



Gorgon Project:

Jansz Feed Gas Pipeline Preparatory Works (Northern Scarp) - Summary Environment Plan

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Terms, Definitions and Abbreviations

AFMA	Australian Fisheries Management Authority
AMSA	Australian Maritime Safety Authority
AQIS	Australian Quarantine and Inspection Service
AS/NZS	Australian Standard/ New Zealand Standard
BOD	Biological Oxygen Demand
CO ₂	Carbon dioxide
DMP	Western Australian Department of Mines and Petroleum (formerly Western Australia Department of Industry and Resources [DoIR])
DSEWPaC	Commonwealth Department of Sustainability, Environment, Water, Population and Communities (formerly Commonwealth Department of the Environment, Water, Heritage and the Arts [DEWHA])
EPBC	Environment Protection and Biodiversity Conservation
GDA	Geocentric Data of Australia
HFO	Heavy Fuel Oil
IMDG	International Maritime Dangerous Goods
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.
MFO	Marine Fauna Observer
MGA	Map Grid of Australia
mm	Millimetres
MSDS	Material Safety Data Sheet
MTPA	Million Tonnes Per Annum
nm	Nautical Miles
ODS	Ozone Depleting Substance
ppm	Parts Per Million
SOPEP	Shipboard Oil Pollution Emergency Plan

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

2.1 Scarp Trenching

At 78 km from the Barrow Island shore crossing location (see Table 1 and Figure 1) and at 600 m water depth, the pipeline route between Jansz–lo gas fields and Barrow Island has to cross a steep scarp area 100 m high.

Table 1: Coordinates of Proposed Seabed Preparatory Activities

Location	MGA Coordinates (GDA94) UTM 80 Zone 50	
	Latitude, Longitude	Easting, Northing
Centre of Trench	20° 13' 22.35" S 114° 52' 18.53" E	277656 m E 7762427 m N

Chevron Australia plans to conduct pre-lay trench excavation on the scarp to obtain an acceptable seabed profile for the installation of the pipelines. The proposed works will involve excavating a main trench at the top of the scarp (approximately 50 m long, 12 m wide and 8 m deep) and a secondary shallow trench (approximately 31 m long, 12 m wide and 1.5 m deep) on the upper shoulder, 50 m up the slope from the main trench (see Figure 1). The total duration of the proposed works is expected to be approximately 30 days and will be carried out sometime between October 2010 and March 2011. However, subject to weather and field conditions, the works may extend by up to 90 days.

The trenches will be excavated principally by High Pressure Jetting/Mass Flow Excavation, which use a controllable water jetting that is projected toward the seabed to fluidise and remove seabed material. A hydraulically operated clamshell grab shall be used as a secondary system. In the event of over-excavation where the design tolerance of the trenches is exceeded, gravels will be used to fill in the specific areas.

To avoid potential issues during trenching of the Scarp Crossing trenches, a trial of the trenching equipment will be conducted at a location 50 to 100 m north of the proposed main trench. It is estimated that an area of 20 × 50 m will be used to trial and optimise the excavation parameters of the trenching equipment.

The proposed trench profile will produce a total of approximately 4515 m³ of excavated materials. Material excavated by the primary system (high pressure jetting) will flow downhill

along the length of the trench and exit from the lower end of the trench down the scarp. It is expected that only lighter particles will settle outside the trench excavation and this will be parallel to the trench. If a clamshell grab (secondary system) is used, then materials will be deposited approximately 50 m from the trench to prevent the materials from falling back into the trench.

A number of seabed surveys, primarily carried out by a Remotely Operated Vehicle, will be undertaken prior to, during, and after the seabed preparatory works. Annual surveys may also be conducted for a period of up to three years after the completion of the initial works to determine the integrity of the trenches. An array of transponder beacons mounted on seabed frames close to the excavation sites will be installed to provide survey repeatability. These frames will be left *in situ* on the seabed over the life of the project construction period (approximately five years) but will be retrieved at the completion of construction.

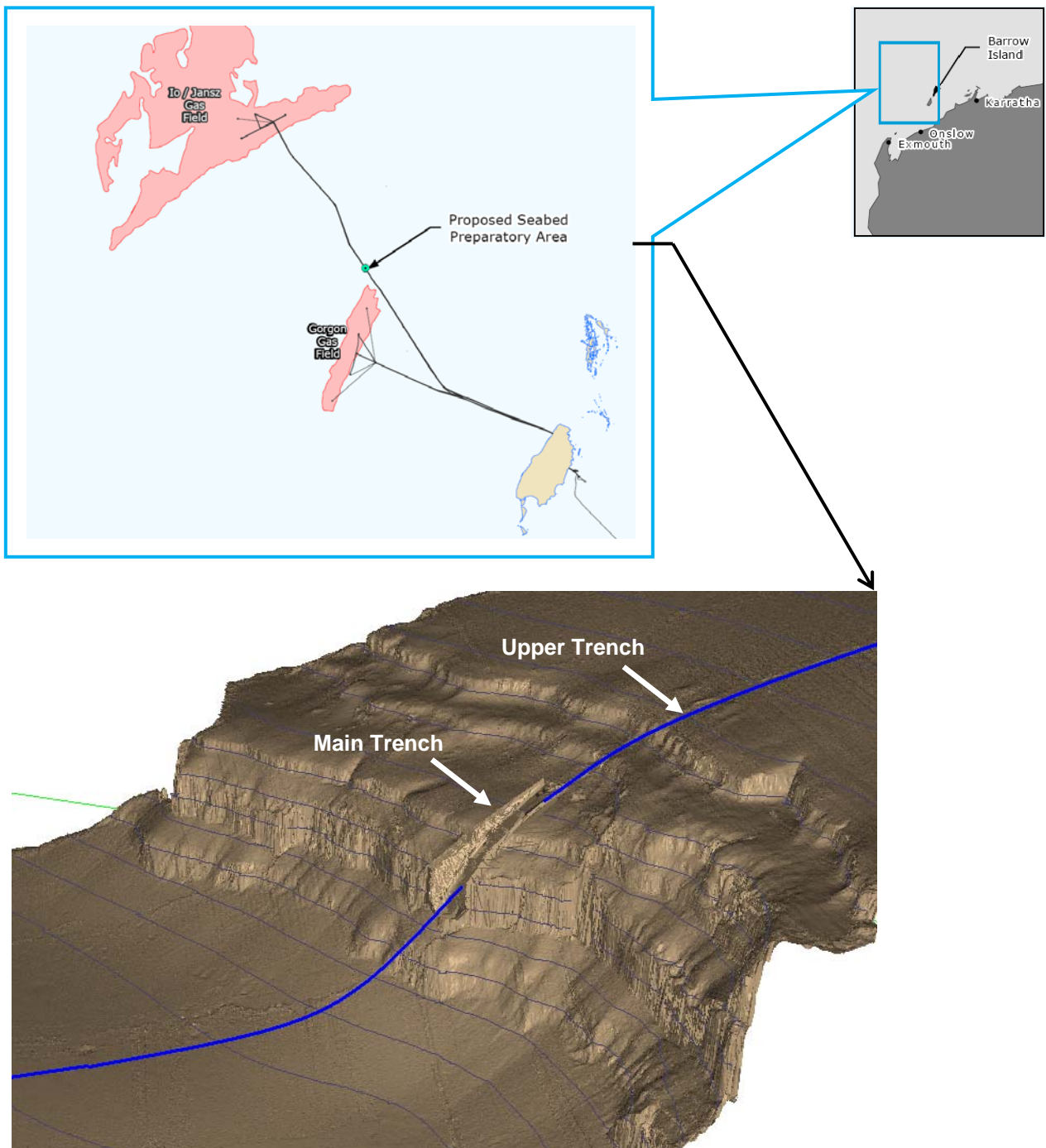


Figure 1: Proposed Trench Location and Profile

2.2 Freespan Correction

Chevron Australia will also undertake freespan correction activities at the following locations (see Figure 2) immediately after the completion of the Scarp trenching works:

- Location 1: ~1.5 km south-east of the Scarp Crossing, at a water depth approximately 450 m
- Location 2: ~3.3 km south-east of the Scarp Crossing, at a water depth approximately 285 m
- Location 3: ~4.3 km south-east of the Scarp Crossing, at a water depth approximately 260 m.

The works will comprise of the excavation of a limited number of ridges to reduce the freespan heights and building discreet pipeline supports using gravels. It is anticipated that approximately 700 m³ of soils will be excavated within Location 3 by using the MFE/jetting equipment and approximately 3500 tonnes of gravels will be placed over the three identified locations.

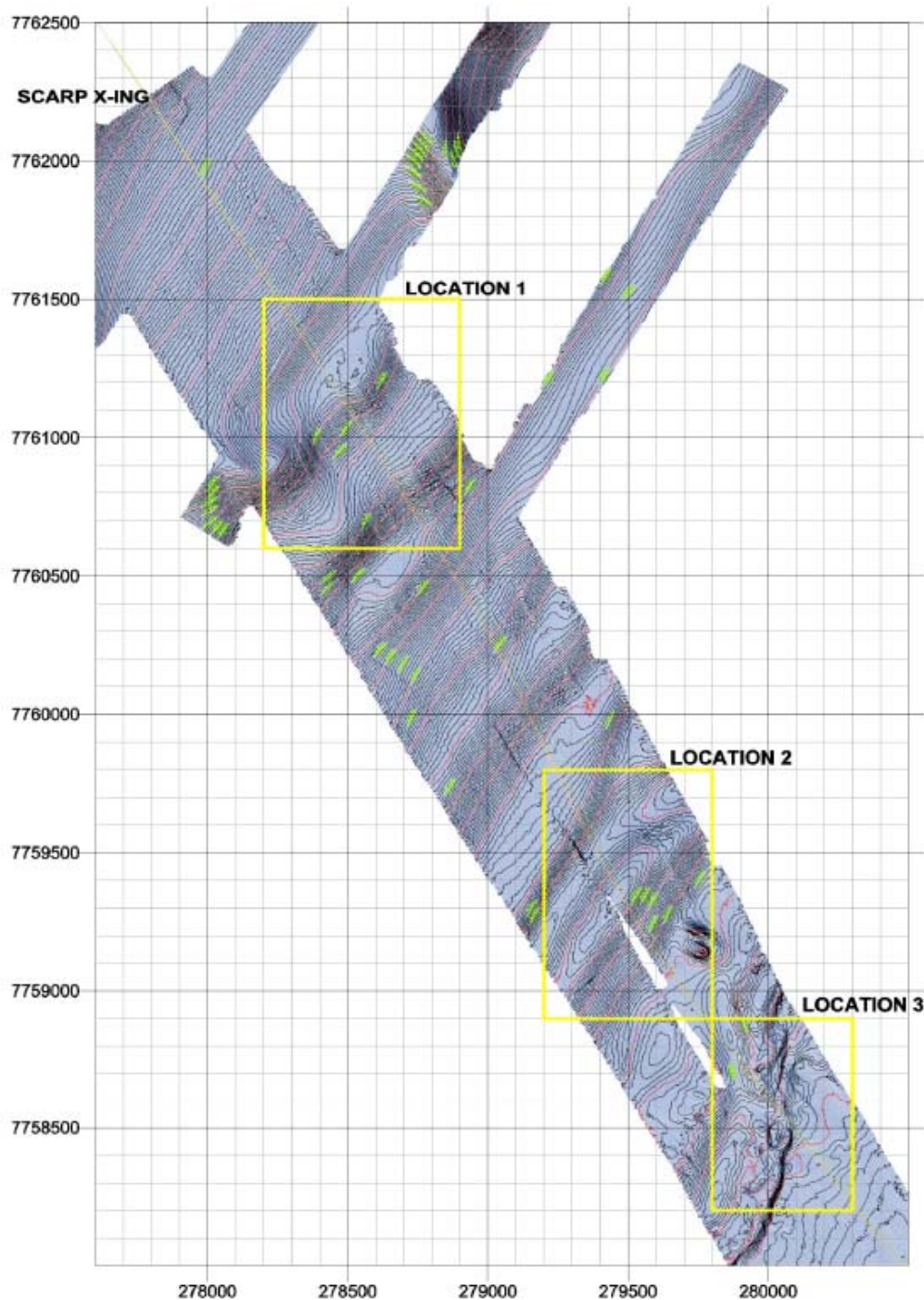


Figure 2: Freespan Correction Location

3.0 Receiving Environment

The proposed area is not located within any marine reserve or conservation area. The nearest marine protected area, the Barrow Island Marine Management Area, is located approximately 78 km to the south-east.

The climate of the area is arid and subtropical, with warm, dry winters from June to August and hot, humid summers between October and March. The months of April, May and September are considered a transition season during which either the summer or winter weather regime may predominate or conditions may vary between the two. Rainfall is low and extremely variable, with the annual average for Barrow Island being 320 mm. Tropical cyclone activity occurs in the region, mostly between November and April.

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 proposed Scarp trenching activities are located in water depth between 600 and 650 m, in an escarpment which forms a sharp transition between the 'shelf' region (less than 300 m water depth) and the deep water region (greater than 1200 m water depth). The freespan correction activities are located in an area of undulating seabed (Gully Region) at a water depth between 260 m and 450 m.

Seabed sediment samples collected in the area indicate that the soils comprise of mostly poorly sorted carbonates including bioclastic fragments enclosed in a matrix of predominantly silt-sized carbonate particles, typical of seabed sediments found off the coasts of north-west Australia. The seabed is mainly devoid of marine growth, with occasional sparse communities of benthic invertebrates including soft corals, bryozoans and colonial ascidians. Qualitative observations of benthic epifauna and quantitative analysis of infauna revealed that benthic fauna in the region are generally depauperate, which is typical of the low abundances, richness and diversity observed in other deep areas of the North West Shelf.

Several species of whale and dolphins are known to occur in the region. Humpback Whales are known to pass through the Barrow Island region between June and October on their annual migration between their summer feeding grounds and their subtropical winter calving grounds. However, the proposed seabed preparatory area is located outside their known migration route. Blue Whale migration patterns are thought to be similar to Humpback Whales, with most migrating annually to Antarctic waters in early summer and leaving in autumn to breed in deep tropical waters. However, the Blue Whale tends to be more widely dispersed in its migration and rarely presents in large numbers outside aggregation areas, the nearest of which is located approximately 1200 km to the south at the Perth Canyon.

Other cetaceans that may occur in the region include Antarctic Minke, Bryde's, Killer, and Sperm Whales as well as Spinner, Striped, Risso's, Spotted and Rough-toothed Dolphins. However, the proposed seabed preparatory area is not known as a recognised breeding, feeding or migratory areas for any cetacean species.

Three of the six species of marine turtle found in Western Australia are known to occur in the region. Of these, Green and Flatback Turtles regularly nest on the sandy beaches of Barrow Island, approximately 78 km south-east of the proposed seabed preparatory area.

Over 508 fish species have been identified in the region, including a number of species important to commercial and recreational fisheries. However, the deep offshore environment of the proposed seabed preparatory area is typical of the region and is not expected to represent habitat of particular importance to these fish.

The North West Shelf region has been subjected to extensive petroleum exploration and production activities since the late 1960s. The nearest oil and gas production facility to the proposed seabed preparatory area is the John Brookes platform, approximately 35 km south-east. Other activities in the region include low levels of commercial fishing and shipping

activities. Little marine-based tourism occurs in the proposed work locations due to the area's isolation from major mainland centres and lack of visitor facilities.

4.0 Major Environmental Hazards and Control

Chevron Australia has conducted an environmental risk assessment of all aspects of the proposed seabed preparatory 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 2).

5.0 Summary of Management Approach

Chevron Australia's overall objective is to ensure that the seabed preparatory works are conducted in a manner that protects environmental values and reduces impacts to the environment as far as practicable.

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 2.

6.0 Consultation

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

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

- Australian Fisheries Management Authority (AFMA)
- 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 2: 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"> Seabed preparatory vessel creates obstacle to other vessel movements Restrict access to the proposed area 	<ul style="list-style-type: none"> Consultation with commercial fishing groups to advise them of the planned movements and schedule of the proposed works Activities are of short duration and limited spatial extent 	Low
	<ul style="list-style-type: none"> Survey permanent monument frames create navigation/snagging hazards 	<ul style="list-style-type: none"> Water depth (<200 m) unlikely to pose navigation/snagging hazards Monuments will be removed after the completion of construction (~5 years) 	Low
	<ul style="list-style-type: none"> Adverse impacts to other oil and gas facilities 	<ul style="list-style-type: none"> No nearby oil and gas facilities in the vicinity of the proposed activities 	Low
Interference with marine fauna	<ul style="list-style-type: none"> Injury/mortality resulting from vessel strike 	<ul style="list-style-type: none"> Area is not known as having significant concentration of marine fauna All vessels will adhere to Part 8 of EPBC Regulation and 2005 Australian Guideline to Whale Watching (Department of Environment and Heritage 2006) Project personnel will not be permitted to feed, harass, capture, disturb, harm, or kill marine fauna on or near the worksite Vessel Master or delegate will be trained as the Marine Fauna Observer (MFO) and used during daylight hours when the vessels are moving at a speed greater than 5 knots within the project area to minimise risks of marine fauna injury/mortality due to vessel strike. The MFO will be trained in the actions to be taken in the event of marine fauna sightings, injury or mortality Marine megafauna (whales, dolphins, turtles) sighting reports will be completed and submitted by all vessels to the Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC) via the Australian Antarctic Division 	Low
	<ul style="list-style-type: none"> Injury/mortality resulting from entanglement 	<ul style="list-style-type: none"> Vessels used in the proposed activities will be dynamically positioned (no mooring lines and anchors) 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 submersible lift pumps will be supplied equipped with coarse mesh with approximately 1" diameter apertures 	Low

Aspects	Potential Environmental Impacts	Management and Mitigation Measures	Residual Risk
Artificial light	<ul style="list-style-type: none"> Disorientate marine fauna such as birds Increase incidents of marine fauna interactions with vessels and equipment Cause greater concentration of adaptable species leading to increased mortality of food source 	<ul style="list-style-type: none"> Lighting will be kept to that required for safety and navigation in accordance with Long-term Marine Turtle Management Plan (Chevron Australia 2009). Activities are of short duration (<90 days) Activities are of significant distance to known sensitive area (>70 km from turtle nesting beaches, bird colonies) 	Low
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"> Activities will comply with Part 8 of the EPBC Regulations 2000 All vessels will operate in accordance with appropriate industry and equipment noise and vibration standards Regular maintenance will be conducted to the manufacturers' specifications Engines, thrusters and auxiliary plants will not be left in stand-by or running mode unnecessarily 	Low
Seabed disturbance	<ul style="list-style-type: none"> Direct loss of sensitive or ecologically important benthic communities from within the trenches area 	<ul style="list-style-type: none"> Vessels will be dynamically positioned with no anchor All equipment on board vessels will be stowed securely to prevent solid objects that may present potential snagging or navigation hazard from falling overboard 	Low
	<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"> The location of any lost material will be recorded and, where objects are not recoverable, notification to the appropriate authorities will be given (Department of Mines and Petroleum [DMP], Australian Maritime Safety Authority [AMSA], DSEWPaC). 	Low
	<ul style="list-style-type: none"> Burial of ecologically important benthic communities from sediment settlements 	<ul style="list-style-type: none"> Habitat types are widespread in the region Benthic fauna in the region is depauperate Turbidity levels will return to normal soon after the completion of the proposed works 	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 location Should any shipwreck or relics be discovered, Chevron Australia will provide the DSEWPaC Maritime Heritage Section with written notification 	Low

Aspects	Potential Environmental Impacts	Management and Mitigation Measures	Residual Risk
Discharge of sewage, greywater and putrescible wastes	<ul style="list-style-type: none"> Increased nutrient availability and BOD Adversely impacting 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, including: <ul style="list-style-type: none"> Inspection of treatment system will be conducted on regular basis 	Low
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 legal requirements, industry standards and Material Safety Data Sheet (MSDS) requirements A complete inventory of all hazardous materials stored on the vessels will be maintained on board, together with a complete up-to-date set of MSDSs for each hazardous or dangerous goods substance All 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 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 Fully biodegradable and phosphate-free detergent selected for wash-down, where practicable Low level of contamination and high dilution in offshore environment 	Low
Discharge from equipment/machinery space	<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"> Oily water from equipment/machinery space will be treated to an oil-in-water concentration of 15 ppm An oily water monitor, which is routinely calibrated and maintained, will continuously monitor the discharge stream Collected oil will be transported onshore as waste to a government-approved waste disposal facility Each shipment of wastes to the onshore facility will be accompanied by a waste manifest and recorded in a waste transfer book 	Low

Aspects	Potential Environmental Impacts	Management and Mitigation Measures	Residual Risk
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
	<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"> The seawater cooling is segregated from all oil services, preventing oil contamination of the cooling water discharge stream Only small quantity of biocide used 	Low
Emissions 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
Emissions 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 systems containing ODS that need recharging or replacement will be exchanged to an 'ozone friendly' system, wherever options are available 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
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 will be required to conform to the requirements of Australian Quarantine and Inspection Service (AQIS) Australian Ballast Water Management Activities are conducted in remote location (>12 m) and deep water location (>50 m) 	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"> Vessel hull will be cleaned in Singapore prior to mobilisation to Australian waters Activities are conducted in remote location (>12 nm) and deep water location (>50 m) 	Low

Aspects	Potential Environmental Impacts	Management and Mitigation Measures	Residual Risk
Disposal of wastes and hazardous materials	<ul style="list-style-type: none"> Reduction in 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 for 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 (except for those approved by MARPOL to be discharged) will be returned to the mainland for re-use, recycling or disposal in government-approved recycling or waste disposal facility 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 (IMDG) 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) being returned to the Western Australian mainland will be managed in accordance with the Western Australian Environmental Protection (Controlled Waste) Regulations 2004 	Low
Diesel spills – vessel collision/grounding	<ul style="list-style-type: none"> Acute and chronic toxicity to marine life 	<ul style="list-style-type: none"> No refuelling will be undertaken at the seabed preparatory location; refuelling will be undertaken in port when necessary Vessels will adhere to maritime standards and procedures, including maintaining specific lights configuration and radar/watch Only personnel who are fully trained and competent in navigation and communication procedure will be used 	Low
Heavy Fuel Oil (HFO) spills – vessel collision/grounding	<ul style="list-style-type: none"> Oiling of birds Shoreline pollution Disruption to fishing activities 	<ul style="list-style-type: none"> Notice to mariners will be posted to alert fishermen and other vessels in the area Marine operations will cease operating and seek safe harbour (or deep water) where extreme conditions make it unsafe to continue seabed preparatory activities Marine Oil Pollution Plan to ensure a rapid and appropriate response Sufficient Shipboard Oil Pollution Emergency Plan (SOPEP) equipment will be carried on board to deal with an on-deck spill 	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)

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