Harbour (refer to ***Attachment A (Figure 4-12)***) indicates that the mangrove communities present adjacent to the ODA include the following species:

- *Rhizophora stylosa*/*Camptostemon schultzii* low to mid closed-forest/open-forest (shoreline forest and tidal creek forest)
- *Rhizophora stylosa*/*Bruguiera* spp/*Ceriops* spp low closed-forest/low open-forest (transition zone)
- *Ceriops tagal* low closed-forest/low open-forest (tidal flats)
- mixed species low closed-forest (hinterland)
- *Ceriops tagal* low closed-forest/open-forest (hinterland)
- *Avicennia marina*/*Ceriops* spp low open-forest/low closed-forest
- mixed species low open-forest/low closed-forest
- *Sonneratia alba* low woodland/low open forest.

Further information is provided in ***Attachment A (Section 4.5.1 - Mangroves).***

Weeds

Annual weed surveys have been undertaken by INPEX on Middle Arm Peninsula for environmental monitoring compliance. Weed surveys have recorded the following weed species some of which are listed as declared weeds under the *Weeds Management Act 2001* (NT).

- Gamba Grass (*Andropogon gayanus*)

- Hyptis (*Mesosphaerum suaveolens)*
- Lantana (*Lantana camera*)
- Annual mission grass (*Cenchrus pedicellatus*)
- Perrennial mission grass (*Cenchrus polystachios*)
- Sida - Flannel weed (*Sida cordifolia*)
- Stylo - Caribbean (*Stylosanthes hamata*)
- Lion’s tail (*Leonotis nepetifolia*)
- Barnyard grass (*Echinochloa colona*)
- Mimosa (*Mimosa pigra*)

Further information is provided in ***Attachment A (Section 4.5.1 - Weeds and Table 4-5).***

3.2.2 Describe the vegetation (including the status of native vegetation and soil) within the project area.

Vegetation

Nearshore and offshore

Seagrass monitoring undertaken for the Ichthys Nearshore Environmental Monitoring Plan identified large seagrass beds along the Darwin coastal region between Fannie Bay and Lee Point, and smaller isolated patches at Woods Inlet and off Charles Point along the Cox Peninsula.

Known localities of macroalgae communities are East Point Reef and Weed Reef. Marine habitat investigations by URS (INPEX 2010) recorded a sparse though diverse macroalgal community on the rubble covered pavement at Weed Reef, which included browns (*Sargassum* and *Padina* spp.), foliose reds (*Laurencia* spp.), greens (*Caulerpa*, *Ulva* and *Udotea* spp.) and calcareous greens (*Halimeda* spp.) (INPEX 2010).

Soft substrates, which make up the largest habitat within Darwin Harbour, consist mainly of muds and fine sand and are found in front of (i.e. seaward of) mangroves and in intertidal and subtidal areas between the hard substrates and the main drainage channels.

Further information is provided in ***Attachment A: Bonaparte Carbon Capture and Storage (CCS) Project - Supporting Information Document (Section 4.4.1).***

Onshore

The Onshore Development Area (ODA) lies within the Darwin Coastal Bioregion, which is characterised by mangroves, monsoon vine forest and tall open eucalypt forest. Much of the ODA has been previously cleared during the construction of the Ichthys GEP, however mangrove rehabilitation efforts have been undertaken in the area since 2014 to revegetate the 1.6 ha clearing.

The mangrove community types recorded in the ODA include (refer to ***Attachment A (Section 4.5.1, Figure 4-10)***):

- *Sonneratia* woodland
- shoreline forest
- *Avicienna*/*Ceriops* open forest
- mixed hinterland closed forest.

There are no EPBC Act listed threatened ecological communities (refer to ***Attachment C: Bonaparte Carbon Capture and Storage (CCS) Project - PMST (Part 4)***) in the vicinity of the ODA. The mangrove communities and the monsoon vine forest within the ODA are considered to have high conservation value in Darwin Harbour for biological and cultural reasons, and as such are Significant Vegetation. Significant vegetation types recorded on Middle Arm Peninsula include:

- mangrove communities
- monsoon vine forest / vine thicket
- wetlands
- riparian vegetation
- sandsheet heath
- old-growth forest supporting large, hollow-bearing trees.

Further information is provided in ***Attachment A (Section 4.5.1, Figure 4-10).***

Mangroves

Mangroves in the Darwin Harbour area constitute approximately 44% of the mangrove communities in the Darwin Coastal Bioregion and about 5% of the total mangrove area of the NT, with 80% of these mangroves found in the “inner” Harbour between Sadgroves Creek and Mandorah (INPEX 2010).

The distribution of mangrove communities in Darwin Harbour (refer to ***Attachment A (Figure 4-12)***) indicates that the mangrove communities present adjacent to the ODA include the following species:

- *Rhizophora stylosa*/*Camptostemon schultzii* low to mid closed-forest/open-forest (shoreline forest and tidal creek forest)
- *Rhizophora stylosa*/*Bruguiera* spp/*Ceriops* spp low closed-forest/low open-forest (transition zone)
- *Ceriops tagal* low closed-forest/low open-forest (tidal flats)
- mixed species low closed-forest (hinterland)
- *Ceriops tagal* low closed-forest/open-forest (hinterland)
- *Avicennia marina*/*Ceriops* spp low open-forest/low closed-forest
- mixed species low open-forest/low closed-forest
- *Sonneratia alba* low woodland/low open forest.

Further information is provided in ***Attachment A (Section 4.5.1 - Mangroves).***

Weeds

Some species of introduced flora are declared to be weeds under the NT *Weeds Management Act 2001* because of the environmental and/or economic harm they can cause. Class A weeds are to be eradicated by landowners and occupiers. Class B weeds must have their growth and spread controlled by landowners and occupiers.

The remaining introduced flora species are referred to as environmental weeds. The Commonwealth Government has also categorised some species as Weeds of National Significance (WoNS). WoNS are a significant problem in the NT and pose multiple threats to the savanna woodlands, resulting in intense wildfires and tree canopy destruction. Weed distribution is often related to environmental disturbances caused by the construction of roads and tracks and feral animals.

Annual weed surveys have been undertaken by INPEX on Middle Arm Peninsula for environmental monitoring compliance. Weed surveys have recorded the following weed species which are listed as declared weeds under the *Weeds Management Act 2001* (NT).

- Gamba Grass (*Andropogon gayanus*) - is a weed of National significance (WoNS) with a *NT Weeds Management Act 2001* Class B
- Hyptis (*Mesosphaerum suaveolens*) - is unknown if it is a WoNS with a *NT Weeds Management Act 2001* Class B
- Lantana (*Lantana camera*) - is a WoNS with a *NT Weeds Management Act 2001* Class B
- Annual mission grass (*Cenchrus pedicellatus*) - is not a WoNS with no class against the *NT Weeds Management Act 2001*
- Perrennial mission grass (*Cenchrus polystachios*) - is not a WoNS with a *NT Weeds Management Act 2001* Class B
- Sida - Flannel weed (*Sida cordifolia*) - is not a WoNS with a *NT Weeds Management Act 2001* Class B
- Stylo - Caribbean (*Stylosanthes hamata*) - is not a WoNS with no class against the *NT Weeds Management Act 2001*
- Lion’s tail (*Leonotis nepetifolia*) - is not a WoNS with a *NT Weeds Management Act 2001 Class B*
- Barnyard grass (*Echinochloa colona*) - is not a WoNS with a *NT Weeds Management Act 2001* Class C
- Mimosa (*Mimosa pigra*) - is a WoNS with a *NT Weeds Management Act 2001* Class A

Further information is provided in ***Attachment A (Section 4.5.1).***

Geology and geomorphology

The ODA is underlain by Early Proterozoic and Burrell Creek Formation rocks, with some Cretaceous Darwin Formation rocks along the shoreline. Soils over half of the site are very gravelly, massive earths that range in depth from shallow (<0.25 m) to moderately deep (0.25 to <0.5 m) (Fogarty et al. 1984).

The following soil families have been identified at Bladin Point: Bladin (red, fine sandy clay loam); Hotham (brown, massive, fine sandy loam with medium gravel); Koolpinyah (yellow sandy loam over sandy clay loam); Mullalgah (deep, peaty soils on marine sediments); Euro (hydrosols on intertidal flats); Maand (poorly drained marine muds); and Rinamatta (siliceous sands).

The Mullalgah, Euro, Maand and Rinamatta soil families contain varying levels of ASS. Geotechnical investigations for Ichthys LNG construction phase identified areas of ASS within Ichthys LNG footprint, within 4 km of the ODA (JKC 2014; Coffey 2014). In addition to areas of ASS, geotechnical investigations also reported soils with natural non sulphuric acidity (pH levels as 3.4 to 6.8); natural acidity formed through hydrolysis reactions where the anions are leached and replaced with hydrogen soils (JKC 2014; Coffey 2014).

Further information is provided in **Attachment A (Section 4.3.7).**

3.3 Heritage

3.3.1 Describe any Commonwealth Heritage Places Overseas or other places recognised as having heritage values that apply to the project area.

World heritage properties

There are no World Heritage Properties present within the Project area.

National heritage places and Commonwealth heritage places

There are no National or Commonwealth heritages places within the Project area.

Heritage places

A search of the Australian Heritage Database determined there are three registered places of heritage significance in the vicinity of the nearshore PDA:

- Channel Island Reefs
- Channel Island Leprosarium
- Darwin Harbour Wetlands.

Additionally, a search of the NT Heritage Register determined one place with a permanent heritage declaration under the Northern Territory Heritage Act 2011 in the vicinity of the nearshore PDA: the Channel Island Leprosarium and Reefs.

Channel Island is approximately 200 m south of the nearshore PDA. The Channel Island Leprosarium was a quarantine station from 1884, converted into a Leprosarium in 1930. It is both a culturally and socially significant site providing a view on enforced isolation of diseased people in the NT (Earth Sea Heritage Survey 2024). The Channel Island Reef is biologically significant, hosting a diverse coral community in an area characterised by conditions typically unfavourable for coral growth, including strong currents, high turbidity, fine muddy sediment and low salinity (Earth Sea Heritage Survey 2024). The Darwin Harbour Wetlands are listed as indicative, meaning that there is no heritage protection in place.

Maritime heritage

Nearshore

Under the *Underwater Cultural Heritage Act 2018* (Cwlth), any shipwrecks, sunken aircraft or other types of maritime heritage over 75 years old are automatically afforded protection. A search of the Australian National Shipwrecks Database (DCCEEW 2024h) determined that the nearshore PDA overlaps five shipwreck sites and three heritage “declared areas” under the Northern Territory *Heritage Act 2011* (refer to ***Attachment A: Bonaparte Carbon Capture and Storage (CCS) Project - Supporting Information Document (Figure 4-19)***):

- Ellengowan (declared area)
- Dieman
- Mandorah Queen
- Mauna Loa United States Army transport (USAT) (declared area)
- Medkhanun 3
- Meigs USAT (declared area)
- John Holland Barge
- Yu Han 22.

Further information is provided in ***Attachment A (Section 4.7.3).***

Offshore

Underwater cultural heritage sites are recognised as a part of the marine environment ecosystem. Under the *Underwater Cultural Heritage Act 2018* (Cwlth), any shipwrecks, sunken aircraft or other types of cultural heritage over 75 years old are automatically afforded protection. Under this Act, there is also a provision to provide protection zones, that can range from 200 m to 3,200 m radius, surrounding the wrecks. These zones are in place to limit disturbance of the cultural heritage and also the surrounding environment.

A search of the Australian National Shipwrecks Database, WAM shipwrecks database and NT Heritage Register identified no wrecks within the IDA. There are no known records of historical maritime infrastructure occurring in the offshore PDA or IDA; however, there is potential for Project activities to encounter unlocated wrecks or structures not documented in historical records.

Further information is provided in ***Attachment A (Section 4.7.3).***

Historic heritage

Archaeological surveys undertaken to support the Ichthys LNG Development Project identified World War II objects on Bladin Point. Objects found within the vicinity of Ichthys LNG were deemed to not be of heritage value and were removed following consultation with the NT Heritage Branch. There are no known World War II heritage sites within, where Project activities are planned to be undertaken.

3.3.2 Describe any Indigenous heritage values that apply to the project area.

Traditional Owners

Archaeological sites and evidence, including shell mounds and rock art, found throughout Darwin and Middle Arm Peninsula in the harbour provides evidence for Aboriginal occupation of this area over time and throughout landscape changes (O'Brien et al. 2025).

The Larrakia people are recognised as Traditional Owners and custodians of the Darwin region, including Middle Arm Peninsula, whose country stretches from Finnis River in the West to Adelaide River in the east, and inland along the Charlotte River. Both historic and present cultural places are located throughout Darwin Harbour, and the Larrakia people continue to maintain culture and uphold links to the land and sea country (Earth Sea Heritage Survey 2024).

Additionally, throughout the 1700s to 1900s, fleets of Indonesian fisher people and traders, known as the Macassan Traders, traversed through the Timor Sea, along the Tiwi Islands and along the Cobourg Peninsula on the north Australian coastline (O'Brien et al. 2025). Macassan artifacts have been found on beaches within the Darwin region, including a cast iron swivel gun collected on the shoreline of Darwin Harbour in 1908, however, there are no historical accounts that the Macassan Traders travelled into Darwin Harbour (O'Brien et al. 2025).

Further information is provided in ***Attachment A: Bonaparte Carbon Capture and Storage (CCS) Project - Supporting Information Document (Section 4.7.1).***

Culture and connection to country

According to Aboriginal beliefs, the physical environment of each local area was created and shaped by the actions of spiritual ancestors who travelled across the landscape (WWIA 2023). Songlines are tied to the Australian landscape and provide important knowledge, cultural values and wisdom. Songlines trace the journeys of ancestral spirits as they created the land, animals and lore, and are integral to Aboriginal spirituality and connectedness to country.

Aboriginal groups in northern Australia had several centuries of contact with foreign visitors before the arrival of Europeans (National Oceans Office 2004). Many coastal and island regions in Western Australia and the NT were the scene of complex patterns of interaction, trade and exchange with outsiders including Macassan trepangers from Sulawesi from the late 1600s until early 1900s, European mariners from the mid-1600s, and Japanese pearl divers after European arrival (McCarthy et al. 2022).

Evidence of visits and interactions between Macassan and Aboriginal people include the remains of stone fireplaces and smoke houses, tamarind trees planted by Macassan people and fragments of earthenware and porcelain. Although not necessarily marine based, Aboriginal and Macassan archaeological places are important to Aboriginal people as part of their continuing culture and identity.

Further information is provided in ***Attachment A (Section 4.7.1).***

Sea country and submerged historic landscapes

Aboriginal and Torres Strait Islander peoples have been sustainably using and managing their sea country for tens of thousands of years, in some cases since before rising sea levels created these marine environments. Sea country (or saltwater country) refers to the areas of the sea that Aboriginal and Torres Strait Islander peoples are particularly affiliated with. Sea country is valued for Aboriginal and Torres Strait Islander cultural identities, health and wellbeing.

Types of sites in the NT that may preserve on the seabed include:

1. stone tool scatters, like those on Murujuga
2. engraved rock art
3. shell mounds and middens
4. fish traps and weirs
5. burials.

The oldest dated terrestrial sites have been found in the NT, there is a potential for the existence of submerged landscapes with associated Aboriginal heritage values to exist throughout the previously submerged areas of the continental shelf where strong cultural connections between Traditional Owners and the sea exist (McCarthy et al. 2022). Such relationships and the connections with sea country transcends the landscape/seascape divide and the sea is not only a physical and temporal space, but also a mental map of ancestral journeys and rituals to nurture and pass on to future generations (Ward et al. 2022).

Further information is provided in ***Attachment A (Section 4.7.1).***

Aboriginal sacred sites and other recognised heritage places

During heritage surveys undertaken to support the construction of the Ichthys LNG facility, a number of Aboriginal heritage sites were identified within and adjacent to the ODA. Following consultation with the Larrakia Heritage Management Executive Committee and NT Heritage Branch actions were taken to protect and manage heritage places. Additional surveys are planned to be conducted by qualified Larrakia cultural heritage monitors to assist with pipeline design; route selection and geotechnical investigation works. Project surveys are planned to be conducted in late 2025 and continue during project execution.

Since the 1980's, over 30 terrestrial and maritime related heritage studies have been undertaken at Middle Arm (Earth Sea Heritage Survey 2024). These studies identified several archaeological features, including shell mounds on Channel Island and on Coastal areas of Darwin Harbour (Bourke 1994, 1996), petroglyphs at Middle Arm (Bourke and Mulvaney 2003), skeletal remains at Middle Arm (Richardson 1996) and shell middens at Wickam Point (Crassweller 2002).

A search of the Aboriginal Areas Protection Authority interactive map of 'Regions of Sacred Sites in the NT, identified a number of registered sacred sites within the region (AAPA 2023). These sites are protected under the *Northern Territory Aboriginal Sacred Sites Act 1989* (Northern Territory). Some sites located directly on the coast or on offshore islands that have values associated with plant resources, water sources, hunting places/camps and spiritual and cultural history.

INPEX has been issued an AAPA Authority certificate for the onshore areas where Project activities will occur (Authority Certificate C2011/166) and also for the offshore dredge spoil area (Authority Certificate C2012/138). An application is in progress for the nearshore PDA.

Further information is provided in ***Attachment A (Section 4.7.1).***

Aboriginal seasonal calendars

Aboriginal and Torres Strait Islander peoples have developed an understanding of the Australian environment over many thousands of years (BOM 2023; CSIRO 2022). Aboriginal knowledge of the seasons is highly localised and unique to each Aboriginal group. As such, the number of seasons recognised in an annual cycle, the length of each season, and how they are locally defined and understood, differs a lot depending on where the seasonal knowledge of Country has developed (CSIRO 2022).

Within specific seasons certain activities occur; these include customary activities such as ceremonies and burn offs. Resource availability is also influenced by season such as the flowering of certain plants, identifying when eggs are available for collection or specific bird calls which indicate that yams are ready to eat (BOM 2023).

Some examples of specific traditional activities that may occur in the region that are influenced by season include:

- On the Tiwi Islands, turtles are collected whenever possible, although Jamutakari (wet season; December to February) seems to be the most fruitful time (TLC 2023). Crested terns also lay eggs towards the end of Jamutakari which are collected for food (TLC 2023).
- Gulumoerrgin (Larrakia) seasonal calendar shows that turtle eggs are collected during Mayilema (March to April), green sea turtles are hunted throughout the year, except when they are mating and

laying eggs, dugong hunting occurs during Dinidjanggama (June to July) and cockles collected during Gurrulwa (August; Williams, et al. 2012).

Further information is provided in ***Attachment A (Section 4.7.1).***

Traditional use of resources

Traditional fishing occurs along the majority of the Kimberley and NT coastline. The practice of traditional fishing includes harvesting turtles, dugong, fish and other marine life, with traditional fishing methods consisting of the use of lines, hand collection, nets and spears (National Oceans Office 2004).

A search of the National Indigenous Australians Agency (NIAA) interactive map confirmed there were no Indigenous protected areas (IPAs) within the Project area (NIAA 2023) However, non-designated areas along the NT coastline are used for traditional fishing with approximately 55 per cent of the NT coastline owned by Traditional Aboriginal Owner groups. These areas support a range of economies and livelihoods and contain many iconic fishing areas (NLC 2021).

A National Recreational and Indigenous Fishing Survey undertaken in 2000 reported that the greatest fishing effort focused on saltwater environments, including estuarine, coastal, inshore (less than 5 km from the coast) and offshore (greater than 5 km from the coast) with line fishing and hand gathering being the two most common fishing methods (National Oceans Office 2004). Data collected during the survey in 2000, showed that offshore fishing activities represented only 2 per cent of total indigenous fishing effort with inshore (49 per cent), coastal (23 per cent), rivers (16 per cent) and lakes/dams (10 per cent) being more common (National Oceans Office 2004).

Further information is provided in ***Attachment A (Section 4.7.1).***

3.4 Hydrology

3.4.1 Describe the hydrology characteristics that apply to the project area and attach any hydrological investigations or surveys if applicable. *

Oceanography

Offshore

The Indonesian Throughflow current is generally strongest during the south-east monsoon from May to September (Qiu et al. 1999). The Indonesian Throughflow is a key link in the global exchange of water and heat between ocean basins. It brings warm, low-nutrient, low-salinity water from the western Pacific Ocean, through the Indonesian archipelago, to the Indian Ocean. It is the primary driver of the oceanographic and ecological processes in the region (DSEWPaC 2012a). The Joseph Bonaparte Gulf experiences a mixed semidiurnal tide with a very large range in tidal elevations and correspondingly strong tidal currents, recording some of the highest tides in northern Australia (up to 7 m) (Przeslawski et al. 2011; Galaiduk et al. 2018).

Seasonal changes of mean sea level in Darwin are only approximately 0.15 m, while offshore the changes are expected to be considerably less and quite insignificant (approximately 0.05 m) (RPS 2011). Short period waves within the Joseph Bonaparte Gulf are generated by local synoptic winds and are typically largest during winter months when the south-easterly trade winds dominate (Maxwell et al. 2004).

In the Bonaparte Basin, the Southern Ocean swell is slightly higher during winter than in summer due to the northerly migration of swell-generating storms. The wave period and significant wave height generated by this swell is highly dependent on the exact location within the basin (e.g. the Joseph Bonaparte Gulf is protected from the Southern Ocean swell and therefore swells affecting the area are limited to those generated by cyclones or prolonged storm winds (Maxwell et al. 2004). Summertime tropical cyclones generate waves propagating radially out from the storm centre. Depending upon the storm size, intensity, relative location and forward speed, tropical cyclones may generate swell with periods of 6–10 seconds (s) from any direction and with wave heights of 0.5–9.0 m.

Nearshore

The Darwin region marine environment encompasses the open ocean of the Beagle Gulf and the estuarine-dominated Darwin Harbour. Tidal forces have the greatest control over the sea level and water currents in Darwin Harbour.
Darwin Harbour is classed as a macro-tidal estuary, with maximum tidal range reaching 7.8 m (Padovan 2003; Li 2013). The Darwin region experiences a semidiurnal tidal cycle (i.e. two highs and two lows per day) with a slight diurnal inequality between the successive tides. The average daily tidal range is ~6 m during the spring phase and ~3 m during neap phase of the tidal cycle (Cardno 2014). There is also considerable annual variability, with the largest spring tides typically occurring in March and September/October.
Tidal excursions range from 8 to 15 km during spring tides and 2 to 8 km during neap tides (Hanley and Caswell 1995; Semeniuk 1985). Within East Arm, model results show large tidal ranges produce strong currents that peak at 1.5 to 2.0 ms–1 during spring tides (HRW 2013).

Further information is provided in ***Attachment A: Bonaparte Carbon Capture and Storage (CCS) Project - Supporting Information Document (Section 4.3.4).***

Water quality

Offshore

The Bonaparte Basin and Joseph Bonaparte Gulf experience an influx of comparatively nutrient-rich waters at depth in summer (wet season) and a variety of processes, such as tidal currents, internal waves and cyclone mixing, are known to carry these nutrients into the bottom waters of the shelf (Hallegraeff 1995).

The surface waters in the Joseph Bonaparte Gulf marine park, located approximately 64 km south of the IDA, are characterised by very high primary productivity. The long-term annual mean surface chlorophyll-a concentrations range from 0.6 to 27 mg/m3 with levels in the dry season (winter) often higher than other the

wet season (summer). However, these values are likely over-estimates due to the dissolved and suspended materials brought in by rivers and the contamination of the remote sensing satellite imagery resulting in bottom reflectance in shallow water areas (Galaiduk et al. 2018).

Marine baseline studies undertaken by ERM in 2010 and 2011 measured water quality during the wet season and dry season in the Joseph Bonaparte Gulf in the Petrel and Tern gas fields (ERM 2011), located south-west of the IDA. Water quality was found to be relatively pristine with results typical of nutrient poor offshore northern Australian waters. Dissolved oxygen (DO) concentrations ranged from a minimum of 3.6 mg/L (49.8 per cent) near the seabed to 7.8 mg/L (117.2 per cent) at the sea surface. DO was consistently found to decrease with depth (ERM 2011). This is often linked to higher photosynthetic activity at the seawater surface and wave/wind generated mixing. These values are typical of unpolluted seawater (ERM 2011).

ERM (2011) found total suspended solids (TSS) levels were low across the area during the time of sampling, as would be expected for offshore waters in the region. Concentrations of nutrients (nitrogen and phosphorous) were also found to be low, as is expected for oligotrophic offshore waters (ERM 2011).

Seawater temperature is well mixed through the water column in the Joseph Bonaparte Gulf and tidal currents restrict formation of a thermocline. ERM (2011) reported that temperature remained consistent throughout the 100 m sampled water column, with a mean temperature of 29.5 °C recorded during the 2010 wet (summer) season and a mean of 27.9 °C recorded during the 2011 dry (winter) season. The seawater pH was found to range from a minimum of 7.67 to a maximum of 8.37, with basic to slightly alkaline properties (ERM 2011).

Nearshore

Darwin Harbour is a naturally turbid environment due to the large tidal ranges and associated currents, with clearest water occurring during neap tides while the spring tides are associated with increased turbidity due to increased current velocities.

During the wet season, monsoonal troughs and tropical cyclones (events) significantly influence water quality, in particular turbidity. These events increase metocean conditions (wind and waves) which suspend sediments resulting in high turbidity levels (>150 nephelometric turbidity unit (NTU) daily average) in coastal waters outside the harbour, while waters within the harbour are typically sheltered. Turbidity inside the harbour would also be increased by increased sediment loading from surface runoff associated with increased rainfall during such events.

Conversely, metocean conditions in the dry season are relatively benign, with water quality primarily driven by tides. As a result, clearer waters are measured inside and outside the harbour, with turbidity typically between 1 and 7 NTU (median daily average).

Water temperature typically varies from 24 °C in the dry season to over 30 °C in the wet season.

Salinity within Darwin Harbour is generally slightly lower in the wet season when compared to the dry season due to rainfall; however, in either season there can be strong local gradients in salinity. During the wet season, salinity can range from approximately 30 to 35 parts per thousand (ppt) in the mid-Harbour down to near 0 ppt further up rivers (Makarynska 2019), where there are significant freshwater inflows. During the dry season, a lack of rainfall and increased evaporation can lead to salinities between 35 and 40 ppt in upstream waters where there is limited tidal flushing (Cardno 2014; Makarynska 2019).

Dissolved oxygen in Darwin Harbour typically ranges from 74 to 96 per cent (mean 84 per cent), with no seasonal effects (INPEX 2011; Padovan 1997).

The *Water Act 1992* (Northern Territory) defines several beneficial uses for water bodies in the NT. Beneficial uses describe how a community values and uses a water resource. These are then used to set water quality objectives relevant to the beneficial uses declared for a particular water body. The declared

beneficial uses for the Darwin Harbour Region – High Water Mark and Darwin Harbour Region – Natural Waterways are as follows:
aquaculture: water for commercial production of aquatic animals, including related research

- environment: water to maintain the health of aquatic ecosystems
- cultural: water to meet aesthetic, recreational and cultural needs.

Further information is provided in ***Attachment A (Section 4.3.5).***

4. Impacts and mitigation

4.1 Impact details

Potential Matters of National Environmental Significance (MNES) relevant to your proposed action area.

EPBC Act section	Controlling provision	Impacted	Reviewed
S12	World Heritage	No	Yes
S15B	National Heritage	No	Yes
S16	Ramsar Wetland	No	Yes
S18	Threatened Species and Ecological Communities	Yes	Yes
S20	Migratory Species	Yes	Yes
S21	Nuclear	No	Yes
S23	Commonwealth Marine Area	Yes	Yes
S24B	Great Barrier Reef	No	Yes
S24D	Water resource in relation to large coal mining development or coal seam gas	No	Yes
S26	Commonwealth Land	No	Yes
S27B	Commonwealth Heritage Places Overseas	No	Yes
S28	Commonwealth or Commonwealth Agency	No	Yes

4.1.1 World Heritage

You have identified your proposed action will likely directly and/or indirectly impact the following protected matters.

A direct impact is a direct consequence of an action taken – for example, clearing of habitat for a threatened species or permanent shading on an ecological community as the result of installing solar panels.

An indirect impact is an 'indirect consequence' such as a downstream impact or a facilitated third-party action.

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4.1.1.1 Is the proposed action likely to have any direct and/or indirect impact on any of these protected matters? *

No

4.1.1.3 Briefly describe why your action is unlikely to have a direct and/or indirect impact. *

There are no world heritage areas within the Project Area or within proximity to the Project Area.

4.1.2 National Heritage

You have identified your proposed action will likely directly and/or indirectly impact the following protected matters.

A direct impact is a direct consequence of an action taken – for example, clearing of habitat for a threatened species or permanent shading on an ecological community as the result of installing solar panels.

An indirect impact is an 'indirect consequence' such as a downstream impact or a facilitated third-party action.

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4.1.2.1 Is the proposed action likely to have any direct and/or indirect impact on any of these protected matters? *

No

4.1.2.3 Briefly describe why your action is unlikely to have a direct and/or indirect impact. *

There are no National Heritage areas within the Project Area or within proximity to the Project Area.

4.1.3 Ramsar Wetland

You have identified your proposed action will likely directly and/or indirectly impact the following protected matters.

A direct impact is a direct consequence of an action taken – for example, clearing of habitat for a threatened species or permanent shading on an ecological community as the result of installing solar panels.

An indirect impact is an 'indirect consequence' such as a downstream impact or a facilitated third-party action.

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4.1.3.1 Is the proposed action likely to have any direct and/or indirect impact on any of these protected matters? *

No

4.1.3.3 Briefly describe why your action is unlikely to have a direct and/or indirect impact. *

There are no Ramsar Wetlands within the Project Area or within proximity to the Project Area.

4.1.4 Threatened Species and Ecological Communities

You have identified your proposed action will likely directly and/or indirectly impact the following protected matters.

A direct impact is a direct consequence of an action taken – for example, clearing of habitat for a threatened species or permanent shading on an ecological community as the result of installing solar panels.

An indirect impact is an 'indirect consequence' such as a downstream impact or a facilitated third-party action.

Threatened species

Direct impact	Indirect impact	Species	Common name
No	No	Acanthophis hawkei	Plains Death Adder
No	No	Antechinus bellus	Fawn Antechinus
Yes	Yes	Arenaria interpres	Ruddy Turnstone
No	No	Atalaya brevialata	
No	Yes	Balaenoptera borealis	Sei Whale
No	Yes	Balaenoptera musculus	Blue Whale
No	Yes	Balaenoptera physalus	Fin Whale
No	Yes	Calidris acuminata	Sharp-tailed Sandpiper
Yes	Yes	Calidris canutus	Red Knot, Knot
No	Yes	Calidris ferruginea	Curlew Sandpiper
Yes	Yes	Calidris tenuirostris	Great Knot
No	No	Carcharodon carcharias	White Shark, Great White Shark
No	Yes	Caretta caretta	Loggerhead Turtle
Yes	Yes	Charadrius leschenaultii	Greater Sand Plover, Large Sand Plover
Yes	Yes	Charadrius mongolus	Lesser Sand Plover, Mongolian Plover
No	Yes	Chelonia mydas	Green Turtle
No	Yes	Chloebia gouldiae	Gouldian Finch
No	No	Conilurus penicillatus	Brush-tailed Rabbit-rat, Brush-tailed Tree-rat, Pakooma
No	No	Dasyurus hallucatus	Northern Quoll, Digul [Gogo-Yimidir], Wijingadda [Dambimangari], Wiminji [Martu]
No	Yes	Dermochelys coriacea	Leatherback Turtle, Leathery Turtle, Luth
No	Yes	Eretmochelys imbricata	Hawksbill Turtle

Direct impact	Indirect impact	Species	Common name
No	No	Erythrotriorchis radiatus	Red Goshawk
No	No	Falco hypoleucos	Grey Falcon
No	No	Geophaps smithii smithii	Partridge Pigeon (eastern)
No	Yes	Glyphis garricki	Northern River Shark, New Guinea River Shark
No	Yes	Lepidochelys olivacea	Olive Ridley Turtle, Pacific Ridley Turtle
No	Yes	Limnodromus semipalmatus	Asian Dowitcher
Yes	Yes	Limosa lapponica baueri	Nunivak Bar-tailed Godwit, Western Alaskan Bar-tailed Godwit
No	Yes	Limosa limosa	Black-tailed Godwit
No	No	Macroderma gigas	Ghost Bat
Yes	Yes	Mesembriomys gouldii gouldii	Black-footed Tree-rat (Kimberley and mainland Northern Territory), Djintamoonga, Manbul
Yes	Yes	Natator depressus	Flatback Turtle
No	Yes	Numenius madagascariensis	Eastern Curlew, Far Eastern Curlew
Yes	Yes	Orcaella heinsohni	Australian Snubfin Dolphin
No	No	Petrogale concinna canescens	Nabarlek (Top End)
No	No	Phaethon rubricauda westralis	Red-tailed Tropicbird (Indian Ocean), Indian Ocean Red-tailed Tropicbird
No	No	Phascogale pirata	Northern Brush-tailed Phascogale
Yes	Yes	Pluvialis squatarola	Grey Plover
Yes	Yes	Pristis clavata	Dwarf Sawfish, Queensland Sawfish
No	Yes	Pristis pristis	Largetooth Sawfish, Freshwater Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish
Yes	Yes	Pristis zijsron	Green Sawfish, Dindagubba, Narrowsnout Sawfish
No	Yes	Rhincodon typus	Whale Shark
No	Yes	Rostratula australis	Australian Painted Snipe

Direct impact	Indirect impact	Species	Common name
Yes	Yes	Saccolaimus saccolaimus nudicluniatus	Bare-rumped Sheath-tailed Bat, Bare-rumped Sheathtail Bat
Yes	Yes	Sousa sahulensis	Australian Humpback Dolphin
No	Yes	Sphyrna lewini	Scalloped Hammerhead
Yes	Yes	Sternula albifrons	Little Tern
No	No	Stylidium ensatum	a triggerplant
Yes	Yes	Tiliqua scincoides intermedia	Northern Blue-tongued Skink
Yes	Yes	Trichosurus vulpecula arnhemensis	Northern Brushtail Possum
No	Yes	Tringa nebularia	Common Greenshank, Greenshank
No	No	Typhonium praetermissum	
No	No	Typhonium sp. Cox Peninsula (S.Nicholas 15/12/1999)	
No	No	Typhonium taylori	a herb
No	No	Tyto novaehollandiae kimberli	Masked Owl (northern)
No	No	Varanus mertensi	Mertens' Water Monitor
No	Yes	Varanus mitchelli	Mitchell's Water Monitor
No	No	Xeromys myoides	Water Mouse, False Water Rat, Yirrkoo

Ecological communities

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4.1.4.1 Is the proposed action likely to have any direct and/or indirect impact on any of these protected matters? *

Yes

4.1.4.2 Briefly describe why your action has a direct and/or indirect impact on these protected matters. *

The BCCS Supporting Information Document (***Attachment A: Bonaparte Carbon Capture and Storage (CCS) Project - Supporting Information Document (Section 7***) includes an assessment of potential impacts and risks to threatened species and ecological communities from proposed Project activities and identification of key management and mitigation measures. A summary of the potential impacts based on the Project Area is provided below.

Marine Reptiles

Direct Impacts: Six turtle species may be present within the Project area, one internesting BIA, and two foraging BIAs overlap the Project area. The potential impacts from seabed disturbance on epifaunal communities may result in some minor changes to, and/or loss of, foraging habitat for marine turtles, or localised displacement of individual turtles from areas utilised as foraging habitat during construction activities (refer to ***Attachment A (Section 7.1.2)***). Impacts are expected to be localised to the area of disturbance and short-term during construction/installation activities. The ongoing presence of Project infrastructure is not expected to have a lasting impact on marine turtle habitat utilisation.

Indirect Impacts:

- Marine debris as a result of mis-handled vessel waste or dropped objects from Project activities is estimated to be minimal and localised and are not expected to be significant if they are managed in accordance with the key mitigation measures identified in ***(Attachment A (Section 7.2.1))***.
- Impacts from marine discharges (routine / non-routine) from the MODU, vessels and subsea infrastructure have been assessed as having minor to insignificant effects ***(Attachment A (Sections 7.1.8, 7.1.9, 7.1.10, 7.2.2 and 7.2.4))***. Significant impacts to marine turtles are not expected due to rapid dilution and dispersion, the likely small volumes of any unplanned discharges, and the occasional nature of the event.
- Artificial lighting may result in the attraction of prey and adult turtles near vessels during the Project ***(Attachment A (Section 7.1.5))***. Foraging turtles may be present in the Project area year-round, with nesting and internesting turtles present in the PDA during nesting seasons. The offshore light emissions generated from MODU/vessel lighting is not expected to have a discernible effect on foraging turtles and the potential for light from MODU/vessels to attract marine turtles once they are at sea is not expected. Lighting would be managed in nearshore areas such that impacts to hatchling turtles are not anticipated.
- There is potential for marine turtles to be impacted by project vessels and construction / decommissioning activities; however, any potential vessel strike to marine turtles is likely to be an isolated incident ***(Attachment A (Section 7.2.8))***.
- Underwater noise from drilling, construction, commissioning and decommissioning activities may result in localised behavioural responses such as avoidance to individuals present in the Project area. Impacts would be temporary and not expected to have a significant effect at the population level ***(Attachment A (Section 7.1.6))***.

Terrestrial Reptiles and Terrestrial Mammals

Direct Impacts:

Two critically endangered reptile species may occur within the ODA. Given the Project area is not known to support important populations of either species, and the pre-disturbed nature of the ODA and absence of freshwater sources, adverse impacts to habitat critical to either species is not expected ***(Attachment A (Section 7.1.3))***.

Potential direct impacts to terrestrial mammal species are primarily associated with construction related habitat disturbance (i.e. via vegetation removal, earthworks and civil works). While the ODA supports preferred habitat of the species, the localised disturbance is not expected to have a significant impact on the habitat critical for the survival of a threatened species ***(Attachment A (Section 4.5.2, 4.5.6 and 7.1.3))***.

Indirect Impacts:

- Routine/non-routine atmospheric emissions can lead to a reduction in ambient air quality and contribute to GHG emissions, which can have adverse effects on the natural environment as well as potential localised behavioural disturbances to fauna ***(Attachment A (Section 7.1.4))***
- Airborne noise and vibration emissions during all phases of the Project may result in a change in ambient noise and vibration conditions and behavioural disturbance to threatened fauna ***(Attachment A (Section 7.1.7))***
- Contamination of groundwater, surface water and soil as a result of unplanned discharges or wastes may cause attraction of fauna or pests to waste and indirect impacts to fauna through predation ***(Attachment A (Section 7.2.2))***
- Routine light emissions onshore may lead to light pollution and a behavioural disturbance to fauna ***(Attachment A (Section 7.1.5))***

Marine Mammals

Direct Impacts: Seabed disturbance from dredging and subsea installation has the potential to impact marine mammal habitat. However, potential impacts are expected to be temporary and minor in the context of the broader distributions and habitat utilisation of the marine mammals ***(Attachment A (Section 7.1.2))***.

Indirect Impacts:

- Marine debris as a result of mis-handled vessel waste or dropped objects is estimated to be minimal and localised and are not expected to be significant if they are managed in accordance with the key mitigation measures identified in ***(Attachment A (Section 7.2.1))***.
- Chemical discharges have the potential to result in fauna injury/mortality, with a minor and temporary impact on a small proportion of species ***(Attachment A (Sections 7.1.8, 7.1.9, 7.1.10, 7.2.2 and 7.2.4))***.
- Vessels in the Project area have the potential to interact with EPBC-listed threatened species. This may result in injury or death of marine mammals from a vessel strike or entanglement/entrainment from the use of equipment. ***(Attachment A (Section 7.2.8))***.
- Underwater noise from drilling, construction, commissioning and decommissioning activities may temporarily disturb or displace groups or individuals of marine mammals. Such impacts are expected to be temporary and minor in the context of the broader distributions and habitat utilisation of the marine mammals ***(Attachment A (Section 7.1.6))***.

Avifauna

Direct Impacts: Vegetation clearing associated with the Project is not anticipated to significantly impact avifauna habitat due to the presence of alternative habitat for resting and foraging in the area, resulting in minimal deviation from migratory pathways and limited potential for behavioural disruption. Given the pre-disturbed nature of the habitat overlapping the ODA, threatened avifauna species are considered unlikely to depend on the habitat within the ODA or be present in significant numbers ***(Attachment A (Section 7.1.3))***.

Indirect Impacts:

- Light emissions may attract and disorient avifauna, disrupt foraging and potentially cause injury and/or death through collision with infrastructure. However, light emissions generated from the construction/installation phase would be temporary. ***(Attachment A (Section 7.1.5))***
- Exposure to air pollutants may cause respiratory distress in birds, increasing their susceptibility to respiratory infection and may impair the avian immune response. Given the volumes, any atmospheric emissions would be rapidly dispersed and unlikely to impact individual birds ***(Attachment A (Section 7.1.4))***.
- Marine avifauna may be exposed to MDO/MGO on the sea surface or upper water column, if resting or foraging in waters near to the spill. Impacts may include mortality due to oiling of feathers or the ingestion of hydrocarbons. This event is highly unlikely and impacted avifauna would likely comprise a small proportion of the resident and transitory population. ***(Attachment A (Section 7.2.4))***.

- Routine noise and vibration emissions during all phases of the Project may result in a change in ambient noise and vibration conditions, behavioural disturbance to threatened avifauna species ***(Attachment A (Section 7.1.7))***.
- Contamination of groundwater, surface water and soil, as a result of construction including ground disturbance activities, may result in impacts to threatened avifauna species ***(Attachment A (Section 7.2.2))*.**

Fish, sharks and rays

Direct Impacts: Seabed disturbance associated with the Project this expected to be temporary and minor in the context of the broader distributions and habitat utilisation of these species. Due to the highly mobile nature of these species within Australian waters, they may occur transitionally through the Project area, however there are no BIAs, habitat critical to the survival, or known important habitats of these species within the Project area ***(Attachment A (Section 7.1.2))***.

Indirect Impacts:

- Underwater noise may result in changes in behaviour to threatened fish and shark species, with a minor and temporary impact on a small proportion of species populations ***(Attachment A, (Section 7.1.6))*.**
- Vessels in the Project area have the potential to interact with EPBC-listed threatened species. This may result in injury or death from a vessel strike or entanglement/entrainment from the use of equipment. ***(Attachment A, (Section 7.2.8))*.**
- Chemical discharges have the potential to result in injury/mortality, with a minor and temporary impact on a small proportion of species ***(Attachment A, (Sections 7.1.8, 7.1.9, 7.1.10, 7.2.2 and 7.2.4))*.**
- Impacts to threatened fish and shark species may occur through direct contact with hydrocarbons and contamination of tissues and internal organs either through direct contact or via the food chain (i.e., consumption of prey). This event is highly unlikely and impacted avifauna would likely comprise a small proportion of the resident and transitory population. ***(Attachment A, (Section 7.2.4))*.**

4.1.4.4 Do you consider this likely direct and/or indirect impact to be a Significant Impact? *

No

4.1.4.6 Describe why you do not consider this to be a Significant Impact. *

A preliminary assessment of the potential for significant impacts on relevant MNES was undertaken (refer ***Attachment A: Bonaparte Carbon Capture and Storage (CCS) Project - Supporting Information Document (Section 7.3)***. This assessment has been undertaken in accordance with *MNES Significant Impact Guidelines 1.1* (CoA 2013), with the relevant significant impact criteria for each matters of national environmental significance (MNES) being evaluated against the Projects likelihood to:

- lead to a long-term decrease in the size of a population
- reduce the area of occupancy of the species
- fragment an existing population into two or more populations
- adversely affect habitat critical to the survival of a species
- 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
- result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat
- introduce disease that may cause the species to decline, or
- interfere with the recovery of the species.

The Project may result in direct impacts to threatened and migratory species as a result of vegetation clearing and seabed disturbance associated primarily with construction and pipelay activities. These are outlined below and described in further detail in ***Attachment A (Section 7.1.2, 7.1.3, 7.3.1 and 7.3.2).***

While vegetation clearing associated with the Project may result in direct impacts to threatened species, the habitat within the Project area is not considered core habitat when assessed in the context of the broader Middle Arm Peninsula. Most of the ODA was previously cleared of vegetation during the construction of Ichthys GEP, which was approved as part of the Ichthys LNG Development Project. These areas have since been subject to rehabilitation efforts (refer to ***Attachment A, (Section 4.5.1)***). Construction activities for the Project would be limited to the previously disturbed envelope for the GEP where possible, subject to geotechnical and heritage surveys ***(Attachment A, (Section 7.1.3))***. Given the pre-disturbed nature of the ODA, native fauna of conservation significance are unlikely to depend on the habitat within the ODA or be present in significant numbers. No significant impact is anticipated.

Seabed disturbance from Project activities would result in localised, short-term alterations in sediment and water quality. Alterations in sediment quality would be highly localised and intermittent where accumulated sediment would be naturally reworked into the benthic habitats through bioturbation. These would not impact the availability or quality of habitat to an extent where marine species are significantly impacted.

Indirect impacts associated with the Project including underwater noise, routine and non-routine discharges, lighting emissions IMS, physical interactions and emissions are described in ***Attachment A (Section 7.1 and 7.2)*** and assessed against EPBC significant impact criteria in ***Attachment A (Section 7.3).***

Based on the assessment provided in ***Attachment A (Section 7.1 and Section 7.2)***, the proposed action is not likely to have a significant impact on listed threatened species or ecological communities under the EPBC Act. INPEX acknowledges that further studies will be undertaken to confirm the initial assessment undertaken does not have a significant impact on MNES.

4.1.4.7 Do you think your proposed action is a controlled action? *

Yes

4.1.4.8 Please elaborate why you think your proposed action is a controlled action. *

While INPEX has assessed the proposed action as not likely to have a significant impact on listed threatened species or ecological communities under the EPBC Act, INPEX acknowledges that further studies will be undertaken to confirm the initial assessment and as such considers the Project to be a controlled action.

4.1.4.10 Please describe any avoidance or mitigation measures proposed for this action and attach any supporting documentation for these avoidance and mitigation measures. *

Mitigation measures and controls required to manage any potential direct or indirect impacts are summarised in ***Attachment A: Bonaparte Carbon Capture and Storage (CCS) Project - Supporting Information Document (Section 7).***

4.1.4.11 Please describe any proposed offsets and attach any supporting documentation relevant to these measures. *

No significant residual impacts from the proposed Project are expected on threatened species or ecological communities. As such no offsets are proposed.

4.1.5 Migratory Species

You have identified your proposed action will likely directly and/or indirectly impact the following protected matters.

A direct impact is a direct consequence of an action taken – for example, clearing of habitat for a threatened species or permanent shading on an ecological community as the result of installing solar panels.

An indirect impact is an 'indirect consequence' such as a downstream impact or a facilitated third-party action.

Direct impact	Indirect impact	Species	Common name
No	Yes	Acrocephalus orientalis	Oriental Reed-Warbler
Yes	Yes	Actitis hypoleucos	Common Sandpiper
No	Yes	Anous stolidus	Common Noddy
Yes	Yes	Anoxypristis cuspidata	Narrow Sawfish, Knifetooth Sawfish
No	Yes	Apus pacificus	Fork-tailed Swift
Yes	Yes	Arenaria interpres	Ruddy Turnstone
No	Yes	Balaenoptera borealis	Sei Whale
No	Yes	Balaenoptera edeni	Bryde's Whale
No	Yes	Balaenoptera musculus	Blue Whale
No	Yes	Balaenoptera omurai	Omura's Whale
No	Yes	Balaenoptera physalus	Fin Whale
No	Yes	Calidris acuminata	Sharp-tailed Sandpiper
No	Yes	Calidris alba	Sanderling
Yes	Yes	Calidris canutus	Red Knot, Knot
No	Yes	Calidris ferruginea	Curlew Sandpiper
No	Yes	Calidris melanotos	Pectoral Sandpiper
Yes	Yes	Calidris tenuirostris	Great Knot
No	Yes	Calonectris leucomelas	Streaked Shearwater
No	Yes	Carcharhinus longimanus	Oceanic Whitetip Shark
No	Yes	Carcharias taurus	Grey Nurse Shark
No	No	Carcharodon carcharias	White Shark, Great White Shark
No	Yes	Caretta caretta	Loggerhead Turtle
No	Yes	Cecropis daurica	Red-rumped Swallow

Direct impact	Indirect impact	Species	Common name
Yes	Yes	Charadrius leschenaultii	Greater Sand Plover, Large Sand Plover
Yes	Yes	Charadrius mongolus	Lesser Sand Plover, Mongolian Plover
No	Yes	Charadrius veredus	Oriental Plover, Oriental Dotterel
No	Yes	Chelonia mydas	Green Turtle
No	Yes	Crocodylus porosus	Salt-water Crocodile, Estuarine Crocodile
No	Yes	Cuculus optatus	Oriental Cuckoo, Horsfield's Cuckoo
No	Yes	Dermochelys coriacea	Leatherback Turtle, Leathery Turtle, Luth
No	Yes	Dugong dugon	Dugong
No	Yes	Eretmochelys imbricata	Hawksbill Turtle
No	Yes	Fregata ariel	Lesser Frigatebird, Least Frigatebird
No	Yes	Fregata minor	Great Frigatebird, Greater Frigatebird
No	Yes	Glareola maldivarum	Oriental Pratincole
No	Yes	Hirundo rustica	Barn Swallow
No	Yes	Isurus oxyrinchus	Shortfin Mako, Mako Shark
No	Yes	Isurus paucus	Longfin Mako
No	Yes	Lepidochelys olivacea	Olive Ridley Turtle, Pacific Ridley Turtle
No	Yes	Limnodromus semipalmatus	Asian Dowitcher
Yes	Yes	Limosa lapponica	Bar-tailed Godwit
No	Yes	Limosa limosa	Black-tailed Godwit
No	Yes	Megaptera novaeangliae	Humpback Whale
No	Yes	Mobula alfredi	Reef Manta Ray, Coastal Manta Ray
No	Yes	Mobula birostris	Giant Manta Ray
No	Yes	Motacilla cinerea	Grey Wagtail
No	Yes	Motacilla flava	Yellow Wagtail
Yes	Yes	Natator depressus	Flatback Turtle
No	Yes	Numenius madagascariensis	Eastern Curlew, Far Eastern Curlew

Direct impact	Indirect impact	Species	Common name
Yes	Yes	Numenius phaeopus	Whimbrel
Yes	Yes	Orcaella heinsohni	Australian Snubfin Dolphin
No	Yes	Orcinus orca	Killer Whale, Orca
Yes	Yes	Pandion haliaetus	Osprey
No	No	Phaethon lepturus	White-tailed Tropicbird
No	No	Phaethon rubricauda	Red-tailed Tropicbird
Yes	Yes	Pluvialis squatarola	Grey Plover
Yes	Yes	Pristis clavata	Dwarf Sawfish, Queensland Sawfish
No	Yes	Pristis pristis	Largetooth Sawfish, Freshwater Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish
Yes	Yes	Pristis zijsron	Green Sawfish, Dindagubba, Narrowsnout Sawfish
No	Yes	Rhincodon typus	Whale Shark
Yes	Yes	Sousa sahulensis	Australian Humpback Dolphin
Yes	Yes	Sternula albifrons	Little Tern
Yes	Yes	Tringa nebularia	Common Greenshank, Greenshank
Yes	Yes	Tursiops aduncus (Arafura/Timor Sea populations)	Spotted Bottlenose Dolphin (Arafura/Timor Sea populations)

4.1.5.1 Is the proposed action likely to have any direct and/or indirect impact on any of these protected matters? *

Yes

4.1.5.2 Briefly describe why your action has a direct and/or indirect impact on these protected matters. *

The BCCS Supporting Information Document **(*Attachment A: Bonaparte Carbon Capture and Storage (CCS) Project - Supporting Information Document (Section 7*)** includes an assessment of potential impacts and risks to threatened and migratory species and ecological communities from proposed Project activities and identification of key management and mitigation measures. A summary of the potential impacts based on the Project Area is provided below.

Marine Reptiles

Direct Impacts: Six turtle species may be present within the Project area, one internesting BIA, and two foraging BIAs overlap the Project area. The potential impacts from seabed disturbance on epifaunal communities may result in some minor changes to, and/or loss of, foraging habitat for marine turtles, or localised displacement of individual turtles from areas utilised as foraging habitat during construction activities (refer to ***Attachment A (Section 7.1.2)*****).** Impacts are expected to be localised to the area of disturbance and short-term during construction/installation activities. The ongoing presence of Project infrastructure is not expected to have a lasting impact on marine turtle habitat utilisation.

Indirect Impacts:

- Marine debris as a result of mis-handled vessel waste or dropped objects from Project activities is estimated to be minimal and localised and are not expected to be significant if they are managed in accordance with the key mitigation measures identified in ***(Attachment A (Section 7.2.1))*****.**
- Impacts from marine discharges (routine / non-routine) from the MODU, vessels and subsea infrastructure have been assessed as having minor to insignificant effects ***(Attachment A (Sections 7.1.8, 7.1.9, 7.1.10, 7.2.2 and 7.2.4))*****.** Significant impacts to marine turtles are not expected due to rapid dilution and dispersion, the likely small volumes of any unplanned discharges, and the occasional nature of the event.
- Artificial lighting may result in the attraction of prey and adult turtles near vessels during the Project ***(Attachment A (Section 7.1.5))*****.** Foraging turtles may be present in the Project area year-round, with nesting and internesting turtles present in the PDA during nesting seasons. The offshore light emissions generated from MODU/vessel lighting is not expected to have a discernible effect on foraging turtles and the potential for light from MODU/vessels to attract marine turtles once they are at sea is not expected. Lighting would be managed in nearshore areas such that impacts to hatchling turtles are not anticipated.
- There is potential for marine turtles to be impacted by project vessels and construction / decommissioning activities; however, any potential vessel strike to marine turtles is likely to be an isolated incident ***(Attachment A (Section 7.2.8))*****.**
- Underwater noise from drilling, construction, commissioning and decommissioning activities may result in localised behavioural responses such as avoidance to individuals present in the Project area. Impacts would be temporary and not expected to have a significant effect at the population level ***(Attachment A (Section 7.1.6))*****.**

Marine Mammals

Direct Impacts: Seabed disturbance from dredging and subsea installation has the potential to impact marine mammal habitat. However, potential impacts are expected to be temporary and minor in the context of the broader distributions and habitat utilisation of the marine mammals ***(Attachment A (Section 7.1.2))*****.**

Indirect Impacts:

- Marine debris as a result of mis-handled vessel waste or dropped objects is estimated to be minimal and localised and are not expected to be significant if they are managed in accordance with the key mitigation measures identified in ***(Attachment A (Section 7.2.1))*****.**
- Chemical discharges have the potential to result in fauna injury/mortality, with a minor and temporary impact on a small proportion of species ***(Attachment A (Sections 7.1.8, 7.1.9, 7.1.10, 7.2.2 and 7.2.4))*****.**

- Vessels in the Project area have the potential to interact with EPBC-listed threatened and migratory species. This may result in injury or death of marine mammals from a vessel strike or entanglement/entrainment from the use of equipment. ***(Attachment A (Section 7.2.8))*.**
- Underwater noise from drilling, construction, commissioning and decommissioning activities may temporarily disturb or displace groups or individuals of marine mammals. Such impacts are expected to be temporary and minor in the context of the broader distributions and habitat utilisation of the marine mammals ***(Attachment A (Section 7.1.6))*.**

Avifauna

Direct Impacts: Vegetation clearing associated with the Project is not anticipated to significantly impact avifauna habitat due to the presence of alternative habitat for resting and foraging in the area, resulting in minimal deviation from migratory pathways and limited potential for behavioural disruption. Given the pre-disturbed nature of the habitat overlapping the ODA, threatened and migratory avifauna species are considered unlikely to depend on the habitat within the ODA or be present in significant numbers ***(Attachment A (Section 7.1.3))*.**

Indirect Impacts:

- Light emissions may attract and disorient avifauna, disrupt foraging and potentially cause injury and/or death through collision with infrastructure. However, light emissions generated from the construction/installation phase would be temporary. ***(Attachment A (Section 7.1.5))***
- Exposure to air pollutants may cause respiratory distress in birds, increasing their susceptibility to respiratory infection and may impair the avian immune response. Given the volumes, any atmospheric emissions would be rapidly dispersed and unlikely to impact individual birds ***(Attachment A (Section 7.1.4))*.**
- Marine avifauna may be exposed to MDO/MGO on the sea surface or upper water column, if resting or foraging in waters near to the spill. Impacts may include mortality due to oiling of feathers or the ingestion of hydrocarbons. This event is highly unlikely and impacted avifauna would likely comprise a small proportion of the resident and transitory population. ***(Attachment A (Section 7.2.4))*.**
- Routine noise and vibration emissions during all phases of the Project may result in a change in ambient noise and vibration conditions, behavioural disturbance to threatened and migratory avifauna species ***(Attachment A (Section 7.1.7))*.**
- Contamination of groundwater, surface water and soil, as a result of construction including ground disturbance activities, may result in impacts to threatened and migratory avifauna species ***(Attachment A, (Section 7.2.2))*.**

Fish, sharks and rays

Direct Impacts: Seabed disturbance associated with the Project this expected to be temporary and minor in the context of the broader distributions and habitat utilisation of these species. Due to the highly mobile nature of these species within Australian waters, they may occur transitionally through the Project area, however there are no BIAs, habitat critical to the survival, or known important habitats of these species within the Project area ***(Attachment A (Sections 4.6.6 and 7.1.2))*.**

Indirect Impacts:

- Underwater noise may result in changes in behaviour to threatened and/or migratory fish, shark and ray species, with a minor and temporary impact on a small proportion of species populations ***(Attachment A, (Section 7.1.6))*.**
- Vessels in the Project area have the potential to interact with EPBC-listed threatened and migratory species. This may result in injury or death from a vessel strike or entanglement/entrainment from the use of equipment. ***(Attachment A, (Section 7.2.8))*.**
- Chemical discharges have the potential to result in injury/mortality, with a minor and temporary impact on a small proportion of species ***(Attachment A, (Sections 7.1.8, 7.1.9, 7.1.10, 7.2.2 and 7.2.4))*.**

- Impacts to threatened and migratory fish, shark and ray species may occur through direct contact with hydrocarbons and contamination of tissues and internal organs either through direct contact or via the food chain (i.e., consumption of prey). This event is highly unlikely and impacted avifauna would likely comprise a small proportion of the resident and transitory population. ***(Attachment A, (Section 7.2.4))*.**

4.1.5.4 Do you consider this likely direct and/or indirect impact to be a Significant Impact? *

No

4.1.5.6 Describe why you do not consider this to be a Significant Impact. *

A preliminary assessment of the potential for significant impacts on relevant MNES was undertaken (refer ***Attachment A: Bonaparte Carbon Capture and Storage (CCS) Project - Supporting Information Document (Section 7.3)*** . This assessment has been undertaken in accordance with *MNES Significant Impact Guidelines 1.1* (CoA 2013), with the relevant significant impact criteria for each MNES being evaluated against the Projects likelihood to:

- lead to a long-term decrease in the size of a population
- reduce the area of occupancy of the species
- fragment an existing population into two or more populations
- adversely affect habitat critical to the survival of a species
- 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
- result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat
- introduce disease that may cause the species to decline, or
- interfere with the recovery of the species.

The Project may result in direct impacts to threatened and migratory species as a result of vegetation clearing and seabed disturbance associated primarily with construction and pipelay activities. These are outlined below and described in further detail in ***Attachment A (Section 7.1.2, 7.1.3, 7.3.1 and 7.3.2)***.

While vegetation clearing associated with the Project may result in direct impacts to threatened species, the habitat within the Project area is not considered core habitat when assessed in the context of the broader Middle Arm Peninsula. Most of the ODA was previously cleared of vegetation during the construction of Ichthys GEP, which was approved as part of the Ichthys LNG Development Project. These areas have since been subject to rehabilitation efforts (refer to ***Attachment A, (Section 4.5.1)***). Construction activities for the Project would be limited to the previously disturbed envelope for the GEP where possible, subject to geotechnical and heritage surveys (***Attachment A, (Section 7.1.3)***). Given the pre-disturbed nature of the ODA, native fauna of conservation significance are unlikely to depend on the habitat within the ODA or be present in significant numbers. No significant impact is anticipated.

Seabed disturbance from Project activities would result in localised, short-term alterations in sediment and water quality. Alterations in sediment quality would be highly localised and intermittent where accumulated sediment would be naturally reworked into the benthic habitats through bioturbation. These would not impact the availability or quality of habitat to an extent where marine species are significantly impacted.

Indirect impacts associated with the Project including underwater noise, routine and non-routine discharges, lighting emissions IMS, physical interactions and emissions are described in ***Attachment A (Section 7.1 and 7.2)*** and assessed against EPBC significant impact criteria in ***Attachment A (Section 7.3)***.

Based on the assessment provided in the BCCS Supporting Information Document ***(Attachment A, (Section 7))***, the proposed action is not likely to have a significant impact on listed threatened or migratory species under the EPBC Act. INPEX acknowledges that further studies will be undertaken to confirm the initial assessment undertaken does not have a significant impact on MNES.

4.1.5.7 Do you think your proposed action is a controlled action? *

Yes

4.1.5.8 Please elaborate why you think your proposed action is a controlled action. *

While INPEX has assessed the proposed action as not likely to have a significant impact on listed migratory species under the EPBC Act, INPEX acknowledges that further studies will be undertaken to confirm the initial assessment and as such considers the Project to be a controlled action.

4.1.5.10 Please describe any avoidance or mitigation measures proposed for this action and attach any supporting documentation for these avoidance and mitigation measures. *

Mitigation measures and controls required to manage any potential direct or indirect impacts are summarised in ***Attachment A: Bonaparte Carbon Capture and Storage (CCS) Project - Supporting Information Document (Section 7)***.

4.1.5.11 Please describe any proposed offsets and attach any supporting documentation relevant to these measures. *

No significant residual impacts from the proposed Project are expected on threatened species or ecological communities. As such no offsets are proposed.

4.1.6 Nuclear

4.1.6.1 Is the proposed action likely to have any direct and/or indirect impact on this protected matter? *

No

4.1.6.3 Briefly describe why your action is unlikely to have a direct and/or indirect impact. *

The proposed Project does not relate to a nuclear action.

4.1.7 Commonwealth Marine Area

You have identified your proposed action will likely directly and/or indirectly impact the following protected matters.

A direct impact is a direct consequence of an action taken – for example, clearing of habitat for a threatened species or permanent shading on an ecological community as the result of installing solar panels.

An indirect impact is an 'indirect consequence' such as a downstream impact or a facilitated third-party action.

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4.1.7.1 Is the proposed action likely to have any direct and/or indirect impact on any of these protected matters? *

Yes

4.1.7.2 Briefly describe why your action has a direct and/or indirect impact on these protected matters. *

Direct impacts resulting from habitat modification and disturbance are anticipated within the defined footprint of the Project. These impacts may occur during seabed preparation, the temporary or permanent placement of infrastructure, installation activities, and eventual decommissioning of equipment and structures. While the North Marine Region encompasses several Key Ecological Features (KEFs), the Project Area does not overlap with any of these features (refer to ***Attachment A: Bonaparte Carbon Capture and Storage (CCS) Project - Supporting Information Document (Section 4.6.4)***). Therefore, impacts from the Project activities are expected to be of negligible to minor impact significance level and would be localised, temporary and of short duration.

Project activities such as dredging, infrastructure installation, and vessel movements may temporarily reduce water quality, particularly in shallow areas, due to sediment disturbance and turbid plumes. These effects typically last from hours to days depending on environmental conditions. Dredging may release fine sediments that can travel long distances and potentially redistribute contaminants, although no lasting changes to sediment quality are expected outside the project footprint. Benthic habitats and communities, including epifauna and infauna, may be directly impacted by seabed disturbance and sedimentation. However, these communities are expected to recover quickly, and no long-term ecological changes are anticipated. Sensitive habitats such as coral and seagrass in overlapping areas may be indirectly affected by increased turbidity and sedimentation. The installation of subsurface infrastructure may temporarily enhance local biodiversity by providing artificial habitat, but its removal is not expected to cause lasting impacts. Further information on direct impacts from Seabed disturbance is provided in ***(Attachment A (Section 7.1.2))***.

Potential indirect impacts to the Commonwealth Marine Area as a result of the Project are described in detail in ***Attachment A (Section 7)*** and summarised below:

The presence of the MODU and support vessels may temporarily disrupt marine activities such as shipping and fishing due to space limitations, with safety exclusion zones established during drilling and construction phases. Subsea infrastructure associated with the Project such as wells, infield pipelines and CO_2 transport pipeline may interfere with the activities of other marine users such as overlapping fisheries (***Attachment A (Section 7.1.1)***). A number of oil and gas pipelines and communication cables are located in the vicinity of the Project area ***(Attachment A (Section 4.8.6 and 4.8.8))***.

Sources of atmospheric emissions in the Commonwealth Marine Area are predominantly from power generation on the project vessels and MODU, hydrocarbon combustion to operate the MODU, vessels and helicopters (***Attachment A (Section 7.1.4)***). There will also be some occasional venting of CO_2 subsea through IMMR, pigging, or well workover activities (refer to ***Attachment A (Section 7.1.4)***). These emissions would be regulated according to Australian and international maritime laws, such as Marine Orders and the MARPOL. Overall, localised changes in air quality are not anticipated to adversely affect ecological integrity, biodiversity, social amenity, or human health.

Artificial light emissions can affect fauna by disrupting natural behaviours and orientation. Many species rely on natural light cycles, such as day-night patterns and moonlight, to regulate behaviour, and artificial lighting can override these cues. Additionally, animals like marine turtles and seabirds use natural light sources for navigation, and brighter artificial lights may cause disorientation by interfering with these natural signals. Light emissions are relevant to all phases of the Project with the potential impacts being dependent on a number of factors such as specifications and activity duration. Light emissions would be highest during the construction phase (i.e. drilling and construction/installation) due to the presence of onshore construction works and multiple vessels and the MODU offshore (***Attachment A (Section 7.1.5)***).

Underwater noise would come from continuous sound sources such as MODU noise associated with drilling activities, vessel noise, and helicopter movements, and impulsive noise sources such as marine seismic surveys. Routine underwater noise emissions from Project activities may alter ambient sound levels, affect marine fauna behaviour, and potentially cause injury or mortality. Key receptors include EPBC-listed transient species (such as marine mammals, turtles, and whale sharks) and commercially important fish.

Seismic surveys, planned during operations to monitor the CO_2 plume, may also impact plankton and benthic communities due to their high-intensity sound. Underwater noise can harm fauna through physical effects on hearing, interference with biologically important sounds, and behavioural disturbance or displacement. The severity of impacts depends on noise frequency, intensity, and environmental conditions (***Attachment A (Section 7.1.6)***).

Routine MODU and vessel discharges, drilling and subsea discharges, sediment plumes from seabed disturbance and possible unplanned discharges or loss of containment may result in changes to water quality. Any planned and unplanned vessel discharges would be managed in accordance with Australian and international maritime legislation (e.g., Marine Orders, MARPOL). Given the dynamic open ocean environment of the Project area (i.e. tides and currents) discharges are expected to rapidly disperse relatively close to the point of discharge and the effects would be temporary and highly localised ***(Attachment A (Section 7.1.8, 7.1.9, 7.1.10, 7.2.1, 7.2.2 and 7.2.4))***. A large-scale spill of hydrocarbons (e.g. from a major vessel accident) has the potential to adversely impact biodiversity, ecological integrity, social amenity or human health, however while these events can occur, they are highly unlikely ***(Attachment A (Section 7.2.4))***.

The introduction and establishment of IMS into the marine environment may result in impacts to benthic communities and associated receptors dependent on these including fishing, due to changes to the structure of benthic habitats and native marine organisms through predation and/or competition for resources, leading to a change in ecological function. With the implementation of the proposed mitigation measures the likelihood of the introduction and establishment of an IMS as a result of the Project is remote (***Attachment A (Section 7.2.5)***).

No shipwrecks were identified to overlap the IDA, however, the SEDCO Helen shipwreck is located approximately 11 km from the IDA at the closest point. There are five historic shipwrecks which overlap the nearshore PDA. These include Ellengowan, Yu Han 22, Song Saigon, Mauna Loa USAT, and Meigs USAT (***Attachment A (Section 4.7.3)***). The placement of infrastructure and associated seabed activities is yet to be confirmed and would be designed to avoid impacts to known maritime and cultural heritage from Project activities ***(Attachment A (Section 7.2.10))***.

As identified in the relevant sections above and throughout ***(Attachment A, (Section 7))***, there is the potential for disruption to the following groups of listed marine or cetacean fauna groups:

- Marine reptiles as a result of light emissions, routine MODU and vessel discharges, underwater noise, waste, unplanned discharges, and loss of containment.
- Marine avifauna as a result of atmospheric emissions, light emissions, routine MODU and vessel discharges, underwater noise, waste, unplanned discharges, and loss of containment.
- Marine mammals, specifically blue whales, sei whales, and fin whales, as a result of light emissions, routine MODU and vessel discharges, drilling and completions discharges, subsea discharges, underwater noise, waste, unplanned discharges, loss of containment, and vessel interactions.
- Fish and sharks, as a result of routine MODU and vessel discharges, subsea discharges, underwater noise, waste, unplanned discharges, loss of containment, and vessel interactions.

The following BIAs overlap the Project area and therefore there is also the potential for disruption to the following species:

- Australian snubfin dolphin breeding BIA (overlaps nearshore PDA)
- Australian humpback dolphin breeding BIA (overlaps nearshore PDA)
- spotted bottlenose dolphin breeding BIA (overlaps nearshore PDA)
- flatback turtle internesting BIA (overlaps offshore and nearshore PDA)
- green turtle foraging BIA (overlaps IDA and offshore PDA)
- olive ridley turtle foraging BIA (overlaps IDA and offshore PDA)

4.1.7.4 Do you consider this likely direct and/or indirect impact to be a Significant Impact? *

No

4.1.7.6 Describe why you do not consider this to be a Significant Impact. *

A preliminary assessment of the potential for significant impacts on relevant MNES was undertaken (refer ***Attachment A: Bonaparte Carbon Capture and Storage (CCS) Project - Supporting Information Document (Section 7.3)*** . This assessment has been undertaken in accordance with *MNES Significant Impact Guidelines 1.1* (CoA 2013), with the relevant significant impact criteria for Commonwealth Marine Areas being evaluated against the Projects likelihood to:

- result in a known or potential pest species becoming established.
- modify, destroy, fragment, isolate or disturb an important or substantial area of habitat such that an adverse impact on marine ecosystem functioning or integrity.
- have a substantial adverse effect on a population of a marine species or cetacean including its life cycle (for example, breeding, feeding, migration behaviour, life expectancy) and spatial distribution.
- result in a substantial change in air quality or water quality (including temperature) which may adversely impact on biodiversity, ecological integrity, social amenity or human health.
- result in persistent organic chemicals, heavy metals, or other potentially harmful chemicals accumulating in the marine environment such that biodiversity, ecological integrity, social amenity or human health may be adversely impacted
- have a substantial adverse impact on heritage values of the Commonwealth marine area, including damage or destruction of an historic shipwreck.

The Project may result in direct impacts to threatened and migratory species as a result of vegetation clearing and seabed disturbance associated primarily with construction and pipelay activities. These are outlined below and described in further detail in ***Attachment A (Section 7.1.2, 7.1.3, 7.3.1 and 7.3.2)***.

Seabed disturbance from Project activities would result in localised, short-term alterations in sediment and water quality. Alterations in sediment quality would be highly localised and intermittent where accumulated sediment would be naturally reworked into the benthic habitats through bioturbation. These would not impact the availability or quality of habitat to an extent where marine species are significantly impacted.

Indirect impacts associated with the Project including underwater noise, routine and non-routine discharges, lighting emissions IMS, physical interactions and emissions are described in ***Attachment A (Section 7.1 and 7.2)*** and assessed against EPBC significant impact criteria in ***Attachment A (Section 7.3)***.

Based on the assessment provided in the BCCS Supporting Information Document ***(Attachment A)***, the proposed action is not likely to have a significant impact on listed threatened species or ecological communities under the EPBC Act. INPEX acknowledges that further studies will be undertaken to confirm the initial assessment undertaken does not have a significant impact on MNES.

4.1.7.7 Do you think your proposed action is a controlled action? *

Yes

4.1.7.8 Please elaborate why you think your proposed action is a controlled action. *

While INPEX has assessed the proposed action as not likely to have a significant impact on Commonwealth Marine Areas under the EPBC Act, INPEX acknowledges that further studies will be undertaken to confirm the initial assessment and as such considers the Project to be a controlled action.

4.1.7.10 Please describe any avoidance or mitigation measures proposed for this action and attach any supporting documentation for these avoidance and mitigation measures. *

Mitigation measures and controls required to manage any potential direct or indirect impacts are summarised in ***Attachment A: Bonaparte Carbon Capture and Storage (CCS) Project - Supporting Information Document (Section 7).***

4.1.7.11 Please describe any proposed offsets and attach any supporting documentation relevant to these measures. *

No significant residual impacts from the proposed Project are expected on threatened species or ecological communities. As such no offsets are proposed.

4.1.8 Great Barrier Reef

4.1.8.1 Is the proposed action likely to have any direct and/or indirect impact on this protected matter? *

No

4.1.8.3 Briefly describe why your action is unlikely to have a direct and/or indirect impact. *

There are no Great Barrier Reef areas within the Project area or within proximity to the Project area.

4.1.9 Water resource in relation to large coal mining development or coal seam gas

4.1.9.1 Is the proposed action likely to have any direct and/or indirect impact on this protected matter? *

No

4.1.9.3 Briefly describe why your action is unlikely to have a direct and/or indirect impact. *

The proposed Project does not relate to a coal mining development or coal seam gas.

4.1.10 Commonwealth Land

You have identified your proposed action will likely directly and/or indirectly impact the following protected matters.

A direct impact is a direct consequence of an action taken – for example, clearing of habitat for a threatened species or permanent shading on an ecological community as the result of installing solar panels.

An indirect impact is an 'indirect consequence' such as a downstream impact or a facilitated third-party action.

Direct impact	Indirect impact	Commonwealth land area
No	No	Commonwealth Land -
No	No	Commonwealth Land - Australian Government Solicitor
No	No	Defence - Patrol Boat Base (DARWIN NAVAL BASE)

4.1.10.1 Is the proposed action likely to have any direct and/or indirect impact on any of these protected matters? *

No

4.1.10.3 Briefly describe why your action is unlikely to have a direct and/or indirect impact. *

The proposed Project will avoid direct and/or indirect impact to any Commonwealth land.

4.1.11 Commonwealth Heritage Places Overseas

You have identified your proposed action will likely directly and/or indirectly impact the following protected matters.

A direct impact is a direct consequence of an action taken – for example, clearing of habitat for a threatened species or permanent shading on an ecological community as the result of installing solar panels.

An indirect impact is an 'indirect consequence' such as a downstream impact or a facilitated third-party action.

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4.1.11.1 Is the proposed action likely to have any direct and/or indirect impact on any of these protected matters? *

No

4.1.11.3 Briefly describe why your action is unlikely to have a direct and/or indirect impact. *

There are no recognised overseas Commonwealth Heritage places within the proposed Project Area or within proximity to the Project Area.

4.1.12 Commonwealth or Commonwealth Agency

4.1.12.1 Is the proposed action to be taken by the Commonwealth or a Commonwealth Agency? *

No

4.2 Impact summary

Conclusion on the likelihood of significant impacts

You have indicated that the proposed action will likely have a significant impact on the following Matters of National Environmental Significance:

None

Conclusion on the likelihood of unlikely significant impacts

You have indicated that the proposed action will unlikely have a significant impact on the following Matters of National Environmental Significance:

- World Heritage (S12)
- National Heritage (S15B)
- Ramsar Wetland (S16)
- Threatened Species and Ecological Communities (S18)
- Migratory Species (S20)
- Nuclear (S21)
- Commonwealth Marine Area (S23)
- Great Barrier Reef (S24B)
- Water resource in relation to large coal mining development or coal seam gas (S24D)
- Commonwealth Land (S26)
- Commonwealth Heritage Places Overseas (S27B)
- Commonwealth or Commonwealth Agency (S28)

4.3 Alternatives

4.3.1 Do you have any possible alternatives for your proposed action to be considered as part of your referral? *

No

4.3.8 Describe why alternatives for your proposed action were not possible. *

Several potentially feasible project design alternatives have been considered during the early engineering phase of the Project. The below concepts represent the project alternatives that have been assessed against economic, health, safety, environmental and strategic criteria to optimise value and align with the overall Project objectives **(*Attachment A: Bonaparte Carbon Capture and Storage (CCS) Project - Supporting Information Document (Section 7.3)*)**.

In-field Platform vs Subsea development approach

- Options for the infield facilities included an in-field normally unattended installation (NUI) platform or using an all-subsea approach. A comprehensive evaluation including but not limited to, health, safety and environment (HSE) risks, physical presence impacting other marine users (including defence and fishers) and the GHG emission footprint concluded that an all-subsea development was the preferred concept to develop the CO2 storage potential of the Project.

Pipeline and cable routing

Commonwealth waters

- The pipeline and cable routing options within Commonwealth waters remains under consideration and are subject to further engineering studies and approvals.
- Approximately 165 km of the proposed CO2 pipeline route has been aligned with the existing Ichthys GEP route and leverages knowledge of the existing environment along the route.
- An additional alternative pipeline/cable route option was considered, which deviates from the Ichthys GEP upon exiting Darwin Harbour and has the shortest pipeline length. However, based on initial screening this alternative pipeline/cable route was not considered further due to the environmental and economic implications.

Darwin Harbour

- Alternative pipeline/cable routes within Darwin Harbour were considered but deemed unfeasible due to existing infrastructure and environmental sensitivities.

Shore-crossing

- No alternative shore crossing locations have been considered given the pipeline/cable would utilise an area adjacent to the existing Ichthys GEP beach valve precinct on Middle Arm.

Subsea control system

- An all-electric subsea system has been selected over traditional subsea hydraulically operated valves (with the exception of hydraulically activated SSSV's). This development concept represents a reduction in hydraulic fluid discharge volumes whilst maintaining system performance.

Shore crossing design

- The construction of the pipeline shore crossing would use an open trench excavation design. Horizontal direction drilling was assessed as a shore crossing option but was considered high risk due to the length and pipeline size required; however, may be viable for the SPFO cable installation.

No Development

- Without the Project, third-party CO2 generating industries in Darwin may continue to emit CO2 to atmosphere, given there are currently no other approved or sanctioned CCS projects in the region. The Project is justified for the reasons provided in ***Attachment A,* (Section 1.1)**. The Project also represents additional employment opportunities and economic investment in the region.

5. Lodgement

5.1 Attachments

1.2.1 Overview of the proposed action

	Type	Name	Date	Sensitivity	Confidence
#1.	Document	Attachment A_Bonaparte CCS Project_Supporting Information Document.pdf BCCS Supporting Information Document	06/03/2026	No	High

1.2.5 Information about the staged development

	Type	Name	Date	Sensitivity	Confidence
#1.	Document	Attachment A_Bonaparte CCS Project_Supporting Information Document.pdf BCCS Supporting Information Document	06/03/2026	No	High

1.2.6 Commonwealth or state legislation, planning frameworks or policy documents that are relevant to the proposed action

	Type	Name	Date	Sensitivity	Confidence
#1.	Document	Attachment A_Bonaparte CCS Project_Supporting Information Document.pdf BCCS Supporting Information Document	06/03/2026	No	High

1.2.7 Public consultation regarding the project area

	Type	Name	Date	Sensitivity	Confidence
#1.	Document	Attachment A_Bonaparte CCS Project_Supporting Information Document.pdf BCCS Supporting Information Document	06/03/2026	No	High
#2.	Document	Attachment E_Bonaparte CCS_Stakeholder Engagement Plan.pdf Stakeholder Engagement Plan	16/10/2025	No	High

1.3.2.18 (Person proposing to take the action) If the person proposing to take the action is a corporation, provide details of the corporation’s environmental policy and planning framework

	Type	Name	Date	Sensitivity	Confidence
#1.	Document	Attachment B_IPX HSSEQ Policy.pdf Health, Safety, Security, Environment and Quality Policy	10/03/2025	No	High

3.1.1 Current condition of the project area's environment

	Type	Name	Date	Sensitivity	Confidence
#1.	Document	Attachment A_Bonaparte CCS Project_Supporting Information Document.pdf BCCS Supporting Information Document	06/03/2026	No	High

3.1.2 Existing or proposed uses for the project area

	Type	Name	Date	Sensitivity	Confidence
#1.	Document	Attachment A_Bonaparte CCS Project_Supporting Information Document.pdf BCCS Supporting Information Document	06/03/2026	No	High

3.1.3 Natural features, important or unique values that applies to the project area

	Type	Name	Date	Sensitivity	Confidence
#1.	Document	Attachment A_Bonaparte CCS Project_Supporting Information Document.pdf BCCS Supporting Information Document	06/03/2026	No	High

3.1.4 Gradient relevant to the project area

	Type	Name	Date	Sensitivity	Confidence
#1.	Document	Attachment A_Bonaparte CCS Project_Supporting Information Document.pdf BCCS Supporting Information Document	06/03/2026	No	High

3.2.1 Flora and fauna within the affected area

	Type	Name	Date	Sensitivity	Confidence
#1.	Document	Attachment A_Bonaparte CCS Project_Supporting Information Document.pdf BCCS Supporting Information Document	06/03/2026	No	High
#2.	Document	Attachment C_Bonaparte CCS Project-PMST_Part1.pdf PMST Infield Development Area	25/03/2026	No	High
#3.	Document				

		Attachment C_Bonaparte CCS Project-PMST_Part2.pdf PMST - Offshore Pipeline Development Area	25/03/2026	No	High
#4.	Document	Attachment C_Bonaparte CCS Project-PMST_Part3.pdf PMST - Nearshore Pipeline Development Area	25/03/2026	No	High
#5.	Document	Attachment C_Bonaparte CCS Project-PMST_Part4.pdf PMST - Onshore Development Area	25/03/2026	No	High
#6.	Document	Attachment C_Bonaparte CCS Project-PMST_Part5.pdf PMST - Dredge Spoil Disposal Ground	25/03/2026	No	High
#7.	Document	Attachment D_Bonaparte CCS Project-Likelihood of Occurrence Assessment.pdf Likelihood of Occurrence Assessment	06/03/2026	No	High

3.2.2 Vegetation within the project area

	Type	Name	Date	Sensitivity	Confidence
#1.	Document	Attachment A_Bonaparte CCS Project_Supporting Information Document.pdf BCCS Supporting Information Document	06/03/2026	No	High
#2.	Document	Attachment C_Bonaparte CCS Project-PMST_Part4.pdf PMST - Onshore Development Area	25/03/2026	No	High

3.3.1 Commonwealth heritage places overseas or other places that apply to the project area

	Type	Name	Date	Sensitivity	Confidence
#1.	Document	Attachment A_Bonaparte CCS Project_Supporting Information Document.pdf BCCS Supporting Information Document	06/03/2026	No	High

3.3.2 Indigenous heritage values that apply to the project area

	Type	Name	Date	Sensitivity	Confidence
#1.	Document	Attachment A_Bonaparte CCS Project_Supporting Information Document.pdf	06/03/2026	No	High

BCCS Supporting Information Document

3.4.1 Hydrology characteristics that apply to the project area

	Type	Name	Date	Sensitivity	Confidence
#1.	Document	Attachment A_Bonaparte CCS Project_Supporting Information Document.pdf BCCS Supporting Information Document	06/03/2026	No	High

4.1.4.2 (Threatened Species and Ecological Communities) Why your action has a direct and/or indirect impact on the identified protected matters

	Type	Name	Date	Sensitivity	Confidence
#1.	Document	Attachment A_Bonaparte CCS Project_Supporting Information Document.pdf BCCS Supporting Information Document	06/03/2026	No	High

4.1.4.6 (Threatened Species and Ecological Communities) Why you do not consider the direct and/or indirect impact to be a Significant Impact

	Type	Name	Date	Sensitivity	Confidence
#1.	Document	Attachment A_Bonaparte CCS Project_Supporting Information Document.pdf BCCS Supporting Information Document	06/03/2026	No	High

4.1.4.10 (Threatened Species and Ecological Communities) Avoidance or mitigation measures proposed for this action

	Type	Name	Date	Sensitivity	Confidence
#1.	Document	Attachment A_Bonaparte CCS Project_Supporting Information Document.pdf BCCS Supporting Information Document	06/03/2026	No	High

4.1.5.2 (Migratory Species) Why your action has a direct and/or indirect impact on the identified protected matters

	Type	Name	Date	Sensitivity	Confidence
#1.	Document	Attachment A_Bonaparte CCS Project_Supporting Information Document.pdf BCCS Supporting Information Document	06/03/2026	No	High

4.1.5.6 (Migratory Species) Why you do not consider the direct and/or indirect impact to be a Significant Impact

	Type	Name	Date	Sensitivity	Confidence
#1.	Document	Attachment A_Bonaparte CCS Project_Supporting Information Document.pdf BCCS Supporting Information Document	06/03/2026	No	High

4.1.5.10 (Migratory Species) Avoidance or mitigation measures proposed for this action

	Type	Name	Date	Sensitivity	Confidence
#1.	Document	Attachment A_Bonaparte CCS Project_Supporting Information Document.pdf BCCS Supporting Information Document	06/03/2026	No	High

4.1.7.2 (Commonwealth Marine Area) Why your action has a direct and/or indirect impact on the identified protected matters

	Type	Name	Date	Sensitivity	Confidence
#1.	Document	Attachment A_Bonaparte CCS Project_Supporting Information Document.pdf BCCS Supporting Information Document	06/03/2026	No	High

4.1.7.6 (Commonwealth Marine Area) Why you do not consider the direct and/or indirect impact to be a Significant Impact

	Type	Name	Date	Sensitivity	Confidence
#1.	Document	Attachment A_Bonaparte CCS Project_Supporting Information Document.pdf BCCS Supporting Information Document	06/03/2026	No	High

4.1.7.10 (Commonwealth Marine Area) Avoidance or mitigation measures proposed for this action

	Type	Name	Date	Sensitivity	Confidence
#1.	Document	Attachment A_Bonaparte CCS Project_Supporting Information Document.pdf BCCS Supporting Information Document	06/03/2026	No	High

4.3.8 Why alternatives for your proposed action were not possible

Type	Name		Date	Sensitivity	Confidence	
#1.	Document	Attachment A_Bonaparte CCS Project_Supporting Information Document.pdf BCCS Supporting Information Document		06/03/2026	No	High

5.2 Declarations

Completed Referring party's declaration

The Referring party is the person preparing the information in this referral.

ABN/ACN	48150217262
Organisation name	INPEX OPERATIONS AUSTRALIA PTY LTD
Organisation address	Level 22, 100 St Georges Terrace PERTH WA 6000
Representative's name	Obelia Akerman
Representative's job title	Environmental Team Lead Approvals and Compliance
Phone	08 62136000
Email	obelia.akerman@inpex.com.au
Address	Level 22 100 St Georges Terrace, Perth WA, 6000

☑ Check this box to indicate you have read the referral form. *

☑ Check this box to confirm these are the correct identification details. *

☑ By checking this box, I, **Obelia Akerman of INPEX OPERATIONS AUSTRALIA PTY LTD**, declare that to the best of my knowledge the information I have given on, or attached to this EPBC Act Referral is complete, current and correct. I understand that giving false or misleading information is a serious offence. *

You may receive automated notifications that aim to assist you in tracking the progress of your project. You can opt out of these notifications by updating your communication preferences on your profile.

Completed Person proposing to take the action's declaration

The Person proposing to take the action is the individual, business, government agency or trustee that will be responsible for the proposed action.

ABN/ACN	48150217262
Organisation name	INPEX OPERATIONS AUSTRALIA PTY LTD
Organisation address	6000 WA
Representative's name	Christopher Justin Wilson

Representative's job title	Director
Phone	+61 8 6213 6000
Email	chrisj.wilson@inpex.com.au
Address	Level 22, 100 St Georges Terrace PERTH WA 6000

☑ Check this box to indicate you have read the referral form. *

☑ Check this box to confirm these are the correct identification details. *

☑ I, **Christopher Justin Wilson of INPEX OPERATIONS AUSTRALIA PTY LTD**, declare that to the best of my knowledge the information I have given on, or attached to the EPBC Act Referral is complete, current and correct. I understand that giving false or misleading information is a serious offence. I declare that I am not taking the action on behalf or for the benefit of any other person or entity. *

You may receive automated notifications that aim to assist you in tracking the progress of your project. You can opt out of these notifications by updating your communication preferences on your profile.

✔ Completed Proposed designated proponent's declaration

The Proposed designated proponent is the individual or organisation proposed to be responsible for meeting the requirements of the EPBC Act during the assessment process, if the Minister decides that this project is a controlled action.

Same as Person proposing to take the action information.

☑ Check this box to indicate you have read the referral form. *

☑ Check this box to confirm these are the correct identification details. *

☑ I, **Christopher Justin Wilson of INPEX OPERATIONS AUSTRALIA PTY LTD**, the Proposed designated proponent, consent to the designation of myself as the Proposed designated proponent for the purposes of the action described in this EPBC Act Referral. *

You may receive automated notifications that aim to assist you in tracking the progress of your project. You can opt out of these notifications by updating your communication preferences on your profile.