

Ichthys Gas Export Pipeline (Operation) Environment Plan - five-year revision

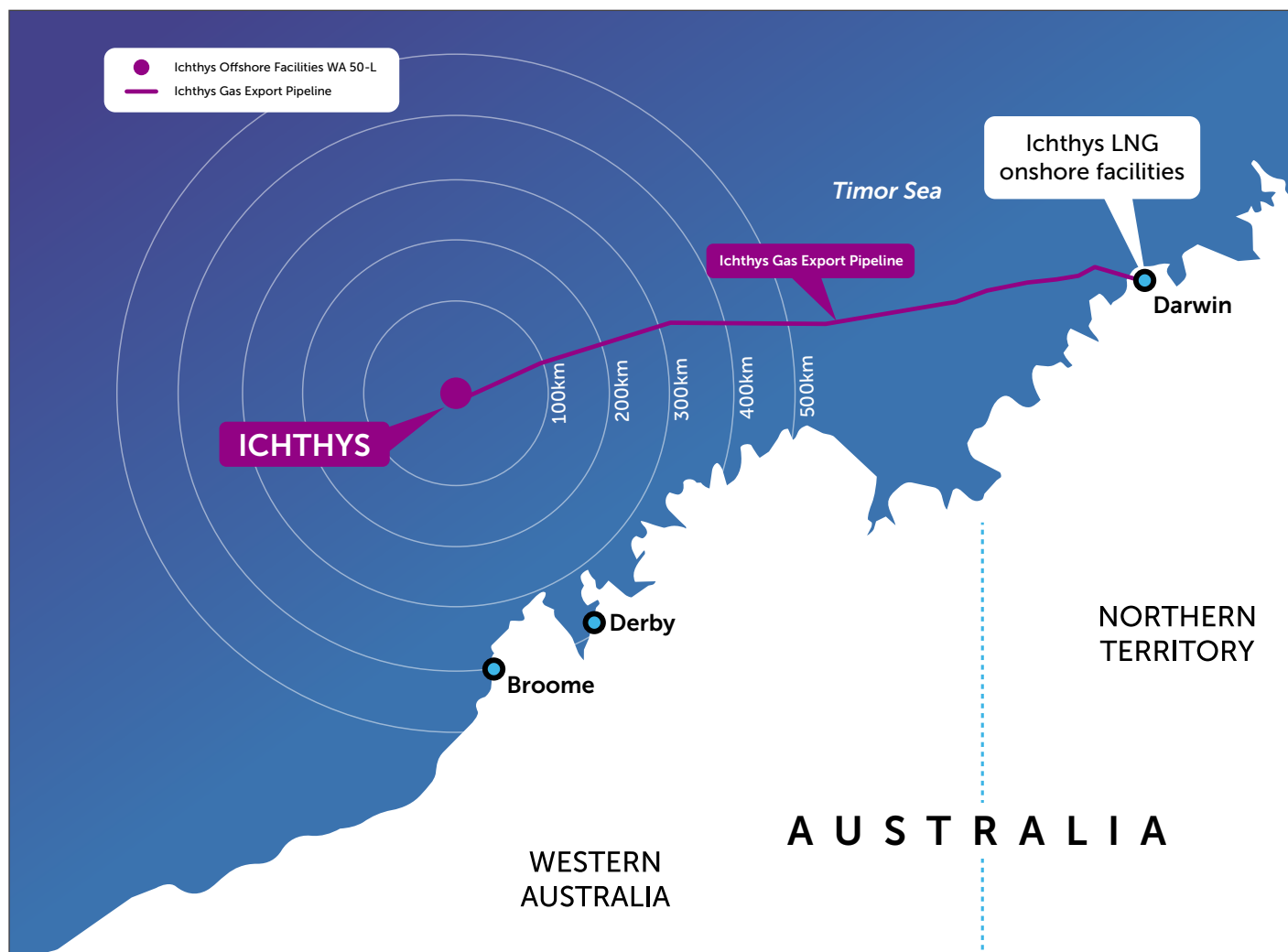


Figure 1: Location of the 890-kilometre Ichthys gas export pipeline. Not to scale

Introduction

INPEX Ichthys Pty Ltd (INPEX), on behalf of the Ichthys Upstream Unincorporated Joint Venture Participants, is developing the Ichthys Field in the Browse Basin off the north-west coast of Western Australia (WA). Condensate produced offshore is exported predominantly to Japan, and export gas is transported via a 890-kilometer subsea pipeline for further processing at the Ichthys liquefied natural gas (LNG) plant near Darwin.

The Ichthys LNG gas export pipeline (GEP) and associated offshore production infrastructure (i.e. the central processing facility, floating production, storage and offloading facility and subsea production system) were constructed, installed and commissioned from 2014 through 2018 with the assets commencing production in July 2018.

Ichthys LNG Pty Ltd is the titleholder of pipeline licences WA-22-PL, NT/PL4 and NT/PL4C and operates the GEP under the current Ichthys Gas Export Pipeline (Operation) Environment Plan (EP) accepted by the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA). In accordance with regulatory requirements, INPEX is currently preparing the scheduled five-year revision of this EP.

Ichthys Gas Export Pipeline (GEP)

The GEP is a 42-inch outer diameter, steel pipeline, installed offshore with a concrete weight and asphalt enamel external coating. The concrete coating is primarily designed for seabed stability, however it also provides a degree of protection for the GEP against potential impacts, such as from dropped objects or fishing equipment.

The GEP has been installed with five hot-tap-tees and one midline dummy spool, all with 'over-trawl' covers installed. These facilities provide the capability to safely undertake future intervention activities on the pressurised pipeline, if required.

The GEP transports natural gas from the Ichthys Field to the Ichthys LNG processing facilities in Darwin. The gas transported through the GEP comprises reservoir hydrocarbons from the Ichthys Field that have undergone offshore processing to remove most of the water and heavier hydrocarbon components. As a result, the gas stream consists predominantly of natural gas, with a small proportion of light condensate (C5-C13), a very light hydrocarbon liquid.

The operation of the GEP is an entirely closed system, meaning there are no planned discharges to the marine environment.

The scope of this five-year revision is limited to pipeline operations within Commonwealth waters. However, the management controls described in this document may also be applied to operations within the Northern Territory coastal waters of NTC/PL4. The revision includes:

- Vessel-based survey of the GEP: external visual inspections of the pipeline are typically conducted using either a crewed vessel or uncrewed survey vessel (USV), travelling along the pipeline route.
- Contingency for maintenance and repair activities such as physical seabed intervention/excavation alongside the GEP infrastructure to gain access to, or enable maintenance or repairs, cathodic protection system maintenance (e.g. replacement of anodes and cathodic protection equipment) and marine growth removal. If maintenance or repairs are required, a vessel may remain on site for approximately 15 to 60 days at a time, depending on the nature of the work.
- Contingency for major repairs such as installing clamps and potential dewatering and passivation of the GEP.
- Updates as result of management of change, continual improvement initiatives, audits and inspections.



Figure 2: Example of offshore survey vessel.



The revised EP will be subject to regulation by NOPSEMA, the national regulatory body for health and safety, well integrity and environmental management for all offshore petroleum and greenhouse gas storage activities. The EP and an Oil Pollution Emergency Plan (OPEP) will describe potential environmental impacts and risks associated with the operations of the gas export pipeline, and how they will be managed to meet the requirements of the Commonwealth *Offshore Petroleum and Greenhouse Gas Storage Act 2006*.

Overview of activity description

Table 1: Summary of proposed activities

Item	Description
Pipeline licence	WA-22-PL, NT/PL4 and NTC/PL4 (Refer to Figure 3)
Gas field	Ichthys Field (Browse Basin)
Hydrocarbon type	Gas and condensate (referred to as "GEP gas").
Activity location	The GEP is approximately 890 km long, with approximately 790 km located within Commonwealth waters, between the Ichthys Field and the Northern Territory (NT) three-nautical mile (nm) limit. Activities covered by this EP are wholly located in Commonwealth waters. The operational area comprises a 2 km wide corridor extending 1 km either side of the GEP centreline, from the pipeline end termination (PLET) to the boundary of NT coastal waters. Water depths within the operational area range from ~250 m below lowest astronomical tide (LAT) at the offshore facility end, to ~30 m LAT, at the boundary of Commonwealth waters and the NT three-nautical mile limit.
Activity description	Operation of the GEP involves the flow and transportation of gas from the offshore facilities to the Ichthys LNG onshore processing facilities in Darwin. Inspections provide assurance that infrastructure is performing according to design. They also proactively identify maintenance and/or repair activities that may be required to protect the GEP integrity. Inspection activities within the EP include: • utilisation of marine vessels to travel along the GEP • ROV / AUV inspections • marine acoustic surveys Maintenance and repair activities described in this EP are not intended to occur but, if required, may include: • seabed intervention (e.g. jetting, mass flow excavation, installing grout bags, rock placement or concrete mattress installation) • marine growth removal • pigging to recover the integrity of, or isolate, the GEP in the event of a repair • minor/clamp repairs.
Vessels	A single vessel is typically sufficient to undertake inspection, maintenance and repair (IMR) activities. However, depending on the nature, complexity and location of the work, additional vessels may be required. Vessels involved in IMR activities, including minor repair activities, will only use Group II (marine diesel) fuels.
Duration	This EP revision will cover continuous operations 24 hours per day, for a period of up to five years from the date of acceptance of the revised EP.

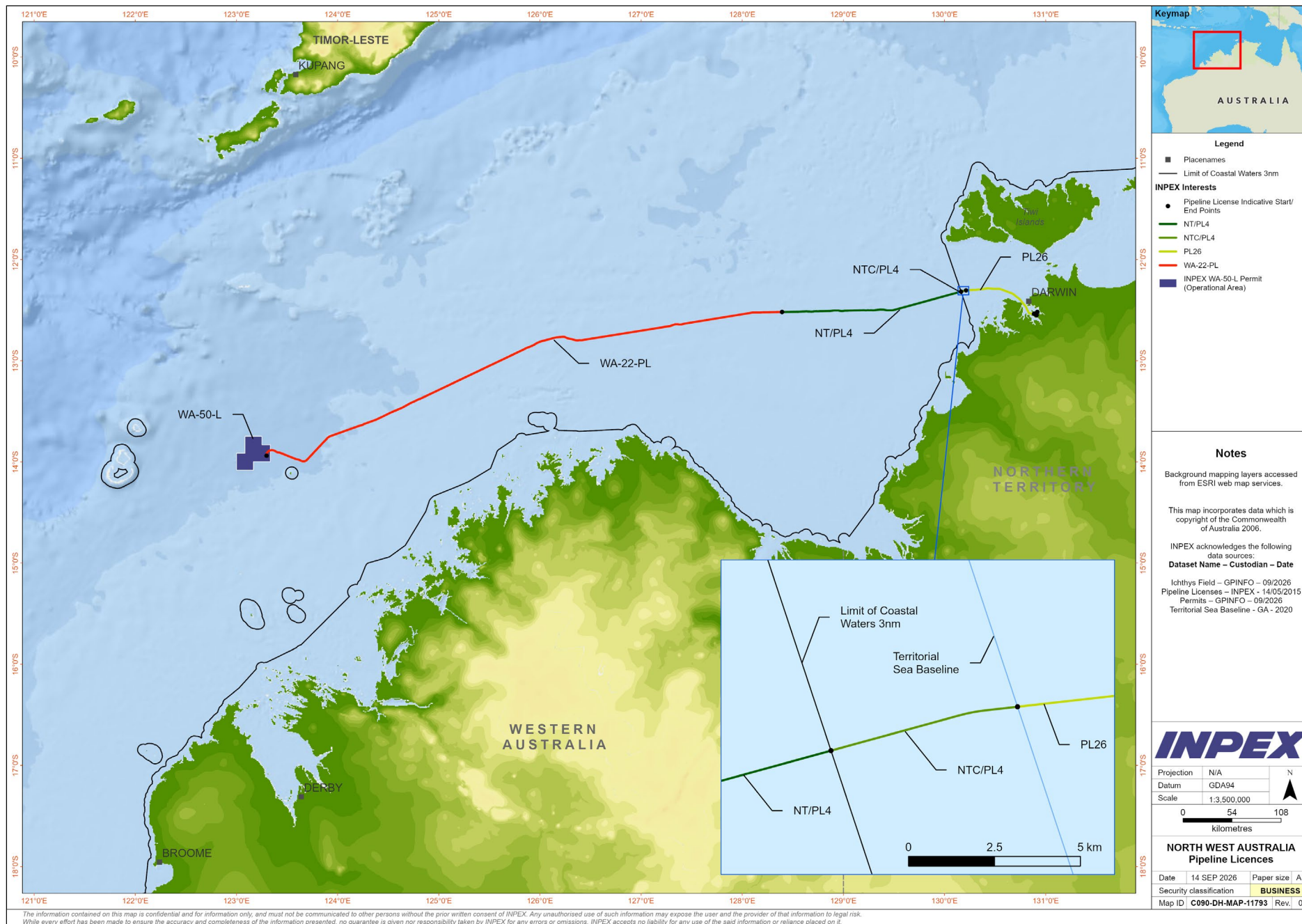


Figure 3: Overview of the GEP licences.

Environment

Pipeline route (Operational area)

- The seabed where the GEP is installed is predominantly characterised by unconsolidated clay, silt and sands with few distinct features.
- No marine mammal Biologically Important Areas (BIA) overlap the operational area.
- Marine turtle BIAs overlapping the operational area include the green turtle internesting buffer at Browse Island, internesting habitat for flatback and olive ridley turtles on the Melville Island/Coburg Peninsula coastlines and the Joseph Bonaparte Depression which provides foraging habitat for olive ridley, flatback and loggerhead turtles.
- The operational area overlaps a whale shark foraging BIA and a seabird foraging BIA associated with the lesser frigatebird.
- There are four Key Ecological Features along the route of the pipeline.

EMBA

The Environment that May Be Affected (EMBA) defines the maximum geographical area within which an unplanned event could potentially result in environmental impacts. Its overall extent considers both routine project activities and credible unplanned incidents.

The EMBA has been established using a range of modelling scenarios that assess the potential movement of hydrocarbons following highly unlikely release events. The EMBA is a combination of the five largest modelled extents associated with a vessel collision scenario (i.e. collision with the support vessel).

It is important to note that the EMBA does not indicate the area that would be directly impacted by a hydrocarbon release. Instead, it represents the combined footprint of numerous potential spill trajectories generated under varying meteorological and oceanographic conditions from five separate locations along the pipeline.

Consequently, in the highly unlikely event of a hydrocarbon release, only a limited portion of the EMBA would be affected, with the exact extent dependent on the prevailing environmental conditions at the time of the incident. The specific area impacted could only be determined following an actual release event.

Environmentally sensitive areas, including nearest distances to GEP, within the EMBA are described in Table 2 and shown in Figure 4.

Table 2: Environmental sensitivities in the EMBA

Key Ecological Features	Distance from GEP (nearest point)
Carbonate bank and terrace system of the Van Diemen Rise	35 km north
Carbonate bank and terrace system of the Sahul Shelf	Overlaps with pipeline
Pinnacles of the Bonaparte Basin	Overlaps with pipeline (noting no individual pinnacle overlaps)
Ancient coastline at 125 m depth contour	130 km west
Continental Slope Demersal Fish Communities	Overlaps
Ashmore Reef and Cartier Island and surrounding Commonwealth waters	133 km north (shoreline contact)
State Marine Parks / Nature Reserves	
Browse Island Nature Reserve	16 km south
Unnamed WA41775	16 km south
Australian Marine Parks	
Oceanic Shoals	Overlaps with pipeline
Kimberley	13 km south
Cartier Island	133 km north (shoreline contact)
Reefs, Shoals, Banks	
Browse Island	16 km south-east
Ashmore Reef	177 km north (shoreline contact)
Cartier Island	139 km north (shoreline contact)
Heywood shoal	22 km north
Echuca Shoal	10 km south-east
Flat-top Bank	5 km north
Fish Reef (RSB)	14 km
Van Cloon Shoal (RSB)	12 km north
Baldwin Bank (RSB)	6 km south
Favell Bank (RSB)	6 km north-west
Gale Bank	18 km north
Bass Reef (RSB)	22 km south
Holothuria Banks (RSB)	34 km south
Bassett-Smith Shoal	35 km south
Penguin Shoal	23 km south
Shepparton Shoal	27 km
Eugene McDermott Shoal	39 km north

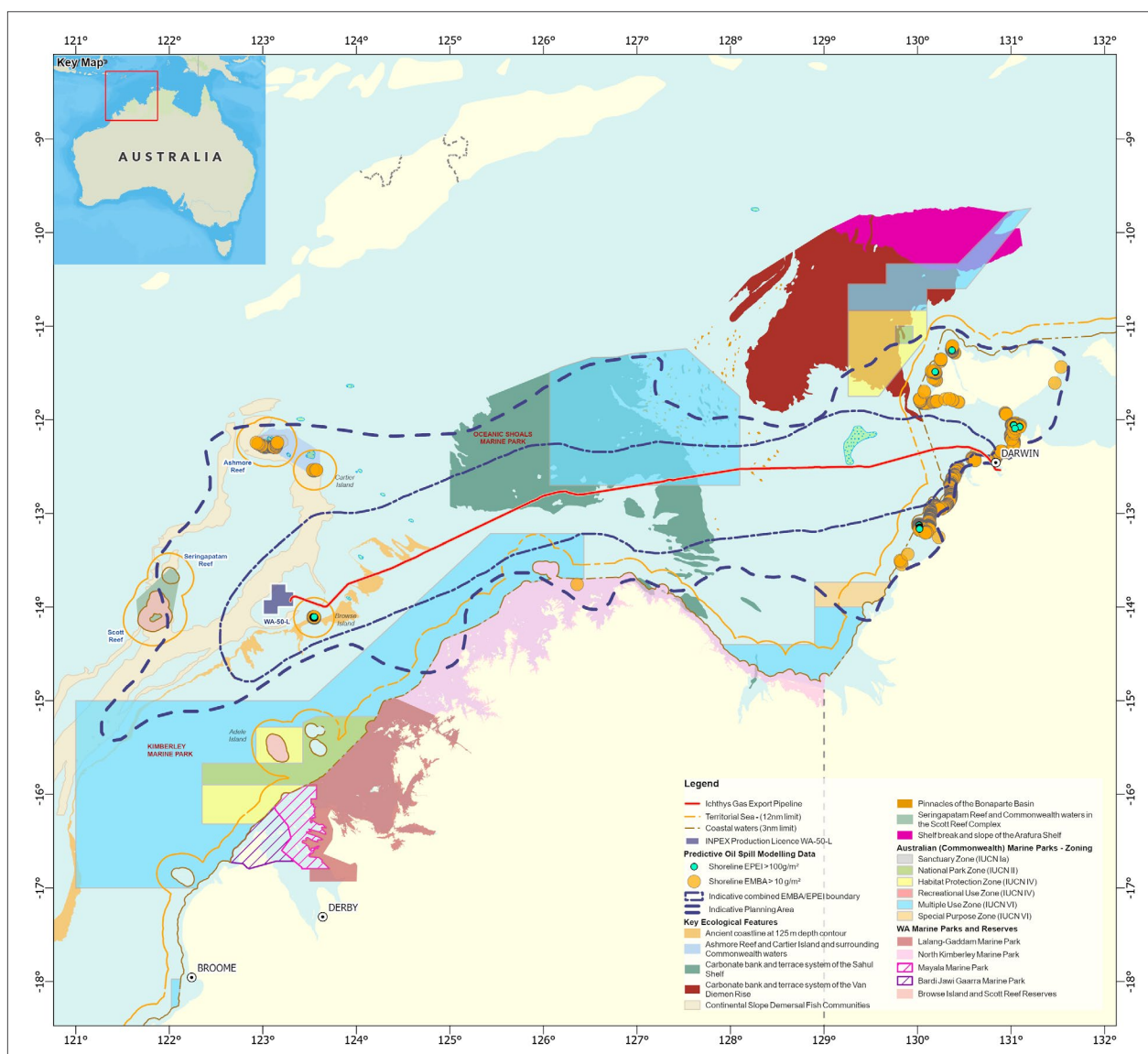


Figure 4: Environmental sensitivities in the EMA (Key Ecological Features, marine parks and reserves, banks and shoals).

Environmental management of key aspects

As part of the EP revision process, INPEX intends to identify and minimise any potential environmental, social and cultural impacts and risks associated with the proposed activities. We welcome your feedback on the proposed management measures and any matters you consider relevant to the assessment and management of potential impacts.

Table 3: Management of key aspects

Aspect	Potential impacts	Proposed controls
Emissions and discharges- Inspection maintenance and repair (IMR)	Some maintenance activities may release small amounts of material into the sea, such as marine growth removed from the pipeline, scale deposits, or small quantities of repair materials. Limited quantities of approved cleaning chemicals may occasionally be used to remove marine growth. These chemicals can temporarily change water quality close to the work area, but they are quickly diluted and neutralised by seawater. Maintenance or repair work may also release small amounts of materials such as concrete, grout, asphalt coating or metal fragments. Any impacts would be limited to a small area around the work site and could temporarily affect animals and plants living on the seabed.	Chemicals used for limescale and marine growth removal, as well as the grouting chemicals, will be selected using INPEX's Chemical Assessment and Approval Procedure. Repair methodology will be considered to minimise discharges to the environment. In the unlikely event of a GEP rupture, production at the CPF would be safely shut down and gas would be redirected to the flare system to minimise the volume of hydrocarbons released to the marine environment.

Aspect	Potential impacts	Proposed controls
Emissions and discharges - vessel discharges	Vessels may release treated wastewater, cooling water, desalination brine and food waste in accordance with regulatory requirements. These discharges may temporarily affect water quality close to the vessel but are expected to disperse quickly and only have localised, short-term effects.	All vessels shall comply with MARPOL 73/78 requirements. These requirements apply to most commercial vessels and set standards for allowable vessel discharges.
Air and greenhouse gas (GHG) emissions	Vessels used for inspection, maintenance and repair activities produce exhaust emissions from engines and onboard equipment. These emissions may temporarily affect local air quality close to the vessel but are quickly dispersed by wind and are not expected to cause long-term impacts.	Vessels will comply with the requirements of Marine Order 97 with regards to air emissions, incineration practices, Ozone Depleting Substance requirements and energy efficiency. Preventative maintenance will be conducted on emission-producing equipment.
Light emissions - sources of artificial light include vessel navigational and deck lighting	Lighting used for safe vessel operations can increase light levels at night. Some marine animals, including turtles, seabirds, fish and plankton, may be attracted to or disturbed by artificial light. Any effects are expected to be temporary and limited to the period of vessel operations.	Vessel personnel will receive an induction/training to inform them of the requirements to minimise external artificial lighting. Premobilisation review and planning of vessel lighting to be undertaken prior to activities commencing. Lighting is directed to working areas (rather than overboard) to minimise light spill to the ocean. Reduce light spill from internal light sources by using blinds on windows.
Waste management	Vessel operations generate a range of wastes, including domestic rubbish, maintenance materials and small amounts of hazardous waste such as waste oil, batteries and chemicals. Waste is not intended to enter the marine environment. However, if waste is accidentally lost overboard, it could affect water quality as materials break down or release contaminants. Marine wildlife may also become entangled in, or mistake waste for food, which could result in injury or death to individual animals. Any impacts would be localised and are not expected to affect populations of protected species.	Vessels will manage waste in accordance with MARPOL Annex V and Marine Orders 94 and 95, including maintaining a Garbage Record Book, holding a garbage management plan and incident notification requirements. Waste will be disposed of at licensed onshore facilities. Spill containment and recovery equipment will be available and any items that are lost to sea shall be reported.
Noise and vibration	Inspection, maintenance and repair activities may generate underwater noise from vessel engines, positioning systems and survey equipment. Some marine animals, including whales, dolphins, turtles, sharks and fish, can be sensitive to underwater noise. Noise from vessels may temporarily disturb these animals and cause them to move away from the area or change their normal behaviour. The expected noise levels are not anticipated to cause hearing damage or injury to marine fauna. Any impacts are expected to be temporary and limited to the vicinity of the activity. Commercial fish species may also avoid the area while activities are occurring, but they are expected to return once the activities are complete.	Vessels will be required to adhere to EPBC Regulations 2025 – Part 8 Division 8.1 on how to interact with cetaceans (and applied to turtles). This requires vessels to manage their speed and separation distance from observed marine fauna.
Biosecurity - invasive marine species (IMS)	Vessels travelling from other locations can potentially introduce marine plants or animals that are not naturally found in the area. If established, these species could compete with native species, change marine habitats and affect local ecosystems and fisheries.	Vessels will: • complete biofouling risk assessment and implement any associated biofouling reduction and management measures. • comply with the Australian Ballast Water Requirements • have an approved ballast water management plan and valid ballast water management certificate, unless an exemption applies or is obtained. • have a biofouling management plan in accordance with the Biosecurity Amendment (Biofouling Management) Regulations 2021 and the Australian biofouling management requirements.

Aspect	Potential impacts	Proposed controls
Interactions with marine fauna	Vessels operating along the pipeline route may occasionally interact with marine animals. There is a small risk that vessels could collide with marine fauna such as turtles, whale sharks or whales, potentially causing injury or death to individual animals. Vessel activities may also temporarily disturb animals while they are feeding, resting or travelling through the area. Any impacts are expected to be localised and are not expected to affect overall populations.	Vessels undertaking IMR activities are generally travelling at slower speeds while conducting visual inspections (ROV) or towing acoustic instruments. EPBC Regulations 2025 Part 8, Division 8.1 will be implemented. Any vessel strikes to marine fauna will be reported as an environmental incident.
Seabed disturbance	Some maintenance or repair activities may require work on the seabed to access, stabilise or protect pipeline infrastructure. This work may temporarily disturb seabed sediments and create small sediment plumes in the surrounding area. These plumes may temporarily affect plants and animals living on or within the seabed close to the work site. Although no known protected underwater cultural heritage sites are presently identified within the operational area, there is a small possibility that previously unknown underwater cultural heritage could be encountered or disturbed during seabed works outside areas that have been disturbed before.	Vessels will use dynamic positioning to ensure no planned anchoring is required. Differential Global Positioning Systems (DGPS) or other subsea positioning equipment used to ensure subsea activities conducted at the correct locations. ROV inspections will be undertaken before and after seabed intervention activities in areas of hard substrate. An underwater cultural heritage unexpected finds protocol shall be implemented. A review of non-invasive survey data will be undertaken prior to conducting any seabed excavation outside areas of previous disturbance.

Footnote: These proposed controls are subject to change through the consultation and subsequent assessment process and may not represent content in the publicly available EP or in the final plan once accepted.

Not all proposed controls are listed.



Further information

Further information can be found online:

Via QR Code

Instructions for accessing QR code:



1. Open your camera app on your Apple or Android device.
2. Point your camera at the QR code as if you are about to take a picture of it.
3. If your device recognises the code, a link will appear on your screen. Tap on the link when it appears.

Via website

<https://anz.planengage.com/ichthysurfconstruction/page/Home>

Alternatively, you can request further information by calling 1800 705 010.

Comments and enquiries

INPEX welcomes your feedback on the proposed five-year revision of the Gas Export Pipeline (Operation) Environment Plan.

You can provide comment in the following ways:

Via email

Contact: INPEX Environment Plan Consultation Team
Subject: Ichthys Gas Export Pipeline (Operation) EP
E-mail: consultation@inpx.com.au

Via website

www.INPEX.com.au

Via phone

Call 1800 705 010 regarding Ichthys Gas Export Pipeline (Operation) EP.

How is your feedback used?

Your feedback assists INPEX with understanding the environment, identifying potential environmental impacts and risks, and enables INPEX to refine its management measures if needed to reduce potential impacts.

All communications will be logged, assessed and acknowledged with a response.

To ensure transparency and in accordance with regulatory requirements, INPEX provides NOPSEMA with full copies of all feedback within the EP submission, together with INPEX's initial correspondence and responses to feedback.

Petroleum titleholders are required to publish full copies of new EPs on the NOPSEMA website. Accordingly, those who provide feedback should advise INPEX if any part of their feedback is not suitable for public disclosure (i.e. is 'sensitive information'). Sensitive information will be removed or redacted from the published EP and provided to NOPSEMA in a separate, private document.

Any stakeholder feedback received after acceptance of an EP will be managed through INPEX's formal stakeholder engagement process.

