# Bayu-Undan to Darwin Gas Export Pipeline

# ENVIRONMENT PLAN SUMMARY

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# 1 INTRODUCTION

ConocoPhillips Pipeline Australia Pty Ltd (COP) is the operator of the existing operational Bayu-Undan to Darwin Gas Export Pipeline (the Pipeline) in the Timor Sea. The pipeline has been operational since 2005. The Pipeline is a lean gas (dry gas) export pipeline, with a low fraction of residual liquid hydrocarbons, and is subject to continual operational controls to maintain pipeline integrity throughout the design life of the activity.

An existing plan for the Bayu-Undan Field Operations Phase was in force, however ConocoPhillips was requested by the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) to submit a proposed revision to the existing Environment Plan, as it pertains to Commonwealth Waters. The Bayu-Undan to Darwin Gas Export Pipeline Environment Plan (the EP) has been prepared for the Commonwealth Waters section, in accordance with requirements under the *Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009* (OPGGS (E) Regulations). The EP has been reviewed and accepted by NOPSEMA.

This document (EP Summary) has been prepared as per requirements of OPGSS (E) Regulation 11(1) of the Environmental Regulations and provides an overview of the activities associated with operation and maintenance of the Pipeline. Relevant preventative and mitigation measures have been developed and implemented to ensure any adverse impacts are eliminated where possible or managed to be as low as reasonably practicable (ALARP).

# 2 LOCATION OF THE ACTIVITY

**Figure 1** shows the regional geographical location of the Pipeline. The Bayu-Undan field is located approximately 500 km north-west of Darwin.

The EP is limited to all activities relevant to the section of the Pipeline that occurs in Commonwealth Waters. This corresponds to the section of the Pipeline from kilometre Point (KP) KP42.4 to KP402.2, as shown in **Figure 2**.

The 26” diameter, 502 km long welded steel pipeline transports lean hydrocarbon (dry) gas from the Bayu-Undan Field to the Darwin LNG facility at Wickham Point, Darwin (**Figure 2)**. The Pipeline is laid directly on the seabed and significant lengths of the Pipeline are protected from dragged or dropped anchors by a protective rock berm.

The nearest land mass to the Pipeline in Commonwealth waters is Bathurst Island (located approximately 20 km to the north of KP400). The shallow sub-tidal and intertidal areas of the Tiwi Islands (Melville and Bathurst Islands) have rocky and coral reef features (see **Figure 2**), however, are distant from the potential area of influence of the Pipeline.

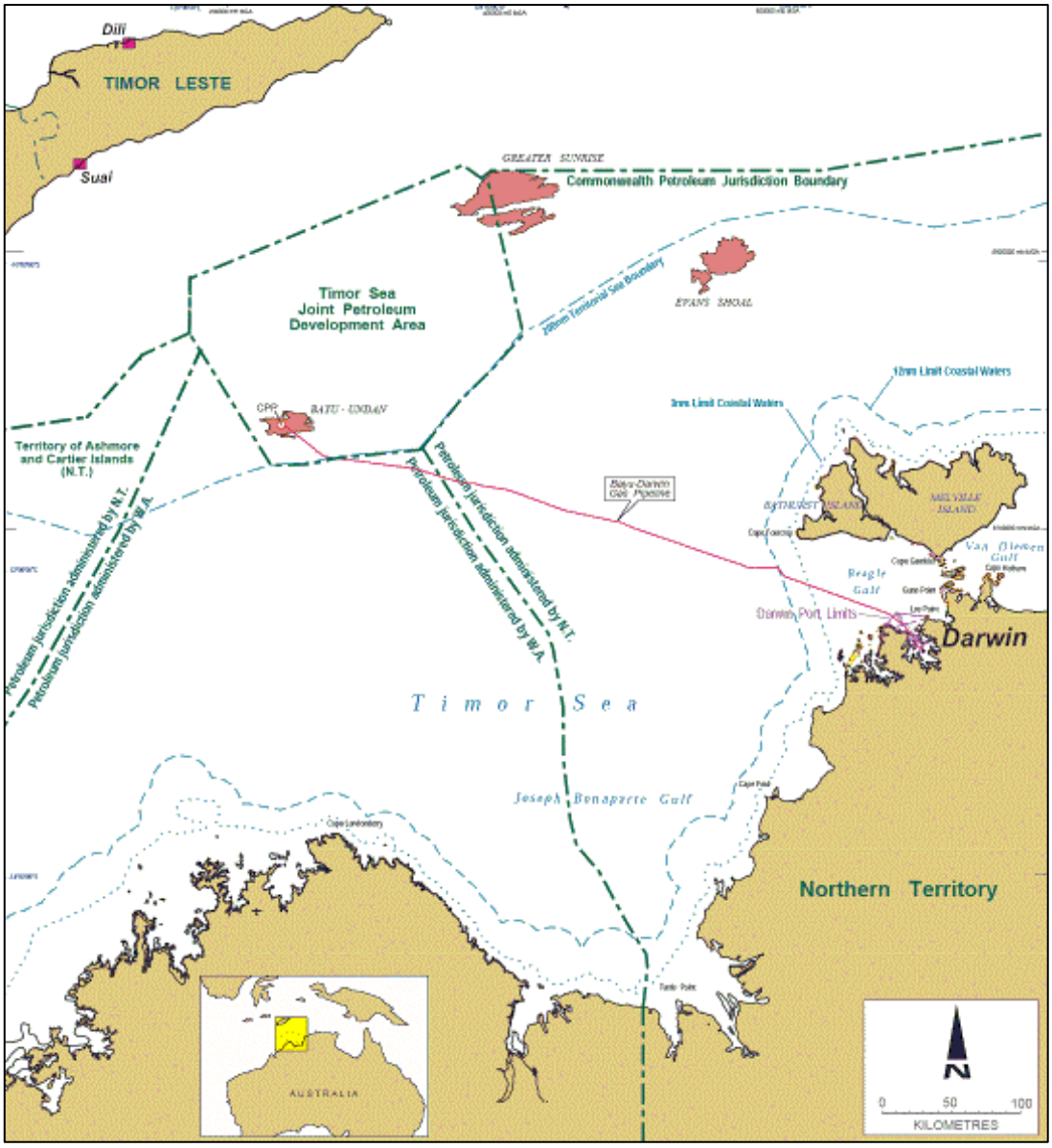


**Figure 1 Regional Location of the Bayu-Undan to Darwin Gas Pipeline**

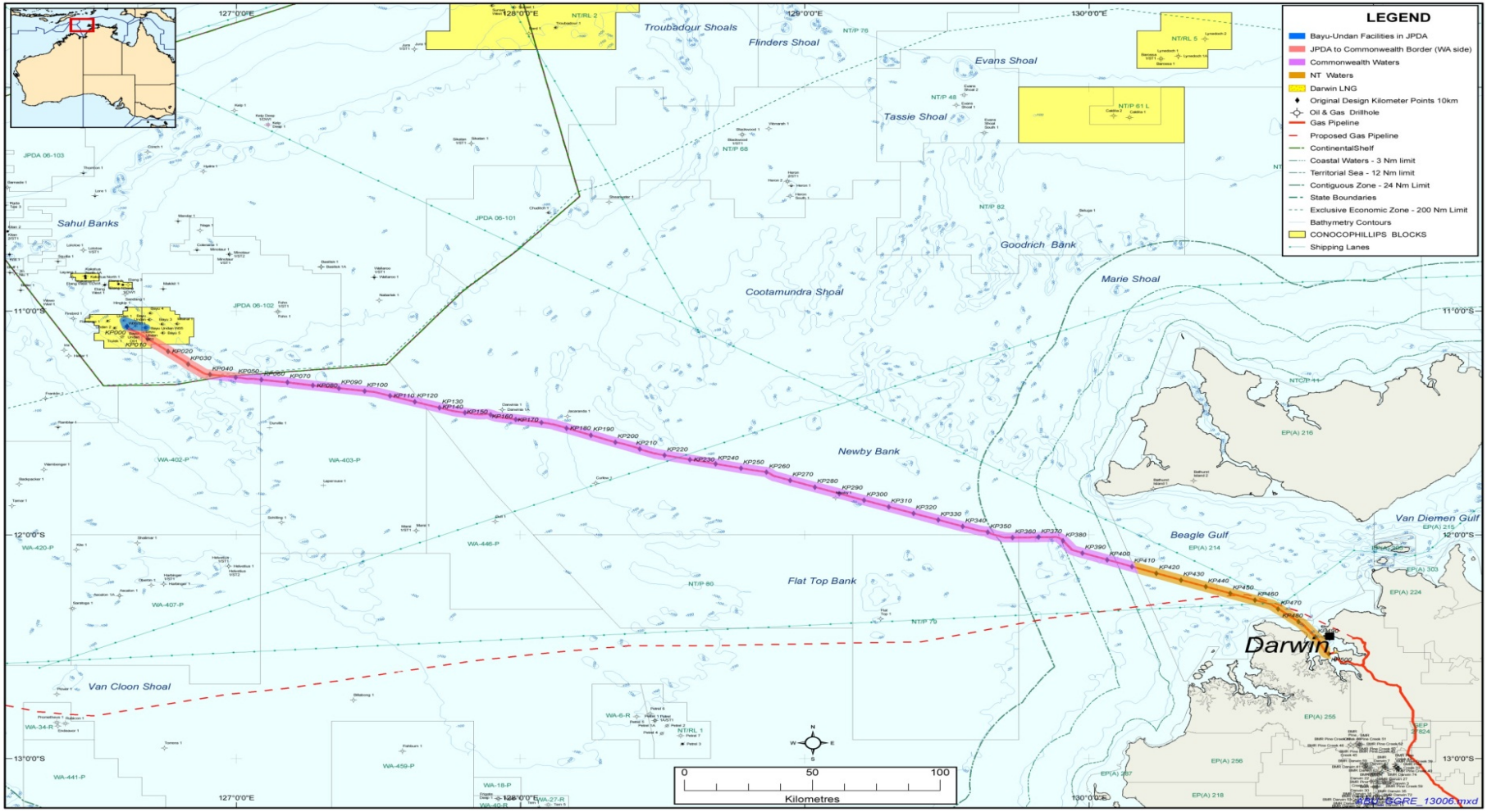


**Figure 2 Location of the Bayu-Undan Pipeline Route Showing Jurisdictional Boundaries**

# 3 DESCRIPTION OF THE EXISTING ENVIRONMENT

## 3.1 PHYSICAL ENVIRONMENT

The region has a tropical monsoonal climate with two distinct seasons known as the North-west Monsoon “wet season” (late October to mid-March) and the Southeast Monsoon or “dry season” (May to mid-October). The variation in seasonal air temperature is small, with regional mean summer and winter air temperatures recorded as ranging from approximately 31 °C to 33 °C.

From the north-western end, the Pipeline initially descends down a slope from 60 m to 100 m before reaching a maximum of 140 m. The seafloor then remains relatively flat at a depth of approximately 100 m before following a general shallowing trend to 60 m. The dominant sediments along the Pipeline route are typically soft silty sands.

The Pipeline lies within the “Northwest Transition Bioregion” which is located across both the North Marine Region and the North West Marine Region. While there are a number of regionally important marine communities and habitats within the North West Marine Region these are all more than 400 km away from the Pipeline. As the Pipeline is an existing operational asset, with the Commonwealth section located on soft substrate and in deep water (depths greater than 30m), with only periodic maintenance activities these regionally significant values are not at risk from the activities covered in the EP.

Tides in the region are typically semi-diurnal (two highs and two lows per day). The primary ocean current is the Indonesian through flow, which drives cooler oceanic water in a south-westerly direction. Regional surface currents show a strong tidal influence with a net southwest drift during the monsoon season.

## 3.2 BIOLOGICAL ENVIRONMENT

Benthic assemblages along the pipeline route are light restricted due to the depth of the sea floor (50-100m). Regional surveys indicate that the soft sandy silts along the Pipeline route support a range of benthic infaunal invertebrate communities (mobile burrowing species), primarily comprising of polychaetes (annelid worms) and crustaceans. This is consistent with the results of surveys of benthic fauna undertaken as part of the baseline studies for the Bayu-Undan field.

A search of the Environment Protection and Biodiversity Conservation Act (EPBC Act) Protected Matters Database identified ten threatened species and 17 listed migratory species that may occur or have habitat in the broad vicinity of the Pipeline easement (**Table 1**). No Threatened Ecological Communities were identified.

**Table 1 Threatened and Listed Migratory Species that May Occur within the Bayu-Undan to Darwin Gas Export Pipeline alignment**

| Category | Scientific Name | Common Name | Status |
|---|---|---|---|
| **Threatened Species** | | | |
| *Sharks, Skates and Rays* | | | |
| | *Pristis zijsron* | Green sawfish, dindagubba, Narrowsnout sawfish | Vulnerable |
| | *Rhincodon typus* | Whale shark | Vulnerable |
| *Cetaceans* | | | |
| | *Balaenoptera musculus* | Blue whale | Endangered |
| | *Megaptera novaeangliae* | Humpback whale | Vulnerable |

| | | | |
|---|---|---|---|
| *Turtles* | | | |
| | *Caretta caretta* | Loggerhead turtle | Endangered |
| | *Chelonia mydas* | Green turtle | Vulnerable |
| | *Dermochelys coriacea* | Leatherback turtle | Endangered |
| | *Eretmochelys imbricata* | Hawksbill turtle | Vulnerable |
| | *Lepidochelys olivacea* | Olive Ridley turtle | Endangered |
| | *Natator depressus* | Flatback turtle | Endangered |
| **Listed Migratory Species** | | | |
| *Sharks Skates and Rays* | | | |
| | *Rhincodon typus* | Whale shark | Vulnerable, Migratory |
| | *Isurus paucus* | Longfin mako | Migratory |
| | *Isurus oxyrinchus* | Shortfin mako | Migratory |
| *Cetaceans* | | | |
| | *Balaenoptera musculus* | Blue whale | Endangered, Migratory |
| | *Megaptera novaeangliae* | Humpback whale | Vulnerable, Migratory |
| | *Balaenoptera edeni* | Bryde's whale | Migratory |
| | *Orcinus orca* | Killer whale | Migratory |
| | *Dungong dugon* | Dugong | Migratory |
| | *Tursiops aduncus (Arafura/Timor Sea populations)* | Spotted Bottlenose Dolphin (Arafura/Timor Sea populations) | Migratory |
| *Turtles* | | | |
| | *Caretta caretta* | Loggerhead turtle | Endangered, Migratory |
| | *Chelonia mydas* | Green turtle | Vulnerable, Migratory |
| | *Dermochelys coriacea* | Leatherback turtle | Endangered, Migratory |
| | *Eretmochelys imbricata* | Hawksbill turtle | Vulnerable, Migratory |
| | *Lepidochelys olivacea* | Olive Ridley turtle | Endangered, Migratory |
| | *Natator depressus* | Flatback turtle | Endangered, Migratory |
| *Reptiles* | | | |
| | *Crocodylus porosus* | Salt-water Crocodile | Migratory |
| *Birds* | | | |
| | *Calonectris leucomelas* | Streaked shearwater | Migratory |

(Note: a 10km radius of the Commonwealth waters section of the Pipeline was searched).

## 3.3 SOCIO-ECONOMIC ENVIRONMENT

A search of the Australian National Shipwreck Database (DSEWPaC 2013) identified that there is a historic shipwreck protection zone surrounding the Japanese submarine 1-124 that was sunk in 1942. The wreck is located immediately north of the existing Pipeline near KP410 within the NT waters, i.e. outside Commonwealth waters.

The Royal Australian Navy undertakes frequent patrols of fishing areas to Australia's north and north-west, primarily in order to control illegal use of resources in the Australian Fishing Zone (AFZ). A large area to the south of the Pipeline alignment is broadly defined as a military exercise area. Extensive consultation with the Department of Defense over many years and implementation of risk control measures have lowered the potential for military activity to impact on the Pipeline. The Pipeline route demarcation is present on navigation charts of the area so it is very unlikely military activities would be conducted over the Pipeline, risking damage from military ordinance.

In general, the Timor and Arafura Seas support a variety of shark, pelagic finfish and crustacean species of commercial and recreational game-fishing importance.

The Timor Sea is an active commercial fishing area used by both Australian and Indonesian fishermen. There are seven main Australian commercial fisheries operating in the areas that encompass or are immediately adjacent to the Pipeline area including:

- *Northern Prawn Fishery.* Activities in the area of interest are generally limited to water more than 200 m deep in areas immediately north of current Timor Reef fishing grounds. While the Pipeline area is likely to overlap areas utilised by the Northern Prawn Fishery it is not located within areas of high fishing effort. Furthermore, it is marked on navigational charts.

- *Timor Reef Fishery*. The principal target species is the gold-band snapper, but important secondary species such as red emperor are also caught. The Pipeline lies approximately 50 km to the south of the extent of this fishery, however the presence and operation of the Pipeline is not expected to have any impact on the Timor Reef fishery.

- *Northern Territory Demersal Fishery*. Within the Northern Territory Demersal Fishery, 95% of the fishing effort occurs in the area adjacent to the Timor Reef fishery to longitude 131° east, targeting gold-band snapper, saddletail snapper, red snapper, red emperor and cods. Only a small number of operators actually work the Fishery and typically do not fish consistently throughout the year. Pipeline operations are not expected to have any impact on the NT Demersal Fishery.

- *Northern Territory Spanish Mackerel Fishery*. The Spanish Mackerel Fishery operates throughout the year in Northern Territory waters seaward of the coast and river mouths, to the outer limit of the AFZ. The presence and operation of the Pipeline is not expected to impact this fishery as it does not overlap significant catch areas.

- *Northern Territory Shark Fishery*. Only a few vessels operate further offshore in the Arafura Region. Pipeline operations are not expected to have any impact on NT Shark Fishery.

- *Western Tuna and Billfish Fishery*. The fishery overlaps the Pipeline area, but activities related to the Pipeline are not expected to have any impact on the fishery.

- *Southern Bluefin Tuna Fishery*. The Pipeline is located within the limits of the southern Bluefin Tuna Fishery, however it is outside of key catch areas so the Pipeline is not expected to have any impact on this fishery.

The Commonwealth Waters section of the Pipeline does not pass through any traditional fisheries.

An assessment of shipping traffic in the vicinity of the Pipeline showed that a limited volume of regular shipping traffic traverses the Central Timor Sea. It is reasonable to expect vessel traffic to transit broadly in the vicinity of the Bayu-Undan to Darwin Gas Export Pipeline as part of routine shipping movements.

There are a number of oil and gas companies holding petroleum permits in the vicinity of the Bayu-Undan to Darwin Gas Export Pipeline. INPEX is currently constructing its Ichthys LNG Project, including an LNG plant at Blaydin Point, and associated gas export pipeline connecting

the offshore gas reserves in the northern Browse Basin in WA into NT waters.

**Marine Reserves**

The Bayu-Undan to Darwin Gas Export Pipeline passes through the Commonwealth Oceanic Shoals Marine Reserve. The Oceanic Shoals Commonwealth Marine Reserve is zoned as a multiple use zone, in which a range of existing activities (including petroleum exploration and production) may continue (DSEWPaC 2011).

The conservation values that the marine reserve encompasses include foraging and inter-nesting areas for turtles and a number of Key Ecological Features (as defined by the Australian Government), that are considered to be important for the biodiversity or ecosystem functioning and integrity of the Commonwealth Marine Area.

The Oceanic Shoals Marine Reserve includes three geographically extensive Key Ecological Features that occur within a 10km radius of the Commonwealth section of the Pipeline: Pinnacles of the Bonaparte Basin, Carbonate bank and terrace system of the Van Diemen Rise and Carbonate banks of the Joseph Bonaparte Gulf.

# 4 DESCRIPTION OF THE ACTION

The Pipeline has been in operation for eight years to date, having been laid and installed in 2005 by ConocoPhillips. It was commissioned in September 2005 and has been operational without incident to date. The Pipeline Operation includes the following activities:

- Operation of the Pipeline
- Pipeline maintenance activities, including vessel related activities such as waste management, and quarantine management.

The Environment Plan provides for a complete description of all relevant activities, to inform the assessment and management of key risks relevant to the project context of an operational pipeline.

# 5 MAJOR ENVIRONMENTAL HAZARDS AND CONTROLS

As required by Regulation 13(3)(b) of the Environmental Regulations, ConocoPhillips conducted an Environmental Risk Assessment for activities associated with the Pipeline. This process was used to identify and detail source of risk, existing controls, possible additional/alternate controls, and provide an assessment of inherent and residual risk. ConocoPhillips' corporate risk management process as outlined in the Australian Business Unit (ABU) Risk Management Overview Procedure and the ConocoPhillips Risk Assessment Guidelines for Upstream Operations, developed by ConocoPhillips Corporate. This process reflects the risk management process detailed within Australian Standard AS/NZS ISO 31000:2009 (AS/NZS 2009) and HB 203:2006 (AS/NZS 2006).

The final stage of this process reviewed risks and controls to ensure that risk is managed to As Low As Reasonably Practicable (ALARP). The ConocoPhillips Risk Matrix identifies ALARP when the residual risk can demonstrate that any potential benefit gained from additional controls would be disproportionate to the cost of implementation. In this case, cost can refer to an impact (e.g. environmental, social) as well as a direct financial cost. In all cases, residual risk must be reduced to ConocoPhillips Risk Matrix Level I or II.

Major environmental hazards and associated controls for the Pipeline are presented in **Appendix A**. For the purposes of this Environment Plan Summary, major environmental hazards are defined as those that are risk ranked as II or greater. Because the gas export pipeline contains >99% dry gas with negligible liquid hydrocarbons, most of the higher risk aspects are associated with ancillary activities e.g. in-field vessel operations. All control measures detailed in the EP will be implemented to ensure risk is managed to ALARP.

# 6 SUMMARY OF MANAGEMENT APPROACH

The Pipeline operation and maintenance will be managed in accordance with the *Bayu-Undan to Darwin Gas Export Pipeline Environment Plan (EP)* accepted by NOPSEMA.

The EP has been prepared in compliance with relevant environmental legislation. It is also in compliance with ConocoPhillips' Health Safety and Environmental Management System (HSEMS) and ConocoPhillips' Corporate Environment Policy, which provide fundamental governance for all ConocoPhillips activities worldwide. (The corporate HSEMS standard is closely analogous to the A/NZS ISO 14001:2004 Environment Management Systems Standard).

The EP is designed to be a practical implementation/management tool. The purpose of the EP is to allow the operation and maintenance of the Pipeline in a manner that poses the lowest risk to the environment as practicable.

A systematic risk management approach has been followed. For each source of risk identified in the Environmental Risk Assessment, the EP defines an environmental performance objective,

identifies relevant standards and establishes controls. A range of measurement criteria for each source of risk have been established to demonstrate that the performance objectives have been achieved. The EP identifies the key responsible and accountable personnel who will ensure the measurement criteria are captured and reflected in internal and external compliance reports. Compliance and environmental performance against the objectives, standards and measurement criteria will be monitored throughout the Pipeline operation.

In accordance with the Environment Regulations 14(1), (2) and (10) the EP includes an implementation strategy 'to direct, review and manage Pipeline operation activities so that environmental impacts and risk are continually being reduced' and 'performance objectives and standards are achieved'. Key components of the implementation strategy detailed further within the EP include:

- ConocoPhillips systems, practices and procedures to conduct operational activities in accordance with relevant legislation, EP commitments and ConocoPhillips standards.
- Definition of the roles/responsibilities of personnel involved in different project activities, such as: emergency response preparedness, risk management, monitoring, reporting and management of project change.
- Training/competency requirements of project personnel (including contractors).
- Auditing and review program.
- Management of non-conformance investigations and corrective actions.
- Reporting and record keeping requirements.

In accordance with Regulation 14 (8) of the Environment Regulations, an Oil Spill Contingency Plan (OSCP) has been developed to accompany the EP. The OSCP sets out spill preparedness measures and emergency arrangements. It provides the information required for an effective response in the unlikely event of an unplanned release of hydrocarbons. The only credible source of an oil spill in relation to Pipeline operations within Commonwealth waters is from Pipeline maintenance vessels. Modelling was undertaken for two credible spill scenarios specific to the Pipeline (detailed within the EP). The OSCP is managed through separate performance objectives, standards and measurement criteria. In addition monitoring, response arrangement testing, as well as audit and review processes are in place to assure the OSCP. Responsibilities for OSCP planning and key response actions are defined within the OSCP.

# 7 CONSULTATION

ConocoPhillips is committed to safe and environmentally responsible operation of the Bayu-Undan to Darwin Pipeline in Commonwealth Waters. To that end, the company has consulted with all relevant stakeholders in the preparation of this EP. Key stakeholder groups identified included Commonwealth and Northern Territory Government departments, commercial fishery associations, private fishing operators and relevant spill response agencies.

The consultation program was designed to meet the following objectives:

- Inform relevant stakeholders of the objectives and rationale for the change in the regulatory role from the Northern Territory Government to the Commonwealth agency (NOPSEMA) with regard to this EP;
- Explain how, through the EP, ConocoPhillips will identify and mitigate against potential risks that may impact stakeholders;
- Obtain information and advice regarding spill response resources and capability;
- Listen to and address any concerns arising from the operation of the Pipeline and understand requirements for ongoing consultation.

Throughout the current consultation period, no concerns have been raised by stakeholders with regard to management of the Pipeline that needs to be addressed or incorporate into the EP development.

ConocoPhillips is committed to on-going proactive engagement with stakeholders for the duration of the revised Pipeline EP. As noted above, ConocoPhillips has dedicated channels for inquiries and ongoing communication with its stakeholders. The company looks to address all incoming correspondence within two working days.

## 8 CONTACT DETAILS

Further information regarding the Bayu-Undan to Darwin Gas Export Pipeline Environment Plan can be obtained from:

External Relations Department

ConocoPhillips Australia Business Unit West

Email: pipeline@conocophillips.com

## 9 REFERENCES

AS/NZS, 2006. Australian Standard HB 203:2006. Published by Standards Australia, 2006.

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Bowman, Bishaw, Gorham, 2001. Bayu-Undan 2000 Environmental Survey Report. Report prepared for Phillips Petroleum (91-12) Pty Ltd. Phillips Report No: 3001C4-ENV Rev. 2. BBG Report No. R00028, 18 October 2001.

DSEWPaC. 2011. Commonwealth Marine Environment Report Card. Supporting the draft marine bioregional plan for the North-west Marine Region. Canberra.

DSEWPaC 2013. North Commonwealth Marine Reserves Network Management Plan 2014-2024.

Heyward, A.J., Pincerato, E.J., and Smith, L. (eds). 1997. Big Bank Shoals of the Timor Sea: An Environmental Resource Atlas.

**Appendix A: Summary of Key Environmental Hazards and Control Measures for the Bayu-Undan to Darwin Gas Export Pipeline**
Note: For a comprehensive discussion of all relevant risks and management controls, refer EP Section 6.

| Source of Hazard (Risk) | Potential Environmental Impact | Control Measures |
|---|---|---|
| *Unplanned Discharges to the Marine Environment* | | |
| Unplanned release of hydrocarbons from a refuelling incident scenario - An instantaneous surface release of 10 $m^3$ of marine diesel fuel tracked for 10 days, to represent a refuelling incident | • Toxic effects to biota<br>• Oiling of marine mammals, reptiles and seabirds<br><br>**<u>Credible Receptors</u>**<br>• Avifauna<br>• Cetaceans<br>• Marine reptiles | **Engineering Controls**<br>Use of dry-break coupling and safety breakaway coupling<br><br>Flotation collars are installed on bulk transfer hoses<br><br>Bulk transfer hoses are certified, rated for hydrocarbons and pressure tested<br><br>**Administrative Controls**<br>Selection of vessel contractor subject to ConocoPhillips local and global marine vessel vetting processes<br><br>Bunkering activities will be controlled through implementation of a Permit to Work (PTW) or equivalent<br><br>Hose register maintained (which records details of date of manufacture, date of pressure test and test pressure, and preventative maintenance and inspection)<br><br>Bunkering during daylight hours where practicable<br>Preventative maintenance of bunkering equipment to ensure ongoing integrity |
| Unplanned release of hydrocarbons from a vessel collision/tank rupture scenario - A 6 hour surface release of 152 $m^3$ of diesel tracked for 20 days | • Toxic effects to biota<br>• Oiling of marine mammals, reptiles and seabirds<br>• Oiling of sensitive shoreline receptors<br><br>**<u>Credible Receptors</u>**<br>• Avifauna<br>• Cetaceans<br>• Marine reptiles<br>• Benthic communities on the shoals<br>• Migratory Shorebirds<br>• Fish | **Engineering Controls**<br>Vessels will use approved navigation systems and depth sounders<br><br>Response and recovery equipment on-board<br><br>**Administrative Controls**<br>Selection of vessel contractor subject to ConocoPhillips local and global marine vessel vetting processes<br><br>Compliance with requirements under the *Navigation Act 2012* – Standard AMSA maritime/safety navigation procedures<br><br>Compliance with *Navigation Act 2012* Marine Orders Part 30: Prevention of |

| Source of Hazard (Risk) | Potential Environmental Impact | Control Measures |
|---|---|---|
| | • Commercial Fisheries | Collisions, Issue 8<br><br>Spill response in accordance with accepted OSCP |
| Minor chemical and hydrocarbon spill during internal transfer, handling and storage on the maintenance vessel(s). | • Toxic effects to biota<br><br>**Credible Receptors**<br>• Cetaceans<br>• Migratory Shorebirds<br>• Marine reptiles<br>• Fish | **Engineering Controls**<br>Hydrocarbons and chemicals in designated storage areas, which are bunded.Chemical storage areas have loss prevention features such as containment bunds and save all drainage systems.<br><br>Response and recovery equipment on-board – stocks of spill response bins/kits readily available and personnel trained in their use.<br><br>**Administrative Controls**<br>Selection of vessel contractor subject to ConocoPhillips local and global marine vessel vetting processes<br><br>Implementation of vessel Permit to Work (PTW) or equivalent authorisation process for all internal transfers<br><br>Compliance with the requirements of the *Protection of the Sea (Prevention of Pollution from Ships) Act 1983*, specifically Parts II, IIA and IIIC and *Navigation Act 2012* Marine Orders Part 91<br><br>Appropriate procedure for storage of chemicals<br><br>Material Safety Data Sheets (MSDS) on board for all hazardous substances, as defined in NOHSC:1008 (2004) |
| Dropped object (unintentional) | • Sea bed disturbance resulting in localised change to benthic communities<br><br>**Credible Receptors**<br>• Potentially affected benthic communities<br>• Cetaceans<br>• Migratory Shorebirds<br>• Marine reptiles<br>• Fish | **Engineering Controls**<br>Lifting equipment maintained in accordance with vessel maintenance<br><br>Dropped objects retrieved where safe and practicable to do so<br><br>**Administrative Controls**<br>Selection of vessel contractor subject to ConocoPhillips local and global marine vessel vetting processes, which include verification of vessel lifting procedures and lifting equipment maintenance records and vessel OVID inspection.<br><br>Vessels have appropriate lifting procedures, which contain as a minimum: |

| Source of Hazard (Risk) | Potential Environmental Impact | Control Measures |
|---|---|---|
| | | - Risk assessment carried out prior to undertaking lifting activity<br>- Use of certified lifting equipment and lifting/fastening procedures<br>- All crane operators, dogmen and riggers to hold appropriate qualifications or competency assessment |
| Pipeline Inspection Guage (PIG) becomes stuck within section of Pipeline (as a result of Pipeline deformation) requiring physical extraction by removing a section of the Pipeline. | Release of trace radioactive compounds from intelligent pig in unlikely event of rupture of pig<br><br>**Credible Receptors**<br><br>Potentially affected benthic communities<br><br>Marine Fauna: Cetaceans, Migratory Shorebirds, Marine reptiles, Fish. | **Administrative Controls**<br>Contractor has in place an approved (by COP) campaign specific inspection and testing plan to minimise the risk of a stuck PIG incident.<br><br>Contractor has in place an approved (by COP) campaign specific procedure to remove a stuck PIG.<br><br>Contractor selection subject to ConocoPhillips Contractor HSE Management Process (ALL/HSE/PRO/016) to verify contractor qualifications and competency to minimise the risk of a stuck PIG incident occurring.<br><br>Contractor will comply with the ConocoPhillips Bayu-Undan Emergency Response Plan (BU/SHE/ER/003) in the event of an incident. |
| Discharge of chemically treated seawater into the marine environment | • Potential toxicity to marine organisms in the immediate surrounds of the discharge<br><br>**Credible Receptors**<br>• Very localised release scenario. No credible receptors were identified | **Engineering Controls**<br>Chemical additives carefully chosen to reduce the potential for environmental impacts as far as reasonably practicable. Chemical selection subject to the following criteria:<br>- Not persistent<br>- Not bioaccumulative<br>- OCNS-D rated or CHARM gold rated<br>- Selection of least hazardous chemicals whilst maintaining technical feasibility.<br><br>**Administrative Controls**<br>Non-urgent repairs managed according to the ConocoPhillips Management of Change Procedure |
| *Routine Discharges to the Marine Environment* | | |
| Routine discharges: sewage, grey water and putrescible wastes | • Temporary, localised nutrient enrichment of surface water around discharge point<br>• Discharge of deck drainage has the potential to cause a temporary | **Engineering Controls**<br>Sewage and putrescible waste macerated to a diameter of less than 25 mm prior to disposal in accordance with MARPOL Annex V<br><br>**Administrative Controls** |

| Source of Hazard (Risk) | Potential Environmental Impact | Control Measures |
|---|---|---|
| | localised change in water quality<br><br>**<u>Credible Receptors</u>**<br>• No credible receptors were identified | Selection of vessel contractor subject to ConocoPhillips local and global marine vessel vetting processes<br><br>Compliance with the requirements of the *Protection of the Sea (Prevention of Pollution from Ships) Act 1983*, specifically MARPOL 73/78 Annex V (garbage) specifically:<br>- Sewage and putrescible wastes macerated to < 25 mm prior to discharge overboard<br>- Records of all discharges maintained in Garbage Record Book<br>- No discharge of treated sewage within three nautical miles of shore<br>- No discharge of putrescible waste within 12 nautical miles of shore |
| Routine discharge from deck drainage and bilge water to marine environment | • Localised change in water quality<br><br>**<u>Credible Receptors</u>**<br>• Cetaceans<br>• Migratory shorebirds<br>• Marine reptiles<br>• Fish | **Engineering Controls**<br>Fuels, oils and chemicals to be stored within contained and bunded areas in accordance with their MSDS and relevant Australian Standards<br><br>Absorbents and containers available on vessel to lean up small accumulations of oil/grease and chemicals<br><br>**Administrative Controls**<br>Selection of vessel contractor subject to ConocoPhillips local and global marine vessel vetting processes<br><br>Compliance with *Navigation Act 2012* Marine Orders 91 – Marine Pollution Prevention - Oil and Marine Order Part 94 – Marine Prevention – Packaged Harmful Substances<br><br>Compliance with the requirements of the *Protection of the Sea (Prevention of pollution from Ships) Act 1983*, Part II (Section 9)<br><br>Liquid from drains only discharged if oil in water is < 15 ppm. If treatment to 15 ppm is not possible, oily water will be stored in suitable containers for disposal onshore.<br>Regular inspections to ensure that deck areas are clean of spillages and accumulations, and that spills/leaks are recorded/reported<br><br>Inspection of spill kits to ensure they are intact and contain adequate quantities of absorbent materials |

| Source of Hazard (Risk) | Potential Environmental Impact | Control Measures |
|---|---|---|
| | | Oil Record book maintained and available for inspection |
| *Physical Presence* | | |
| Transport/ introduction of invasive marine species (IMS) in maintenance vessel ballast water and vessel transfer (e.g. biofouling). | • Introduction and establishment of IMS and displacement of native marine species<br><br>**Credible Receptors**<br>• Commercial fisheries | **Administrative Controls**<br>Selection of vessel contractor subject to ConocoPhillips local and global marine vessel vetting processes<br><br>Compliance with the AQIS Australian Ballast Water Management Requirements (2001), specifically: All ballast water exchanges conducted > 50 nm from land and in > 200m water depth; and Ballast water exchange records maintained on rig/vessel<br><br>Compliance with the Commonwealth Biosecurity Bill (2012) specifically: management of ballast water discharge and maintenance of ballast water records<br><br>Compliance with Operator Guidelines for Vessel 25m and Greater Arriving in Australia (AQIS, 2010) specifically: quarantine pre-arrival approval and reporting requirements for vessels entering Australia and vessel inspection requirements, including hull biofouling<br><br>Compliance with the International Convention on the Control of Harmful Anti-fouling Systems on Ships (IMO 2001)<br><br>Compliance with National Biofouling Guidance for the Petroleum Production and Exploration Industry (AQIS 2009) |
| Physical disturbance to the seabed (including vessel positioning, anchor deployment and retrieval; deployment of emergency repair equipment to the seafloor) | • Seabed disturbance resulting in localised damage to sensitive benthic communities<br><br>**Credible Receptors**<br>• Benthic communities | **Engineering Controls**<br>Equipment deployed to seafloor in accordance with vessel operating procedures<br><br>Vessel anchoring procedure in place prior to commencement of maintenance activities<br><br>**Administrative Controls**<br>Non-urgent repairs managed according to the ConocoPhillips Management of Change Procedure |

| Source of Hazard (Risk) | Potential Environmental Impact | Control Measures |
|---|---|---|
| | | Surveys carried out prior to the deployment of repair equipment to identify appropriate 'landing zones' on the seabed that will avoid sensitive benthic habitats |
| Collisions with/disruption to cetaceans or marine reptiles during vessel movement | • Injury/mortality of wildlife from vessel collision<br>**Credible Receptors**<br>• Cetaceans<br>• Marine reptiles | **Engineering Controls**<br>Vessel-based Pipeline maintenance activities occur only occasionally: typically every three years as a minimum.<br><br>Avoid making sudden or excessive noise (either from mechanical noise sources or people on board) while near cetaceans (and applied for marine turtles in lieu of existing requirements)<br><br>**Administrative Controls**<br>ConocoPhillips will comply with EPBC Regulations 2000 – Part 8 Division 8.1 Interacting with cetaceans which:<br>- Requires that a vessel will not travel greater than 6 knots within 300 m of a whale or turtle (caution zone) and not allow the vessel to approach closer than 100m of a whale or turtle<br><br>Reporting of cetacean interactions to DoE.<br>Continual observation from bridge of vessel during transit and at location<br><br>Record any sightings |
| Physical Presence of Pipeline | • Habitat modification/artificial reef effect<br>• Colonisation by encrusting marine fauna and flora, attracting fish<br>• Local seabed scouring due to Pipeline movements<br>**Credible Receptors**<br>• Benthic communities | **Engineering Controls**<br>Regular marine growth inspection by ROV to monitor level of growth of hard biota<br><br>Pipeline is steel with a concrete coating. Concrete is a pipeline stabilisation measure which restricts lateral movement of the Pipeline and minimises movement of seabed material |
| Illumination of waters within close proximity to the maintenance vessels | Temporary local concentration of marine fauna that are attracted to the lights on the vessel(s). | **Engineering Controls**<br>Lights are not normally directed outwards except when necessary for safe operations such as transfer operations or deployment and retrieval of equipment. |

| Source of Hazard (Risk) | Potential Environmental Impact | Control Measures |
|---|---|---|
| | **Credible Receptors**<br>• Marine fauna | **Administrative Controls**<br>Navigational lighting of the maintenance vessels will satisfy the requirements of the Navigation Act 2012 Marine Order 30 - Prevention of Collisions - states functional lighting is required on the vessel at levels that provide a safe working environment for staff. |
| Interaction with other marine users. | Interference with commercial fishing vessels, commercial shipping, and other marine users.<br><br>Business interruption (abnormal) due to damage to commercial vessels or fishing gear.<br><br>**Credible Receptors**<br>Include: Commercial fishing, Commercial shipping. | **Administrative Controls**<br>*Navigation Act 2012*, including implementing the following standard AMSA maritime safety/navigation procedures:<br>• Use of standard maritime procedures (Notice to Mariners issued by Australian Hydrographical Service (AHS), radio contact, display of appropriate navigation beacons and lights on maintenance vessels).<br>• Compliance with AMSA administered marine safety regulations and maritime notification requirements (e.g. Maritime Safety Information (MSI) notifications).<br>• Marine Orders Part 30 – Prevention of Collisions, including navigational aids such as lights and signals to be provided and used on a ship for the prevention of collisions.<br>• Convention on the International Regulations for Preventing Collisions at Sea 1972 (COLREGS) Part B – Steering and Sailing Rules, including vessels shall at all times maintain a proper look-out to prevent the risk of collision, and vessels shall maintain a safe speed at all times to allow for avoidance of collisions. |
| *Waste Generation and Disposal* | | |
| Unplanned discharge overboard of hazardous and non-hazardous wastes to marine environment | • Decline in water quality and potential to injure fauna<br>**Credible Receptors**<br>• Marine fauna | **Engineering Controls**<br>Segregation and storage of wastes according to waste types<br><br>**Administrative Controls**<br>Selection of vessel contractor subject to ConocoPhillips local and global marine vessel vetting processes<br><br>All Hazardous waste will be managed on the vessel in accordance with MARPOL 73/78 Annex III (as defined for vessel class) |

| Source of Hazard (Risk) | Potential Environmental Impact | Control Measures |
|---|---|---|
| | | Non-hazardous waste managed in accordance with requirements of the *Protection of the Sea (Prevention of pollution from Ships) Act 1983*, specifically MARPOL 73/78 Annex V (garbage)<br><br>Implementation of Vessel Waste Management Plan |
| *Planned and Unplanned Atmospheric Emissions* | | |
| Pipeline rupture | • Accidental rupture of the Pipeline will result in the release of gas, namely methane, ethane and carbon dioxide, which will bubble through the water column to the surface and enter the atmosphere.<br>• Emissions of GHG from the Pipeline rupture or during fossil fuel combustion aboard the maintenance vessels will cause a small incremental increase in contribution to global GHG concentrations, but are not considered to have determinable localised impact.<br>• No credible receptors were identified | **Administrative Controls**<br>ConocoPhillips Pipeline Integrity Management Plan (PIMP) (H8-10000001725).<br><br>The Bayu-Undan Emergency Response Plan (ALL/HSE/ER/003) and the Pipeline Emergency Repair Management Plan (H8-10000005136) details the process to be followed in the event of an impact to the Pipeline, rupture of the Pipeline or sea surface fire resulting from a pipeline.<br><br>Repairs to be carried out in accordance with the Pipeline Integrity Management Plan (H8-10000001725) and DNV Offshore Standard for Submarine Pipeline Systems (DNV-OS-F101) |
| *Environmental Noise* | | |
| Noise emissions into the marine environment generated by maintenance vessels | • Physiological or behavioural disturbance to marine fauna<br><br>**<u>Credible Receptors</u>**<br>• Marine fauna | **Engineering Controls**<br>All noise generating equipment to be serviced and maintained with the vessel owners planned maintenance systems<br><br>Avoid making sudden or excessive noise (either from mechanical noise sources or people on board) while near cetaceans or marine turtles<br><br>**Administrative Controls**<br>Compliance with EPBC Regulations 2000 Part 8 which:<br><br>- Requires that a vessel will not travel greater than 6 knots within 300 m of a whale or turtle (caution zone) and not allow the vessel to approach |

| Source of Hazard (Risk) | Potential Environmental Impact | Control Measures |
|---|---|---|
| | | closer than 100m of a whale or turtle<br>- Reporting of cetacean interactions to DoE. |
| Underwater noise emissions generated from the use of towed side scan sonar | • Potential for physiological damage or behavioural impacts to cetaceans<br><br>**Credible Receptors**<br>• Cetaceans | **Engineering Controls**<br>Vessel travelling at 4-5 knots during side scan sonar survey operations<br><br>**Administrative Controls**<br>Compliance with EPBC Regulations 2000 Part 8 which:<br>- Requires that a vessel will not travel greater than 6 knots within 300 m of a whale or turtle (caution zone) and not allow the vessel to approach closer than 100m of a whale or turtle<br>- Reporting of cetacean interactions to DoE<br><br>Responsibilities for visual monitoring will be clearly communicated to the Vessel Party Chief. Vessel crew will be fully briefed regarding appropriate response to sighting and associated reporting required. |