

Proposed Ichthys Umbilicals, Risers and Flowlines and Subsea Production System Construction Environment Plan

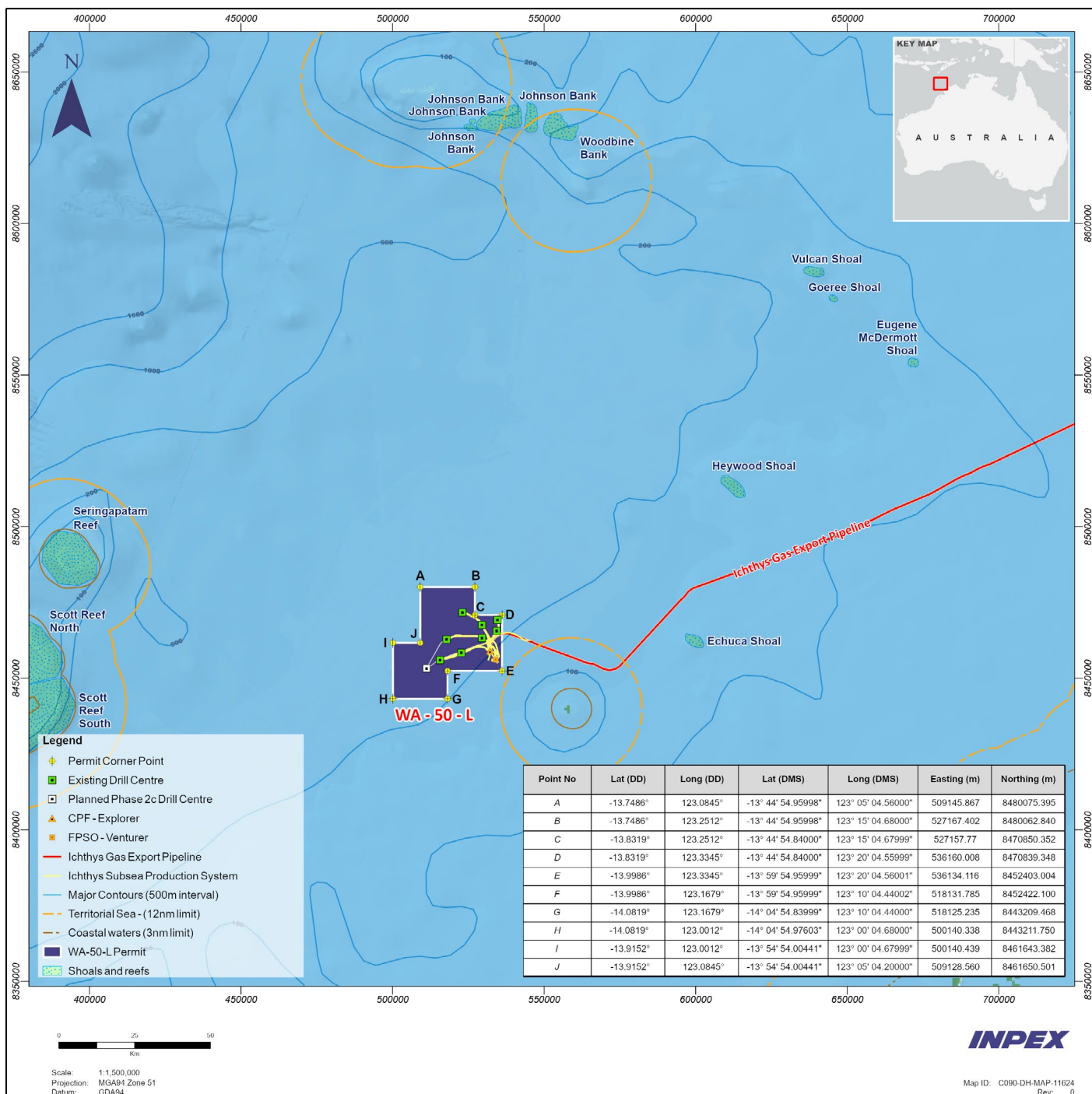


Figure 1: Location and coordinates of production licence WA-50-L in the Browse Basin.

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-kilometre subsea pipeline for further processing at the Ichthys liquefied natural gas (LNG) plant near Darwin.



The Ichthys LNG offshore facilities

The Ichthys LNG offshore facilities were constructed, installed and commissioned from 2014 through 2018 with the assets commencing production in July 2018.

The existing offshore facilities consist of a subsea production system (SPS) (e.g. drill centres, manifolds, subsea control systems, umbilicals, risers and flowlines (URF), and the gas export riser base), which connect the production wells to the Central Processing Platform (CPF Ichthys Explorer) and Floating Production Storage Offtake (FPSO Venturer) facility (*Figure 2*).

Expansion of the SPS includes the installation of new infrastructure to connect new production wells to the existing gathering system already in production. A variety of offshore vessels will be used to perform the installation and link the subsea infrastructure to the offshore facility.

Proposed activities to be completed under this Environment Plan (EP)

Installation, mechanical completion, pre-commissioning and commissioning of URF infrastructure including:

- Umbilicals
- flowlines, comprising a 12" production flowlines and a 3.5" monoethylene glycol (MEG) flowline each approximately 11.9 km in length
- subsea structures including a production manifold, tie-in structure and several well jumper mid-structures (WJMS)
- smaller miscellaneous subsea structures such as zero radius bends (ZRBs), crossings, spool supports, mattresses and scour protection equipment
- control systems.

The connection of URF infrastructure and systems to the existing subsea infrastructure and offshore facility including:

- tie-ins between subsea equipment
- tie-ins to the well head xmas trees (XTs) at drill centres
- installation of spools, jumpers, power cables and communication cables
- subsea connection of umbilicals (electric and hydraulic control cables) and flying leads.

Support activities in WA-50-L including:

- equipment transfers
- refuelling
- bulk transfer of MEG, hydrocarbons and other chemicals
- crew transfers
- transfer of waste
- transfer of general supplies.

Pre-commissioning and commissioning of the wellhead XTs at the drill centres are also included within the scope of this EP along with works associated with the installation, mechanical completion, pre-commissioning and commissioning of infrastructure. This includes seabed rectification activities such as jetting for free-span correction, seabed levelling and grouting. The scope also includes the potential inspection, maintenance and repair (IMR) of existing and proposed SPS infrastructure within WA-50-L.

ICHTHYS LNG - OFFSHORE FACILITIES

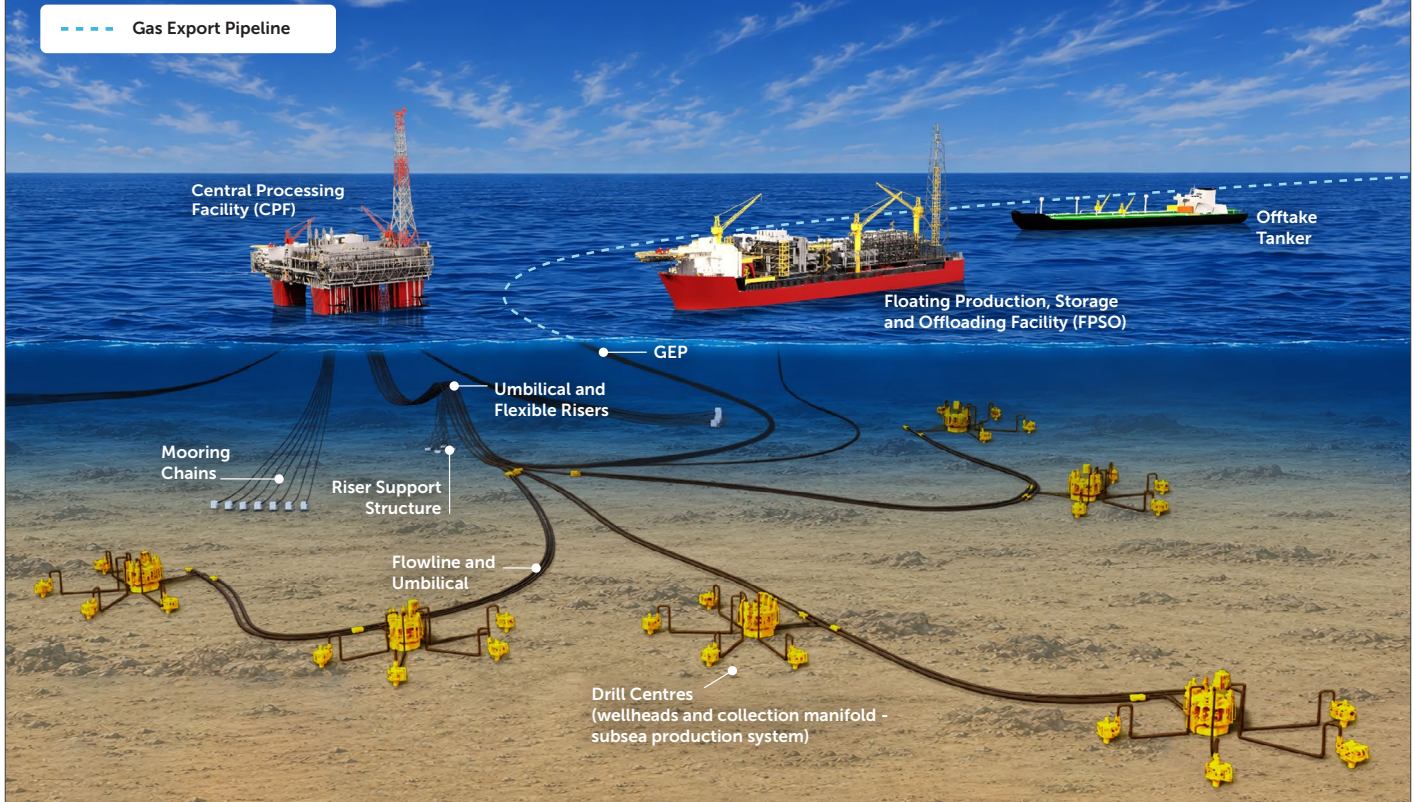


Figure 2: Ichthys LNG subsea production systems overview.

The survey activities to be completed under this EP include:

- geophysical survey scope comprising multibeam echo sounder side scan sonar sub-bottom profiling (SBP)
- geotechnical survey scope comprising piston or vibro-coring/sampling, piezocone penetration tests, box core sampling and geotechnical boreholes
- ultra-short baseline positioning system and mini transponders attached to geotechnical and geophysical equipment
- long Baseline Positioning comprising an array of subsea transponders placed on the seabed to enable highly accurate underwater positioning and metrology measurements. The system is controlled via equipment deployed from a vessel (known as a dunker) and/or a transponder mounted on a remotely operated vehicle (ROV).
- metrology surveys.

Subsea activities will involve remotely operated ROVs with onboard cameras to monitor and perform the installation activities. Due to the water depth, all deep-water connections between components will be guided and actuated by the ROVs. Autonomous underwater vehicles (AUVs) may be utilised for non-intrusive activities such as pre-lay, inspection and as-built surveys.



Figure 3: Example of an uncrewed survey vessel towing an ROV.



The URF activity, comprising of installation and survey activities, 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 all the potential environmental impacts and risks associated with the URF activity, and how they will be managed to meet the requirements of the *Commonwealth Offshore Petroleum and Greenhouse Gas Storage Act 2006*.

Location

Production licence, WA-50-L, is located within the Browse Basin in Commonwealth waters offshore WA. It is approximately 230 kilometres north west of the Kimberley coastline, at its closest point (refer to Figure 1). Water depths in the licence area range between 235 metres and 275 metres at lowest astronomical tide (LAT). The closest major town is Derby, located approximately 390 kilometres south of the licence area.

Schedule

The proposed activities will be undertaken in WA-50-L over a period of five years commencing in quarter 4, 2027, with operations conducted 24 hours per day. The duration of this EP is five years from acceptance by NOPSEMA, providing flexibility to undertake the planned activities, including accommodating weather and other operational factors.

Figure 4: Box core.

Overview of activity description

Table 1: Summary of proposed activities

Summary of activity	
Petroleum production licence area	WA-50-L (refer to Figure 1)
Basin	Browse
Activity location	Wholly located within Commonwealth waters approximately 390 km north of Derby, WA in the Northwest Marine Region (NWMR) of the Timor Sea.
Water depth	Ranges from 235–275 m at Lowest Astronomical Tide.
Vessels	Offshore construction, installation, support, survey vessels and remotely operated vehicles and autonomous underwater vehicles.
Activities	Installation, tie-in, pre-commissioning, mechanical completion and commissioning of umbilicals, flowlines, structures, manifolds, spools, jumpers, well jumpers and associated control systems at WA-50-L drill centres. Geophysical surveying within WA-50-L including the use of multi-beam echo-sounder, side-scan sonar and sub-bottom profiling. Geotechnical surveying within WA-50-L including collection of seabed samples (box core), piston coring/sampling, penetration testing and geotechnical boreholes.
Duration of the EP	Five years from the date this EP is accepted by NOPSEMA.



Environment

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 largest modelled extent is associated with a vessel collision scenario (i.e. collision with a construction vessel) and forms the basis of the EMBA.

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. 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 distances to production licence area WA-50-L, within the EMBA are described in Table 2 and shown in Figure 5. In addition to these, the environmental values that may be impacted by the proposed activities include:

- Benthic and shoreline habitats at Browse Island, Cartier Island and Scott Reef.
- Marine fauna including listed and migratory species identified under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and biologically important areas associated with those species.
- Cultural heritage including underwater cultural heritage.
- Socio-economic receptors such as commercial fisheries.

Table 2: Environmental sensitivities in the EMBA

Key Ecological Features	Distance from WA-50-L
Continental slope demersal fish communities	Overlaps WA-50-L
Ancient coastline at 125 m depth contour	20 km south
Ashmore Reef and Cartier Island and surrounding Commonwealth waters	130 km north
Seringapatam Reef and Commonwealth waters in the Scott Reef complex	100 km west
Marine parks/nature reserves (Commonwealth and State)	
Browse Island Nature Reserve	26 km south-east
Scott Reef Nature Reserve	125 km west
Cartier Island Australian Marine Park	130 km north
Coral reefs	
Browse Island	26 km south-east
Cartier Island	130 km north
Scott Reef	125 km west

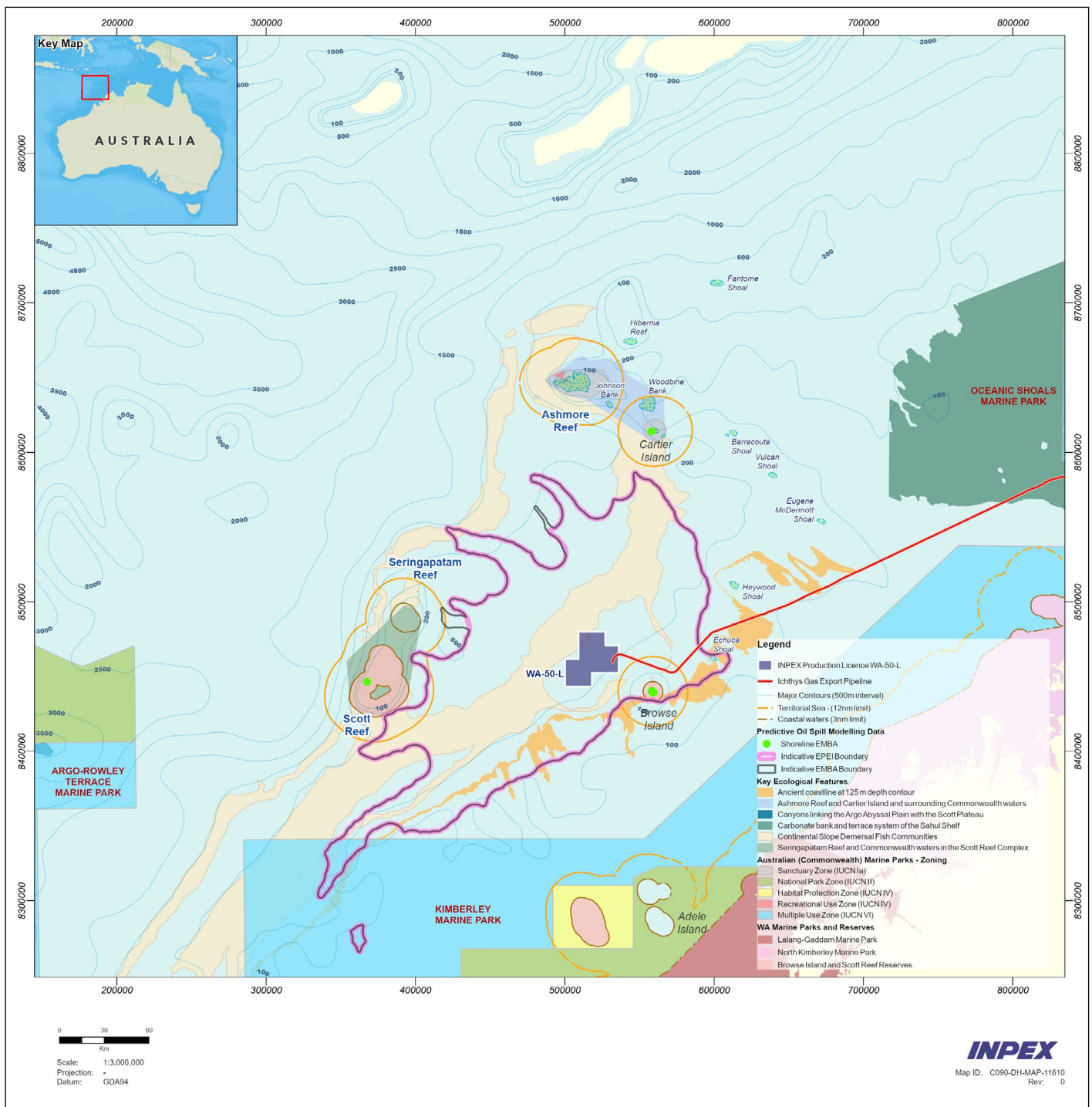


Figure 5: Environmental sensitivities in the EMBA (Key Ecological Features, marine parks and reserves, banks and shoals).

Environmental management of key aspects

In developing the EP, INPEX intends to minimise any potential environmental, social and cultural impacts and risks associated with the proposed activity. 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/outcomes
Light emissions - sources of artificial light include vessel navigational and deck lighting	Light emissions generated from vessel navigational and deck lighting are not expected to have any discernible effect on the ability of adult turtles or hatchlings to orient towards the water at Browse Island (the closest turtle nesting habitat located over 26 km away). Adult turtles undertaking internesting, migration, mating or foraging activities are not known to rely on light cues to guide these behaviours with no evidence to suggest adult turtles (internesting) are attracted to artificial light from offshore vessels. Any impacts are expected to be insignificant. WA-50-L does not overlap with any important bird habitats and the closest breeding/resting areas are more than 50 km from the proposed activity.	Vessel personnel will receive inductions and training to ensure they understand the requirements for minimising external artificial lighting. A pre-mobilisation review and lighting plan will be undertaken before activities commence. Lighting will be directed towards work areas, rather than overboard, to minimise light spill into the marine environment. Light spill from internal light sources will also be minimised through the use of window blinds.
Air and greenhouse gas (GHG) emissions	Atmospheric emissions will be generated through the use of combustion engines, compressors, steam generators and equipment containing ozone-depleting substances (ODS) on board the vessels. Atmospheric emissions from the petroleum activity will contribute to overall GHG concentrations and have the potential to result in localised changes in air quality with potential exposure of marine avifauna to air pollutants. Exposure to air pollutants may cause respiratory distress in birds. Individuals may develop some short-term symptoms if they remain in the immediate vicinity of an emissions source where the pollutants are most concentrated. Rapid recovery is expected once individuals move away from the source. Chronic exposure is not considered likely, given that marine avifauna would move away (i.e. continue migration or undertake foraging activities elsewhere). WA-50-L does not overlap any important bird habitats and the closest breeding/resting areas are more than 50 km away from the proposed activity.	Vessels will: - comply with the air emission requirements of Marine Order 97 (as applicable to vessel and engine size, type and class) including sulphur content of fuel oil. - comply with ODS and energy efficiency requirements of Marine Order 97. Vessel contractors have a preventative maintenance system to ensure diesel-powered, power generation equipment is appropriately maintained. Measurement and monitoring of emissions data to enable legislative reporting requirements under the <i>National Greenhouse and Energy Reporting Act 2007</i> (Cth) to be met for the petroleum activity.
Waste – inappropriate waste handling and disposal	Vessels associated with the activity will generate a variety of non-hazardous and hazardous wastes, which will not be intentionally discharged to the marine environment. Unsecured or incorrectly stored waste may be windblown or displaced into the ocean where it has the potential to adversely affect marine ecosystems. Waste can contaminate the marine environment and result in changes to water quality e.g. through the leaching of chemicals from wastes, which can cause changes to ecosystem productivity and diversity. Certain types of waste can cause injury to marine fauna through entanglement or may affect the health of marine species that ingest waste materials.	- Pre-mobilisation Health, Safety and Environment (HSE) inspections will be undertaken to confirm their capability to correctly store, label and handle wastes. - Spill containment and recovery equipment will be available on board. - Waste management awareness materials will be communicated to site personnel. - Vessels will comply with MARPOL requirements and implement vessel-specific garbage waste management plans in accordance with Marine Order 95. - Any loss of equipment or materials to the marine environment will be reported.

Aspect	Potential impacts	Proposed controls/outcomes
Underwater noise emissions	Noise emissions may be generated by the use of underwater acoustic survey equipment, the operation of vessels and potentially mechanical piling techniques (impact or vibratory hammers) used to drive steel piles into the seabed to secure flowlines. These activities may be audible to marine fauna (cetaceans, turtles and whale sharks) and fish species targeted by commercial fisheries. There are no known marine fauna aggregation areas that would result in sedentary behaviour within WA-50-L. Marine fauna with the potential to be exposed to elevated noise levels are generally transient in nature and able to avoid the area. Commercially important fish species may be exposed to increased noise levels however, any impacts would be localised to individual fish and are not expected to adversely affect fish stocks.	Vessel contractors will comply with relevant requirements of the EPBC Regulations 2025 – Part 8 Division 8.1 (Regulation 8.05) <i>Interacting with cetaceans</i> (modified to include turtles), within the 500 m exclusion zone including: - vessels will not travel faster than 6 knots within 300 m of a cetacean or turtle (caution zone) and minimise noise. - vessels will not approach closer than 50 m to a dolphin or turtle and/or 100 m for a whale (with the exception of bow riding). - if a cetacean shows signs of disturbance, vessels will immediately withdraw from the caution zone at a constant speed of less than 6 knots. Vessel personnel will receive an induction/training to inform them of the requirements of EPBC Regulations 2025 – Part 8, Division 8.1 (Regulation 8.05).
Biosecurity - invasive marine species (IMS)	Benthic communities, the closest of which are located at Browse Island, and commercial fisheries all have the potential to be impacted by introduced marine species (IMS). For IMS to pose a biosecurity risk, viable propagules or individuals must be transferred from a colonised source (for example, a vessel hull), survive in the receiving environment, locate suitable habitat, and establish a self-sustaining population. The introduction or transfer of IMS propagules to sensitive benthic habitats in the wider region may result in localised to medium-scale impacts. It may also disrupt ecological communities, with the potential to adversely affect commercial 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.
Displacement of other marine users	Other marine users in the vicinity of WA-50-L may be affected by the presence of the vessels through reduction of navigable space available to conduct their activities. Potential implications of such disruptions include changes to sailing routes and journey times, or reduced ability to fish in an area. In a worst-case scenario, temporary loss of access to an area could result in economic impacts and, potentially, reduced employment opportunities.	Consultation will be undertaken with relevant persons and organisations to communicate planned activities and identify potential interactions with other marine users. Vessels fitted with lights, signals and navigation equipment as required by the <i>Navigation Act 2012</i> (Cth).
Vessel collision	Potential for exposure to floating oil at the sea surface and within the water column. Potential accumulation on shorelines at Browse Island, Cartier Island and Sandy Islet part of Scott Reef complex however, concentrations are not expected to exceed levels that would result in ecological impacts. Marine mammals, marine reptiles and marine avifauna may be affected through direct hydrocarbon exposure in the water column or at the sea surface. They may also be indirectly impacted through ingestion during foraging activities. Commercial Fisheries may be impacted by the presence of exclusion zones and the oiling of nets and lines. Fish communities may be impacted by exposure to oil within the water column.	Marine vessels greater than 400 tonne will carry shipboard an oil pollution emergency plan. All vessels fitted with lights, signals and navigation equipment as required by the <i>Navigation Act 2012</i> (Cth). Vessels will not carry more than 750 m³ of marine diesel oil fuel in any single tanks (unless the tank is protected by a double hull in accordance with AMSA (2015) vessel collision guidance, such that the credible loss is limited to 50% of the tank capacity). Installation vessels used will have dynamic positioning equipment and have a backup dynamic positioning system as a failsafe measure.

* 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 Ichthys URF Construction activities.

You can provide comment about the Ichthys URF Construction EP in the following ways:

Via email

Contact: INPEX Environment Plan Consultation Team
Subject: Proposed Ichthys URF Construction EP
E-mail: consultation@inpx.com.au

Via website

www.INPEX.com.au

Via phone

Call 1800 705 010 regarding proposed Ichthys URF Construction 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.