Gorgon Project:

Offshore Domestic Gas Pipeline Installation Management Plan: Summary

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Offshore Domestic Gas Pipeline Installation Management Plan: Summary

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Table of Contents

List of Tables

List of Figures

Terms, Abbreviations and Definitions

ABU	Australasian Business Unit
AQIS	Australian Quarantine and Inspection Service
AS	Australian Standard
BOD	Biological Oxygen Demand
DBNGP	Dampier to Bunbury Natural Gas Pipeline
DomGas	Domestic Gas
DoT	Department of Transport
DWLB	Deep Water Lay Barge
EIS/ERMP	Environmental Impact Statement/Environmental Review and Management Programme (for the Proposed Gorgon Gas Development dated September 2005) as amended or supplemented from time to time.
ISO	International Organization for Standardization
JHA	Job Hazard Analysis
km	Kilometre
KP	Kilometre Point
LNG	Liquefied Natural Gas
m	Metre
m/s	Metres per second
MARPOL	The International Convention for the Prevention of Pollution From Ships, 1973 as modified by the Protocol of 1978.
MDF	Marine Disturbance Footprint
MOPP	Marine Oil Pollution Plan
MSDS	Material Safety Data Sheet
MTPA	Million Tonnes per Annum
NDT	Non-destructive testing
NIS	Non-indigenous Species
NZS	New Zealand Standard

ODS	Ozone Depleting Substance
PASS	Potential Acid Sulfate Soils
PER	Public Environmental Review for the Gorgon Gas Development Revised and Expanded Proposal dated September 2008, as amended or supplemented from time to time.
QMS	Quarantine Management System
ROW	Right-of-way
SOPEP	Shipboard Oil Pollution Emergency Plan
SWLB	Shallow Water Lay Barge
TAPL	Texaco Australia Pty. Ltd.

1.0 Introduction

This document summarises the Environment Plan for the Gorgon Gas Development and Jansz Feed Gas Pipeline Offshore Domestic Gas Pipeline Installation. The Offshore Domestic Gas Pipeline Installation Management Plan, Revision 2, was accepted by the Western Australian Department of Mines and Petroleum on 20 January 2014.

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–Io gas fields to the west coast of Barrow Island. From there, the feed gas pipeline system traverses across Barrow Island to a 15 million tonnes per annum (MTPA) Gas Treatment Plant located on the east coast. The Gas Treatment Plant will produce liquefied natural gas (LNG), condensate, and domestic gas. Gas for domestic use will be exported by a pipeline from the east coast of Barrow Island to the domestic gas collection and distribution network on the Western Australian mainland.

1.1 Operator

The Operator for the project is Chevron Australia Pty Ltd, on behalf of the Gorgon Joint Venturers, which comprise:

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

1.2 Location

The Gorgon gas field is located approximately 130 km and the Jansz–Io field approximately 200 km off the north-west coast of Western Australia (Figure 1-1). Barrow Island is located off the Pilbara coast 85 km north-north-east of the town of Onslow and 140 km west of Karratha.

The domestic gas pipeline (‘DomGas pipeline’) (Figure 1-1) extends approximately 60 km offshore from the LNG Jetty on the east coast of Barrow Island to the mainland shore-crossing, approximately 90 km north-east of Onslow and 120 km south-east of Karratha. On the mainland, the DomGas pipeline extends parallel and adjacent to the existing Apache easement, through a 12 km intertidal zone and an 18 km onshore area to a meter station, and then approximately 1.5 km to the tie-in to the Dampier to Bunbury Natural Gas Pipeline (DBNGP).

The co-ordinates for the DomGas pipeline are provided in Table 1-1.

Table 1-1 Co-ordinates for the Domestic Gas Pipeline (Offshore and Intertidal Zone)

Co-ordinates	Offshore Route	Offshore Route	Onshore Route
	KP 0	KP 59.3	KP 12
MGA Zone 50			
Easting	342362	379962	384706.4349
Northing	7698729	7656107	7645054.1702
GDA 94 (Deg Dec Min)			
Longitude	115° 29.118' E	115° 50.614' E	115° 53.311' E
Latitude	20° 48.281' S	21° 11.551' S	21° 17.561' S
GDA 94 (Deg Min Sec)			
Longitude	115° 29' 7.11" E	115° 50' 36.84" E	115° 53' 18.67" E
Latitude	20° 48' 16.84" S	21° 11' 33.08" S	21° 17' 33.64" S
GDA 94 (Decimal Degrees)			
Longitude	115.485307	115.843568	115.888519
Latitude	-20.804678	-21.192521	-21.292678

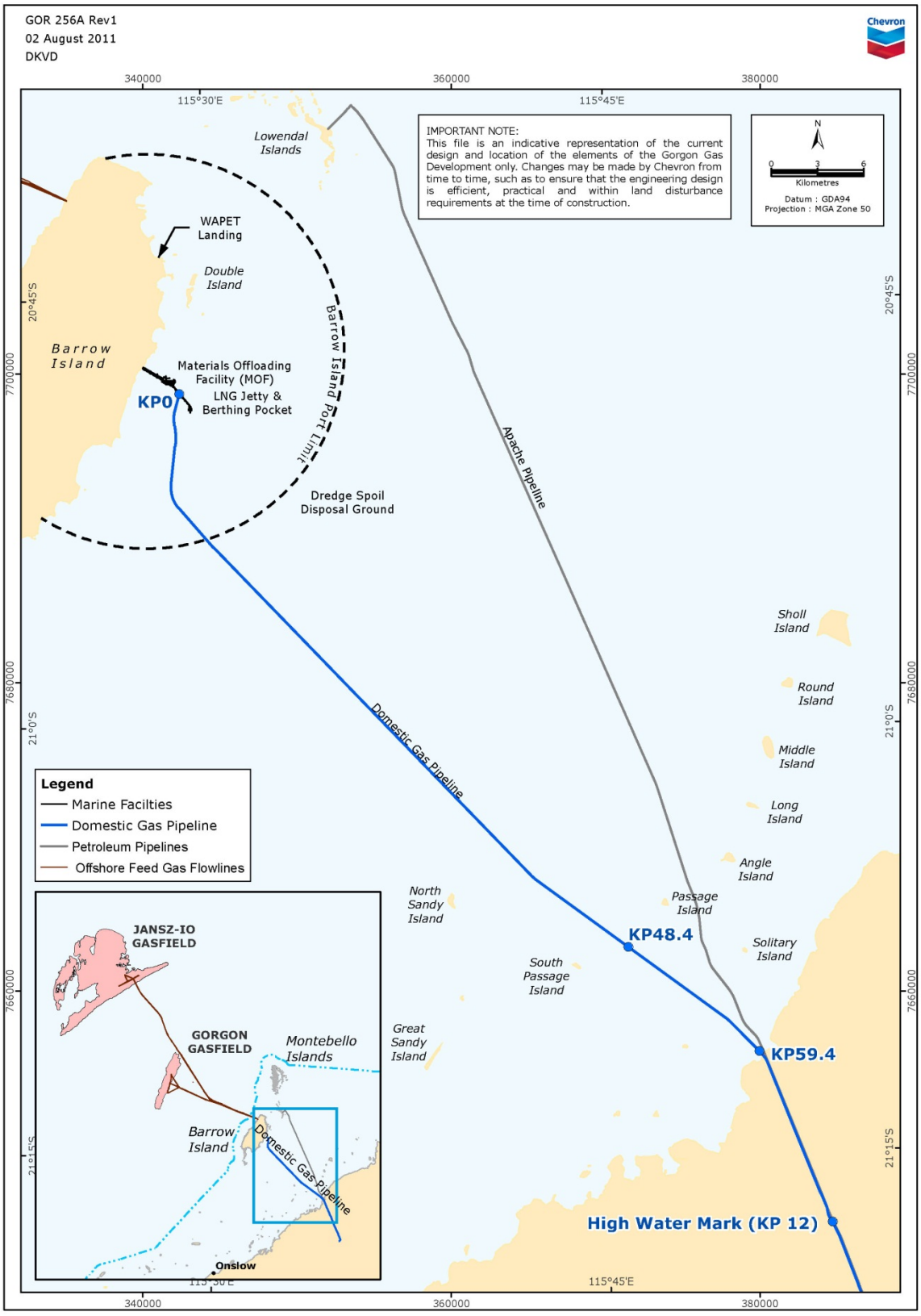

Figure 1-1 Location of Project Area and Domestic Gas Pipeline

2.0 Description of the Environment

2.1 Physical Environment

The waters between Barrow Island and the mainland are sheltered from deep ocean swells by Barrow Island, the shallow underwater ridges between Barrow Island and the mainland, and the island archipelago along the Mary Anne Passage.

There is a large tidal range at Barrow Island and at the mainland shore-crossing, with tides varying approximately three to four metres between highs and lows. The large tidal range generates strong tidal currents at Barrow Island and at the mainland shore-crossing. Water depths along the offshore DomGas pipeline route between Barrow Island and the mainland are less than 16 m.

The seabed geology of the offshore DomGas pipeline route comprises areas of unconsolidated sediments overlying variable cemented calcarenite substrate, bare sands with occasional rocky outcrops, and limestone pavement reef with a veneer of sand. Potential acid sulfate soils (PASS) have been identified within the intertidal zone.

The water quality of the offshore DomGas pipeline route varies from the generally pristine conditions found on the east coast of Barrow Island, through to the turbid waters abutting the mainland coast.

2.2 Biological Environment

Benthic habitats in the vicinity of the DomGas pipeline route between Barrow Island and the mainland shore-crossing are characterised by unvegetated or bare sand, with small, isolated areas of macroalgae (e.g. *Caulerpa*) and seagrass (e.g. *Halophila*) recorded along the pipeline route. Low densities of non-coral benthic macroinvertebrates are also present. The highest diversity of benthic habitats and assemblages (coral, macroalgae, and non-coral benthic macroinvertebrates) is found around offshore islands with fringing coral reefs and/or isolated patch reefs

Four species of marine turtles are likely to occur near the DomGas pipeline, including Green Turtles, Flatback Turtles, Hawksbill Turtles, and Loggerhead Turtles. Beaches at Middle Passage Island (approximately 12 km away) and Sholl Island (24 km distant) are considered to be regionally significant Hawksbill Turtle rookeries.

Mangroves at the mainland shore-crossing are habitat for juvenile Green Turtles, and post-hatchling Flatback Turtles may potentially occur. No suitable habitat for turtle nesting exists at the mainland shore-crossing.

Many migratory shorebirds are likely to exist within the intertidal zone and may occur near the DomGas pipeline route. These species are largely restricted to the tidal flats and mangroves near the shore-crossing. Numbers of migratory and wading birds observed along the DomGas line are considered low to moderate, with no major roosting concentrations.

2.3 Conservation Areas

The following conservation areas are located within the region of the DomGas pipeline:

- Barrow Island Nature Reserve
- Barrow Island Marine Park
- Barrow Island Marine Management Area
- Montebello Islands Conservation Park

- Montebello Islands Marine Park
- Great Sandy Islands Nature Reserve
- North Sandy Island Nature Reserve.

The DomGas pipeline traverses through a small section of the Coastal Margin from Exmouth Gulf to Cape Preston, which is an Indicative Place on the Register of National Estate. It has been nominated for the Register of National Estate as an important representation of intact tidal flats and mangrove thicket of the north-west coast of Western Australia. It contains important habitat for juveniles of many marine species, important bird habitat, and a Dugong colony is present; however, it is not a defined conservation area under State or Commonwealth legislation.

2.4 Social Environment

Currently there are two registered Native Title claims that overlap the DomGas pipeline route at the mainland shore-crossing and within the intertidal zone: Yaburara and Mardudhunera People (Tribunal No. WC96/89) and Kuruma Marthudunera People (Tribunal No. WC99/12).

Chevron Australia has established heritage agreements with both claimant groups to allow for the installation of the DomGas pipeline. Heritage surveys have been undertaken by both claimant groups to identify archaeological and ethnographic sites of cultural significance. Four archaeological sites have been identified, all of which will be avoided by the DomGas pipeline construction.

No shipwrecks have been identified along the offshore DomGas pipeline route during searches of databases of the Western Australian Maritime Museum and during geophysical and marine baseline surveys. However, near the DomGas shore-crossing is Macey's Wreck, an unidentified shipwreck (circa 1880) discovered during construction of the Hadson (now Apache) pipeline in 1991. Macey's Wreck is of cultural heritage significance as it is one of the few tangible remains of the late nineteenth century pearling industry in north-west Australia. The DomGas pipeline has been realigned to avoid disturbance of Macey's Wreck and to allow for safe construction away from Apache's easement.

Commercial fisheries that exist within the region of the DomGas pipeline include:

- Beche-de-mer Fishery (sea cucumbers or trepan)
- Mackerel Managed Fishery (Spanish Mackerel)
- Onslow Prawn Managed Fishery (Tiger Prawns, some King, Banana, and Endeavour Prawns)
- Pearl Oyster Fishery (Silver-lipped Pearl Oyster)
- Pilbara Fish Trawl (Interim) Managed Fishery, Pilbara Line Fishery, and Pilbara Trap Managed Fishery (multiple species).

3.0 Description of the Activity

Installation of the DomGas pipeline includes the following activities:

- mobilisation of vessels, equipment, goods, materials, line pipe, and personnel to site
- pre-lay, as-laid, and as-built pipeline surveys
- offshore pipelay
    - shallow water pipelay

    - deep water pipelay
- offshore pipeline stabilisation
    - trenching and jetting
    - rock-bolting
    - rock installation
- riser installation and installation of concrete mattresses
- intertidal pipeline installation
- pre-commissioning.

4.0 Environmental Hazards and Controls

A number of environmental risk assessments have been completed for the Gorgon Gas Development and Jansz Feed Gas Pipeline in accordance with AS/NZS ISO 31000:2009 Risk Management – Principles and Guidelines and AS/NZS Handbook 203:2006 Environmental Risk Management – Principles and Process.

The outcomes of these assessments have been reviewed and considered during the preparation of the Environment Plan. Based on the outcomes of the risk assessments completed to date, key risk categories and environmental aspects have been identified as shown in Appendix 1.

The key environmental risks were ascertained to be:

- disturbance to or loss of seabed and benthic habitats (from direct and indirect construction activities)
- turbidity and sedimentation (from jetting and trenching)
- erosion (along the pipeline, in creeklines, and in benthic habitat in the intertidal area)
- poor-quality site reinstatement
- introduction of non-indigenous species (weeds)
- spills and leaks from vessel collision or grounding.

5.0 Management Approach

The Environment Plan has been prepared to ensure that the installation and pre-commissioning activities of the DomGas pipeline are conducted in a manner that protects environmental values and reduces impacts to the environment as far as practicable.

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 meet this commitment, objectives have been defined that relate to the management of the identified environmental risks for the Gorgon Gas Development.

All personnel (including contractors and subcontractors) are required to attend environmental inductions and training relevant to their role on the Gorgon Gas Development and Jansz Feed Gas Pipeline. Training and induction programs facilitate the understanding personnel have of their environmental responsibilities, and increase their awareness of the management and protection measures required to reduce potential impacts on the environment.

Chevron Australia has prepared the internal Australasian Business Unit (ABU) Compliance Assurance process to manage compliance. An internal Audit Schedule has been developed and will be maintained for the Gorgon Gas Development and Jansz Feed Gas that includes audits of the Development's environmental performance and compliance with development Conditions, State and Commonwealth legislation.

The Gorgon Gas Development and Jansz Feed Gas Pipeline will use a number of routine internal reporting formats to effectively implement the requirements of this Plan. These reports include information on a number of relevant environmental aspects, such as details of environmental incidents (if any), environmental statistics and records, records of environmental audits and inspections undertaken, status of environmental monitoring programs, and tracking of environmental performance against performance indicators and targets.

6.0 Consultation

Regular consultation with stakeholders has been undertaken by Chevron Australia throughout the development of the environmental impact assessment management documentation for the Gorgon Gas Development and Jansz Feed Gas Pipeline. This stakeholder consultation has included engagement with the community, government departments, industry operators, and contractors to Chevron Australia via planning workshops, risk assessments, meetings, teleconferences, and the Public Environmental Review (PER) and Environmental Impact Statement/ Environmental Review and Management Programme (EIS/ERMP) formal approval processes.

Additionally, consultations and/or notifications have been undertaken with the following stakeholders, and will continue as required:

- Apache Energy
- Austral Fisheries
- Charter Boats Users and Operators Association
- Dampier Bunbury Pipeline
- Department of Regional Development and Lands
- Goldfields Gas Transmission
- Mardie Station (CITIC Pacific Mining Management)
- Native Title claimant groups:
  - Kuruma Marthudunera People
  - Yaburara and Mardudhunera People
- Nickol Bay Professional Fishermens Association Inc
- Pearl Producers Association
- Pilbara Fish Trap
- Recfishwest (WA recreational fishers representation)
- Shire of Roebourne
- Western Australian Department of Fisheries
- Western Australia Fishing Industry Council (WAFIC).

7.0 Contacts

Further information regarding the Gorgon Gas Development and Jansz Feed Gas Pipeline is available at the Chevron Australia website; http://www.chevronaustralia.com.

Further information may also be obtained by emailing ask@chevron.com or writing to:

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Appendix 1 Hazards and Controls

Category	Environmental Aspect and Consequence/Impact	Management and Mitigation Measures
Physical Presence	Fauna interaction (vessel strike) • Fauna injury/mortality	• Appropriate personnel will be responsible for marine fauna observation on installation vessels • If marine fauna are spotted, installation vessels moving at speeds greater than five knots will adjust their speed and direction to avoid impacting the animal • Caution zones around cetaceans will be established for the installation activities, consistent with Part 8 of the Environment Protection and Biodiversity Conservation Regulations 2000 • Marine fauna observers will closely monitor and record fauna behaviour when fauna are observed in the vicinity of or approaching the installation vessels
Physical Presence	Fauna interaction (vehicle strike) • Fauna injury/mortality	• Vehicles travelling along the right-of-way (ROW) will be restricted to designated speed limits • Fauna handling procedures will be developed, outlining the implementation of fauna handling, capturing, removal, and relocation requirements (within the intertidal zone) • Designated personnel (Fauna Handlers) will be trained in fauna handling procedures and only these personnel will handle fauna • Dead fauna will be moved away from worksites (including the ROW), if appropriate and safe to do so
Physical Presence	Fauna interaction (personnel/ equipment) • Fauna injury/mortality	• All worksite personnel and visitors will be inducted regarding the proper response to wildlife encounters • The seawater intake for water winning will be fitted with screens and the intake velocity limited to a maximum of 0.1 m/s • Inspections of cleared areas will be made as soon as possible after clearing, and Fauna Handlers will be called in if displaced or injured animals are found
Physical Presence	Fauna interaction (trenching in the intertidal zone) • Fauna injury/mortality	• The open trench (from Onshore Kilometre Point [KP] 0 to KP 12) will be inspected for fauna twice daily (in the morning and late afternoon when tides allow), where practicable, and prior to stringing and/or lowering in of pipe to the flooded trench and backfilling • Fauna exit structures and/or escape ramps will be constructed at regular intervals to enable fauna to exit the trench • Crossings will be installed across open trenches at regular intervals to enable fauna to cross the trench • Fauna found in trenches will be removed by Fauna Handlers in accordance with fauna handling procedures, where practicable
Physical Presence	Artificial light • Disturbance of fauna, altering foraging and breeding activities	• Lighting will be managed in accordance with the Long-term Marine Turtle Management Plan

Category	Environmental Aspect and Consequence/Impact	Management and Mitigation Measures
Physical Presence	Noise and vibration • Disturbance of fauna behaviour resulting in possible displacement from areas • Masking of biologically important sounds • Temporary or permanent reductions in hearing sensitivity • Physical impact on burrows and habitats from vibration	• Equipment will be designed to operate in accordance with appropriate industry and equipment standards including specifications for noise levels • Equipment will be maintained to manufacturers' specifications to reduce noise emissions • Equipment covers, mufflers, and other noise suppression equipment will be maintained and will be in good working order at all times • Engines and/or equipment will not be left in stand-by or running mode unnecessarily • Helicopter height will be maintained during transit in accordance with the Environment Protection and Biodiversity Conservation Regulations 2000
Physical Presence	Interference with other users • Installation vessels create obstacle to other vessel movements • Restricted access to work areas	• Ongoing liaison/communication will be undertaken with relevant stakeholders (including fishing groups) to ensure awareness of the proposed installation activities and to minimise impacts to other users • Prior to commencement of installation activities, Department of Transport (DoT) will be notified • Notice to Mariners will be posted to alert fishing and other vessels in the area
Installation Activities	Disturbance of benthic habitats (direct loss during pipeline installation) • Direct loss of seabed and benthic habitat where the pipeline is laid	• The offshore DomGas pipeline route has been located to avoid sensitive benthic habitats • The location of the DomGas pipeline route is near the Apache easement to avoid disturbance of other areas along the mainland coastline • A mangrove restoration plan/program will be implemented by Chevron Australia
Installation Activities	Disturbance of benthic habitats (dropped objects) • Disturbance and/or loss of benthic habitats	• Certified and rated equipment will be used during installation activities • Items will be secured on deck during vessel transit • Pipeline installation activities will take place within the approved pipelay corridor and Marine Disturbance Footprint (MDF)
Installation Activities	Disturbance of benthic habitats and other vegetation (unauthorised disturbance) • Disturbance and/or loss of benthic habitats and other vegetation	• Ground and vegetation disturbance procedures will be developed to manage clearing activities • Signage and/or boundary markers will be in place along the ROW, where appropriate • Vehicle movements will be minimised as far as practicable • Traffic management procedures will be developed and implemented • Dedicated turning, overtaking, and parking areas will be established • Vehicle and equipment movement will be restricted to within designated areas
Installation Activities	Anchoring and mooring • Disturbance to seabed and/or benthic habitat	• Anchoring procedures will be developed to limit impacts to coral habitat • Pre-lay surveys will be undertaken and will assist in determining suitable anchoring locations • Anchoring points for pipe supply vessels, cargo barges, accommodation vessels and other ancillary vessels will avoid coral habitat areas • Anchoring procedures to minimise the impacts from anchoring and wire/chain sweep will be developed • Anchors with high holding capacity will be used, where practicable • Anchoring exclusion zones for coral habitats will be identified • Coral habitat mapping will be used to clearly identify coral habitat areas during engineering design and for

Category	Environmental Aspect and Consequence/Impact	Management and Mitigation Measures
		incorporation into anchoring drawings and procedures • Coral habitat within indicative anchoring areas will be identified and marked within vessel navigation systems on the Deep Water Pipelay Barge and the associated Anchor Handling Vessels • Buoys will be attached to mooring lines used above coral habitat areas where there is sufficient water depth, where practicable
Installation Activities	Turbidity and sedimentation (trenching and jetting) • Disturbance and/or loss of benthic habitats from increased turbidity in the water column and/or smothering during sedimentation • Fauna injury/mortality • Disturbance of marine fauna	• Specific operating procedures will be developed by the contractor/s prior to commencement of trenching and jetting activities and implemented • Clearing of mangroves and other vegetation will be restricted to designated areas • Site reinstatement procedures for activities occurring in the intertidal zone (Onshore KP 0 to KP 12) will be developed and implemented as soon as practicable following competition of construction and pre-commissioning activities
Installation Activities	Turbidity and sedimentation (rock-bolting) • Disturbance and/or loss of benthic habitats from increased turbidity in the water column and/or smothering during sedimentation • Fauna injury/mortality • Disturbance of marine fauna	• Rock-bolt design will be fit-for-purpose for the geotechnical conditions along the pipeline route • A rock-bolting procedure will be developed and implemented • Rock-bolting will be a controlled activity within weather limitations • Certified and rated rock-bolting equipment will be used • Rock-bolting equipment will be maintained regularly • Grout and/or cement used during drilling of rock bolts will be approved through Chevron Australia's chemical approval process, with the aim of selecting the least hazardous materials
Installation Activities	Turbidity and sedimentation (rock installation) • Disturbance and/or loss of benthic habitats from increased turbidity in the water column and/or smothering during sedimentation • Fauna injury/mortality • Disturbance of marine fauna	• A rock installation procedure will be developed and implemented • Rock installation will be a controlled activity within weather limitations. • The quantity of rock placed on the DomGas pipeline and surrounding seabed will be controlled by limiting the volume of rock located in each compartment on the Rock Installation Vessel
Installation Activities	Turbidity and sedimentation (thruster wash) • Disturbance and/or loss of benthic habitats from increased turbidity in the water column and/or smothering during sedimentation • Disturbance of marine fauna	• Thrusters will only be used on support vessels (such as anchor handling tugs, pipe supply vessels, survey vessels); pipelay barges will use anchors • Impacts from thruster wash will be short-term in any one location
Installation Activities	Disturbance of PASS • Oxidisation of sulfides • Increased acidity of soils and groundwater • Mobilisation of heavy metals • Loss of benthic habitat and vegetation	• Management measures for reducing potential risks associated with the disturbance of PASS will be detailed in an Acid Sulfate Soil Management Plan

Category	Environmental Aspect and Consequence/Impact	Management and Mitigation Measures
Installation Activities	Erosion • Erosion along the pipeline route in the intertidal zone • Erosion and siltation of creek lines that intersect the pipeline • Disturbance and/or loss of benthic habitats and other vegetation • Poor reinstatement • Increased rehabilitation requirements	• Clearing of mangroves and other vegetation will be restricted to designated areas • Methods that avoid uprooting mangroves will be used during clearing • Temporary erosion control measures will not prevent or unnecessarily restrict water flows from creeks or gullies • Scour protection measures will be installed where required • Trench-breakers will be installed for erosion control and to prevent trench collapse • Site reinstatement procedures for activities occurring within the intertidal zone (KP 0 to KP 12) will be prepared and implemented
Installation Activities	Site reinstatement • Poor site reinstatement • Poor revegetation • Loss of fauna habitat • Loss of biodiversity • Establishment of introduced flora species • Increased erosion and siltation of water courses • Increased maintenance and rehabilitation requirements	• All waste will be removed from within DomGas construction areas and disposed of to approved facilities • The area will be re-contoured to the natural profile and erosion control works will be installed • Temporary artificial drainage, erosion, and sediment control measures will be removed • Any fencing removed during DomGas construction activities will be replaced • Vehicle and equipment access to reinstated areas will be restricted, where practicable
Cultural Heritage	Shipwrecks • Disturbance of shipwrecks • Loss of archaeological data and cultural heritage values	• All clearing and ground-disturbing activities will be undertaken in accordance with ground and vegetation disturbance procedures, including checking of proximity of disturbance activities to identified heritage sites • Access to identified cultural heritage sites will be restricted to essential personnel • Identified cultural heritage sites close to construction areas will be protected by temporary barriers, fences, or other appropriate measures • Should any other shipwrecks or cultural heritage material be discovered during pipeline installation, this will be reported in accordance with legislative requirements
Cultural Heritage	Indigenous heritage sites • Disturbance of indigenous heritage sites and artefacts • Damage and/or loss of artefacts • Loss of cultural heritage values	• All clearing and ground-disturbing activities will be undertaken in accordance with ground and vegetation disturbance procedures, including checking of proximity of disturbance activities to identified heritage sites • Access to identified cultural heritage sites will be restricted to essential personnel • Identified cultural heritage sites close to construction areas will be protected by temporary barriers, fences, or other appropriate measures • Any heritage material that is uncovered during construction will be managed in accordance with State and Commonwealth legislative requirements • To reduce risks to any heritage material that may be uncovered during construction: • all construction work in the immediate vicinity of the material will cease until further notice

Category	Environmental Aspect and Consequence/Impact	Management and Mitigation Measures
		• reasonable efforts will be made to protect the material and secure the site • an archaeologist or physical anthropologist with appropriate experience will be engaged if human remains are discovered in the work area
Introduction of Non-indigenous Species (NIS)	Ballast water • Competition with native fauna and flora for resources such as food and shelter • Introduction of disease and pathogens • Detrimental impacts to aquaculture and fisheries • Predation of fauna • Reduction of native biodiversity • Possible crossbreeding with native fauna • Alteration of natural habitats	• The Chevron Australia Quarantine Management System (QMS) will be implemented • Marine 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 Barrow Island Marine Quarantine Zonation will be required to conform to the requirements of Australian Quarantine and Inspection Service's (AQIS) Australian Ballast Water Management
Introduction of NIS	Biofouling • Competition with native fauna and flora for resources • Introduction of disease and pathogens • Detrimental impacts to aquaculture and fisheries • Predation of native fauna • Reduction of native biodiversity • Possible crossbreeding with native fauna • Alteration of natural habitats	• A desktop quarantine compliance risk assessment will be undertaken to determine the risk posed by each vessel being used • If a vessel is deemed a high risk, inspections for exotic species (and cleaning where required) will be undertaken prior to the vessel arriving at site • Marine vessels entering the Marine Quarantine Zonation will be required to comply with specific wetside and topside requirements, as described in the Phase 4 Marine Quarantine Zonation for Barrow Island
Introduction of NIS	Introduction and/or spread of weeds • Loss of biodiversity • Loss of native flora, vegetation and fauna habitat • Soil erosion • Reduced availability of water resources • Reduced access for native fauna and stock to water • Damage to animal hooves and vehicle tyres from Mesquite thorns • Increased numbers of feral animals, through provision of refuges in dense Mesquite	• Site-specific weed hygiene management procedures will be developed and implemented • Imported fill material shall be free of weeds and contaminants • A weed monitoring plan/program will be implemented by Chevron Australia

Category	Environmental Aspect and Consequence/Impact	Management and Mitigation Measures
Discharges to Sea	Deck drainage • Localised pollution of the water column leading to adverse impacts to marine life	• 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 vessels and they will be stored and handled in accordance with legal requirements and industry standards • Maintenance activities on vessels that have the potential to result in leaks or spills will be contained • 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, spilled materials will be cleaned and removed prior to any deck wash-down activities
Discharges to Sea	Sewage, greywater, and putrescible wastes • Increased nutrient availability and biological oxygen demand (BOD) • Loss of visual amenity	• The disposal of sewage, greywater, and food scraps from DomGas pipeline installation vessels will be done in accordance with the requirements of MARPOL Annex IV – Prevention of Pollution by Sewage from Ships and Annex V – Prevention of Pollution by Garbage from Ships • Inspection and maintenance of waste treatment systems will be conducted regularly to confirm operability and performance • Waste management plans and procedures will be developed and implemented
Discharges to Sea	Equipment and Machinery Space • Localised pollution of the water column leading to adverse impacts to marine life	• The disposal of waste oil, bilge, and sludge generated by equipment will be managed in accordance with MARPOL Annex I – Prevention of Pollution by Oil
Discharges to Sea	Cooling water • Localised pollution of the water column	• A small volume of cooling water will be discharged from DomGas installation vessels
Disposal of Wastes	Non-hazardous and hazardous waste • Fauna injury/mortality from ingestion or entanglement • Soil and/or water contamination • Damage to and smothering of benthic habitat and vegetation • Attraction of pests and seabirds • Generation of odour from inappropriate storage	• Waste management plans and procedures will be developed and implemented • Spill kits and adequate bins for separation and segregation of wastes shall be available • Storage of fuels, oils, solvents, and other chemicals shall be in appropriate facilities • Domestic rubbish shall be stored in designated areas, until removal offsite to approved waste facilities • Waste storage containers will be covered/closed at all times to prevent spillage and fauna access • Regular site inspections will be undertaken, including inspections of housekeeping, and the storage and containment of hydrocarbons, chemicals, and other substances • Solid wastes will be removed from site, as required, for disposal at approved waste facilities
Disposal of Wastes	Welding and coating debris • Soil and water contamination • Fauna injury/mortality through toxicity or ingestion	• Material Safety Data Sheet (MSDS) requirements for use and disposal of welding and coating materials will be adhered to • Enclosed blasting and welding habitats will be used where practicable
Disposal of Wastes	Hydrotest water • Soil and water contamination	• Hydrotest dewatering procedures will be developed and implemented, including details about water volumes, equipment for control and transfer of water, flow rates, concentration of treatment chemicals, testing and/or monitoring of water disposed to the evaporation pond or offsite

Category	Environmental Aspect and Consequence/Impact	Management and Mitigation Measures
	• Fauna injury/mortality	• The evaporation pond will be of a sufficient size to accommodate stormwater and will be lined with an impervious polyethylene liner/membrane • An evaporation pond removal and reinstatement procedure will be developed
Atmospheric Emissions	Combustion emissions • Decline in local air quality • Contribute to global greenhouse gases	• Vessels will comply with the regulations for the Prevention of Air Pollution from Ships contained in Annex VI of the MARPOL Convention • All vehicles and equipment will be operated and maintained to ensure optimum efficiencies, in accordance with the manufacturers' recommendations. • Fuel use within the intertidal zone will be reduced as far as practicable by implementing measures to minimise the number of vehicle movements, such as using buses for personnel transfer, limiting the number of light vehicles available to personnel, and considering vehicle movements in daily planning activities to eliminate unnecessary movements
Atmospheric Emissions	Ozone depleting substances (ODS) • Degradation of the ozone layer	• Vessels will comply with the requirements for ODS specified in Regulation 12 of Annex VI of MARPOL 73/78, including the prohibition of deliberate release of ODS • Personnel handling ODS will be certified and hold the necessary permits and licenses required under the Ozone Protection and Synthetic Greenhouse Gas Management Regulations 1995 • The use of ODS in new refrigeration systems will be avoided where practicable. Any systems containing ODS that require recharging or replacement will be exchanged to an 'ozone-friendly' system, wherever such options are available • The 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, including reporting the release of any ODS
Atmospheric Emissions	Dust • Adverse impacts to human health • Reduced visual amenity • Damage to vegetation, in the event of substantial deposition on foliage • Disturbance of fauna	• Dust control, such as water suppression, compacting, or temporarily covering some areas, will be implemented where necessary • Vehicle movements will be minimised as far as practicable • Vehicles travelling along the ROW will be restricted to designated speed limits
Unplanned Events	Spills and leaks (vessel collision, unintentional grounding) • Acute and chronic toxicity to marine life • Oiling of birds • Shoreline pollution • Disruption to fishing	• Notice to Mariners will be posted to alert fishing and other vessels in the area • Maritime standards and procedures will be adhered to, including maintaining specific lights configuration and radar/watch • Personnel responsible for navigation and communications will be fully trained and competent • Vessels working within the nearshore area will be carefully selected • Tidal and water current data will be used to determine safe working conditions for installation activities • Installation vessels will carry on board a Shipboard Oil Pollution Emergency Plan (SOPEP) in accordance with MARPOL requirements. As part of the SOPEP, sufficient equipment will be carried on board to deal with an oil spill

Category	Environmental Aspect and Consequence/Impact	Management and Mitigation Measures
		• There will be a tiered response to spills in accordance with Chevron Australia's Marine Oil Pollution Plan (MOPP)
Unplanned Events	Spills and leaks (refuelling) • Acute and chronic toxicity to fauna • Oiling of birds • Shoreline pollution • Disruption to fishing • Soil and/or water contamination	• Refuelling will only be undertaken when weather/sea/visibility conditions are appropriate • Personnel will be trained in their roles, functions and responsibilities, including emergency response, prior to refuelling or fuel transfer • Dry break couplings and breakaway couplings will be used, which are fit-for-purpose, used within their design life limits, and regularly checked for damage to prevent leaks • Continuous visual monitoring of hoses, couplings, and flow gauges will be undertaken during refuelling • Open communication channels will be maintained during refuelling • For refuelling activities in the intertidal zone (Onshore KP 0 to KP 12), there will be designated refuelling areas, where practicable, and drip trays/containment will be used during refuelling activities
Unplanned Events	Spills and leaks (construction activities and maintenance) • Acute and chronic toxicity to fauna • Oiling of birds • Shoreline pollution • Soil and/or water contamination	• Certified and rated equipment will be used during installation activities • Regular maintenance of equipment will be undertaken • Operational limitations for installation activities will be defined • A rock-bolting procedure will be developed and implemented • Spill response procedures for construction will be developed and implemented. Regular servicing of vehicles and equipment will be undertaken with appropriate spill and waste management measures in place • All major maintenance and washing of vehicles and equipment will be conducted at designated maintenance areas that are identified in construction drawings • Soil contaminated by a hazardous material spill will be evaluated, cleaned up, and disposed of using methods that have the least environmental harm
Unplanned Events	Spills and leaks (flooding of the work area) • Acute and chronic toxicity to fauna • Oiling of birds • Shoreline pollution • Soil and/or water contamination	• Specialised equipment and/or supporting equipment will be used in the intertidal zone • Tidal constraints will be addressed in scheduling and planning installation activities in the intertidal zone • Weather and tidal forecasts will be used during installation activities • Emergency response procedures developed by the contractor/s prior to commencement of intertidal construction activities will include contingency planning and measures that address unplanned flooding of work sites

Category	Environmental Aspect and Consequence/Impact	Management and Mitigation Measures
Unplanned Events	Unplanned discharge of chemically treated water (wet buckle) • Acute and chronic toxicity to fauna • Reduced water quality in marine environment	• A pre-lay survey will be undertaken to identify seabed features or other constraints that may impact pipeline installation • Certified and rated equipment will be used during installation activities • Weather, tidal, and water current data will be used to determine safe working conditions for installation activities • Operational limitations for installation activities will be defined • Pipeline tension and touch-down will be monitored during pipelay
Unplanned Events	Unplanned discharge of chemically treated water (hydrotest leak) • Acute and chronic toxicity to fauna • Reduced water quality in marine environment	• Welding will be undertaken by tested and qualified welders in accordance with Chevron Australia approved welding procedures developed by the contractor/s prior to commencement of pipelay • Non-destructive testing (NDT) will be undertaken by tested and qualified technicians and will verify weld integrity in accordance with Chevron Australia approved NDT procedures developed by the contractor/s • Certified and tested equipment will be used for hydrotesting (pumps, hoses and fittings) • Spill containment and clean-up equipment will be available at the pre-commissioning start-up location during pressurisation
Unplanned Events	Fire • Damage to vegetation • Fauna injury/mortality	• All personnel will undertake an induction prior to commencing work that will include fire management requirements and restrictions on smoking. Smoking will only be allowed in designated areas • Work procedures and Job Hazard Analyses (JHAs) will be implemented for activities that may pose a fire risk (e.g. clearing, welding, soldering and cutting) • Sufficient and appropriate equipment, materials and resources (including trained emergency response personnel) will be available to respond to a fire • Mobile refuelling will be undertaken with appropriate fire equipment and mitigation measures in place