PROPOSED PROJECT ACTIVITY	RESIDUAL RISK		
	Construction & commissioning	Operations	Non-routine
VEGETATION AND FLORA			
Clearing for gas processing facility, pipelines, jetty approaches and associated infrastructure (restricted flora and vegetation communities)	M		
Clearing for gas processing facility, pipelines, jetty approaches and associated infrastructure (general flora and vegetation communities)	L		
Clearing for CO_2 seismic baseline survey (restricted flora and vegetation communities)	M		
Clearing for CO_2 seismic baseline survey (general flora and vegetation communities)	L		
Minor clearing and earthworks restricted to previously disturbed ground (restricted and general flora and vegetation communities)		L	
Re-clearing survey lines for CO_2 seismic monitoring every 5 to 10 years (restricted and general flora and vegetation communities)		L	
Fire from welding, grinding and vehicle exhausts, which can be ignition sources	M		
Fire from maintenance activities and vehicle exhausts, which can be ignition sources		M	
Fire from fall out of burning particles from flare		M	
Low levels of vehicle and equipment exhaust	L	L	
Atmospheric emissions from flaring and venting	L		
Combustion and fugitive emissions of SO_2, NO_x, CO_2, VOCs and particulates		L	
Atmospheric emissions from gas leak through pipeline or equipment failure			L
Atmospheric emissions from flaring			L
Smoke and particulates from fire			L
Atmospheric emissions from gas venting during start up and shut down of gas processing facility			L
Temporary shading from stockpiles and equipment	L		
Long term shading from pipelines		L	
Heat and reflected light from infrastructure		L	
Condensation from cool feed gas pipeline		L	
Dust generation from clearing and earthworks	L		
Dust generation from vehicle and machinery movement on unsealed roads and exposed surfaces	L	L	
Dust generation from wind erosion of stockpiles	L		
Unpredicted CO_2 migration from failure of CO_2 injection facilities			L
Unpredicted CO_2 migration from failure of subsurface containment			L
Spill during storage and transport of fuel or hazardous material	L	L	
Spill or leak during waste storage and disposal	L	L	
Spill or leak from failure of plant, equipment or pipelines	L	L	
Leakage of storage tanks and bunds	L	L	

PROPOSED PROJECT ACTIVITY	RESIDUAL RISK		
	Construction & commissioning	Operations	Non-routine
TERRESTRIAL FAUNA			
Clearing of vegetation and structural habitats	M		
Limited clearing and earthworks of previously cleared areas		L	
Periodic clearing on previous survey grid for CO_2 seismic monitoring		L	
Physical interaction with vehicular traffic	M	M	
Physical interaction with operation of equipment and machinery	M	M	
Physical interaction with workforce activities	M	M	
Physical interaction with the presence of infrastructure		M	
Spill during storage and transport of fuel or hazardous material	L	L	
Spill or leak during waste storage and disposal	L	L	
Spill or leak from failure of plant, equipment or pipelines	L	L	
Shading from infrastructure	L	L	
Artificial lighting at night from construction sites and flares	L	L	
Flaring during process upset or emergency	L	L	L
Low levels of vehicle and equipment exhaust (NO_x and SO_x)	L	L	
Combustion and fugitive emissions of SO_2, NO_x, CO_2, VOCs and particulates		L	
Pipeline or equipment failure resulting in the emission of H_2S, BTEX, CO_2 or hydrocarbons	L	L	L
Flaring releasing combustion products or unburnt gas	L	L	L
Smoke and particulates from fire and flaring	L	L	L
Atmospheric emissions from unscheduled start up and shut down of gas processing facility	L	L	L
Dust generation from clearing of vegetation and removal of topsoil	L		
Dust generation from earthmoving	L		
Dust generation from the movement of heavy machinery and vehicles on unpaved surfaces	L		
Dust generation from blasting	L		
Dust generation from the movement of vehicles and machinery on unsealed surfaces		L	
Dust generation from wind erosion of unsealed surfaces		L	
Unpredicted CO_2 migration or release from failure of CO_2 injection facilities, or subsurface containment			L
Unpredicted CO_2 migration or release from emergency venting of CO_2 to atmosphere if injection system breaks down			L
Heat from sources such as power generators, turbines, air coolers, pipelines, earthmoving equipment, welding units and vehicles	L		
Cold from pipelines	L		
Heat from power generators, air coolers, turbines, flares etc		L	
Feed gas pipeline will be at ambient temperature		L	
Noise and vibration from blasting	L		
Noise and vibration from earthworks, vehicle movements and the operation of equipment	L		
Noise and vibration from seismic survey	L		
Noise and vibration from the gas processing facility		M	
Noise and vibration from the operation of vehicles and equipment		M	

PROPOSED PROJECT ACTIVITY	RESIDUAL RISK		
	Construction & commissioning	Operations	Non-routine
Noise and vibration from flaring		M	
Noise and vibration from seismic monitoring every 5 to 10 years		M	
Fire from vehicles, welding sparks and potential ignition sources	M	M	
Fire from flare event dislodging hot build up from inside flare tower	M	M	
Fire from runoff of water or foam used in fire control near infrastructure	M	M	
SUBTERRANEAN FAUNA			
Clearing and earthworks for the infrastructure	L – H*		
Excavation of material during site preparation	L – H*		
Shallow blasting of cap rock over 40 to 60% of the gas processing facility site	L – H*		
Installation of about 750 piles, to a depth of about 32 metres	L – H*		
Minor clearing and earthworks during operations		L	
Use of treated grey water to control dust at the gas processing facility site contaminating subterranean habitats	M		
Noise and vibration from shallow blasting of cap rock over 40 to 60% of the gas processing facility site	L – M*		
Noise and vibration from the installation of about 750 piles, to a depth of about 32 metres	L – M*		
Spill or leak from failure of proposed bulk storage tanks and containment bund	L	L	
Spill during storage and transport of fuel or hazardous material	L	L	
Spill or leak during waste storage and disposal	L	L	
Spill or leak from failure of plant, equipment or pipelines	L	L	
Unpredicted CO_2 migration from failure of CO_2 injection facilities, or subsurface containment		M	
Physical presence of gas processing facility resulting in impermeable surfaces with no groundwater recharge over 30 to 40% of the site (45 to 60 hectares)		M	
Abstraction of groundwater for reverse osmosis plant		H	
SOIL AND LANDFORM			
Vegetation clearing and earthworks for construction of infrastructure	M		
Minor clearing and earthworks		L	
Generation and disposal of liquid and solid wastes	M	L	
Spill during storage and transport of fuel or hazardous material	M	M	
Spill or leak during waste storage and disposal	M	M	
Spill or leak from failure of plant, equipment or pipelines	M	M	
Horizontal directional drilling fluid release	M	M	
SURFACE WATER AND GROUNDWATER			
Vegetation clearing and earthworks for construction of infrastructure	M		
Minor clearing and earthworks		L	
Sealing of gas processing facility site and road surfaces	M	M	
Generation and disposal of liquid and solid wastes	M	L	

* If subterranean fauna currently found beneath the footprint site are shown to have a wider distribution, the risk is reduced to Low

PROPOSED PROJECT ACTIVITY	RESIDUAL RISK		
	Construction & commissioning	Operations	Non-routine
Spill during storage and transport of fuel or hazardous material	M	M	
Spill or leak during waste storage and disposal	M	M	
Spill or leak from failure of plant, equipment or pipelines	M	M	
MARINE FAUNA			
Seabed disturbance from dredging and blasting for marine infrastructure	M		
Seabed disturbance from dumping of dredge spoil	M		
Seabed disturbance from construction of feed gas pipelines and domestic gas pipeline	M		
Seabed disturbance from construction of causeway and open pile jetty	M		
Seabed disturbance from drilling of subsea wells	M		
Seabed disturbance from installation of subsea gathering system	M		
Seabed disturbance from anchoring of drill rigs and pipelay vessel	M		
Seabed disturbance from installation of optical fibre cable to the mainland	M		
Seabed disturbance from localised maintenance dredging		L	
Seabed disturbance from re-suspension of materials at spoil disposal site		L	
Physical interaction with vessels and barges	M	M	
Physical interaction during dredging for shipping channels	M		
Physical interaction with the workforce on Barrow Island	M	M	
Physical interaction during maintenance operations at marine facilities		M	
Physical presence of marine infrastructure, gas pipelines, optical fibre cables and dredged channels		L	
Discharge of stormwater containing chemicals, hydrocarbons and sediments into the marine environment	L		
Deck washdown	L		
Deck runoff and domestic discharges from rigs and other construction vessels	L		
Discharge of hydrotest water from feed gas pipeline containing biocides and corrosion inhibitors	L		
Discharge of drilling fluids	L		
Runoff from hardstand areas such as the jetty, containing chemicals, or hydrocarbons and entering the marine environment		L	
Runoff from decks (operations vessels)		L	
Leaching of anti-foul compounds from painted infrastructure and vessel hulls		L	
Artificial light from infrastructure on the east and west coast	M – H		
Flaring during commissioning	M – H		
Night time operation of the gas processing facility and associated infrastructure		M – H	
Flaring during non routine operations			L
Noise and vibration from vessel movements, drilling, dredging, pipelay and piling	M		
Noise and vibration from blasting during dredging on the east coast for marine infrastructure	M		

PROPOSED PROJECT ACTIVITY	RESIDUAL RISK		
	Construction & commissioning	Operations	Non-routine
Noise and vibration from horizontal directional drilling for the west coast shore crossing	M		
Noise from vessel and tanker movements		L	
Noise from subsea gathering system		L	
Small spill or leak caused by small vessel grounding/collision, vessel refuelling, transferring and transport of hydrocarbons and/or chemicals	M	M	
Large spill or leak caused by pipeline failure, larger vessels damaged by grounding or collision, process or operator failure or collision during construction or operations	M	M	
PHYSICAL MARINE ENVIRONMENT			
Seabed disturbance from dredging and blasting for the construction of marine infrastructure	L – M		
Seabed disturbance from dumping of dredge spoil	L – M		
Seabed disturbance from construction of feed gas pipelines, domestic gas pipeline and optical fibre cable	L – M		
Seabed disturbance from drilling of subsea wells and installation of subsea gathering system	L – M		
Seabed disturbance from anchoring of drill rigs, pipelay vessels and dredge vessels	L – M		
Seabed disturbance from localised maintenance dredging		L	
Seabed disturbance from re-suspension of sediments in vessel turning areas		L	
Seabed disturbance from additional wells		L	
Physical presence of marine infrastructure and optical fibre cables		L	
Physical presence of feed gas and domestic gas pipelines		L	
Generation and disposal of liquid and solid wastes entering the marine environment	L	L	
Leaks or spills from the storage and transport of chemicals, fuels or other hazardous material impacting the seabed	L	L	
Leaks or spills from vessel collision or grounding impacting the seabed	L	L	
Leaks or spills from failure of equipment or pipelines impacting the seabed	L	L	
Changes to marine water quality from discharges from marine construction vessels – stormwater, brine from desalination, sewage, grey water and macerated food	L		
Changes to marine water quality from the dredge spoil	L		
Changes to marine water quality from the discharge of hydrotest water	L		
Changes to marine water quality from the discharge of drilling fluids	L		
Changes to marine water quality from maintenance dredging		L	
Changes to marine water quality from runoff from hardstand areas such as the jetty and materials offloading facility		L	
Changes to marine water quality from the discharge of ballast and bilge water from loading vessels		L	
Changes to marine water quality from leaching of anti-fouling compounds from vessel hulls and marine structures		L	
Leaks or spills from the storage and transport of chemicals, fuels or other hazardous material impacting marine water quality	L	L	

PROPOSED PROJECT ACTIVITY	RESIDUAL RISK		
	Construction & commissioning	Operations	Non-routine
Leaks or spills from vessel collision or grounding impacting marine water quality	L	L	
Leaks or spills from failure of equipment or pipelines impacting marine water quality	L	L	
Physical disturbance of the foreshore from clearing and earthworks for infrastructure	M		
Exposure of potential acid sulphate soils on mainland domestic pipeline and optical fibre cable easements	M		
No clearing or earthworks are expected in foreshore areas during operations		L	
The physical presence of the causeway and dredged channels may potentially affect longshore coastal sediment transport dynamics		L	
The cleared domestic gas pipeline corridor on the mainland impacting on the foreshore		L	
BENTHIC PRIMARY PRODUCERS			
Seabed disturbance from dredging and blasting for the construction of the materials offloading facilty, causeway, LNG load-out facility and jetty	M (direct impacts) L – M (indirect impacts)		
Seabed disturbance from dumping of dredge spoil	M (direct impacts) L – M (indirect impacts)		
Seabed disturbance from construction of feed gas pipelines, domestic gas pipeline and optical fibre cable	M (direct impacts) L – M (indirect impacts)		
Seabed disturbance from construction of open pile jetty	M (direct impacts) L – M (indirect impacts)		
Seabed disturbance from drilling of subsea wells	M (direct impacts) L – M (indirect impacts)		
Seabed disturbance from installation of subsea gathering system	M (direct impacts) L – M (indirect impacts)		
Seabed disturbance from anchoring of drill rigs and pipelay vessel	M (direct impacts) L – M (indirect impacts)		
Seabed disturbance from localised maintenance dredging		L	
Seabed disturbance from re-suspension of sediments at spoil disposal site		L	
Small spill or leak from small vessel grounding or collision, refuelling, transferring and transport of hydrocarbons and/or chemicals during construction and operations			L – M
Large leak or spill from pipeline failure, process or operator failure or vessel grounding or collision during construction or operations			L – M
Tanker, barge and other vessel movements	L	L	
Permanent presence of marine infrastructure		L	

PROPOSED PROJECT ACTIVITY	RESIDUAL RISK		
	Construction & commissioning	Operations	Non-routine
Stormwater discharge from construction areas on shore	L		
Deck wash from rigs and other construction vessels	L		
Drilling fluids and cuttings discharged at offshore field	L		
Ballast water discharge	L		
Discharge of hydrotest water containing biocides and corrosion inhibitors	L		
Runoff from hardstand areas containing chemicals		L	
Runoff from decks of tankers and support vessels		L	
Ballast and bilge water discharge		L	
AIR QUALITY			
Low levels of emissions associated with vessels	L		
Low levels of vehicle and equipment exhaust (NO_x and SO_x)	L	L	
Combustion and fugitive emissions of SO_2, NO_x, CO_2, CO, CO_4, VOCs and particulates		L	
Atmospheric emissions from CO_2 leaks			L
Atmospheric emissions from pipeline or equipment failure			L
Atmospheric emissions from flaring			L
Smoke and particulates from fire			L
Start up and shut down of gas processing facility			L
Dust generation associated with clearing and earthworks and vehicle movement	L		
Localised dust generation associated with minor clearing and earthworks		L	

PROPOSED PROJECT ACTIVITY	RESIDUAL RISK			
	Pre-construction	Construction	Operations	Closure
CULTURAL HERITAGE				
Damage to anthropological or archaeological sites from surface disturbing activities	L	H	M	L
Damage to historical sites (terrestrial and underwater) from surface disturbing activities	L	M	L	L
PUBLIC HEALTH AND SAEFTY				
Plant or equipment failure		M	M	
Cyclones or other natural disasters		M	M	
Development standards not maintained		M	M	
Ineffective contract management		M	M	
Construction workforce restricted to construction site and village areas		M		
Traffic accidents from transport of materials, goods and personnel on local roads		L		
Traffic accidents from use of heavy vehicles		L		

Total number of proposed project activities with a Low residual risk	163
Total number of activities with a Medium residual risk	103
Total number of activities with a High residual risk	9
Total number of activities	275
Percentage of activities that have a Low residual risk	**59**
Percentage of activities that have a Medium residual risk	**38**
Percentage of activities that have a High residual risk	**3**

Gorgon Development Environmental Risk Matrix

		Consequence category				
		Minor	Moderate	Serious	Major	Critical
Likelihood category	Almost certain					
	Likely					
	Possible					
	Unlikely					
	Remote					

Low risk Medium risk High risk