Ichthys Carbon Capture and Storage Project

Application Number: **03197** Commencement Date: **21/10/2025** Status: **Locked**

1. About the project

1.1 Project details

1.1.1 Project title *

Ichthys Carbon Capture and Storage Project

1.1.2 Project industry type *

Energy Generation and Supply (non-renewable)

1.1.3 Project industry sub-type

—

1.1.4 Estimated start date *

01/04/2028

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. *

INPEX is actively working to decarbonise its operations, to provide a stable supply of diverse and clean energy sources. Key to the planned decarbonisation of the INPEX-operated Ichthys liquified natural gas (LNG) facility is the development of a carbon dioxide (CO_2) compression and export system at Bladin Point, near Darwin. INPEX Operations Australia Pty Ltd is the Proponent of the Project, as the operator on behalf of Ichthys LNG Pty Ltd, an incorporated joint venture.

The Project will install a CO_2 export pipeline on Middle Arm, connecting the existing Ichthys LNG facility to an onshore inlet station (the Ichthys Carbon Capture and Storage (CCS) pipeline tie-in station) for proposed offshore CO_2 transport and long-term storage under the Bonaparte CCS Project (a separate CCS storage project proposed by INPEX as delegated operator on behalf of the Bonaparte CCS joint venture). The BCCS Project is described in ***Attachment A: Ichthys Carbon Capture and Storage (CCS) Project - Supporting Information Document (Section 1.6.2).***

The Project also includes an additional tie-in station at the Darwin LNG facility boundary and a pipeline to deliver CO_2 from the Darwin LNG facility to the ICCS pipeline tie-in station. The pipeline connection to the Darwin LNG facility will include the operational option to direct Ichthys LNG facility CO_2 to Darwin LNG facility through the pipeline for sequestration under the Bayu Undan CCS Project (managed by Santos).

The following new infrastructure/equipment is proposed to be installed on the Middle Arm Peninsula, as part of the Project:

- a pipeline extending from the Ichthys LNG facility boundary to a pipeline tie-in station located near the existing Ichthys Project gas export pipeline beach valve precinct on Middle Arm
- a pipeline extending from the Ichthys CCS pipeline tie-in station to a pipeline tie-in station located adjacent to the Darwin LNG facility boundary on Wickham Point. This pipeline would be designed to allow for flow of CO_2 in either direction between the two pipeline tie-in stations.
- Two pipeline tie-in stations:
    - the Ichthys CCS pipeline tie-in station, located near the existing Ichthys Project gas export pipeline beach valve precinct on Middle Arm.
    - the Darwin LNG pipeline tie-in station, located adjacent to the Darwin LNG facility boundary on Wickham Point
- power and communications cables between the Ichthys LNG facility, Ichthys CCS pipeline tie-in station and the Darwin LNG pipeline tie-in station.
- a supplementary power intake substation (located near the Ichthys LNG facility), and associated power and communications cables connecting back to the Ichthys LNG facility to facilitate the future import of green power from a third-party source.

The location of the proposed infrastructure on Middle Arm peninsula is shown in ***Figure 2-3*** of ***Attachment A*** and described in ***Section 2.2*** of ***Attachment A***, with further detail of the infrastructure provided in ***Section 2.3.1*** of ***Attachment A***.

The following activities are required to be undertaken to support the Project:

- The construction/installation of the Ichthys CCS and Darwin LNG pipelines and associated pipeline tie-in stations, supplementary power intake substation, interfacing power and communications cabling and the establishment of temporary ancillary construction areas, such as laydown areas, hard stands, batching plants and soil stockpiling and treatment areas
- Pre-commissioning including pipeline cleaning, gauging, flooding, testing, dewatering, drying and preservation of the following infrastructure:
    - the CO_2 export pipeline and the Ichthys LNG facility CO_2 pipeline
    - the pipeline inlet stations
    - the supplementary intake power substation and cabling.
- Commissioning and start-up of the following infrastructure:
    - the CO_2 export pipeline and the Ichthys LNG facility CO_2 pipeline
    - the supplementary intake power substation and cabling (cold commissioning only)

    - Ichthys LNG facility upgraded AGRUs, CCES and supplementary power assets (hot-commissioning and start-up only)
- The operations and maintenance of all CO_2 pipeline components within the Ichthys LNG facility, Ichthys CCS and Darwin LNG Pipeline inlet stations, operations of the Ichthys LNG facility upgraded AGRUs, integrated CCES and internal CO_2 pipeline infrastructure and the inspection, maintenance and repair activities for all assets (refer to ***Attachment A (Section 2.3.1, Section 2.3.2 and Section 2.4.3)*** for a detailed description of operations).
- Decommissioning of the Project infrastructure at the end of project life.

To enable the construction and installation of the Project, INPEX require to undertake site establishment works (including vegetation clearing, earthworks, surveying etc), trenching and/or horizontal directional drilling and acid sulphate soils management (refer to ***Attachment A (Section 2.4.1)***). A total combined area of approximately 40 hectares (ha) is proposed to be cleared, most of the area required to be cleared is located in previously disturbed areas (i.e. construction ROWs of the Ichthys GEP or other pipelines on Middle Arm or locations used during the initial construction of the Ichthys LNG facility). However, some areas of native vegetation would need to be cleared.

A detailed description of the Ichthys CCS Project is provided within ***Section 2*** of ***Attachment A***.

Project area

The “Project area” is defined as the area where activities associated with the Project may occur. The Project area encompasses all of the following:

- areas required to be disturbed as a result of civil construction and commissioning activities required to support the installation of new infrastructure
- areas which may be utilised for temporary laydown, siting of plant equipment and other facilities required for construction and commissioning activities
- the operational area of the Project, including any buffers required to protect infrastructure.

Project footprint

The “Project footprint” is defined as the area that would be disturbed, either temporarily or permanently, as a result of the civil construction activities required to support the installation of new infrastructure on Middle Arm peninsula.

The “Project footprint” comprises a total area of approximately 77 ha and incorporates areas of previously disturbed land.

The Project footprint includes the following five defined areas:

- the Ichthys CCS pipeline area
- the Ichthys CCS pipeline tie-in station area
- the Ichthys CCS (Darwin LNG link) pipeline area
- the Darwin LNG pipeline tie-in station area
- the supplementary power intake sub-station area.

The Project area and Project footprint are shown in ***Figure 2-3 and Figure 2-4*** of ***Attachment A.***

The locations of the discrete areas within the Project footprint are described within ***Section 2.2.1*** of ***Attachment A***.

Project schedule

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

- site preparation works (commence Q2, 2028)
- pipeline/cable excavation and backfill (commence Q3, 2028)

- pipeline and transmission cable installation/Ichthys CCS pipeline tie-in station construction (commence Q3, 2028)
- CO2 pipeline pre-commissioning (commence Q2, 2030)
- AGRU and CCES hot commissioning – brownfields modifications and modules (commence Q2, 2028)
- AGRU and CCES start-up and operation (commence Q1, 2030)
- Operational life of approximately 30 years.

An indicative Project schedule is presented in ***Figure 2-1*** 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?

No

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

The following legislation is applicable to the Project; further detail is provided in ***Attachment A: Ichthys Carbon Capture and Storage (CCS) Project - Supporting Information Document (Section 3, Table 3-1 and Table 3-2)***. A summary of key relevant legislation is provided below:

Commonwealth legislation:

- ***Biosecurity Act 2015:*** The Act manages biosecurity risks in Australia, in particular diseases and pests that may cause harm to human, animal or plant health or the environment. This Act sets out requirements on goods, aircraft, and vessels from overseas that enter Australian territory and implements the Ballast Water Convention, regulating ballast water of certain vessels.
- ***Environment Protection and Biodiversity Conservation Act 1999*****:** The Act provides for the protection and management of nationally and internationally important flora, fauna, ecological communities, and heritage places. Matters of National Environmental Significance (MNES) are protected under Part 3 of the Act and projects require approval under the Act if they are likely to result in a significant impact on MNES. While INPEX does not believe the Project will have a significant impact on MNES, a referral will be submitted to DCCEEW to determine whether formal assessment is required.
- ***National Greenhouse Gas and Energy Reporting Act 2007:*** The Act establishes a national framework mandating corporations meeting specific thresholds to report their greenhouse gas emissions, energy production and energy consumption.
- **National Greenhouse and Energy Reporting (Safeguard Mechanism) Rule 2015:** The safeguard mechanism is a Commonwealth Government mechanism for reducing emissions at industrial facilities. It sets legislated limits, known as baselines on the greenhouse gas emissions of these facilities. According to information published by the Clean Energy Regulator, these baselines will decline, predictably and gradually, on a trajectory consistent with achieving Australia's emission reduction targets of 43% below 2005 levels by 2030 and net zero by 2050.

Northern Territory legislation

- ***Dangerous Goods Act 1998*** **and Dangerous Goods Regulations 2017:** The Act is aimed at protecting the safety, health, and welfare of people and the environment. The Act establishes duties for the safe handling, storage, and transport of dangerous goods, outlines the responsibilities of manufacturers, handlers, and transporters. The associated Dangerous Goods Regulations 2017 complement the Act by providing detailed requirements for the classification, packaging, labelling, and transport of dangerous goods.
- ***Energy Pipelines Act 1981:*** The Act regulates the construction, operation, and maintenance of pipelines used for conveying hydrocarbons for energy production. The Act outlines requirements for permits, licenses, and registration, as well as standards for construction, operation, and maintenance. Whilst the Act does not currently regulate CO_2 pipelines. The Northern Territory Department of Mines and Energy have advised INPEX that amendments to the Act are being proposed to address this gap and that relevant licence and standards would apply to the proposed CO_2 export pipeline.
- ***Environment Protection Act 2019:*** The Act aims to promote ecological sustainable development, manage significant disturbances through an environmental approval process, provide for broader community involvement and recognise the importance of participation of Aboriginal people and communities in environmental decisions. Under the Act, the NT EPA regulates the environment impact assessment process to identify potential environmental impacts of development proposals. Pre-referral screening determined the Project has the potential to impact on ten environmental factors (refer to Appendix A). As such, the Project is being referred to the NT EPA to determine whether formal assessment is required.
- ***Heritage Act 2011:*** The Act provides for the conservation of the Northern Territory's cultural and natural heritage. All Aboriginal or Macassan archaeological places or objects are automatically declared heritage places or objects under the Act. Other places or objects can be nominated, and if

accepted, can be declared heritage places or objects under the Act. A works approval is required to carry out work on a heritage place or object.

- ***Northern Territory Aboriginal Sacred Sites Act 1989:*** The Act provides protection from unauthorised entry or damage to all sacred sites in the NT. Under the Act those wishing to undertake works on land or sea are required to obtain an Authority Certificate. Authority Certificates are a legal document that protects sacred sites from damage by setting out the conditions for carrying out specific works on an area of land and/or sea. INPEX has been issued with relevant AAPA certificates that cover Project Area and proposed activities.
- ***Planning Act 1999:*** The Act regulates how land in the NT can be developed and used. This includes the establishment of planning scheme, development consent authority and planning commission. The following permits may be required for the Project:
    - Land clearing permit - required for any native vegetation clearing in the Northern Territory on zoned and unzoned land more than one hectare in aggregate land (including any area already cleared of native vegetation).
    - Development permit (planning permit) – required if a building type or land use requires consent under the Northern Territory Planning Scheme 2020.
- ***Territory Parks and Wildlife Conservation Act 1976:*** The Act forms a framework for the establishment and management of parks and reserves and declaration of protected wildlife. Assessment is required to confirm whether listed threated flora and fauna species are likely to be impacted by the Project and a permit may be required to take or interfere with protected wildlife.
- ***Waste Management and Pollution Control Act 1998 and Waste Management and Pollution Control (Administration) Regulations 1998:*** The Act provides for the protection, and where practicable the restoration and enhancement of the quality of, the Territory environment. Specifically, by preventing pollution, reducing the likelihood of pollution occurring, effectively responding to pollution, avoiding and reducing the generation of waste, increasing the re-use and recycling of waste, and effectively managing waste disposal. It also to encourages ecologically sustainable development and facilitates the implementation of national environment protection measures. Schedule 2 of Act outlines activities that require an approval or licence under the Act, which requires approvals and licences for activities that relate to processing of hydrocarbons to produce, store and/or despatch liquefied natural gas or methanol. INPEX will engage with the NT EPA on the requirement for approvals under the WMPC Act for construction activities associated with the Project. Waste management during the Project will be incompliance with the requirements of the Act.
- ***Water Act 1992:*** The Act provides for the investigation, allocation, use, control, protection, management and administration of water resources, including extraction of ground water, wastewater management and water pollution. Under the Act waste discharge licences are required where an activity could affect a declared beneficial use of a water resource. A waste discharge licence may be required if wastewater associated with commissioning activities is required to be discharged to Darwin Harbour.
- ***Weeds Management Act 2001:*** The Act allows for the declaration of weeds into classifications for the purposes of preventing a plant entering into, or managing the plant in, the Territory or a part of the Territory. The Act provides for statutory weed management plans, which prescribe management actions for high priority weeds. The Act also gives powers to authorised officers, including the power to order certain activities in relation to declared weeds.

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 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 A: Appendix C - Ichthys Carbon Capture and Storage (CCS) Project 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: Ichthys Carbon Capture and Storage (CCS) Project - Supporting Information Document (Section 5).***

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	Level 22, 100 St Georges Terrace Perth 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
Ichthys LNG Pty Ltd	Level 22, 100 St Georges Terrace, Perth WA 6000	42150217299	Tetsu Murayama	enquiries@inpex.com.au

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. *

Historical Performance

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 our regulatory obligations within the prescribed legislation. IOAPL has not been subject to proceedings by 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 resources.

INPEX confirms to the best of our information, knowledge and belief, the following incidences of non-compliance:

- 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 of EPBC 2008/4208. The infringement notice related to the release of spoil outside DSDA. 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.

Ichthys LNG Pty Ltd was subject to the following:

- On 15 September 2023, Ichthys LNG Pty Ltd was issued with an infringement notice for contravening condition 17.2 of EPL228-05. The infringement related to a heating medium release. Ichthys LNG Pty Ltd paid the infringement.
- On 13 June 2014, Ichthys LNG Pty Ltd was issued two infringements for contravening conditions 6 and 31 of EPA8-01. The infringements related to the release of spoil outside dredge spoil disposal area. Ichthys LNG Pty Ltd paid the infringements.
- On 16 July 2023, Ichthys LNG Pty Ltd was issued with an infringement notice for contravening condition 6 of EPA8-01. The infringement related to a traverse through marine heritage exclusion zone (Catalina). Ichthys LNG Pty Ltd paid the infringement.

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

INPEX'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	Level 22, 100 St Georges Terrace Perth 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	Level 22, 100 St Georges Terrace Perth 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: 283.65 Ha **Disturbance Footprint:** 77.35 Ha

2.2 Footprint details

2.2.1 What is the address of the proposed action? *

144 Wickham Point Road, Wickham NT 0822

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

Northern Territory

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

No

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

The land use zones for Middle Arm peninsula applicable to project components within the Project area are detailed below:

Ichthys LNG Facility

- Freehold land (NT Portion 7002). Land use listed as development under the NT Planning Scheme.

Supplementary power intake substation area

- Crown land (Section 1888). Land use listed as development under the NT Planning Scheme.

Ichthys CCS pipeline area

- Freehold land (Section 1908). Land use listed as development under the NT Planning Scheme.
- Crown land (Road reserve). Land use listed as main road under the NT Planning Scheme.
- Crown land (Road reserve). Land use listed as proposed main road under the NT Planning Scheme.
- Freehold land (Section 1958). Land use listed as utilities under the NT Planning Scheme.

Ichthys CCS pipeline tie-in station area

- Freehold land (Section 1896). Land use listed as utilities under the NT Planning Scheme.

Ichthys CCS (Darwin LNG link) pipeline area

- Freehold land (Section 1958). Land use listed as utilities under the NT Planning Scheme.
- Crown land (Road reserve). Land use listed as main road under the NT Planning Scheme.
- Freehold land (Section 1860). Land use listed as future development under the NT Planning Scheme.

Darwin LNG pipeline tie-in station area

- Freehold land (Section 1860). Land use listed as future development under the NT Planning Scheme.

Further information is detailed in ***Attachment A: Ichthys Carbon Capture and Storage (CCS) Project – Supporting Information Document (Section 2.2.2, Table 2-1 and Figure 2-5)***

3. Existing environment

3.1 Physical description

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

Location

The Project is wholly located on Middle Arm peninsula. The area encompasses locations within the existing Ichthys LNG facility located on Bladin Point on the northern side of Middle Arm peninsula, and on the western side of Middle Arm Peninsula (refer to ***Attachment A: Ichthys Carbon Capture and Storage (CCS) Project – Supporting Information Document (Section 2.2.1, Figure 2-2)***).

The Project at its closest point is located approximately:

- 4km from Palmerston (the nearest residential zone)
- 4km (by sea) from East Arm Wharf
- 7km south-east of the Darwin central business district (CBD), across Darwin Harbour waters
- the Santos operated Darwin LNG processing and export facility is directly adjacent to the Project development area.

Current condition

Project area encompasses the following:

- areas required to be disturbed as a result of civil construction and commissioning activities required to support the installation of new infrastructure
- areas which may be utilised for temporary laydown, siting of plant equipment and other facilities required for construction and commissioning activities
- the operational area of the Project, including any buffers required to protect infrastructure.

Project footprint comprises a total area of approximately 77 hectares (ha) and incorporates areas of previously disturbed land. The project footprint includes the following five defined areas:

- the Ichthys CCS pipeline area
- the Ichthys CCS pipeline tie-in station area
- the Ichthys CCS (Darwin LNG link) pipeline area
- the Darwin LNG pipeline tie-in station area
- the supplementary power intake sub-station area.

Refer to ***Attachment A Figure 2-3 and Figure 2-4*** for the Project area and Project footprint.

Ichthys CCS Pipeline area

The Ichthys CCS pipeline area commences at the Ichthys LNG facility boundary and terminates at the Ichthys CCS pipeline tie-in station (refer to ***Attachment A (Figure 2-3)***). The area includes areas previously disturbed during the construction of the Ichthys Project (refer to ***Attachment A (Section 1.5)***). The total area is approximately 53 ha, which encompasses areas of both permanent disturbance and temporary disturbance.

Ichthys CCS Pipeline tie-in station area

The Ichthys CCS pipeline tie-in station area would be located, adjacent to the existing Ichthys LNG Project GEP beach valve station on the western side of Wickham Point Road (refer to ***Attachment A (Figure 2-3)***). The area includes areas previously disturbed during the construction of the Ichthys Project (refer to ***Attachment A (Section 1.5)***). The total area is approximately 3.5 ha and encompasses both areas of permanent disturbance and temporary disturbance.

Ichthys CCS Pipeline (Darwin LNG link) area

The Ichthys CCS pipeline (Darwin LNG link) area commences at the Ichthys CCS pipeline tie-in station and terminates at the Darwin LNG pipeline tie-in station (refer to ***Attachment A (Figure 2-3)***). The area includes areas previously disturbed during the construction of third-party pipelines associated with the Darwin LNG facility. The total area is approximately 16 ha, which encompasses areas of both permanent disturbance and temporary disturbance.

Darwin LNG pipeline tie-in station area

The Darwin LNG pipeline tie-in station area would be located adjacent to the Darwin LNG facility boundary on the southwestern side of Wickham Point Road (Refer to ***Attachment A (Figure 2-3)***). This area will require clearing of pre-disturbed and native vegetation. The total area is approximately 1.5 ha, which encompasses areas of both permanent disturbance and temporary disturbance.

Supplementary power intake substation area

The supplementary power intake substation area would be located near the Ichthys LNG facility on land in Section 1888 (refer to ***Attachment A (Figure 2-3 and Figure 2-5)***). The area includes areas previously disturbed during the construction of Ichthys Project (refer to ***Attachment A (Section 1.5)***). The total area is approximately 3.5 ha, which encompasses areas of both permanent disturbance and temporary disturbance.

Most of the project footprint required to be cleared is located in previously disturbed areas (i.e. construction ROWs of the Ichthys GEP or other pipelines on Middle Arm or locations used during the initial construction of the Ichthys LNG facility). However, some areas of native vegetation would need to be cleared. A total combined area of approximately 40 ha is proposed to be cleared.

Wickham Point Road and Channel Island Road are public access roads providing entry to the industrial premises, with associated parallel utility corridors.

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

Land tenure, planning and zoning

The Middle Arm peninsula lies within the Litchfield Council region. The Project area encompasses land zoned under the Northern Territory Planning Scheme 2020 as either Development, Future Development, Utilities, Main Road and Proposed Main Road. Surrounding land is mostly zoned as Conservation.

The land use zones for Middle Arm peninsula applicable project components within the Project area are described below:

- Ichthys LNG Facility – Freehold land (NT Portion 7002), development land use zone
- Supplementary power intake sub-station – Crown land (Section 1888), development land use zone
- Ichthys CCS pipeline
    - Freehold land (Section 1908), development land use zone
    - Crown land (Road reserve), main road land use zone
    - Crown land (Road reserve), proposed main road land use zone
    - Freehold land (Section 1958), utilities land use zone
- Ichthys CCS pipeline tie-in station – Freehold land (Section 1896), utilities land use zone
- Ichthys CCS (Darwin LNG link) pipeline
    - Freehold land (Section 1958), utilities land use zone
    - Crown land (Road reserve), main road land use zone
    - Freehold land (Section 1860), future development land use zone
- Darwin LNG pipeline tie-in station – Freehold land (Section 1860), future development land use zone

Further information is provided in ***Attachment A: Ichthys Carbon Capture and Storage (CCS) Project – Supporting Information Document (Section 2.2.2, Figure 2-5)***).

Existing land use and infrastructure

The Middle Arm Precinct (location of project area) provides an area for processing and transmission of utilities, particularly gas. This includes most notably the Ichthys LNG and Darwin LNG facilities and their associated infrastructure. Oil and gas infrastructure in proximity to the Project area, as well as current land uses of Middle Arm Peninsula are described below:

- Darwin LNG facility – operator/owner Santos, 200m north of the Project area
- Channel Island power station – operator/owner Territory Generation, 2km south-west of the Project area
- Weddel power station – operator/owner Territory Generation, 5km south-east of the Project area
- Bladin village – operator/owner Trepang Services Pty Ltd, 2km south-east of the Project area
- Darwin aquaculture centre – operator/owner Northern Territory Government, 2km south-west of the Project area

Other proposed uses of the Middle Arm peninsula include the proposed Middle Arm Sustainable Development Precinct, currently the subject of a Strategic Assessment under the *Environment Protect and Biodiversity Conservation Act 1999* (Cwlth) and *Environment Protection Act 2019* (NT). It is proposed that this will be a hub for manufacturing, export and energy industries.

Other existing uses

The Project area is surrounded by Darwin Harbour that supports a range of commercial and recreational maritime uses, including fisheries, tourism and recreational shipping/boating activities. The water surrounding Middle Arm Peninsula is used for recreational fishing, sailing and general boating. Boat ramps in proximity to the Project area include Channel Island, Palmerston and East Arm.

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

Northern Territory reserves and parks

No Northern Territory (NT) protected reserves or parks overlap the Project area; however, there are a number of parks and reserves within proximity to the Project area described below:

- Casuarina Coastal Reserve (IUCN Category – V (protected landscape or seascape)) 15km from the Project area
- Charles Darwin National Park (IUCN Category – V (protected landscape or seascape)) 6km from the Project area
- Holmes Jungle Nature Park (IUCN Category – V (protected landscape or seascape)) 11km from the Project area
- Knuckey Lagoons Conservation Reserve (IUCN Category – IV (habitat or species management area)) 8km from the Project area
- Howard Spring Nature Park (IUCN Category – V (protected landscape or seascape)) 13km from the Project area
- Howard Spring Hunting Reserve (IUCN Category – VI (protected area with sustainable use of natural resources)) 16km from the Project area

Further information is provided in ***Attachment A: Ichthys Carbon Capture and Storage (CCS) Project – Supporting Information Document (Section 4.2.5 – Northern Territory reserves and parks, Table 4-6, Figure 4-5).***

Wetlands

There are no RAMSAR wetlands within or in proximity to the Project area, however, a national important wetland (NIW), Port Darwin NIW, overlaps the Project area (refer to ***Attachment A (Figure 4-6)***).

Further information is provided in ***Attachment A (Section 4.2.5 – wetlands, Figure 4-6).***

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

The Project area is generally flat and varies only 10 m in topography. After rainfall, the majority of surface water will flow into either the adjacent creeks (Lightning, Cossack or Jones creeks) Elizabeth River that feed in Darwin Harbour or directly into Darwin Harbour.

A semi-confined aquifer in the clayey sand/gravel horizons of the Darwin Formation generally follows the topography of the Project area with the lowest levels located near the coast. The groundwater levels in this aquifer fluctuate seasonally between 0.5 and 5 metres and are also influenced by the Darwin Harbour tides in coastal areas. Groundwater level contours indicate that groundwater flows radially from the central part of Ichthys LNG site towards low lying area typically inundated by tides. The construction of the Ichthys LNG facility has altered the topography of Bladin Point and the recharge of groundwater through decreased permeability associated with compacted soil and fill, sealed surfaces and storm water drainage system.

Further information is provided in ***Attachment A: Ichthys Carbon Capture and Storage (CCS) Project – Supporting Information Document (Section 4.1.4 – hydrology and hydrogeology).***

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.

Flora and ecological communities

The Project area lies within the Darwin Coastal Bioregion, which is characterised by mangroves, monsoon vine forest and tall open eucalypt forest (refer to ***Attachment A: Ichthys Carbon Capture and Storage (CCS) Project - Supporting Information Document (Section 4.2.1, Figure 4-2***)). The large portions of the Project area were previously cleared during the construction of Ichthys LNG Project. There is no remaining native vegetation within the Ichthys LNG facility site boundaries.

A ground-truth vegetation survey of the Project Area was undertaken in December 2023 to verify existing vegetation within the corridor. There were five broad vegetation systems within the Project Area identified: eucalypt woodland, drainage, grassland, mangrove and mixed monsoon forest. There were 24 vegetation units within the broader communities.

The mangrove communities were the dominant vegetation community within the Project area, followed by monsoon forest, Eucalypt woodland communities and areas of regrowth, with less than 1% coverage of drainage communities, grasslands or disturbed land. The majority of vegetation communities were consistent with existing mapping.

Whilst there are no threatened ecological communities in the vicinity of the Project area, the mangrove communities and the monsoon vine forest near the Project area are considered to have high conservation value in Darwin Harbour for biological and cultural reasons.

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.

Mangrove mapping by Brocklehurst et al (2018) indicates that the mangrove communities present adjacent to the Project area 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)
- *Avicenniaa marina*/*Ceriops* spp low open-forest/low closed-forest
- mixed species low open-forest/low closed-forest
- *Sonneratia alba* low woodland/low open forest.

These mangrove communities are considered regionally common and represented throughout Darwin Harbour. Further information is provided in ***Attachment A (Section 4.2.1 - Mangroves and Figure 4-2).***

Threatened Flora

The PMST search identified three EPBC Act listed threatened plant species as having potential to occur within the Project area; *Atalaya brevialata*, *Stylidium ensatum* (a triggerplant) and *Typhonium taylorii* (refer to ***Attachment A: Appendix A - Ichthys Carbon Capture and Storage (CCS) Project EPBC Act Protected Matters Search).*** A ground-truth vegetation survey of the Project area was undertaken in December 2023 to verify existing vegetation mapping of the area and identify suitable habitat for the *Territory Parks and Wildlife Conservation Act 1976* (TPWC Act) listed threatened flora species; *Cycas armstrongii* (Darwin cycad) and *Typhonium praetermissum/Typhonium* sp. Cox Peninsula.

Targeted surveys have focused on determining the density of the Darwin cycad across Middle Arm Peninsula, and suitable habitat (savanna woodland) for the species has been detected within the Project area.

The Project area may overlap known *Typhonium* distribution identified directly adjacent, however, no suitable habitat was identified within the survey footprint.

Weeds

Annual weed surveys have been undertaken by INPEX on Middle Arm Peninsula for environmental monitoring compliance. Weed surveys undertaken in and around Ichthys LNG facility between November 2018 and May 2023 recorded 12 weed species, some of which are declared as weeds under the *Weeds Management Act 2001* (NT).

Thirty-two incidental weed records were obtained during field investigations in December 2023. Gamba grass (*Andropogon gayanus*) was the most common weed species, followed by wild passionfruit (*Passiflora foetida*) and hyptis (*Mesosphaerum suaveolens*). There were two Weeds of National Significance present within the Project area: gamba grass and *Lantana camara*. Weeds were most prominent along the edges of tracks and disturbed areas that had been previous cleared.

Terrestrial fauna and habitats

The local Eucalyptus woodland habitat contained the highest species richness for animals during the surveys. No trees within the proposed corridor met the threshold for large, hollow-bearing trees to support hollow-dependent native fauna species. However, the surveyed corridor transects other suitable habitat for the following terrestrial fauna species:

- bare-rumped sheath-tailed bat (*Saccolaimus saccolaimus nudicluniatus*) (savanna woodland)
- black-footed tree-rat (*Mesembriomys gouldii gouldii*) (savanna woodland)
- northern brushtail possum (*Trichosurus vulpecula arnhemensis*) (savanna woodland)
- Mitchell's water monitor (*Varanus mertensi*) (mangroves).

Further, the Ichthys CCS Pipeline (Darwin LNG link) transects areas of saltpans, near Wickham Point Road up to the Ichthys CCS pipeline tie-in station, which are known to be important roosting habitat for threatened shorebirds

Threatened species

The PMST (included a 20km buffer surrounding the Project area) search identified 56 listed threatened species and 71 migratory species which may be present or adjacent to the Project area (refer to ***Attachment A - Appendix A****)*. 28 of the listed species were both threatened and/or migratory. Further, 40 species were also listed under the TPWC Act.

A likelihood of occurrence (LoO) assessment was undertaken to determine which species have the potential to occur in the vicinity of the Project Area (refer to ***Attachment A: Appendix B - Ichthys Carbon Capture and Storage (CCS) Project Likelihood of Occurrence***).

Avifauna

Avifauna that could potentially use or pass through the Project area are identified in ***Table 4-5*** within ***Attachment A***. A description of individual avifauna species with the potential to occur within the Project area is presented in the likelihood of occurrence assessment (refer to ***Attachment A - Appendix B***). In addition to six species of seabirds, the search of the EPBC Act Protected Matters database (refer to ***Attachment A - Appendix A***) identified 36 species of shorebirds 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.

Twelve shorebird species were recorded on the Middle Arm Peninsula during the targeted shorebird surveys from 2018 to 2022. Of the 12 species recorded, seven shorebird species are currently listed as threatened under the EPBC Act or TPWC Act, including:

- common greenshank (*T. nebularia*)
- far eastern curlew (*N. madagascariensis*)

- greater sand plover (*C. leschenaultii*)
- grey plover (*P. squatarola*)
- bar-tailed godwit (*L. lapponica baueri*)
- sharp-tailed sandpiper (*C. acuminata*)
- terek sandpiper (*Z. cinereus*).

Shorebird count data for Middle Arm between 2018 and 2022 is presented in ***Attachment A (Section 4.2.3 - Avifauna, Figure 4-4).***

The intertidal areas along Middle Arm from Lightning Creek to the north-west of the Peninsula, including Cossack Creek, represent one of three key foraging sites within Darwin Harbour. Large congregations of shorebirds have been recorded during low tide aerial surveys on the intertidal mudflat between the Bladin Point and the Darwin LNG facility. However, survey records show that areas immediately surrounding the Ichthys LNG facility (within one kilometre buffer) are not core habitat in context to surrounding areas of the Middle Arm Peninsula.

The saltpans (used as roost sites) surrounding Ichthys LNG facility are not used by the shorebirds and fewer shorebirds have been observed within the intertidal foraging habitat in comparison to the broader Middle Arm Peninsula.

Terrestrial mammals

Three terrestrial mammal species have a LoO within the Project area: Bare-rumped sheath-tailed bat, Black-footed tree-rat (Kimberley and mainland NT) and the Northern brushtail possum. Further information regarding these species is provided in ***Attachment A (Section 4.2.3 - Terrestrial mammals).***

A list of EPBC and TPWC Act Threatened and/or Migratory terrestrial mammals predicted to occur within the Project area or 20km buffer is provided in ***Attachment A (Section 4.2.3, Table 4-5)***.

Terrestrial reptiles

One terrestrial reptile species; Mitchell's water monitor has a LoO within the Project area. Further information regarding this species is provided in ***Attachment A (Section 4.2.3 - Terrestrial reptiles).***

A list of EPBC and TPWC Act Threatened and/or Migratory terrestrial reptiles predicted to occur within the Project area or 20km buffer is provided in ***Attachment A (Section 4.2.3, Table 4-5).***

Invertebrates

One invertebrate species has a LoO within the Project area: Atlas moth. Further information regarding this species is provided in ***Attachment A (Section 4.2.3 - Invertebrates).***

A list of EPBC and TPWC Act Threatened Invertebrates predicted to occur within the Project area or 20km buffer is provided in ***Attachment A (Section 4.2.3, Table 4-5)***.

Other matters of national environmental significance identified in the PMST report relate to the surrounding Darwin Harbour, these include:

- a wetland of national significance in the Directory of Important Wetlands in Australia (Port Darwin NT029).
- a biologically important area (BIA) for breeding and foraging, for Australian snubfin dolphin (*O. heinsohni*), Indo-Pacific humpback dolphin (*S. chinensis)* and Indo-Pacific bottlenose dolphin (*T. Aduncus*); and
- a BIA for flatback turtle internesting and habitat critical to the species survival.

Further information regarding threatened/migratory fauna present within or adjacent to the Project area is provided in ***Section 4.2.3*** of ***Attachment A.***

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

Flora and ecological communities

The Project area lies within the Darwin Coastal Bioregion, which is characterised by mangroves, monsoon vine forest and tall open eucalypt forest (refer to ***Attachment A: Ichthys Carbon Capture and Storage (CCS) Project - Supporting Information Document (Section 4.2.1, Figure 4-2***)). The large portions of the Project Area were previously cleared during the construction of Ichthys LNG Project. There is no remaining native vegetation within the Ichthys LNG facility site boundaries.

A ground-truth vegetation survey of the Project area was undertaken in December 2023 to verify existing vegetation within the corridor. There were five broad vegetation systems within the Project area identified: eucalypt woodland, drainage, grassland, mangrove and mixed monsoon forest. There were 24 vegetation units within the broader communities.

The mangrove communities were the dominant vegetation community within the Project area, followed by monsoon forest, Eucalypt woodland communities and areas of regrowth, with less than 1% coverage of drainage communities, grasslands or disturbed land. The majority of vegetation communities were consistent with existing mapping.

Whilst there are no threatened ecological communities in the vicinity of the Project area, the mangrove communities and the monsoon vine forest near the Project area are considered to have high conservation value in Darwin Harbour for biological and cultural reasons.

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.

Mangrove mapping by Brocklehurst et al (2018) indicates that the mangrove communities present adjacent to the Project area 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).
- *Avicenniaa marina*/*Ceriops* spp low open-forest/low closed-forest.
- mixed species low open-forest/low closed-forest.
- *Sonneratia alba* low woodland/low open forest.

These mangrove communities are considered regionally common and represented throughout Darwin Harbour. Further information is provided in ***Attachment A (Section 4.2.1 - Mangroves and Figure 4-2).***

Threatened Flora

The PMST search identified three EPBC Act listed threatened plant species as having potential to occur within the Project area; *Atalaya brevialata*, *Stylidium ensatum* (a triggerplant) and *Typhonium taylorii* (refer to ***Attachment A: Appendix A - Ichthys Carbon Capture and Storage (CCS) Project EPBC Act Protected Matters Search***)***.*** A ground-truth vegetation survey of the Project area was undertaken in December 2023 to verify existing vegetation mapping of the area and identify suitable habitat for the *Territory Parks and Wildlife Conservation Act 1976* (TPWC Act) listed threatened flora species; *Cycas armstrongii* (Darwin cycad) and *Typhonium praetermissum/Typhonium* sp. Cox Peninsula.

Targeted surveys have focused on determining the density of the Darwin cycad across Middle Arm Peninsula, and suitable habitat (savanna woodland) for the species has been detected within the Project area.

The Project area may overlap known *Typhonium* distribution identified directly adjacent, however, no suitable habitat was identified within the survey footprint.

Weeds

Annual weed surveys have been undertaken by INPEX on Middle Arm Peninsula for environmental monitoring compliance. Weed surveys undertaken in and around Ichthys LNG facility between November 2018 and May 2023 recorded 12 weed species, some of which are declared as weeds under the *Weeds Management Act 2001* (NT).

Thirty-two incidental weed records were obtained during field investigations in December 2023. Gamba grass (*Andropogon gayanus*) was the most common weed species, followed by wild passionfruit (*Passiflora foetida*) and hyptis (*Mesosphaerum suaveolens*). There were two Weeds of National Significance present within the Project area: gamba grass and *Lantana camara*. Weeds were most prominent along the edges of tracks and disturbed areas that had been previous cleared.

Geology and geomorphology

The Project area 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 metre) to moderately deep (0.25 to <0.5 metre).

Subsurface conditions along the Project pipeline corridor are highly variable, reflecting a mix of coastal, estuarine, and residual geological environments. The stratigraphy generally transitions from soft, compressible marine deposits in mangrove and tidal zones to residual soils and weathered rock in elevated or inland areas.

The main soil and rock types encountered along the alignment include:

- Mangrove Mud Very soft to soft, high-plasticity clay or clayey silt with organic content, often fibrous or peaty. These materials are prevalent in low-lying, tidally influenced areas and present significant geotechnical challenges for stability and settlement.
- Alluvium: Ranges from loose clayey gravel to sandy clay, often weakly cemented. Both fine- and coarse-grained alluvium are present, with stiffness and density increasing inland.
- Lateritic Soils: Sandy or gravelly clays with low to high plasticity, often overlying residual rock. These are typically medium-dense to dense and offer improved bearing capacity compared to marine sediments.
- Residual Soils and Phyllite: Residual phyllite soils (silty clays or sands) are stiff to hard and transition into shallow phyllite bedrock with low to medium strength. Weathered phyllite and siltstone are commonly found beneath lateritic crusts or alluvium.

Further information is provided in ***Attachment A (Section 4.1.5).***

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.

Commonwealth heritage places

There are no Commonwealth heritage places within or adjacent to the Project area.

World heritage places

There are no world heritage places within or adjacent to the Project area.

National heritage places

There are no National heritage places within or adjacent to the Project area.

Cultural heritage sites and objects

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, petroglyphs at Middle Arm, skeletal remains at Middle Arm and shell middens at Wickam Point.

A 2024 draft heritage desktop study investigated the area between the current INPEX operated Ichthys LNG facility and the Darwin LNG facility. It found that the northern section of the wider Middle Arm Peninsula contains some 123 recorded archaeological / heritage sites and isolated artefacts.

A small number of these sites intersect with the Project area, most notably around the Darwin LNG pipeline tie-in station, to the south of the salt flats in the Ichthys CCS pipeline (Darwin LNG link) area and at the intersection of Wickham Point Road and the Ichthys LNG facility access road. There are no known Aboriginal heritage sites remaining within the fence line of the Ichthys LNG facility.

In the Northern Territory Aboriginal heritage sites/objects are automatically protected under the *Heritage Act 2011* (Northern Territory).

Sacred sites

Sacred sites are places within the landscape that have a special meaning or significance under Aboriginal tradition. In coastal and sea areas, sacred sites may include features that lie both below and above the water. There are several sacred sites in Darwin Harbour and the surrounding waters. All sacred sites within the Northern Territory are protected under the Northern Territory Aboriginal Sacred Sites Act 1989.

Anyone proposing to use or work on land in the Northern Territory may apply to the AAPA for an Authority Certificate to cover their proposed activities. Authority Certificates are issued following consultation with traditional custodians and include conditions on what can and cannot be done in and around identified sacred sites. The Larrakia people are acknowledged as the traditional owners of the area in and around Darwin.

The Project through its infrastructure design, including construction and decommissioning methodologies would seek to avoid and minimise the impacts on known heritage sites as far as reasonably practicable, implement robust chance finds procedures, leverage its stablished mechanisms to facilitate consultation and heritage management with Larrakia people and organisations, as well as ensure compliance with regulatory heritage requirements.

INPEX currently holds three Authority certificate which cover the Project area and works associated with the Project: C2011/166, C2025/082 and C2014/007. Further information is provided in ***Attachment A: Ichthys Carbon Capture and Storage (CCS) Project – Supporting Information Document (Section 4.3.3, Table 4-8)***).

Historic heritage

Archaeological surveys undertaken to support the Ichthys Project identified World War II objects on Bladin Point. There are no known World War II heritage sites within the fence line of the Ichthys LNG facility, where Project activities are planned to be undertaken.

A search of the Australian Heritage Database shows that there are two places as part of the Register of the National Estate, within vicinity of the Project area (refer to ***Figure 4-7*** in ***Attachment A****)*.

- Channel Island Leprosarium: Site Status – Registered (14/05/1991)
- Channel Island Reefs: Site Status – Registered (30/06/1992)

The Channel Island Leprosarium and Reefs (approximately 2km southwest of the Project area) have been declared and are protected under the *Heritage Act 2011* (Northern Territory) (refer to ***Figure 4-7*** in ***Attachment A****)*.

Further information is provided within ***Section 4.3*** of ***Attachment A.***

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

Traditional Owners

Aboriginal and Torres Strait Islander peoples' continuing connection to country is recognised in Australia under both State/Territory and Commonwealth legislation. At a national level, the Native Title Act 1993 (Cwlth) establishes Native title, which recognises, under Australian common law, pre-existing Indigenous rights and interests according to traditional laws and customs. Native title is different from land rights as it is not a grant or right created by governments.

Aboriginal land in the Northern Territory is defined by the Aboriginal Land Rights (Northern Territory) Act 1976 (Cwlth), which affords Traditional Owners sovereign rights to country. In some instances, where Native Title exists it may extend over land and sea.

Two Aboriginal land councils represent Aboriginal communities in the region: the Northern Land Council and Tiwi Land Council in Northern Territory. There are also a number of Prescribed Bodies Corporates that represent Aboriginal peoples in the Northern Territory.

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).

It has been established that human presence in the Northern Territory dates back 65,000 years, and continuous occupation of the Tiwi Islands of at least 6,000 years, pending further archaeological investigation (Burns 1994). Archaeological sites and evidence, including shell mounds and rock art, found throughout Darwin and Middle Arm Peninsular in the harbour provides evidence for Aboriginal occupation of this area over time and throughout landscape changes (O'Brien et Al. 2025).

Aboriginal and Torres Strait Islander peoples have passed down their culture through generations over the past 65,000 years. Historically, Aboriginal people lived in small family groups and were semi-nomadic, with each family group living in a defined territory, systematically moving across a defined area following seasonal changes. Aboriginal people built semi-permanent dwellings; as a nomadic society emphasis was on relationships to family, group and country. Membership within each family or language group was based on birthright, shared language, and cultural obligations and responsibilities. Groups had their own distinct history and culture and at certain times, family groups would come together for social, ceremonial and trade purposes (Working with Indigenous Australians 2023).

Cultural heritage sites and objects

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, petroglyphs at Middle Arm, skeletal remains at Middle Arm and shell middens at Wickam Point.

A 2024 draft heritage desktop study investigated the area between the current INPEX operated Ichthys LNG facility and the Darwin LNG facility. It found that the northern section of the wider Middle Arm Peninsula contains some 123 recorded archaeological / heritage sites and isolated artefacts.

A small number of these sites intersect with the Project area, most notably around the Darwin LNG pipeline tie-in station, to the south of the salt flats in the Ichthys CCS pipeline (Darwin LNG link) area and at the intersection of Wickham Point Road and the Ichthys LNG facility access road. There are no known Aboriginal heritage sites remaining within the fence line of the Ichthys LNG facility.

In the Northern Territory Aboriginal heritage sites/objects are automatically protected under the *Heritage Act 2011* (Northern Territory).

Sacred sites

Sacred sites are places within the landscape that have a special meaning or significance under Aboriginal tradition. In coastal and sea areas, sacred sites may include features that lie both below and above the water. There are several sacred sites in Darwin Harbour and the surrounding waters. All sacred sites within the Northern Territory are protected under the Northern Territory Aboriginal Sacred Sites Act 1989.

Anyone proposing to use or work on land in the Northern Territory may apply to the AAPA for an Authority Certificate to cover their proposed activities. Authority Certificates are issued following consultation with traditional custodians and include conditions on what can and cannot be done in and around identified sacred sites. The Larrakia people are acknowledged as the traditional owners of the area in and around Darwin.

The Project through its infrastructure design, including construction and decommissioning methodologies would seek to avoid and minimise the impacts on known heritage sites as far as reasonably practicable, implement robust chance finds procedures, leverage its stablished mechanisms to facilitate consultation and heritage management with Larrakia people and organisations, as well as ensure compliance with regulatory heritage requirements.

INPEX currently holds three Authority certificate which cover the Project area and works associated with the Project: C2011/166, C2025/082 and C2014/007. Further information is provided in ***Attachment A: Ichthys Carbon Capture and Storage (CCS) Project – Supporting Information Document (Section 4.3.3, Table 4-8)***).

Further information is provided within ***Section 4.3*** of ***Attachment A***.

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. *

Hydrology and hydrogeology

The Project area is generally flat and varies only 10 m in topography. After rainfall, the majority of surface water will flow into either the adjacent creeks (Lightning, Cossack or Jones creeks) Elizabeth River that feed in Darwin Harbour or directly into Darwin Harbour.

Groundwater levels are generally shallow, with recharge mainly occurring by rainfall infiltration during the wet season. A semi-confined aquifer in the clayey sand/gravel horizons of the Darwin Formation generally follows the topography of the Project area with the lowest levels located near the coast. The groundwater levels in this aquifer fluctuate seasonally between 0.5 and 5 metres and are also influenced by the Darwin Harbour tides in coastal areas. Groundwater level contours indicate that groundwater flows radially from the central part of Ichthys LNG site towards low lying area typically inundated by tides. The construction of the Ichthys LNG facility has altered the topography of Bladin Point and the recharge of groundwater through decreased permeability associated with compacted soil and fill, sealed surfaces and storm water drainage system. Ongoing groundwater monitoring throughout operations has measured both increases and decreases in seasonal groundwater levels compared to the baseline.

Refer to ***Attachment A: Ichthys Carbon Capture and Storage (CCS) Project - Supporting Information Document (Section 4.1.4)*** for further information.

Groundwater quality

Aquifers in the Darwin Formation are typically acidic to neutral, with a pH ranging from 4.1 to 7.6. Sampling of groundwater at the Ichthys LNG site prior to construction recorded fresh to saline water with pH levels of 4.6 to 6.4. The natural acidity of groundwater reflects the natural acidic soils found within the Project area. Reported concentrations of aluminium, arsenic, cadmium, copper, manganese, nickel and zinc were higher than ANZG (2018) trigger values prior to commencement of construction. Reported concentrations are a likely result of historic groundwater interaction at different depths within the aquifer with soil stratigraphy for some time under acidic conditions resulting in metal mobilisation. Nutrients have likely been released into the uppermost aquifer by rainwater interaction with organic rich surface material, organic muds and inorganic minerals in rocks and soils.

Under the *Water Act 1992* (Northern Territory), beneficial uses for groundwater have been declared for the Darwin Rural Adelaide River Water Control District which includes the Project area. These are listed as agriculture, aquaculture, environment, public water supply, cultural, Aboriginal economic development, industry, rural stock and domestic, mining activity and petroleum activity.

Groundwater monitoring carried out throughout Ichthys LNG construction phase analysed a large number of bores and parameters. Groundwater parameters were not uniform across Ichthys LNG site, with natural pockets of acidic groundwater and variable metal concentrations. Natural groundwater pH values were consistently lower than pH 7 (median of 5.5) and in some cases were as low as pH 3, with no notable decreasing trend over the construction monitoring (AEC Environmental 2018). Groundwater monitoring along the proposed Ichthys CCS pipeline route showed similar trends to that seen within the Ichthys LNG site, with pH varying between 3.5 and 7.2 (median of 5.6). The groundwater levels during construction rose and fell in accordance with the season, with the lowest levels in October (dry season end) and the peak levels being reached in late-March/early-April (wet season end). Measured salinity levels also indicated that majority of bores are brackish to hypersaline. Naturally elevated concentrations of metals and nutrients were consistently reported throughout construction. Majority of nutrient samples (88 % of ammonia, 73% of total nitrogen, 67% of total phosphorus and 61% of oxides of nitrogen) exceeded water quality objectives for Darwin Harbour (NRETAS 2010). Similarly, metals frequently exceeding their relevant trigger values (41% of aluminium, 63% of arsenic, 25% of cadmium, 80% of cobalt, 22% of copper, 66% of manganese, 52% of nickel, 58% of zinc).

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	No	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.

—

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 adjacent 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.

—

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 placed within or adjacent 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.

—

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 or adjacent 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
No	Yes	Arenaria interpres	Ruddy Turnstone
No	No	Balaenoptera musculus	Blue Whale
No	Yes	Calidris acuminata	Sharp-tailed Sandpiper
No	Yes	Calidris canutus	Red Knot, Knot
No	Yes	Calidris ferruginea	Curlew Sandpiper
No	Yes	Calidris tenuirostris	Great Knot
No	No	Carcharodon carcharias	White Shark, Great White Shark
No	No	Caretta caretta	Loggerhead Turtle
No	Yes	Charadrius leschenaultii	Greater Sand Plover, Large Sand Plover
No	Yes	Charadrius mongolus	Lesser Sand Plover, Mongolian Plover
No	No	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	No	Dermochelys coriacea	Leatherback Turtle, Leathery Turtle, Luth
No	No	Eretmochelys imbricata	Hawksbill Turtle
No	No	Erythrotriorchis radiatus	Red Goshawk
No	No	Falco hypoleucos	Grey Falcon
No	No	Geophaps smithii smithii	Partridge Pigeon (eastern)

Direct impact	Indirect impact	Species	Common name
No	No	Glyphis garricki	Northern River Shark, New Guinea River Shark
No	No	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
No	Yes	Natator depressus	Flatback Turtle
Yes	Yes	Numenius madagascariensis	Eastern Curlew, Far Eastern Curlew
No	Yes	Orcaella heinsohni	Australian Snubfin Dolphin
No	No	Petrogale concinna canescens	Nabarlek (Top End)
No	No	Phascogale pirata	Northern Brush-tailed Phascogale
No	Yes	Pluvialis squatarola	Grey Plover
No	Yes	Pristis clavata	Dwarf Sawfish, Queensland Sawfish
No	No	Pristis pristis	Largetooth Sawfish, Freshwater Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish
No	Yes	Pristis zijsron	Green Sawfish, Dindagubba, Narrowsnout Sawfish
No	No	Rhincodon typus	Whale Shark
No	Yes	Rostratula australis	Australian Painted Snipe
Yes	Yes	Saccolaimus saccolaimus nudicluniatus	Bare-rumped Sheath-tailed Bat, Bare-rumped Sheathtail Bat
No	Yes	Sousa sahulensis	Australian Humpback Dolphin
No	No	Sphyrna lewini	Scalloped Hammerhead
No	Yes	Sternula albifrons	Little Tern

Direct impact	Indirect impact	Species	Common name
No	No	Tiliqua scincoides intermedia	Northern Blue-tongued Skink
Yes	Yes	Trichosurus vulpecula arnhemensis	Northern Brushtail Possum
No	Yes	Tringa nebularia	Common Greenshank, Greenshank
No	No	Tyto novaehollandiae kimberli	Masked Owl (northern)
No	No	Uperoleia daviesae	Howard River Toadlet, Davies's Toadlet
No	No	Varanus mertensi	Mertens' Water Monitor
No	Yes	Varanus mitchelli	Mitchell's Water Monitor
No	Yes	Xenus cinereus	Terek Sandpiper
No	No	Xeromys myoides	Water Mouse, False Water Rat, Yirrkoo

Ecological communities

—

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 Ichthys Supporting Information Document (***Attachment A: Ichthys Carbon Capture and Storage (CCS) Project - Supporting Information Document (Section 6.5, Appendix F)***) includes a preliminary screening assessment of potential impacts and risks to threatened / migratory species and ecological communities. A summary of the potential impacts based on the Project area is provided below.

Direct Impacts

The Project may result in direct impacts to threatened and migratory species as a result of vegetation clearing and earthworks. The Project infrastructure would largely be built within an existing, previously cleared and in parts rehabilitated corridor, however clearing of some areas of previously undisturbed native vegetation would be required. The total area cleared would be determined and refined during the project design and approvals process and depend on the final construction methodology chosen, with a large portion only planned as temporary clearance to support construction works followed by rehabilitation.

The construction and ongoing maintenance of pipelines and associated onshore infrastructure is anticipated to result in the direct loss of some native vegetation and habitat, potentially including areas important to species listed under the EPBC Act and TPWC Act.

Vegetation clearance for easements and infrastructure footprints leads to the removal of flora and potential disruption of ecosystems, with potential consequences for threatened or migratory species that may rely on the habitat for foraging and breeding.

Indirect Impacts

The Project may result in indirect impacts to threatened or migratory species. These are described in further detail in ***Attachment A (Section 7.2.3, Section 7.7.3, and Appendix F)*** and summarised below. Mitigation and controls required to manage and potential indirect impacts are described in ***Attachment A (Section 7)***.

<u>Noise and Vibration</u>

Airborne noise and vibration from activities associated with the project could result in the following potential impacts on terrestrial reptiles, mammals and avifauna:

- Habitat displacement of various reptiles and amphibians that usually inhabit in proximity to the proposed pipeline corridor
- Foraging and dispersal patterns, thereby changing where they are present
- Changes in reproduction patterns, potentially impacting population dynamics
- Additional or elevated stress for taxa, being on high alert constantly
- Impacted vocal production and perception of acoustic communication between taxa
- Potentially impacting a species ability to predate upon other species due to increased noise or vibration levels.

Airborne noise and vibration also has the potential to impact marine reptiles (turtles and crocodiles) in the nearshore or onshore environment.

While noise an vibration impacts could arise during construction of the Project, the area already experiences some noise disturbance (although minimal) from the ongoing operation of nearby gas plants. It is considered unlikely that the construction noise associated with the proposed pipeline and tie-in stations would significantly impact threatened or migratory species.

<u>Light Emissions</u>

Light would be emitted from project machinery and from temporary lighting during construction activities. The existing context for the onshore environment includes multiple existing onshore sources of light, including East Arm Wharf, the Darwin LNG facility, the Ichthys LNG facility and lower intensity lighting from residential and urban areas.

Light emissions may affect fauna in two main ways:

- Behaviour: Many organisms are adapted to natural levels of lighting and the natural changes associated with the day and night cycle as well as the night-time phase of the moon. Artificial lighting has the potential to create a constant level of light at night that can override these natural levels and cycles.
- Orientation: Organisms such as marine turtles and marine avifauna may also use lighting from natural sources to orient themselves in a certain direction at night. In instances where an artificial light source is brighter than a natural source, the artificial light may act to override natural cues, leading to disorientation or mis-orientation.

Given the existing levels of artificial light adjacent to the Project area, the temporary nature of lighting for construction works and the low level of lighting required at the pipeline tie-in stations during operations, it is considered unlikely that the artificial light would significantly impact threatened or migratory species ***(Attachment A, Section 7.2, Section 7.7 and Appendix F)***.

Atmospheric and Dust Emissions

Routine and non-routine atmospheric emissions (including venting during Project operations and dust emissions), can lead to a reduction in ambient air quality and contribute to GHG emissions which can have adverse effects on the natural environment including potential localised behavioural disturbances to threatened and migratory species. Mitigation and controls required to manage any potential indirect impacts as a result of atmospheric and dust emissions are described in ***Attachment A (Section 7.2)***.

Change in Fire Risk

The key environmental impacts and risks due to fire events include loss and/or degradation of vegetation and fauna habitat, and injury/death of fauna due to fire in surrounding vegetation. A number of conservation significant terrestrial fauna species have been recorded in the Project area. However, the habitat types associated with these species are considered to be well represented within the locality and in the wider region. ***Attachment A (Section 7.2)***.

Entrapment or Injury to Fauna

Vehicle movements, vegetation clearing and earthworks, such as the onshore trenching, may pose potential risks to terrestrial fauna such as removal of habitat causing displacement, potential injury due to physical interactions with vehicles or equipment and entrapment within trenches. Given the vast area of habitat at Middle Arm, the vegetation clearing and earthworks are anticipated to result in limited disturbance to fauna and are not considered to cause long-term impacts on faunal communities in the area.

Open trenches and excavation sites created during pipeline construction can act as unintentional traps for terrestrial fauna. Animals such as reptiles, amphibians, small mammals, and ground-dwelling birds may fall into these structures while foraging or migrating, becoming unable to escape due to the steep or slippery sides.

Vehicle strikes pose an increased risk to terrestrial fauna during the construction phase, as machinery and vehicles operate in and traverse natural habitats with increased frequency. Particularly, wildlife may be struck while attempting to cross access roads or construction zones. This risk is higher during dawn and dusk, when many species are most active.

Given the highly disturbed nature of the habitat overlapping the Project area and the short-term nature of the construction activities, native fauna of conservation significance are considered unlikely to depend on the habitat within the Project area. Mitigation and controls required to manage any potential indirect impacts as a result of entrapment or injury to fauna are described in ***Attachment A (Section 7.2)***.

Invasive Species

Project activities also have the potential to introduce new terrestrial species of plants and animals into the Middle Arm Peninsula area from the mobilisation of clearing and excavation vehicles. The introduction and establishment of invasive species and weeds can change the floristic structure of a vegetation community,

reducing the diversity and ecological value of that area.

Fauna species, and particularly threatened fauna species, have the potential to be impacted by invasive species. Loss of habitat due to weed encroachment and change in floristic structure can reduce the range of occupancy of fauna species. Fauna species are also vulnerable to predation, particularly by invasive species such as feral cats and feral pigs, both of which have been recorded on Middle Arm Peninsula.

Given the existing presence of invasive species (refer to ***Attachment A, Section 4.2.6***) on the Middle Arm Peninsula impacts from Project activities are considered low.

Acid Sulphate Soils (ASS)

Areas of PASS are known to be present within the Project area, giving rise to the potential for ASS disturbance and localised acidification of surface water and groundwater. Based on prior knowledge gained from the construction of the gas export pipeline for the Ichthys LNG Development project, the Project has been designed with consideration of ASS treatment as outlined in ***Attachment A (Section 2.4.1)*** and captured in the mitigation measures specified in ***Attachment A (Section 7.4.4)***. With these measures in place, there is potential for minor localised and temporary impacts on water quality.

Hydrotest Water Discharge

The Project has the potential to impact on the quality of the marine environment adjacent to the Project area as a result of discharge of hydrotest water. The discharge of hydrotest wastewater (refer ***Attachment A, Section 2.5.1***) into the environment could potentially cause impacts to the beneficial uses of Darwin Harbour – Water Quality (NRETAS, 2010). Although hydrotest wastewater is predominantly scheme water (and therefore likely clean), it has the potential to absorb contaminants remaining in pipework and infrastructure. The most likely contaminant is nickel, which was found to be absorbed from infrastructure being hydrotested during Ichthys LNG construction (JKC, 2015).

The discharge of hydrotest water to the marine environment may result in temporary and short-term impacts on the quality of the marine environment in the immediate vicinity of the discharge, however it is unlikely to result in significant impacts to the quality of the habitat of threatened fish, shark or turtle species.

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: Ichthys Carbon Capture and Storage (CCS) Project - Supporting Information Document (Section 6.5, Appendix F)***). This assessment has been undertaken in accordance with *MNES Significant Impact Guidlines1.1* (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
- 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 earthworks. These are outlined below and described further in ***Attachment A (Section 2.4 and 7.2)***.

While vegetation clearing associated with the Project may result in direct impacts to threatened and migratory species, the habitat within the Project area does not overlap with any habitats that host important populations of critically endangered, endangered or vulnerable species ***Attachment A (Appendix F)***. The Project infrastructure would largely be built within an existing, previously cleared and in parts rehabilitated corridor, however clearing of some areas of previously undisturbed native vegetation would be required. The total area cleared would be determined and refined during the project design and approvals process and depend on the final construction methodology chosen, with a large portion only planned as temporary clearance to support construction works followed by rehabilitation.

Indirect impacts associated with the Project including noise and vibration, light emissions, atmospheric and dust emissions, fire risk, entrapment, invasive species, ASS and hydrotest water discharge are described in ***Attachment A (Section 7)*** and assessed against EPBC significant impact criteria in ***Attachment A (Section 2.4 and Appendix F)***.

Based on the assessment provided in ***Attachment A (Section 2.4 and Appendix F),*** the proposed action is not likely to have a significant impact on listed threatened species or ecological communities under the EPBC Act.

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

No

4.1.4.9 Please elaborate why you do not think your proposed action is a controlled action. *

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, however INPEX does not consider 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: Ichthys 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
No	Yes	Actitis hypoleucos	Common Sandpiper
No	Yes	Anous stolidus	Common Noddy
No	No	Anoxypristis cuspidata	Narrow Sawfish, Knifetooth Sawfish
No	Yes	Apus pacificus	Fork-tailed Swift
No	Yes	Arenaria interpres	Ruddy Turnstone
No	No	Balaenoptera edeni	Bryde's Whale
No	No	Balaenoptera musculus	Blue Whale
No	No	Balaenoptera omurai	Omura's Whale
No	Yes	Calidris acuminata	Sharp-tailed Sandpiper
No	Yes	Calidris alba	Sanderling
No	Yes	Calidris canutus	Red Knot, Knot
No	Yes	Calidris ferruginea	Curlew Sandpiper
No	Yes	Calidris melanotos	Pectoral Sandpiper
No	Yes	Calidris ruficollis	Red-necked Stint
No	No	Calidris subminuta	Long-toed Stint
No	Yes	Calidris tenuirostris	Great Knot
No	No	Calonectris leucomelas	Streaked Shearwater
No	No	Carcharhinus longimanus	Oceanic Whitetip Shark
No	No	Carcharias taurus	Grey Nurse Shark
No	No	Carcharodon carcharias	White Shark, Great White Shark
No	No	Caretta caretta	Loggerhead Turtle
No	Yes	Cecropis daurica	Red-rumped Swallow

Direct impact	Indirect impact	Species	Common name
No	Yes	Charadrius leschenaultii	Greater Sand Plover, Large Sand Plover
No	Yes	Charadrius mongolus	Lesser Sand Plover, Mongolian Plover
No	Yes	Charadrius veredus	Oriental Plover, Oriental Dotterel
No	No	Chelonia mydas	Green Turtle
No	Yes	Crocodylus porosus	Salt-water Crocodile, Estuarine Crocodile
No	Yes	Cuculus optatus	Oriental Cuckoo, Horsfield's Cuckoo
No	No	Dermochelys coriacea	Leatherback Turtle, Leathery Turtle, Luth
No	Yes	Dugong dugon	Dugong
No	No	Eretmochelys imbricata	Hawksbill Turtle
No	No	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	No	Lepidochelys olivacea	Olive Ridley Turtle, Pacific Ridley Turtle
No	Yes	Limicola falcinellus	Broad-billed Sandpiper
No	Yes	Limnodromus semipalmatus	Asian Dowitcher
Yes	Yes	Limosa lapponica	Bar-tailed Godwit
No	Yes	Limosa limosa	Black-tailed Godwit
No	No	Megaptera novaeangliae	Humpback Whale
No	No	Mobula alfredi	Reef Manta Ray, Coastal Manta Ray
No	No	Mobula birostris	Giant Manta Ray
No	Yes	Motacilla cinerea	Grey Wagtail
No	Yes	Motacilla flava	Yellow Wagtail
No	Yes	Natator depressus	Flatback Turtle
Yes	Yes	Numenius madagascariensis	Eastern Curlew, Far Eastern Curlew
No	Yes	Numenius minutus	Little Curlew, Little Whimbrel

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

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 Ichthys Supporting Information Document (***Attachment A: Ichthys Carbon Capture and Storage (CCS) Project - Supporting Information Document (Section 6.5, Appendix F)***) includes a preliminary screening assessment of potential impacts and risks to threatened / migratory species and ecological communities. A summary of the potential impacts based on the Project area is provided below.

Direct Impacts

The Project may result in direct impacts to threatened and migratory species as a result of vegetation clearing and earthworks. The Project infrastructure would largely be built within an existing, previously cleared and in parts rehabilitated corridor, however clearing of some areas of previously undisturbed native vegetation would be required. The total area cleared would be determined and refined during the project design and approvals process and depend on the final construction methodology chosen, with a large portion only planned as temporary clearance to support construction works followed by rehabilitation.

The construction and ongoing maintenance of pipelines and associated onshore infrastructure is anticipated to result in the direct loss of some native vegetation and habitat, potentially including areas important to species listed under the EPBC Act and TPWC Act.

Vegetation clearance for easements and infrastructure footprints leads to the removal of flora and potential disruption of ecosystems, with potential consequences for threatened or migratory species that may rely on the habitat for foraging and breeding.

Indirect Impacts

The Project may result in indirect impacts to threatened or migratory species. These are described in further detail in ***Attachment A (Section 7.2.3, Section 7.7.3, and Appendix F)*** and summarised below. Mitigation and controls required to manage and potential indirect impacts are described in ***Attachment A (Section 7)***.

<u>Noise and Vibration</u>

Airborne noise and vibration from activities associated with the project could result in the following potential impacts on terrestrial reptiles, mammals and avifauna:

- Habitat displacement of various reptiles and amphibians that usually inhabit in proximity to the proposed pipeline corridor
- Foraging and dispersal patterns, thereby changing where they are present
- Changes in reproduction patterns, potentially impacting population dynamics
- Additional or elevated stress for taxa, being on high alert constantly
- Impacted vocal production and perception of acoustic communication between taxa
- Potentially impacting a species ability to predate upon other species due to increased noise or vibration levels.

Airborne noise and vibration also has the potential to impact marine reptiles (turtles and crocodiles) in the nearshore or onshore environment.

While noise an vibration impacts could arise during construction of the Project, the area already experiences some noise disturbance (although minimal) from the ongoing operation of nearby gas plants. It is considered unlikely that the construction noise associated with the proposed pipeline and tie-in stations would significantly impact threatened or migratory species.

<u>Light Emissions</u>

Light would be emitted from project machinery and from temporary lighting during construction activities. The existing context for the onshore environment includes multiple existing onshore sources of light, including East Arm Wharf, the Darwin LNG facility, the Ichthys LNG facility and lower intensity lighting from residential and urban areas.

Light emissions may affect fauna in two main ways:

- Behaviour: Many organisms are adapted to natural levels of lighting and the natural changes associated with the day and night cycle as well as the night-time phase of the moon. Artificial lighting has the potential to create a constant level of light at night that can override these natural levels and cycles.
- Orientation: Organisms such as marine turtles and marine avifauna may also use lighting from natural sources to orient themselves in a certain direction at night. In instances where an artificial light source is brighter than a natural source, the artificial light may act to override natural cues, leading to disorientation or mis-orientation.

Given the existing levels of artificial light adjacent to the Project area, the temporary nature of lighting for construction works and the low level of lighting required at the pipeline tie-in stations during operations, it is considered unlikely that the artificial light would significantly impact threatened or migratory species ***(Attachment A, Section 7.2, Section 7.7 and Appendix F)***.

Atmospheric and Dust Emissions

Routine and non-routine atmospheric emissions (including venting during Project operations and dust emissions), can lead to a reduction in ambient air quality and contribute to GHG emissions which can have adverse effects on the natural environment including potential localised behavioural disturbances to threatened and migratory species. Mitigation and controls required to manage any potential indirect impacts as a result of atmospheric and dust emissions are described in ***Attachment A (Section 7.2)***.

Change in Fire Risk

The key environmental impacts and risks due to fire events include loss and/or degradation of vegetation and fauna habitat, and injury/death of fauna due to fire in surrounding vegetation. A number of conservation significant terrestrial fauna species have been recorded in the Project area. However, the habitat types associated with these species are considered to be well represented within the locality and in the wider region. ***Attachment A (Section 7.2)***.

Entrapment or Injury to Fauna

Vehicle movements, vegetation clearing and earthworks, such as the onshore trenching, may pose potential risks to terrestrial fauna such as removal of habitat causing displacement, potential injury due to physical interactions with vehicles or equipment and entrapment within trenches. Given the vast area of habitat at Middle Arm, the vegetation clearing and earthworks are anticipated to result in limited disturbance to fauna and are not considered to cause long-term impacts on faunal communities in the area.

Open trenches and excavation sites created during pipeline construction can act as unintentional traps for terrestrial fauna. Animals such as reptiles, amphibians, small mammals, and ground-dwelling birds may fall into these structures while foraging or migrating, becoming unable to escape due to the steep or slippery sides.

Vehicle strikes pose an increased risk to terrestrial fauna during the construction phase, as machinery and vehicles operate in and traverse natural habitats with increased frequency. Particularly, wildlife may be struck while attempting to cross access roads or construction zones. This risk is higher during dawn and dusk, when many species are most active.

Given the highly disturbed nature of the habitat overlapping the Project area and the short-term nature of the construction activities, native fauna of conservation significance are considered unlikely to depend on the habitat within the Project area. Mitigation and controls required to manage any potential indirect impacts as a result of entrapment or injury to fauna are described in ***Attachment A (Section 7.2)***.

Invasive Species

Project activities also have the potential to introduce new terrestrial species of plants and animals into the Middle Arm Peninsula area from the mobilisation of clearing and excavation vehicles. The introduction and establishment of invasive species and weeds can change the floristic structure of a vegetation community,

reducing the diversity and ecological value of that area.

Fauna species, and particularly threatened fauna species, have the potential to be impacted by invasive species. Loss of habitat due to weed encroachment and change in floristic structure can reduce the range of occupancy of fauna species. Fauna species are also vulnerable to predation, particularly by invasive species such as feral cats and feral pigs, both of which have been recorded on Middle Arm Peninsula.

Given the existing presence of invasive species (refer to ***Attachment A, Section 4.2.6***) on the Middle Arm Peninsula impacts from Project activities are considered low.

Acid Sulphate Soils (ASS)

Areas of PASS are known to be present within the Project area, giving rise to the potential for ASS disturbance and localised acidification of surface water and groundwater. Based on prior knowledge gained from the construction of the gas export pipeline for the Ichthys LNG Development project, the Project has been designed with consideration of ASS treatment as outlined in ***Attachment A (Section 2.4.1)*** and captured in the mitigation measures specified in ***Attachment A (Section 7.4.4)***. With these measures in place, there is potential for minor localised and temporary impacts on water quality.

Hydrotest Water Discharge

The Project has the potential to impact on the quality of the marine environment adjacent to the Project area as a result of discharge of hydrotest water. The discharge of hydrotest wastewater (refer ***Attachment A, Section 2.5.1***) into the environment could potentially cause impacts to the beneficial uses of Darwin Harbour – Water Quality (NRETAS, 2010). Although hydrotest wastewater is predominantly scheme water (and therefore likely clean), it has the potential to absorb contaminants remaining in pipework and infrastructure. The most likely contaminant is nickel, which was found to be absorbed from infrastructure being hydrotested during Ichthys LNG construction (JKC, 2015).

The discharge of hydrotest water to the marine environment may result in temporary and short-term impacts on the quality of the marine environment in the immediate vicinity of the discharge, however it is unlikely to result in significant impacts to the quality of the habitat of threatened fish, shark or turtle species.

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: Ichthys Carbon Capture and Storage (CCS) Project - Supporting Information Document (Section 6.5, Appendix F)***). This assessment has been undertaken in accordance with *MNES Significant Impact Guidlines1.1* (CoA 2013), with the relevant significant impact criteria for migratory species being evaluated against the Projects likelihood to:

- substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species
- result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species
- seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species.

The Project may result in direct impacts to threatened and migratory species as a result of vegetation clearing and earthworks. These are outlined below and described further in ***Attachment A (Section 2.4 and 7.2)***.

While vegetation clearing associated with the Project may result in direct impacts to threatened and migratory species, the habitat within the Project area does not overlap with any habitats that host important populations of critically endangered, endangered or vulnerable species ***Attachment A (Appendix F)***. The Project infrastructure would largely be built within an existing, previously cleared and in parts rehabilitated corridor, however clearing of some areas of previously undisturbed native vegetation would be required. The total area cleared would be determined and refined during the project design and approvals process and depend on the final construction methodology chosen, with a large portion only planned as temporary clearance to support construction works followed by rehabilitation.

Indirect impacts associated with the Project including noise and vibration, light emissions, atmospheric and dust emissions, fire risk, entrapment, invasive species, ASS and hydrotest water discharge are described in ***Attachment A (Section 7)*** and assessed against EPBC significant impact criteria in ***Attachment A (Section 2.4 and Appendix F)***.

Based on the assessment provided in ***Attachment A (Section 2.4 and Appendix F),*** the proposed action is not likely to have a significant impact on listed migratory species under the EPBC Act.

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

No

4.1.5.9 Please elaborate why you do not think your proposed action is a controlled action. *

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, however INPEX does not consider 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 or indirect impacts are summarised in ***Attachment A: Ichthys 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 migratory species. 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.

—

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

No

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

The proposed Project is not located in or adjacent to any Commonwealth marine areas.

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. *

The proposed Project is wholly located within the Northern Territory.

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 a 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.

—

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 is not located on Commonwealth land and there is no adjacent 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.

—

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. *

The proposed Project will not impact on Commonwealth heritage places overseas; it is wholly located within the Northern Territory.

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. *

Bayu-Undan CCS Project CO_2 storage option

The Project considers an alternative scenario where the proposed Santos operated Bayu-Undan CCS Project would be used as the storage option for captured CO_2 from the Ichthys LNG facility. The changes to the base-case design and infrastructure, if this alternative was pursued are outlined below and described further within ***Attachment A: Ichthys Carbon Capture and Storage (CCS) Project - Supporting Information Document (Section 2.6.1, Table 2-6)***.

CO_2 export pipeline

The CO_2 export pipeline route would not change. While more direct routes have been considered the base-case pipeline route remains the most suitable due to:

- existing infrastructure corridors and access
- limited clearing requirements
- pipeline constructability and reduced interactions with acid sulfate soils.

The Ichthys CSS pipeline tie-in station separating the two independent sections of pipeline (i.e. Ichthys CCS and Ichthys CCS (Darwin LNG link) sections), would no longer be required. Instead, the pipeline would be constructed as a single pipeline.

The Ichthys CCS (Darwin LNG link) pipeline section is being designed to allow for the flow of CO_2 in both directions. No other changes to the design are required.

Ichthys CCS pipeline tie-in station

The Ichthys CCS pipeline tie-in station would no longer be required in its entirety; however, these areas would include provision for pigging facilities to be temporarily installed.

Darwin LNG pipeline tie-in station

The Darwin LNG pipeline tie-in station is being designed to accommodate both the receival and export of CO_2 from the Ichthys CCS (Darwin LNG link) pipeline. No other changes to the design or proposed infrastructure are required.

PDA and disturbance footprint

No change to the PDA. The Project disturbance footprint would decrease marginally with the removal of the Ichthys pipeline tie-in station from the design.

Power infrastructure

Alternative option for sourcing of electrical power required for the operations of Ichthys CCS pipeline tie-in and Darwin LNG tie-in stations and CO2 export pipeline is being investigated (refer to ***Attachment A (Section 2.3.1 - Power and communications infrastructure)***).

The alternative would involve sourcing power from the existing Power and Water Corporation overhead power network that is local to the Ichthys CCS pipeline tie-in and Darwin LNG tie-in stations, negating the need for installation of power cabling between these areas.

Supplementary power intake substation location

The location of the supplementary power intake substation on land within Section 1888 has been identified as the preferred location for the supplementary power intake substation. Whilst the location within Section 1888 is preferred, alternative locations in comparable land areas are still being considered (refer to ***Attachment A (Section 2.2.1 - Supplementary power intake substation area and 2.3.1-Supplementary power intake substation)***). The final location would be in proximity to the Ichthys LNG facility and be determined following design and assessment of comparable land areas.

5. Lodgement

5.1 Attachments

1.2.1 Overview of the proposed action

	Type	Name	Date	Sensitivity	Confidence
#1.	Document	Attachment A_Ichthys CCS Project_Supporting Information Document.pdf Supporting Information Document	18/11/2025	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_Ichthys CCS Project_Supporting Information Document.pdf Supporting Information Document	17/11/2025	No	High

1.2.7 Public consultation regarding the project area

	Type	Name	Date	Sensitivity	Confidence
#1.	Document	Attachment A_Appendix C-Ichthys CCS Project Stakeholder Engagement Plan.pdf Stakeholder engagement plan	31/10/2025	No	High
#2.	Document	Attachment A_Ichthys CCS Project_Supporting Information Document.pdf Supporting Information Document	17/11/2025	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_INPEX HSSEQ Policy.pdf Inpex HSSEQ Policy	10/03/2025	No	High

2.2.5 Tenure of the action area relevant to the project area

	Type	Name	Date	Sensitivity	Confidence
#1.	Document	Attachment A_Ichthys CCS Project_Supporting Information Document.pdf Supporting Information Document	17/11/2025	No	High

3.1.1 Current condition of the project area's environment

	Type	Name	Date	Sensitivity	Confidence
#1.	Document				

Attachment A_Ichthys CCS Project_Supporting Information Document.pdf Supporting Information Document	17/11/2025	No	High	

3.1.2 Existing or proposed uses for the project area

	Type	Name	Date	Sensitivity	Confidence
#1.	Document	Attachment A_Ichthys CCS Project_Supporting Information Document.pdf Supporting Information Document	17/11/2025	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_Ichthys CCS Project_Supporting Information Document.pdf Supporting Information Document	17/11/2025	No	High

3.1.4 Gradient relevant to the project area

	Type	Name	Date	Sensitivity	Confidence
#1.	Document	Attachment A_Ichthys CCS Project_Supporting Information Document.pdf Supporting Information Document	17/11/2025	No	High

3.2.1 Flora and fauna within the affected area

	Type	Name	Date	Sensitivity	Confidence
#1.	Document	Attachment A_Appendix A-Ichthys CCS Project EPBC Act Protected Matters Search.pdf EPBC Act Protected Matters Search	12/05/2025	No	High
#2.	Document	Attachment A_Appendix B-Ichthys CCS Project Likelihood of Occurrence.pdf Likelihood of occurrence	31/10/2025	No	High
#3.	Document	Attachment A_Ichthys CCS Project_Supporting Information Document.pdf Supporting Information Document	17/11/2025	No	High

3.2.2 Vegetation within the project area

	Type	Name	Date	Sensitivity	Confidence

#1.	Document	Attachment A_Appendix A-Ichthys CCS Project EPBC Act Protected Matters Search.pdf EPBC Act Protected Matters Search	11/05/2025	No	High
#2.	Document	Attachment A_Ichthys CCS Project_Supporting Information Document.pdf Supporting Information Document	17/11/2025	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_Ichthys CCS Project_Supporting Information Document.pdf Supporting Information Document	17/11/2025	No	High

3.3.2 Indigenous heritage values that apply to the project area

	Type	Name	Date	Sensitivity	Confidence
#1.	Document	Attachment A_Ichthys CCS Project_Supporting Information Document.pdf Supporting Information Document	17/11/2025	No	High

3.4.1 Hydrology characteristics that apply to the project area

	Type	Name	Date	Sensitivity	Confidence
#1.	Document	Attachment A_Ichthys CCS Project_Supporting Information Document.pdf Supporting Information Document	17/11/2025	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_Ichthys CCS Project_Supporting Information Document.pdf Supporting Information Document	17/11/2025	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_Ichthys CCS Project_Supporting Information	17/11/2025	No	High

Document.pdf
Supporting Information Document

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_Ichthys CCS Project_Supporting Information Document.pdf Supporting Information Document	17/11/2025	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_Ichthys CCS Project_Supporting Information Document.pdf Supporting Information Document	17/11/2025	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_Ichthys CCS Project_Supporting Information Document.pdf Supporting Information Document	17/11/2025	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_Ichthys CCS Project_Supporting Information Document.pdf Supporting Information Document	17/11/2025	No	High

4.3.8 Why alternatives for your proposed action were not possible

	Type	Name	Date	Sensitivity	Confidence
#1.	Document	Attachment A_Ichthys CCS Project_Supporting Information Document.pdf Supporting Information Document	17/11/2025	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	Level 22, 100 St Georges Terrace Perth 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.