



Gorgon Project:

Offshore Feed Gas Pipeline System Installation – Summary Environment Plan

Document No:	G1-NT-PLNX0000954	Revision:	0
Revision Date:	1 June 2011	Copy No:	
IP Security:	Public		

Table of Contents

Terms, Definitions and Abbreviations	5
1.0 Background	6
2.0 Activity and Location	6
3.0 Receiving Environment	9
4.0 Major Environmental Hazards and Control.....	10
5.0 Summary of Management Approach.....	10
6.0 Consultation.....	10
7.0 Further Information	10
8.0 References	17

List of Tables

Table 1 Environmental Risks and Management Measures.....	11
--	----

List of Figures

Figure 1 Proposed Installation Location	8
---	---

Terms, Definitions and Abbreviations

AQIS	Australian Quarantine and Inspection Service
AS/NZS	Australian Standard/ New Zealand Standard
BOD	Biological Oxygen Demand
CDU	Control Distribution Unit
CO ₂	Carbon dioxide
EHU	Electric Hydraulic Umbilical
HDD	Horizontal Directional Drilling
HFO	Heavy Fuel Oil
km	Kilometres
LNG	Liquefied Natural Gas
m	Metres
MARPOL	The International Convention for the Prevention of Pollution From Ships, 1973 as modified by the Protocol of 1978. Also known as MARPOL 73/78.
MDF	Marine Disturbance Footprint
MEG	Monoethylene Glycol
mm	Millimetres
MSDS	Material Safety Data Sheet
MTPA	Million Tonnes Per Annum
nm	Nautical Miles
ODS	Ozone Depleting Substance
PTS	Pipeline Termination Structure
ROV	Remotely Operated Vehicle
SEWPaC	Commonwealth Department of Sustainability, Environment, Water, Population and Communities (formerly Commonwealth Department of the Environment, Water, Heritage and the Arts [DEWHA])
UMCA	Umbilical Midline Connection Assembly

1.0 Background

Chevron Australia proposes to develop the gas reserves of the Greater Gorgon Area. Subsea gathering systems and subsea pipelines will be installed to deliver feed gas from the Gorgon and Jansz–lo gas fields to the west coast of Barrow Island. The feed gas pipeline system will be buried as it traverses from the west coast to the east coast of the Island, where the system will tie in to the Gas Treatment Plant located at Town Point. The Gas Treatment Plant will comprise of three Liquefied Natural Gas (LNG) trains capable of producing a nominal capacity of five Million Tonnes Per Annum (MTPA) per train. The Gas Treatment Plant will also produce condensate and domestic gas. Carbon dioxide (CO₂), which occurs naturally in the feed gas, will be separated during the production process. As part of the Gorgon Gas Development, the separated CO₂ will be injected into deep formations below Barrow Island. The LNG 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.

2.0 Activity and Location

The Gorgon gas field is located approximately 130 km off the north-west coast of Australia and 65 km to the west of Barrow Island, in water depths approximately 220 m. The Jansz–lo field is located 130 km north-west of Barrow Island in a water depth of approximately 1350 m. The initial subsea development concept for Gorgon is an eight well, three manifold scheme; whilst the initial Jansz–lo subsea development concept is a ten well, two manifold scheme.

For each field, horizontal jumpers will connect wells to the manifolds, which will be connected via corrosion-resistant, alloy-clad, carbon steel infield pipelines to a midline Pipeline Termination Structure (PTS). Carbon steel production pipelines will take product from the midline PTS to the LNG Plant located on Barrow Island. Each subsea development will be supported with its own utility pipeline, Monoethylene Glycol (MEG) pipeline, and an electro-hydraulic umbilical.

All offshore pipelines will be installed in separate lay corridors, with MEG and utility pipelines installed in close proximity (approximately 2 m separation) through the rock stabilised section. The umbilicals will be laid parallel to the pipeline route, at an offset distance of approximately 50 m from the nearest pipeline. The width of the pipeline corridor for the Gorgon and Jansz offshore pipelines will be approximately 200 m, varying in width along the length of the corridor to allow for construction of the pipeline with consideration to subsea features. In State waters, the pipeline will lay within the Marine Disturbance Footprint (MDF), which encompasses an area extending 100 m either side of the outermost design pipeline route. The pipeline and umbilical routes are shown in Figure 1.

The Offshore Feed Gas System installation will include these activities:

Pipeline Installation

- laying the main production pipeline, MEG pipeline, and utility pipeline from the Horizontal Directional Drilling (HDD) shore crossing to each gas field's midline PTS (Gorgon and Jansz)
- laying the infield production pipeline, MEG pipeline, and utility pipeline from each manifold to each midline PTS
- installing pipeline crossings over the East Spar pipeline and the Halyard Electro Hydraulic Umbilical (EHU)
- trenching part of the MEG and utility pipelines from where they exit the rock berm
- installing anti-burial mattresses and buckle initiators system

Umbilical Installation

- installing Gorgon and Jansz Control Distribution Units (CDUs) and Jansz Umbilical Midline Connection Assembly (UMCA)
- laying and testing the main umbilicals from the HDD pull-in to each gas field's CDU
- laying and testing the infield umbilicals from the drill centre manifolds to each gas field's CDU
- trenching part of the main umbilicals from where they exit the rock berm

Structures and Tie-ins

- installing the subsea structures, i.e. manifolds, PTSs, and their foundations
- installing the production, MEG and utility tie-in spool pieces, the well production jumpers, and the control system fly-in leads tie-ins

Pre-commissioning

- cleaning, flooding, gauging, and testing the installed Gorgon and Jansz pipeline systems
- baseline inspection pigging to determine the pipewall condition of the Gorgon and Jansz production pipelines before operation
- dewatering and nitrogen packing of the pipelines

Rock Installation

- installing rock berms over the pipelines and umbilicals to provide long-term operational stability between 12.5 m and 60 m water depth
- installing rock berms over the East Spar Pipeline and Halyard EHU crossings to ensure pipeline stability
- correcting free-spans (pre- and post-lay) where required, and where pipeline or umbilical trenching is not possible due to the hardness of the seabed
- scour protection/remediation around mattresses and subsea structures, where required.

A number of surveys, including pre-lay, intermediate, and 'as built' surveys, will be carried out to support the installation activities. The surveys will predominantly use multibeam bathymetry and side scan sonar techniques, as well as Remotely Operated Vehicle (ROV)-mounted video and obstacle avoidance sonar at areas of particular interest.

Installation of the offshore feed gas pipeline system is expected to start in August 2011 and will run 24-hours a day over approximately 24 months, from mobilisation to demobilisation.

A range of purpose built installation vessels, including pipelay, umbilical installation, rock installation, and heavy lift vessels will be used during the 24-month construction period. A number of support vessels, including pipe supply vessels, transportation barges, cargo ships, and bulk carriers will be used to support the installation activities. Helicopters will be used for personnel transfer to the installation vessels, via Barrow Island.

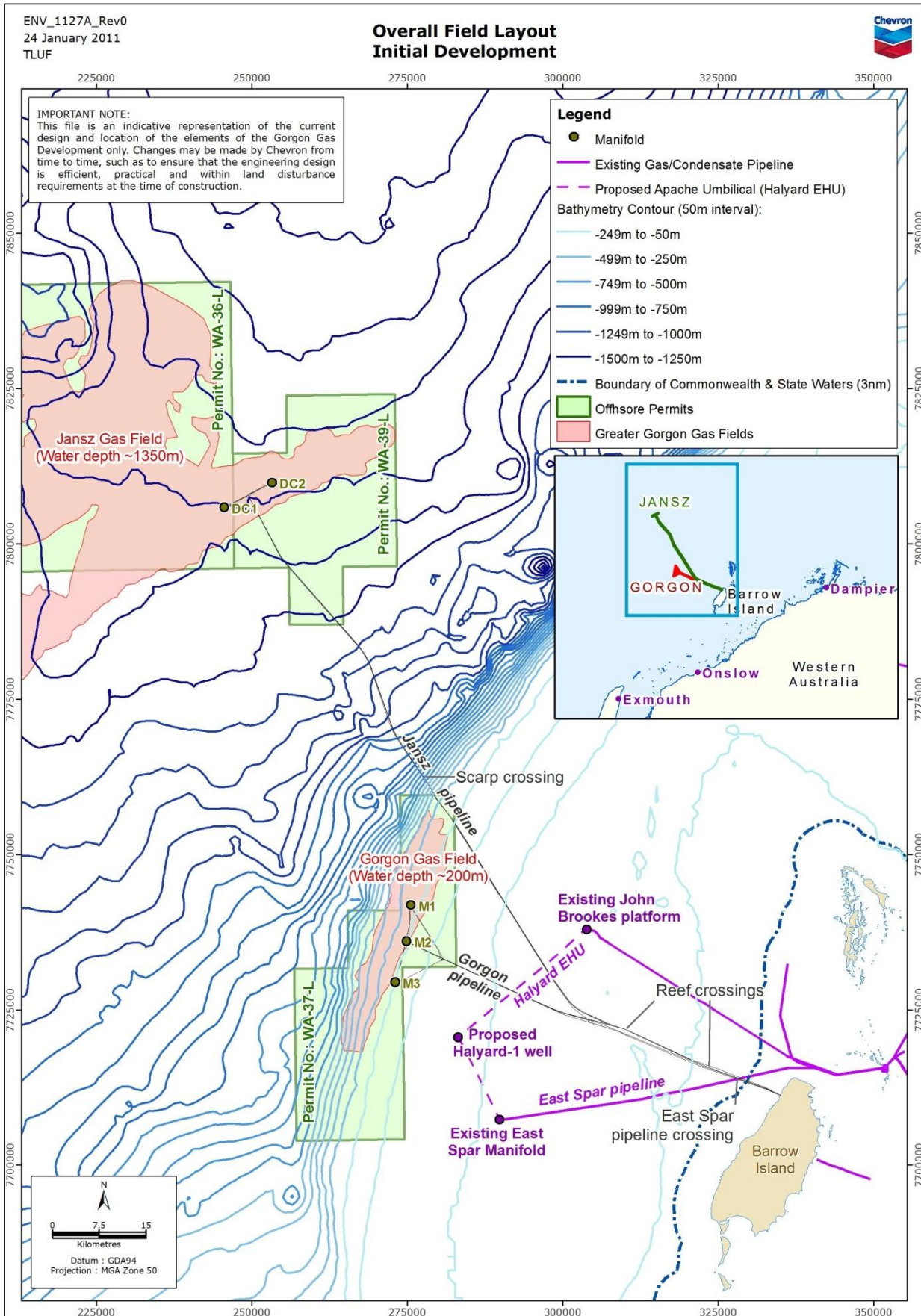


Figure 1 Proposed Installation Location

3.0 Receiving Environment

The southern portion of the North West Shelf, including Barrow Island, is characterised by an arid, subtropical climate, with warm, dry winters from June to August, and hot, humid summers between October and March. Rainfall is low and extremely variable; the average annual rainfall for Barrow Island is 320 mm. Tropical cyclone activity occurs in the region, mostly between November and April.

Surface water temperatures offshore from Barrow Island vary between 22 °C and 31 °C. The prevailing oceanic conditions in the Barrow Island region 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. Tides in the Barrow Island region are semidiurnal, comprising two high tides and two low tides per day. The tidal gradients are strong, and aligned in a north–south direction.

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 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 macro-invertebrates were present in relatively low abundances close to shore near the HDD exits. Two reef areas, at approximately 40 m water depth and 50 to 55 m water depth respectively, will be crossed by the Offshore Feed Gas Pipeline System. Although the reef areas support scattered corals and sponges, they are too deep to support well-developed benthic primary producer assemblages. Further offshore, the substrate most commonly found in the deeper water was composed of soft sediments with little evidence of life.

Several species of whale and dolphins are known to occur in the region. 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, so they are likely to be transient through the area.

Five of the six species of marine turtle found in Western Australia are known to occur in the region. Of these, Green, Flatback and Hawksbill Turtles are known to regularly nest on the sandy beaches of Barrow Island. 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.

Over 508 fish species have been identified in the region, including a number of species important to commercial and recreational fisheries. 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.

The Gorgon and Jansz pipeline and umbilical route will traverse the Barrow Island marine management area, which includes waters surrounding Barrow Island; the route lies outside the marine parks. A number of shipwrecks exist within the Montebello/Barrow islands region; however, surveys conducted along the pipeline route have not revealed the presence of any shipwreck material.

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. 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.

4.0 Major Environmental Hazards and Control

Chevron Australia has conducted an environmental risk assessment of all aspects of the proposed installation works in accordance with Australian Standard/New Zealand Standard (AS/NZS) Handbook 203:2006 Environmental Risk Management – Principles and Process (Standards Australia/Standards New Zealand 2006). The analysis indicates that, with the proposed management/mitigation measures implemented, no aspects or impacts assessed as having significant residual risk are expected (see Table 1).

5.0 Summary of Management Approach

Chevron Australia is committed to conducting activities associated with the Gorgon Gas Development and Jansz Feed Gas Pipeline in an environmentally responsible manner, and aims to implement best practice environmental management as part of a program of continual improvement.

To achieve this, the proposed activities will be conducted within Chevron Australia's Operational Excellence Management System, which provides a systematic approach to the management of safety, health, environment, reliability and efficiency.

The key management objectives and commitments to be applied during the proposed activities are summarised in Table 1.

6.0 Consultation

Chevron Australia is committed to open and accountable processes that encourage stakeholder engagement throughout all stages of the Gorgon Gas Development and Jansz Feed Gas Pipeline. An extensive and ongoing stakeholder engagement program that builds on a proactive approach to consultation commenced in early 2002 and has continued until now.

Consultations and/or notifications with relevant stakeholders have been undertaken and will continue as required, including:

- Australian Fisheries Management Authority
- Western Australian Department of Fisheries
- Western Australia Fishing Industry Council
- Pearl Producers Association
- Charter Boats Users and Operators Association
- Nickol Bay Professional Fishermens Association Inc.
- Recfishwest (WA recreational fishers representation)
- Pilbara Fish Trap
- Austral Fisheries.

7.0 Further Information

Further information may be obtained by writing to:

Ashley Geneve
Offshore Construction Manager
PO Box 7869
Cloister Square WA 6850

Table 1 Environmental Risks and Management Measures

Aspects	Potential Environmental Impacts	Management and Mitigation Measures	Residual Risk
Interference with other marine users	<ul style="list-style-type: none"> Installation vessels create obstacle to other vessel movements Restrict access to the proposed area 	<ul style="list-style-type: none"> Ongoing liaison/communication with relevant stakeholders (including fishing groups) has been undertaken and will continue, to ensure awareness of the proposed installation activities 	Low
	<ul style="list-style-type: none"> Adverse impacts to other oil and gas facilities 	<ul style="list-style-type: none"> East Spar pipeline and Halyard EHU crossing will be designed and constructed in accordance with AS 2885:4 No other nearby oil and gas facilities in the vicinity of the proposed installation activities 	Low
Interference with marine fauna	<ul style="list-style-type: none"> Injury/mortality resulting from vessel strike 	<ul style="list-style-type: none"> Project personnel will not be permitted to feed, harass, capture, disturb, harm, or kill marine fauna on or near the worksite Installation vessels will be stationary or very slow moving (≤ 0.5 knots) Responsibility for marine fauna observation will be allocated to appropriate personnel (such as the Vessel Master or delegate) on the installation vessels, who will maintain watch for marine fauna during daylight hours when the vessels are moving at speeds greater than 5 knots When marine fauna are in the vicinity of or approaching the installation vessels, the observer will closely monitor and record the animal's behaviour. If marine fauna are spotted, installation vessels moving >5 knots will adjust their speed to <6 knots and alter their direction to avoid impacting the animal, where practicable Marine megafauna (whales, dolphins, turtles, Whale Sharks) sighting observations will be recorded and reported to the Commonwealth Department of Sustainability, Environment, Water, Population and Communities (SEWPaC) 	Low
	<ul style="list-style-type: none"> Injury/mortality resulting from entanglement 	<ul style="list-style-type: none"> Where anchoring is required, anchor lines will be deployed with sufficient tension to minimise risks of entanglement Structures and equipment will be deployed using taut/rigid lines 	Low
	<ul style="list-style-type: none"> Injury/mortality resulting from entrainment 	<ul style="list-style-type: none"> The seawater intake for the water winning at Barrow Island will be fitted with screens and the intake velocity will be limited to a maximum of 0.1 m/s to prevent entrainment of flotsam and marine fauna, as far as practicable. 	Low
Artificial light	<ul style="list-style-type: none"> Alter foraging and breeding activity in turtles, seabirds, fish and dolphins 	<ul style="list-style-type: none"> Lighting will be managed in accordance with Long-term Marine Turtle Management Plan (Chevron Australia 2009), as amended from time to time 	Low

Aspects	Potential Environmental Impacts	Management and Mitigation Measures	Residual Risk
Underwater noise	<ul style="list-style-type: none"> Mask biologically important sounds Disturb marine fauna normal behaviour resulting in possible displacement from areas Cause temporary or permanent reductions in hearing sensitivity. 	<ul style="list-style-type: none"> See Management and Mitigation Measures for 'Interference with marine fauna' for installation vessels Helicopter height will be maintained in accordance with Part 8 of the Environment Protection and Biodiversity Conservation Regulations 2000 Engines, thrusters and auxiliary plants will not be left in stand-by or running mode unnecessarily 	Low
Installation of the Offshore Feed Gas Pipeline System	<ul style="list-style-type: none"> Permanent physical loss of seabed habitat over which the pipeline system is laid Increased turbidity of the water column leading to adverse impacts to marine life 	<ul style="list-style-type: none"> Habitat types are widespread and well represented in the region Impacts will be confined to an area equal to the footprint where the pipeline system is laid, and is not expected to impact areas outside the MDF The lay corridor will be restricted when the route traverses the reef sections Turbidity is expected to be localised and temporary, ceasing when installation activities are complete 	Low
Rock Installation	<ul style="list-style-type: none"> Permanent physical loss of seabed habitat over which rocks are installed Increased turbidity of the water column leading to adverse impacts to marine life 	<ul style="list-style-type: none"> Habitat types are widespread and well represented in the region Materials used are very coarse, so that any sediment spill will be related to suspension of the local sediment caused by the momentum of the rock materials placed on the seabed The use of a fall-pipe vessel allows accurate placement of rocks, thus impacts will be confined to an area equal to the footprint where rocks are installed Turbidity impacts will be limited to the immediate vicinity of the rock installation area, ceasing a few hours after completion of the works 	Low
Trenching	<ul style="list-style-type: none"> Increased turbidity of the water column leading to adverse impacts to marine life Burial of ecologically important benthic communities by settling sediments 	<ul style="list-style-type: none"> Habitat types are widespread and well represented in the region Turbidity expected to be localised and temporary, ceasing when installation activities are complete Burial effect is expected to be localised and confined to the area near the proposed trench area where sedimentation is expected to be at its thickest. 	Low
Thruster wash	<ul style="list-style-type: none"> Increased turbidity of the water column leading to adverse impacts to marine life 	<ul style="list-style-type: none"> Installation vessels will move along a pre-defined path along the pipeline corridor, thus impacts from thruster wash will be limited to areas within the MDF Impacts will be limited to shallow areas and will become negligible as the installation vessels move to deeper offshore waters 	Low

Aspects	Potential Environmental Impacts	Management and Mitigation Measures	Residual Risk
Anchoring	<ul style="list-style-type: none"> Direct loss of habitat in the contact area 	<ul style="list-style-type: none"> Anchoring will be limited to the indicative anchoring area No significant areas of coral habitat or Coral Assemblages are identified in this location 	Low
Cultural heritage disturbance	<ul style="list-style-type: none"> Damage to shipwreck or relics 	<ul style="list-style-type: none"> No shipwrecks are recorded within a radius of 15 nm (28 km) of the proposed locations Should any shipwreck or relics be discovered, Chevron Australia will provide the SEWPaC Maritime Heritage Section with written notification 	Low
Planned discharge of hydrotest fluids	<ul style="list-style-type: none"> Acute and chronic toxicity of discharge to marine fauna 	<ul style="list-style-type: none"> Careful selection of chemical additives to ensure that the chosen additives will have the minimum potential environmental impact Chemicals used are biodegradable Impact will be localised, with concentration returning to no-effect concentration within a few hours 	Low
Discharge of sewage, greywater and putrescible wastes	<ul style="list-style-type: none"> Increased nutrient availability and biological oxygen demand (BOD) Adverse impacts to the visual amenity of the surrounding environment Localised pollution of the water column leading to adverse impacts to marine life 	<ul style="list-style-type: none"> Compliance to MARPOL Annex IV – Prevention of Pollution by Sewage from Ships and Annex V – Prevention of Pollution by Garbage from Ships Regular inspections of treatment system will be conducted 	Low
Discharge from equipment/machinery	<ul style="list-style-type: none"> Localised pollution of the water column leading to adverse impacts to marine life 	<ul style="list-style-type: none"> Managed in accordance with MARPOL Annex I – Prevention of Pollution by Oil 	Low
Discharge of cooling water	<ul style="list-style-type: none"> Behavioural changes, minor stress and potential mortality of marine fauna from prolonged exposure to elevated water temperature 	<ul style="list-style-type: none"> Relatively small quantity of cooling water discharged to highly dispersive marine environment 	Low

Aspects	Potential Environmental Impacts	Management and Mitigation Measures	Residual Risk
Discharge of deck drainage	<ul style="list-style-type: none"> Localised pollution of the water column leading to adverse impacts to marine life 	<ul style="list-style-type: none"> High standards of housekeeping will be maintained in all areas, including keeping the area litter free Only limited and fit-for-purpose hazardous and dangerous materials will be kept on the vessels and they will be stored and handled in accordance with relevant legal requirements, industry standards and Material Safety Data Sheet (MSDS) requirements A complete inventory of all hazardous materials stored will be maintained on board, together with a complete up-to-date set of MSDSs for each hazardous or dangerous goods substance Maintenance activities on vessels that have the potential to result in leaks or spills will be contained (e.g. undertaken in bunded areas, use drip trays or sheets) Spill containment and recovery equipment will be provided where spills are possible, and such equipment will be maintained to ensure that it is readily available and in working condition. In the event of a spill or leak on deck and if it is safe to do so, vessel scuppers will be closed to ensure any contaminants on deck are not discharged into the ocean In the event of a spill or leak on deck, spilled materials will be cleaned and removed prior to any deck wash-down activities Low level of contamination and high dilution in offshore environment 	Low
Emission of combustion products	<ul style="list-style-type: none"> Decline in local air quality Contribute to global atmospheric concentrations of greenhouse gases 	<ul style="list-style-type: none"> Emissions from marine utilities will be in accordance with the guidelines of MARPOL Annex VI Equipment will be maintained in accordance with the manufacturers' specifications Highly dispersive offshore environment with no sensitive receptors nearby 	Low
Emission of ozone depleting substances	<ul style="list-style-type: none"> Contribute to the destruction of ozone layers 	<ul style="list-style-type: none"> Vessels will comply with the requirements for Ozone Depleting Substances (ODS) specified in Regulation 12 of Annex VI of MARPOL 73/78, including the prohibition of deliberate release of ODS Any personnel handling ODS will be certified and hold the necessary permits and licences Requirements for recording and reporting the use and disposal of ODS under the Ozone Protection and Synthetic Greenhouse Gas Management Regulations 1995 will be adhered to 	Low

Aspects	Potential Environmental Impacts	Management and Mitigation Measures	Residual Risk
Discharge of ballast water	<ul style="list-style-type: none"> • Competition with native fauna and flora for resources such as food and shelter 	<ul style="list-style-type: none"> • Vessels approaching Barrow Island will be subjected to progressively more stringent quarantine requirements in each defined zone as described in the Phase 4 Marine Quarantine Zonation for Barrow Island • Marine vessels operating outside the Marine Quarantine Zonation will be required to conform to the requirements of Australian Quarantine and Inspection Service (AQIS) Australian Ballast Water Management 	Low
Biofouling	<ul style="list-style-type: none"> • Introduction of disease and pathogens • Detrimental impacts to aquaculture and fisheries 	<ul style="list-style-type: none"> • A desktop Quarantine Compliance Risk assessment will be undertaken to determine the risk posed by each vessel being used • Marine vessels entering the Marine Quarantine Zonation will be required to comply with specific wetside requirements as described in the Phase 4 Marine Quarantine Zonation for Barrow Island • Special compliance requirements will be implemented for handling and loading rocks within the Quarantine Controlled Access Zone 	Low
Disposal of wastes and hazardous materials	<ul style="list-style-type: none"> • Reduced water quality • Injury/mortality (e.g. through ingestion or entanglement). • Create minor incremental increase in the rate at which onshore disposal facilities reach their storage capacity resulting in the incremental increase in land disturbance 	<ul style="list-style-type: none"> • Reduce wastes being generated in the first place, whenever practicable • No disposal of wastes (except those approved by MARPOL) into the marine environment • Appropriate waste handling equipment, waste storage containers, and spill response equipment will be provided at the waste storage area • Wastes will be segregated at the source and stored in clearly marked, covered bins secured to the deck to prevent contamination of the various waste streams and to prevent litter • Wastes returned to the mainland will be re-used, recycled, or disposed of in government-approved recycling or waste disposal facilities • Wastes designated as hazardous or dangerous goods will be identified, packaged, segregated, handled, stored, transported and tracked in accordance with legal requirements and industry standards, such as applicable International Maritime Dangerous Goods requirements • Any unidentified wastes will be regarded as hazardous waste and handled and stored accordingly • Controlled wastes (such as clinical wastes and oil/water mixture) returned to the Western Australian mainland will be managed in accordance with the Western Australian Environmental Protection (Controlled Waste) Regulations 2004 	Low

Aspects	Potential Environmental Impacts	Management and Mitigation Measures	Residual Risk
Diesel/ Heavy Fuel Oil (HFO) spill – Refuelling	<ul style="list-style-type: none"> • Acute and chronic toxicity to marine life • Oiling of birds 	<ul style="list-style-type: none"> • Refuelling will only be undertaken when weather/sea/visibility conditions are appropriate • Dry break couplings and breakaway couplings, which are fit for purpose, used within their design life limits, and regularly checked for damage to prevent leaks, will be used • Continuous visual monitoring of hoses, couplings and flow gauges as well as maintaining open communication channels between vessels during refuelling • Installing scupper plugs to mitigate against overboard loss during a refuelling spill 	Low
Diesel/HFO spill – Accidental Damage to Vessel	<ul style="list-style-type: none"> • Shoreline pollution • Disruption to fishing activities 	<ul style="list-style-type: none"> • Notice to Mariners posted to alert fishing and other vessels in the area • Adherence to maritime standards and procedures, including maintaining specific lights configuration and radar/watch • Use of personnel who are fully trained and competent in navigation and communication procedures • Carry out equipment function (e.g. Dynamic Position trial) to ensure that equipment will adequately perform their functions 	Low
MEG spill/leak	<ul style="list-style-type: none"> • Acute and chronic toxicity to marine life 	<ul style="list-style-type: none"> • Perform integrity checks prior to installation to confirm no leaks from spools and structures • Design spools to prevent MEG coming out during installation (e.g. goose necks, gel plugs and end caps) • Only a small volume is likely to be involved 	Low
Subsea hydraulic fluid spill/leak	<ul style="list-style-type: none"> • Acute and chronic toxicity to marine life 	<ul style="list-style-type: none"> • Inspecting and testing mechanical hydraulic couplers (poppets) prior to release from the manufacturer • Factory Acceptance Testing of the poppets when they are integrated into the Umbilical Termination Assembly • Only a small volume is likely to be involved 	Low

8.0 References

Chevron Australia. 2009. *Gorgon Gas Development and Jansz Feed Gas Pipeline Long-term Marine Turtle Management Plan*. Chevron Australia, Perth, Western Australia. (G1-NT-PLNX0000296)

Standards Australia/Standards New Zealand. 2006. *HB 203:2006 Environmental Risk Management – Principles and Process*. Sydney, Australia/Wellington, New Zealand.