



# Gorgon Project:

## Offshore Feed Gas Pipeline System Installation – Summary Environment Plan

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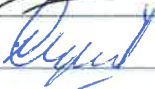
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## Offshore Feed Gas Pipeline System Installation – Summary Environment Plan

### Document Information

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<b>Document Custodian:</b>	Rick Allen	<b>Department:</b>	Gorgon HES

### Revision Approvals

	Name	Signature	Date
<b>Prepared:</b>	Naomi Kerp		7/10/13
<b>Checked:</b>	Jason Seabrook		7/10/13
<b>Approved:</b>	David Equid		07 OCT 2013
<b>Document Control QC:</b>			

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3.	Chevron Australia Pty Ltd	David Humphreys
4.	Chevron Australia Pty Ltd	Chris Bennison
5.	Chevron Australia Pty Ltd	David Equid
6.	Chevron Australia Pty Ltd	Milton Bruce
7.	Chevron Australia Pty Ltd	Ashley Geneve
8.	Chevron Australia Pty Ltd	Jason Seabrook
9.	Chevron Australia Pty Ltd	Sarah Bolitho
10.	Chevron Australia Pty Ltd	Katherine Ross
11.	Chevron Australia Pty Ltd	Kathryn Barras
12.	Chevron Australia Pty Ltd	Leon Sheridan

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## 1.0 Introduction

This Summary Environment Plan – Offshore Feed Gas Pipeline Installation Management Plan (Document Number G1-NT-PLNX0000298) (referred to as the Plan in this document) details the pipeline installation activities for the offshore feed gas pipeline from Gorgon and Jansz-lo gas fields to Barrow Island. This Plan was accepted by the National Offshore Petroleum Safety Environment Management Authority (NOPSEMA) on 27 September 2013.

### 1.1 Operator

Chevron Australia Pty Ltd (Chevron Australia) is the Operator for the Gorgon Gas Development on behalf of the following companies (collectively known as the Gorgon Joint Venturers):

- Chevron Australia Pty Ltd
- Chevron (TAPL) Pty Ltd
- Shell Development (Australia) Pty Ltd
- Mobil Australia Resources Company Pty Limited
- Osaka Gas Gorgon Pty Ltd
- Tokyo Gas Gorgon Pty Ltd
- Chubu Electric Power Gorgon Pty Ltd.

### 1.2 Overview

The Gorgon Gas Development comprises a subsea development within the Gorgon and Jansz-lo gas fields located off the north-west coast of Australia, which are tied back to shore via a network of subsea pipelines to a Gas Treatment Plant on Barrow Island.

The Gas Treatment Plant will comprise three liquefied natural gas trains capable of producing a nominal capacity of five million tonnes per annum per train. The Gas Treatment Plant will also produce condensate and domestic gas. Carbon dioxide, which occurs naturally in the feed gas, will be separated during the production process and then injected into deep formations below Barrow Island. The liquefied natural gas and condensate will be loaded from a dedicated jetty offshore from Town Point and then transported by dedicated carriers to international markets. Gas for domestic use will be exported by a pipeline from Town Point to the domestic gas collection and distribution network on the mainland.

The subsea pipeline networks traverse through both Commonwealth waters and water under Western Australian (State) jurisdiction and are covered by four separate licenses:

- State waters: TPL/21 (Gorgon) and TPL/22 (Jansz)
- Commonwealth waters: WA-20-PL (Gorgon) and WA-19-PL (Jansz).

### 1.3 Location

Six subsea pipelines and two subsea umbilical systems will be installed to transport natural gas from the Gorgon and Jansz fields to Barrow Island for gas processing. The Jansz-lo fields are located within production licenses WA-36-L and WA-39-L, approximately 200 km off the north-west coast of Western Australia in water depth approximately 1350 m. The Gorgon fields are located within production license WA-37-L, approximately 130 km off the north-west coast of Western Australia in water depth approximately 220 m. The total lengths of the pipelines and umbilicals are approximately 58 km and 134 km for Gorgon and Jansz, respectively.

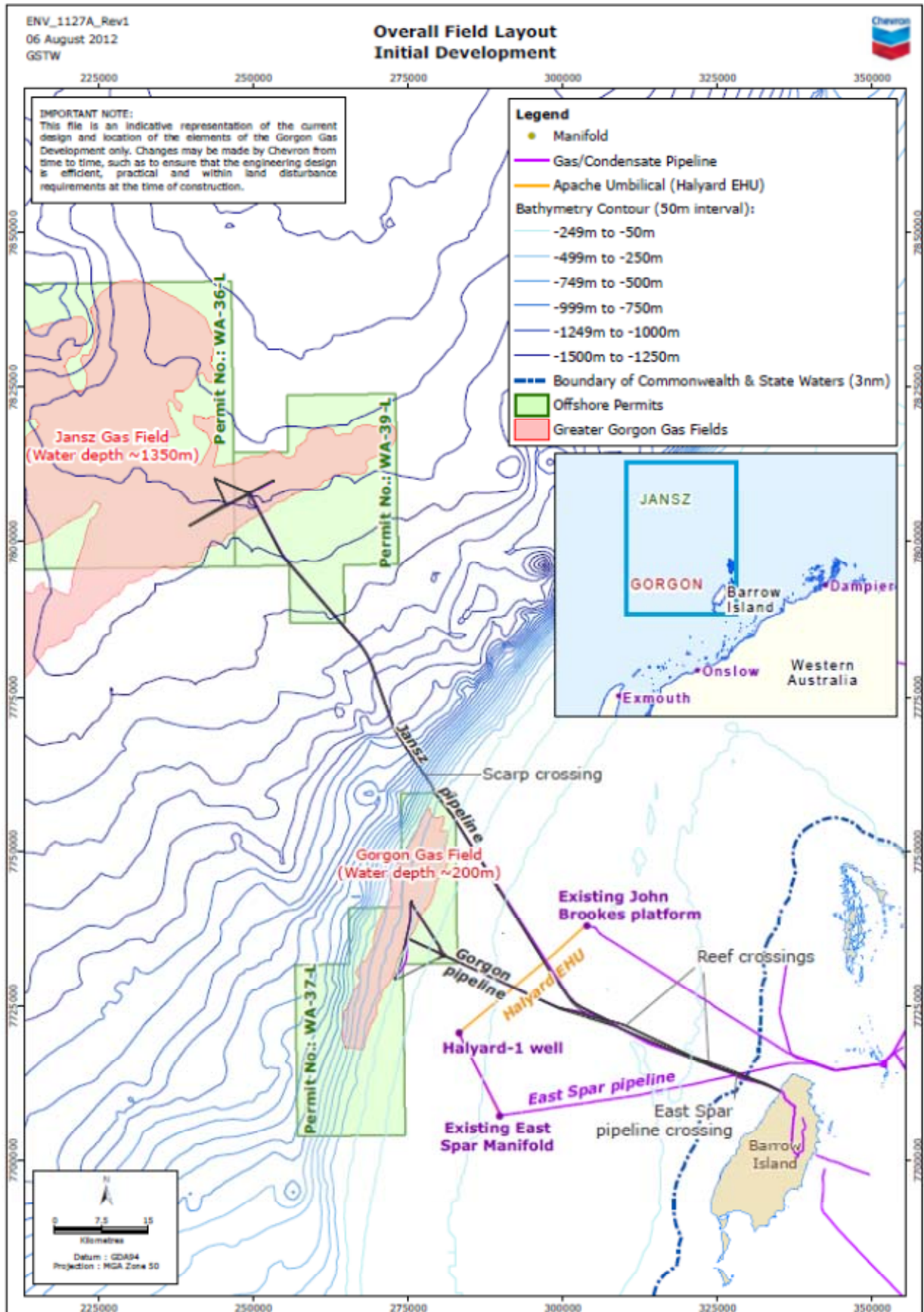
All offshore pipelines will be installed in separate lay corridors, with monoethylene glycol (MEG) and Utility pipelines installed close to each other (approximately 2 m separation) through the rock stabilised section. The width of the pipeline corridor for the Gorgon and Jansz offshore pipelines will be approximately 200 m; this width will vary to allow for consideration of the

subsea features when constructing the pipeline. The umbilicals will be laid in separate lay corridors along the pipelines, typically with a 50 m separation.

The co-ordinates for the Offshore Feed Gas Pipeline are provided in Table 2-1, and the Gorgon and Jansz pipeline routes are shown in Figure 1-1

**Table 2-1 Co-ordinates for the Offshore Feed Gas Pipeline**

Pipeline	Easting	Northing
<b>Gorgon</b>		
HDD tail end ( KP 57.7)	334 242.48 mE	7 711 599.61 mN
State/Commonwealth boundary (KP 52.7)	329 594.74 mE	7 713 430.32 mN
Midline PTS (KP 0)	280 769.91 mE	7 733 179.24 mN
<b>Jansz</b>		
HDD tail end ( KP 133.4)	334 275.37 mE	7 711 668.62 mN
State/Commonwealth boundary (KP 128.5)	329 745.50 mE	7 713 633.04 mN
Midline PTS (KP 0)	249 457.00 mE	7 807 820.57 mN

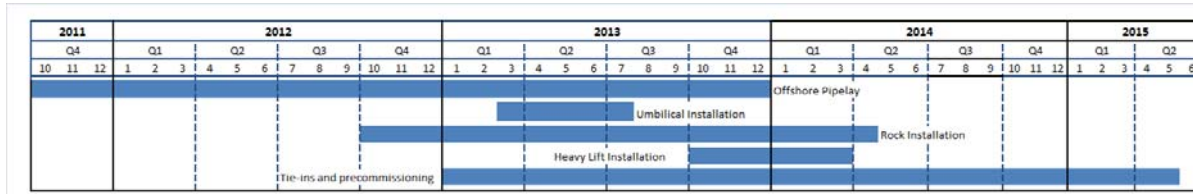


**Figure 1-1 Gorgon and Jansz Pipeline Routes**

## 2.0 Activity Description

### 2.1 Timing and Schedule

The installation of the offshore feed gas pipeline system will run 24 hours a day over approximately 24 months from mobilisation to demobilisation. The current estimate of timing for the key stages for construction is provided in **Figure 2-1 Estimated Activity Schedule**.



**Figure 2-1 Estimated Activity Schedule**

### 2.2 Planned Activity Summary

The Offshore Feed Gas System installation will include the following activities:

1. Installation of pipelines:
  - a. Gorgon and Jansz 30"/34" production pipelines
  - b. Gorgon and Jansz 6" monoethylene glycol (MEG) pipelines
  - c. Gorgon and Jansz 8" utility pipelines
  - d. Gorgon 26" Corrosion Resistant Alloy (CRA) infield pipelines
  - e. Gorgon 6" MEG pipelines
  - f. Gorgon 8" utility pipelines
  - g. Jansz 24" CRA infield pipelines
  - h. Jansz 6" MEG pipelines
  - i. Jansz 8" utility pipelines
2. Installation of umbilicals:
  - a. Gorgon and Jansz umbilicals
3. Installation of long-term stabilisation and protection of the pipelines and umbilicals:
  - a. Gorgon and Jansz rock installation
4. Installation of subsea structures:
  - a. Jansz structure foundations
  - b. Jansz manifold- Pipeline Termination Structures (PTSs)
  - c. Jansz well jumpers / spools
  - d. Jansz Midline PTS
  - e. Jansz Control Distribution Unit (CDU)
  - f. Jansz Umbilical Midline Connection Assembly (UMCA)
  - g. Gorgon Manifolds
  - h. Gorgon structure foundations and PTSs
  - i. Gorgon well jumpers / spools



- j. Gorgon Midline PTS
- k. Gorgon CDU
5. Tie-in of pipelines, umbilicals, and subsea structures
6. Conducting of pre-commissioning activities:
  - a. Water winning
  - b. Flooding, gauging, cleaning, and hydrotesting
  - c. Dewatering
  - d. Inerting
  - e. MEG fill
7. Support activities:
  - a. Construction vessels(including pipelay, umbilical installation, rock installation, and heavy lift vessels)
  - b. Support vessels (including pipe supply vessels, transportation barges, cargo ships, and bulk carriers)
  - c. Helicopter operations
  - d. Seabed surveys (sonar and ROV)

## 2.3 Unplanned Events Summary

Maximum credible spill scenarios were identified for both hydrocarbons and chemicals, including:

- diesel
- Heavy Fuel Oil (HFO)
- hydraulic fluid
- wellbore fluids (MEG/brine mixture)
- Mono-ethylene glycol (MEG)

The largest volume potential scenarios of diesel and HFO were modelled to determine the environment that may be affected by unplanned events (EMBA).

## 2.4 Spill Response Activities Summary

Potential spill scenarios, mitigation measures and response activities have been identified and described in the Oil Spill Operational Response Plan (G1-NT-PLNX0001265), including the following:

- Detailed Chain of Command for:
  - Shipboard Response
  - Barrow Island Installation Emergency Management Team
  - ABU Emergency Management Team
- Roles and Responsibilities
- Unplanned Event Response Action Plans and Checklists
- Protection Prioritisation, strategy selection and Net Environmental Benefit Analysis processes
- Interface of response activities including combat agency interaction and spill response resources

- Demonstration of capability, environmental risk assessment and mitigation measures
- Oil spill response termination arrangements
- Testing and maintenance of spill response
- Maintenance and review of spill response arrangements
- Operational and Scientific Monitoring Plan

### 3.0 Description of Environment

The pipeline construction corridor runs from the west coast of Barrow Island, approximately 50 km off the coast of Dampier in the north-west of Western Australia, out to the Gorgon and Jansz-Lo gas fields, which are 130 km and 200km from the mainland respectively.

To assess the existing marine and terrestrial environments of the Project area, a variety of detailed scientific surveys and studies have been undertaken. In addition, a detailed desktop assessment was also conducted of the greater environment that may be effected (EMBA) by unplanned events.

This EMBA covers a considerably larger physical area than that of planned activities (i.e. the pipeline construction corridor). Because of the large extent of the EMBA, it was divided into 'areas' of similar values and sensitivities to enable a systematic description of ecological, socioeconomic and cultural heritage values and sensitivities - these values are summarised in Table 3-1 and the following sections, with a focus on the pipeline construction corridor values.

#### 3.1 Physical Environment

The southern portion of the North West Shelf, including Barrow Island, is characterised by an arid subtropical climate. The summer season occurs from October to March, with mean daily maximum temperatures reaching 34 °C and mean daily minimum temperatures averaging 20 °C. During winter (June–August), mean daily maximum temperatures reach 26 °C, with mean daily minimum temperatures of 17 °C. April, May, and September are considered transition months, during which either the summer or winter weather regime may predominate or when conditions may vary between the two.

Rainfall in the region is highly seasonal. Lower rainfall and humidity are typically associated with the Southeast Monsoon, in contrast to the high levels of rainfall and humidity associated with the Northwest Monsoon. Cyclones are episodic events in the North-west Marine Region, and usually occur between November and April.

The water depth across the Offshore Feed Gas Pipeline System ranges from 12.5 m at the HDD exits, to 200 m in the Gorgon gas field and 1350 m in the Jansz gas field.

The prevailing oceanic conditions in the proposed installation area are governed by a combination of sea and swell waves. Sea waves are shorter-period waves generated by local winds, whereas swell waves are generated by distant storms. Local wind-generated seas have variable wave heights, typically ranging from 0 to 4 m under non-tropical cyclone conditions. The major surface currents in the North West Shelf region flow towards the poles, away from the equator. The major surface currents influencing the region include the Indonesian Throughflow, the Leeuwin Current, the South Equatorial Current, and the Eastern Gyral Current.

#### 3.2 Ecological Environment

##### *Benthic Habitats*

The benthic habitats along the pipeline routes were found to be dominated by unvegetated bare sands. No coral habitat or coral assemblages were found along the route; however, small, sparse patches of seagrass, macroalgae and sessile benthic macroinvertebrates were present in relatively low abundances close to shore near the HDD exits.

### **Benthic Macroinvertebrates**

Sessile benthic macroinvertebrates (sponges, hydroids, sea pens, sea whips, gorgonians, and ascidians) were present in relatively low abundances, mostly near the HDD exit alignment. All the sessile benthic macroinvertebrate taxa recorded at sites in the MDF and in areas at risk of Material or Serious Environmental Harm were also recorded at reference sites and were well represented elsewhere in Barrow Island waters.

The infauna assemblages comprised nine phyla of varying abundance, with Annalida (polychaete worms) and Arthropoda (Crustacea, predominantly Amphipods) being the most species-rich and numerically dominant phyla. The species richness of infauna assemblages, however, was also significantly higher at reference sites.

### **Marine Mammals**

Several species of whale and dolphin are known to occur in the region. The EPBC Act database lists six whale species and two dolphin species that are protected under the migratory provisions of the Act, with two of the whale species having the threatened status of endangered/vulnerable. There are no known feeding or breeding areas for these listed species within the pipeline construction corridor so these species are likely to be transient through the area, however it is likely that dolphins will be encountered in the proposed installation area, especially in the nearshore area close to Barrow Island.

Specifically, the pipeline and umbilical route will traverse the Humpback Whale migration route between their feeding grounds in Antarctic waters and their calving grounds in Pilbara/Kimberley waters. The migration occurs annually from June to October.

Other cetaceans that may occur in the region include Blue, Antarctic Minke, Bryde's, Killer, and Sperm Whales, as well as Spotted Bottlenose and Indo-Pacific Humpback Dolphins. However, there are no known feeding or breeding areas for these species in the area, so they are likely to be transient through the area.

Dugongs are generally known to occur in shallow water (5–10 m) that support the seagrasses (*Halodule* and *Halophila*) on which they feed. However, dugongs are not expected to frequent the locations where the proposed installation activities will occur, owing to the absence of well-developed seagrass habitats

### **Marine Reptiles**

Five of the six species of marine turtle found in Western Australia are known to occur in the region and are listed under the EPBC Act.

Barrow Island is a regionally important nesting area for Green Turtles and Flatback Turtles, whilst Hawksbill Turtles nest at low densities around the Island and Barrow Island is not considered a regionally important nesting site for them.

Green Turtles are the most abundant marine turtle species on the west coast of Barrow Island, with the Island listed as a major nesting site for the species. North Whites Beach, where the offshore pipelines and umbilicals will make landfall, is however not considered a significant turtle nesting beach relative to other rookeries on Barrow Island (e.g. John Wayne, Turtle Bay) as the shallow sand and limestone reef, including a large limestone shelf along the waterline, make the beach less suitable for nesting.

Marine turtles are likely to occur in the proposed works area as foraging turtles and/or migrants swimming through the area on their way to their nesting/foraging grounds.

There are fourteen protected species of sea snake listed under the EPBC Act that may inhabit the proposed installation area. Sea snakes are generally common in waters around the west coast of Barrow Island and may be found within the vicinity of the offshore feed gas pipeline at some time during the installation program. Although they are highly mobile and can cover large distances, many species are restricted to relatively shallow coastal waters. However, very little is known about the distribution of the individual species of sea snakes in the region.

## ***Fish and Sharks***

Four species of sharks listed under the EPBC Act may inhabit the proposed installation area.

The world largest fish, the Whale Shark, congregates annually off Ningaloo Reef, approximately 150 km south-west of Barrow Island. Whale Sharks may pass through the deeper waters off Barrow Island occasionally; however, they do not aggregate there given the apparent absence of upwelling or other habitats thought to encourage aggregations.

More than 508 demersal fish species have been identified in the region, including a number of species important to commercial and recreational fisheries such as snappers, emperors, and groupers.

Thirty species of EPBC listed pipefish and seahorses that may potentially occur within the proposed pipeline installation area, with *Hippocampus histrix* and *Phoxocampus belcheri* being the only listed species recorded from Barrow Island. Pipefish and seahorses are expected to be widespread through the shallower benthic habitats of Barrow Island; however, the proposed pipeline installation area does not include any spatially restricted habitats and is not expected to be of particular significance to these species

## ***Marine Avifauna***

Ten seabird species protected under the EPBC Act have been identified as likely to pass through the proposed installation area undertaking foraging activities. However, given the lack of suitable roosting areas, sustained stays in the area are considered unlikely.

## ***Marine and Coastal Protected Areas***

The pipeline route overlaps two protected areas: North-west Marine Region marine reserve and the Montebello–Barrow Islands Marine Conservation Reserves.

## ***Key Ecological Features***

The pipeline and umbilical route traverses two key ecological features: Ancient Coastline and Continental Slope Demersal Communities.

## **3.3 Cultural Environment**

The Australian National Shipwreck Database listed seven shipwrecks within the Montebello/Barrow islands region, and the Western Australia Museum identified a further three wrecks. Additionally, it is believed that a number of uncharted wrecks have been lost within the region during cyclones. Surveys conducted in late 2007/early 2008 along the pipeline corridor have not revealed the presence of any shipwreck material.

## **3.4 Socio-economic Environment**

The North West Shelf region has been subjected to extensive petroleum exploration and production activities since the late 1960s and there are a number of subsea pipelines and wellhead platforms in the vicinity of the proposed Offshore Feed Gas Pipeline System.

Other activities in the region include low levels of commercial fishing and shipping activities. Five Commonwealth fisheries intersect the proposal area however the Project is not expected to have any significant adverse impacts on these fisheries and no aquaculture activities have been identified. In addition, although the proposed Gorgon and Jansz pipeline and umbilical route traverses the shipping route between the Western Australian coast and Asia, the main shipping routes to and from Port Hedland and the Port of Dampier are located east of the proposed area.

Recreational boating, diving, snorkelling, surfing, and wildlife observation (e.g. of whales, dolphins, dugongs, turtles, and birds) also occur within the Montebello–Barrow Islands Marine Conservation Reserves. However, due to the area's isolation from major mainland centres and a lack of visitor facilities, visitation remains at a low level.

**Table 3-1: Summary of EMBA Values**

Receptor Type	Pipeline Construction Corridor	EMBA Area									
		Ningaloo Area	Gascoyne and Carnarvon Canyon Area	Exmouth Gulf Area	Pilbara Coast Area	Barrow and Montebello Islands Area	Dampier Archipelago Area	Offshore Area	Port Hedland Area	Eighty Mile Beach Area	Argo-Rowley Terrace Area
Areas of Conservation Significance											
Key Ecological Features											
Mangroves											
Salt Marsh/ Flats											
Intertidal Mud Flats											
Intertidal Sand Bars and Shoals											
Intertidal Rock Pavement and Rocky Shores											
Coral											
Seagrass & Macroalgae Communities											
Soft-substrate Communities											
Benthic Macroinvertebrates											
Birds											
Marine Reptiles											
Marine Mammals											
Sharks and Fish											
Infrastructure											
Commercial Shipping											
Marine-based Tourism and Recreation											
Commercial Fishing											
Aquaculture											
Heritage											
Shipwrecks											

## 4.0 Major Environmental Hazards and Controls

The risk assessment was undertaken in alignment with the processes outlined in AS/NZS ISO 31000:2009 Risk Management and HB 203:2012 Managing Environment-Related Risk, using the Chevron Integrated Risk Prioritization Matrix. The risk assessment involved subject matter experts including environmental advisors, health and safety representatives, package engineers and senior management representatives.

The risk assessment process comprised the following components:

1. Identification of physical, biological and socio-economic receptors, including any considered to be sensitive
2. Identification of activities and events and associated aspects with the potential to impact identified physical, biological and socio-economic receptors
3. Quantification of the level of risk associated with the impact
4. Identification of safeguards and mitigations in place for the specific risk
5. Determination of whether the potential environmental risks and impacts are As Low As Reasonably Practical (ALARP) after considering mitigation effectiveness
6. Determination as to whether the potential environmental risks and impacts are acceptable.

The key environmental hazards and the associated management/mitigation measures to ensure these hazards, arising from operational activities, unplanned events and event response activities, are reduced to As Low As Reasonably Practicable (ALARP) and residual risks are acceptable, are detailed in Table 4-1.

**Table 4-1 Key Environmental Risks and their Management and Mitigation Measures**

Sources of Risk (Hazards)	Potential Environmental Impacts	Management and Mitigation Measures
<ul style="list-style-type: none"> <li>Physical Presence</li> </ul>	<ul style="list-style-type: none"> <li>Creation of artificial habitat and modification of existing habitat</li> <li>Entrainment of marine fauna</li> <li>Interference with other users</li> </ul>	<ul style="list-style-type: none"> <li>Pipeline and umbilicals installation, structures installation and rock installation are confined to within the approved MDF in State Waters, as defined in Coastal and Marine Baseline State and Environmental Impact Report: Offshore Feed Gas Pipeline System and Marine Component of the Shore Crossing.</li> <li>Benthic disturbance is confined to the construction corridor in Commonwealth Waters, as defined in Section 3.3.2 of the EP.</li> <li>Dropped objects are reported to SEWPaC, and retrieved, unless dispensation is granted from SEWPaC.</li> <li>If a dropped object is approved to be left in place and is identified as posing a potential navigation hazard, the coordinates are provided to relevant stakeholders.</li> <li>The HDD seawater winning intake will be screened to prevent fauna entrainment.</li> <li>Screens on seawater intakes will be of sufficient mesh size and material to exclude marine megafauna.</li> <li>The external screen surface velocity of the HDD seawater winning intake will be a maximum of 0.1 m/s.</li> </ul>
<ul style="list-style-type: none"> <li>Vessel Movements</li> </ul>	<ul style="list-style-type: none"> <li>Injury to marine fauna</li> <li>Changes to behaviour of species</li> <li>Interference with other users</li> <li>Collision with other users</li> </ul>	<ul style="list-style-type: none"> <li>A caution zone will be established around observed cetaceans, with a radius of 150 m for a dolphin and 300 m for a whale in accordance with EPBC Regulations 2000 Division 8.1.</li> <li>If marine megafauna are spotted, vessels moving &gt;6 knots will adjust their speed to &lt;6 knots or adjust their direction to avoid impacting the animal, when safe to do so.</li> <li>Any detected injury or fatality attributed to the Gorgon Gas Development and Jansz Feed Gas Pipeline of any marine species (including marine turtles) listed as specially protected under the provisions of section 14 (2)(ba) of the Wildlife Conservation Act 1950 (WA) or the EPBC Act (Cth) will be reported in accordance with Section 7.9 of the EP.</li> <li>Consultation will be undertaken in accordance with Stakeholder Consultation Plan (Chevron Australia 2013b) (Appendix 2).</li> <li>A 24-hour visual, radio and radar watch will be maintained for vessels in the vicinity of the operational area in accordance with Standards of Training, Certification and Watchkeeping (STCW95)</li> <li>Minimum lighting required for safety and navigational purposes, in accordance with the Navigation Act 1912 (Marine Orders Part 30 [Prevention of Collisions]), is onboard and operational.</li> <li>Notice to Mariners is issued prior to work scopes</li> </ul>

Sources of Risk (Hazards)	Potential Environmental Impacts	Management and Mitigation Measures
		<p>commencing.</p> <ul style="list-style-type: none"> <li>Seawater winning intakes will be screened to prevent fauna entrainment.</li> </ul>
<ul style="list-style-type: none"> <li>Benthic Disturbance</li> </ul>	<ul style="list-style-type: none"> <li>Decline in water quality</li> <li>Localised physical damage to sensitive subsea habitat</li> <li>Sediment resuspension causing smothering of sensitive benthic biota</li> <li>Disturbance to heritage sites</li> </ul>	<ul style="list-style-type: none"> <li>Pipeline and umbilicals installation, structures installation and rock installation are confined to within the approved MDF in State Waters, as defined in Coastal and Marine Baseline State and Environmental Impact Report: Offshore Feed Gas Pipeline System and Marine Component of the Shore Crossing (Chevron Australia 2010d).</li> <li>Benthic disturbance is confined to the construction corridor in Commonwealth Waters, as defined in Section 3.3.2 of the EP.</li> <li>In State waters, anchoring will be restricted to within the MDF as defined in Coastal and Marine Baseline State and Environmental Impact Report: Offshore Feed Gas Pipeline System and Marine Component of the Shore Crossing (Chevron Australia 2010d) (indicative anchoring locations detailed in Figure 3 5 of the EP).</li> <li>In Commonwealth waters, anchoring is confined to the construction corridor as defined in Section 3.3.2 of the EP.</li> <li>For vessels that anchor, anchoring will be managed in accordance with maritime industry standard watchkeeping practices, e.g. STCW95.</li> <li>Minimise the loading of fine rock materials by use of an open skeleton bucket front-end loader to load the materials.</li> <li>DP systems will be maintained in accordance with the installation vessel's preventive maintenance program to avoid excessive thruster action.</li> <li>Should any shipwreck or relics be discovered during the course of the proposed activities, SEWPaC Maritime Heritage Section will be notified, including: <ol style="list-style-type: none"> <li>a detailed description of the remains of the shipwreck or the relic, which may include sonar images, electronic data, and/or digital photographs</li> <li>a description of the place where the shipwreck or relic is located that is sufficiently detailed to allow it to be identified and relocated, including navigation data and datum information</li> </ol> </li> <li>Should any shipwreck or relics be discovered during the course of the proposed activities, all project vessels will be notified of location.</li> </ul>
<ul style="list-style-type: none"> <li>Atmospheric Emissions</li> </ul>	<ul style="list-style-type: none"> <li>Temporary reduction in local air quality</li> <li>Contribution to global atmospheric concentrations of greenhouse gases</li> </ul>	<ul style="list-style-type: none"> <li>Incinerators are certified and maintained according to manufacturer's specifications, and volume/type of waste is recorded in Vessel Garbage Log, where applicable.</li> <li>Sulphur content of any fuel oil used will not exceed 3.5% m/m.</li> </ul>



Sources of Risk (Hazards)	Potential Environmental Impacts	Management and Mitigation Measures
	<ul style="list-style-type: none"> <li>Depletion of stratospheric ozone</li> </ul>	<ul style="list-style-type: none"> <li>Vessels will comply with the requirements for ODS specified in Regulation 12 of Annex VI of MARPOL 73/78, including prohibiting the deliberate release of ODS.</li> </ul>
<ul style="list-style-type: none"> <li>Light Emissions</li> </ul>	<ul style="list-style-type: none"> <li>Localised behavioural changes in species</li> </ul>	<ul style="list-style-type: none"> <li>Manage lighting in accordance with the Long-term Marine Turtle Management Plan (LTMTMP) (Chevron Australia 2009a) of which the key requirements are: <ol style="list-style-type: none"> <li>keeping artificial lights to the minimum required to meet navigation and operational safety requirements</li> <li>directing artificial lighting away from Barrow Island and shorelines</li> <li>minimising light spill from indoor sources</li> <li>using lighting types that are least disruptive to turtles where colour definition is not required for safety or operational purposes, or using shielded reduced spectrum lights where minimal colour definition is required.</li> </ol> </li> </ul>
<ul style="list-style-type: none"> <li>Underwater Noise</li> </ul>	<ul style="list-style-type: none"> <li>Behavioural disturbance to marine fauna</li> <li>Injury to marine fauna</li> </ul>	<ul style="list-style-type: none"> <li>A caution zone will be established around observed cetaceans, with a radius of 150 m for a dolphin and 300 m for a whale in accordance with EPBC Regulations 2000 Division 8.1.</li> <li>DP systems will be maintained in accordance with the installation vessel's preventive maintenance program to avoid excessive thruster noise.</li> <li>Helicopters must not fly lower than 500 m or within a 500 m radius of a cetacean or whale shark, if safety is not compromised, in accordance with EPBC Regulations 2000 Division 8.1.</li> </ul>
<ul style="list-style-type: none"> <li>Invasive Marine Species</li> </ul>	<ul style="list-style-type: none"> <li>Changes to habitat structure</li> <li>Predation of native species</li> <li>Outcompeting native species</li> </ul>	<ul style="list-style-type: none"> <li>All international installation vessels involved in the project will be required to confirm to the Australian Ballast Water Management Requirements (AQIS 2008), of which key requirements are: <ol style="list-style-type: none"> <li>non-discharge of 'high-risk' ballast water in Australian ports or waters</li> <li>full ballast exchange outside Australian territorial seas</li> <li>documentation of all ballast exchange activities (including AQIS clearances).</li> </ol> </li> <li>All vessels that will enter the Quarantine Marine Controlled Access Zone or Quarantine Limited Access Zone will be required to conform to the Quarantine Management System (Chevron Australia 2010e)</li> <li>Pre-mobilisation quarantine inspection completed for vessels that are determined to be high risk by the Quarantine Compliance Risk Assessment.</li> <li>Quarantine audits will be conducted on contractors, in accordance with the Quarantine Management System (Chevron Australia 2010e).</li> <li>Rocks loaded from the mainland that will be installed within the Quarantine Marine Controlled Access</li> </ul>

Sources of Risk (Hazards)	Potential Environmental Impacts	Management and Mitigation Measures
		<p>Zone, will be made quarantine compliant by compliance with the QMS, specifically:</p> <ol style="list-style-type: none"> <li>1. Vessel quarantine inspection prior to leaving port to the Quarantine Marine Controlled Access Zone.</li> <li>2. rock quarantine inspection prior to leaving port, for rock intended for within the Quarantine Marine Controlled Access Zone.</li> </ol>
<ul style="list-style-type: none"> <li>• Solid Waste</li> </ul>	<ul style="list-style-type: none"> <li>• Decline in sediment quality</li> <li>• Decline in water quality</li> <li>• Injury to marine fauna</li> <li>• Changes to the visual amenity</li> <li>• Ingestion or entanglement of marine fauna</li> </ul>	<ul style="list-style-type: none"> <li>• Vessels &gt;100 T (or certified for &gt;15 persons onboard) have a Waste Management Plan, in accordance with MARPOL 73/78.</li> <li>• Vessels &gt;400 T (or certified for &gt;15 persons onboard) will have a Garbage Record Book, in accordance with MARPOL 73/78.</li> <li>• Waste handling equipment, waste storage containers, and spill response equipment appropriate to the type and volume of waste will be provided at waste storage areas.</li> <li>• Wastes designated as hazardous or dangerous goods will be identified, packaged, segregated, handled, stored, transported and tracked in accordance with MARPOL 73/78 and applicable International Maritime Dangerous Goods (IMDG) requirements.</li> <li>• Solid and hazardous wastes generated onboard the vessels are incinerated (using an IMO-approved incinerator) or appropriately disposed of at a licensed onshore facility.</li> </ul>
<ul style="list-style-type: none"> <li>• Liquid Waste</li> </ul>	<ul style="list-style-type: none"> <li>• Decline in sediment quality</li> <li>• Decline in water quality</li> <li>• Toxicity to marine fauna</li> </ul>	<ul style="list-style-type: none"> <li>• Offshore discharge of food wastes macerated to &lt;25 mm only when &gt;3 nm from land when vessel is moving, in accordance with MARPOL 73/78.</li> <li>• Macerator maintained as per the Vessel's Preventative Maintenance Schedule.</li> <li>• Vessels have an IMO-approved Sewage Treatment Plant onboard, and when &gt;400 T, will have a Current International Sewage Pollution Prevention (ISPP) Certificate.</li> <li>• Offshore discharge of grey water/treated sewage only when &gt;3 nm from land when vessel is moving, in accordance with MARPOL 73/78.</li> <li>• Vessels &gt;400 T will have an oil-water separator onboard, hold a current International Oil Pollution Prevention (IOPP) Certificate and maintain an Oil Record Book, in accordance with MARPOL 73/78.</li> <li>• Oily water contained onboard will be disposed of at a licensed facility; or discharged to marine environment only when concentration &lt;15 ppm and vessel is moving, in accordance with MARPOL 73/78.</li> <li>• Any spills or leaks to deck, will be cleaned and removed prior to any deck wash-down activities.</li> <li>• Hazardous chemicals and dangerous goods used during the pipeline installation activities are assessed</li> </ul>

Sources of Risk (Hazards)	Potential Environmental Impacts	Management and Mitigation Measures
		<p>and approved, according to the Hazardous Materials Approval Procedure (OE-03.16.13; Chevron Australia 2013) or Chevron Australia-approved Contractor chemical approval process.</p> <ul style="list-style-type: none"> <li>• Chemicals intended for discharge during pre-commissioning are to be assessed as ‘approve for discharge’, in accordance with the Chemical Selection Process described in Appendix 2.</li> <li>• Hydrotest chemicals will be dosed at concentrations such that the calculated discharge concentration do not exceed the modelled concentration described in Section 6.9.2.2 of the EP.</li> <li>• Conduct backseal test following connection makeup to verify no leakages of MEG from spools and structures.</li> <li>• Spool design includes goose necks and end caps, which minimise volume of MEG release during installation.</li> <li>• Failure of mechanical hydraulic couplers (poppets) will be prevented by : <ol style="list-style-type: none"> <li>1. inspecting and testing of the poppets prior to release from the manufacturer</li> <li>2. factory acceptance testing of the poppets when they are integrated into the Umbilical Termination Assembly.</li> <li>3. Mechanical hydraulic couplers (poppets) will be visually inspected prior to umbilical connection to confirm no leakages.</li> </ol> </li> </ul>
<ul style="list-style-type: none"> <li>• Hydrocarbon and Chemical Spills</li> </ul>	<ul style="list-style-type: none"> <li>• Decline in sediment and water quality</li> <li>• Toxicity to marine organisms</li> <li>• Physical impacts to marine fauna</li> <li>• Disruptions to other activities</li> </ul>	<ul style="list-style-type: none"> <li>• Equipment function tests (e.g. DP trials) are conducted to ensure that equipment will adequately perform functions.</li> <li>• Consultation undertaken with relevant stakeholders as per Stakeholder Consultation Plan (Chevron Australia 2013b) (Appendix 3).</li> <li>• Notice to Mariners is issued prior to works scopes commencing.</li> <li>• Minimum lighting required for safety and navigational purposes, in accordance with the Navigation Act 1912 (Marine Orders Part 30 [Prevention of Collisions]), is onboard and operational.</li> <li>• A 24-hour visual, radio and radar watch will be maintained for vessels in the vicinity of the operational area in accordance with Standards of Training, Certification and Watchkeeping (STCW95)</li> <li>• In the event that a vessel loses DP, the following measures to prevent grounding or collision will be implemented: <ol style="list-style-type: none"> <li>1. anchors will be deployed if water depth is shallow enough, or</li> <li>2. tow lines and or mooring lines will be attached to distressed vessel, or</li> </ol> </li> </ul>

Sources of Risk (Hazards)	Potential Environmental Impacts	Management and Mitigation Measures
		<ol style="list-style-type: none"> <li>3. vessel is held in situ or towed into deep water away from shallow ground, or</li> <li>4. restore power to thrusters if possible, allowing for free mobilisation.</li> </ol> <ul style="list-style-type: none"> <li>• Dry-break couplings, breakaway couplings and scupper plugs will be installed on vessels to mitigate against overboard loss in the event of a refuelling spill.</li> <li>• Integrity checks are conducted for reinforced hoses, dry-break and breakaway couplings as part of bunkering checks.</li> <li>• Refuelling and bulk transfer will only be undertaken when weather/ sea/ visibility conditions are appropriate, as determined by the Vessel Master.</li> <li>• Potential fall heights of equipment during tie-in will be minimised by lowering equipment to within 20m above seabed, then moving closer to subsea trees.</li> <li>• Hazardous and dangerous goods will be stored and handled in accordance with relevant legal requirements (e.g. IMDG codes); and Material Safety Data Sheet (MSDS) requirements (including secondary containment, segregation with incompatible materials, level gauges, overflow protection, and drainage systems).</li> <li>• Maintenance activities on vessels that have the potential to result in leaks or spills (including activities such as painting and hydraulic hose maintenance) will be contained (e.g. undertaken in bunded areas, use drip trays or sheets).</li> <li>• Spill containment and recovery equipment will be provided where spills are possible (e.g. where fuel, oil or chemicals and hazardous waste are used or stored) and will be maintained to ensure that it is readily available and in working condition.</li> <li>• A complete inventory of all hazardous and dangerous goods stored on the vessels will be maintained on board, together with current MSDSs for each hazardous or dangerous goods substance.</li> <li>• Prior to use, and following tie-in, all pipelines will be pressure tested according to AS 2885.4-2010 (Standards Australia 2010) to ensure integrity.</li> </ul>

## **5.0 Management Approach**

The implementation strategy identifies the systems, practices and procedures to be used to ensure the environmental impacts and risks of the activities are reduced to ALARP and are acceptable, and the environmental performance objectives and standards are met. The implementation strategy also describes the overview of systems and procedures, training and competency, monitoring and reporting, compliance assurance, control of documents, and review of the Plan.

### **5.1 Roles and Responsibilities**

A summary of the environmental responsibilities regarding the Plan for key personnel is provided for.

### **5.2 Training and Competency**

All personnel (including contractors and subcontractors) are required to attend environmental inductions and training relevant to their role for the activities. Environmental training specific to the activities is described in the strategy and includes induction requirements, environmental roles and responsibilities and spill response / emergency management training. Spill response specific training is described in the OSORP.

Training records will be maintained and will include copies of certificates and attendance sheets. Environmental training and competency requirements for personnel, including contractors and subcontractors, are maintained in a training matrix.

### **5.3 Monitoring and Reporting**

The Implementation Strategy outlines the requirements for the following: emissions and discharges, routine external reporting and non-routine reporting (including internal incident reporting and investigations and external incident reporting).

### **5.4 Compliance Assurance**

A multi-tiered environmental compliance assurance program will be implemented for the duration of the activities described in the detailed Plan, including tools, processes and procedures to deliver and verify compliance with the detailed Plan. Assurance activities will include both Chevron-led and contractor-led audits and inspections. Chevron-led audits and inspections will be undertaken as required and in accordance with Chevron's ABU Compliance Assurance Process and the Health, Environment and Safety (HES) Audit Schedule for the Project.

### **5.5 Documentation and Records**

Chevron Australia's ABU Operational Excellence Management System (OEMS) has dedicated information management tools and processes to ensure critical information is developed, accessible and maintained by the workforce. Wheatstone documentation shall be managed in accordance with this process, and specifically via the Project's Document Management System. Accordingly, all documentation and records demonstrating compliance against environmental performance objectives and standards will be effectively maintained and retained for the life of the Project and not less than five years and are available to the regulator.

### **5.6 Environment Plan Review**

Chevron's Management of Change process will be followed to document and assess the impact of any changes to the activities described in the detailed Plan. These changes will be addressed to determine if there is potential for any new or increased environmental impact or risk not already provided for in the detailed Plan.

The detailed Plan will be re-submitted to NOPSEMA for approval in accordance with Regulation 17 of the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009 (OPGGs(E)R). If these changes do not trigger Regulation 17, the Plan shall be revised and changes recorded within the Plan.

## **6.0 Consultation Process**

Chevron has prepared a Stakeholder Consultation Plan specific for the Offshore Feed Gas Pipeline Installation activities. The Stakeholder Consultation Plan describes:

- Stakeholder identification and analysis
- Communication engagement plan, comprising the level and trigger of engagement, type of engagement, and frequency
- Stakeholder engagement log, including any issues raised and Chevron responses
- Full text of consultation.

### **6.1 Stakeholder Identification and Analysis**

Relevant stakeholders have been identified through a stakeholder analysis process to ensure persons or organisations that may potentially be affected by the activities have been consulted. Stakeholders were identified by reviewing:

- social / commercial receptors within the EMBA
- historical consultation undertaken for Chevron
- applicable legislation to identify regulatory agencies.

### **6.2 Communication Engagement Plan**

Upon completion of stakeholder analysis (included in the Stakeholder Engagement Log in the Stakeholder Consultation Plan), a Communication Engagement Plan was developed to determine the following for each stakeholder:

- The level of engagement;
- The type of engagement;
- When engagement would be undertaken; and
- Frequency of ongoing communication.

The Communication Engagement Plan covers both initial and ongoing stakeholder engagement and covers both planned activities and unplanned events. Chevron will maintain communications with identified stakeholders as required ensuring they are informed of any aspects of the activity that may potentially affect other users of the area.

### **6.3 Stakeholder Engagement Log**

Consultation undertaken specifically for the Plan is in the Stakeholder Engagement Log. Stakeholder responses were assessed, and any relevant feedback made during the engagement process has been addressed within the Plan. Spill response service providers and organisations have also been contacted to advise potential requirements for this environment plan. Greater detail on the capabilities, agreements and timeframes with these service providers is provided in the Environment Plan.

## 7.0 Contact Details

Further information associated with the proposed activities may be obtained from:

Marilyn (Mannie) Shea  
External Affairs Advisor - Policy, Government and Public Affairs  
Chevron Australia Pty Ltd  
250 St Georges Terrace  
Perth WA 6000  
Tel: +61 8 6224 1715  
Email: Marilyn.Shea@chevron.com