



# Executive Summary

Draft Environmental Impact Statement/Environmental Review and Management Programme for the Proposed Wheatstone Project

**July 2010**

**Wheatstone Project**

## **Disclaimer**

In preparing this Draft Environmental Impact Statement/Environmental Review and Management Programme (Draft EIS/ERMP), Chevron Australia Pty Ltd (Chevron) has relied on material provided by specialist consultants, government agencies and other third parties who are identified in the Draft EIS/ERMP. Chevron has not verified the accuracy or completeness of the material provided by these consultants, government agencies and other third parties, except where expressly acknowledged in the Draft EIS/ERMP. Should there be any difference or inconsistency between the material presented in this Draft EIS/ERMP and that in any third-party document referred to herein (including assessments, findings, opinions, project descriptions, proposed management measures and commitments), the material presented in the Draft EIS/ERMP alone shall be taken to represent Chevron's position.

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Title: Draft Environmental Impact Statement/Environmental Review and Management Programme for the Proposed Wheatstone Project: Executive Summary

# Invitation to Comment

The Environmental Protection Authority (EPA)

invites people to make a submission on this proposal.

The environmental impact assessment process is designed to be transparent and accountable, and includes specific points for public involvement, including opportunities for public review of environmental review documents.

In releasing this document for public comment, the EPA advises that no decisions have been made to allow this proposal to be implemented.

## The Proposal

Chevron Australia Pty Ltd (Chevron), as operator of the Wheatstone Project (Project), proposes to construct and operate a Liquefied Natural Gas (LNG) plant and a domestic gas (domgas) plant near Onslow on the Pilbara coast in Western Australia (WA). The development is to be part of the Ashburton North Strategic Industrial Area (SIA) proposed by the Western Australian Government.

The Project will require the installation of gas gathering, export and processing facilities in Commonwealth and State waters and on land. The Project will require the dredging of a shipping access channel and the construction of a new industrial port facility. The associated LNG processing plant will be located on the Ashburton North Strategic Industrial Area approximately 12km south-west of the town of Onslow, Western Australia. The LNG plant will have a maximum capacity of 25 Million Tonnes Per Annum (MTPA).

The Project also includes a domgas plant which will have a capacity equal to approximately 15 per cent of LNG sales. Domestic gas will be delivered to the Western Australian market via the Dampier-to-Bunbury natural gas pipeline.

## Assessment Process

Following referral of the Project in September 2008, the Commonwealth Department of the Environment, Water, Heritage and the Arts (DEWHA) and the Western Australian Environmental Protection Authority (EPA) determined that the proposed Project should be formally assessed at the Environmental Impact Statement (EIS) level under the *Environment Protection and Biodiversity Conservation Act 1999* (the EPBC Act) (EPBC 2008/4469) and the Environmental Review and Management Programme (ERMP) level under the *Environment Protection Act 1986*, respectively.

The Commonwealth and Western Australian governments have agreed to a coordinated environmental assessment process. A single EIS/ERMP document that satisfies the requirements of each jurisdiction is required under this process. Comments from government agencies and from the public will assist the EPA to prepare an assessment report in which it will make recommendations to government.

Chevron Australia has prepared the Draft EIS/ERMP in accordance with EPA and DEWHA guidelines and as set out in the Environmental Scoping Document (Chevron Australia 2009). The EIS/ERMP describes the proposal, and examines the likely environmental effects and proposed environmental management procedures associated with the Project.

The Draft EIS/ERMP is being placed on public exhibition for ten weeks. DEWHA and the EPA will assess the Draft EIS/ERMP following receipt of public submissions, and Chevron's response to those submissions, before reporting to relevant ministers for a final decision on whether the Project should be approved and if so, under what conditions. Comments from government agencies and from the public will assist the EPA to prepare an assessment report in which it will make recommendations to government. DEWHA will also be informed by comments on the Draft EIS/ERMP and will prepare a separate assessment report for the Minister for Environment Protection, Heritage and the Arts.

# Invitation to Comment (cont'd)

## Availability of the Draft EIS/ERMP for Public Comment

This Draft EIS/ERMP will be available for public comment from Monday July 26, 2010 until Monday October 4, 2010.

Copies of the Draft EIS/ERMP may also be downloaded from [www.chevronaustralia.com.au](http://www.chevronaustralia.com.au). Chevron Australia encourages the use of electronic copies of this EIS/ERMP document.

Hard copies of the Draft EIS/ERMP may be purchased for \$10 (including postage and packaging) or a DVD version is available free of charge by contacting:

- Chevron Australia Pty Ltd  
Attention: Wheatstone EIA Coordinator  
GPO Box S1580  
Perth, WA 6845.

Free Call: 1800 611 246

Email: [wheatstone.info@chevron.com](mailto:wheatstone.info@chevron.com)

Copies of the Draft EIS/ERMP will be available for examination at:

- Department of Environment and Conservation  
Library/Reading Room  
4th Floor, The Atrium  
168 St Georges Tce  
Perth, WA 6000
- JS Battye Library of West Australian History  
Perth Cultural Centre  
25 Francis St  
Northbridge, WA 6000
- Department of Environment  
and Conservation Regional Office  
Lot 3, Anderson Road,  
Karratha Industrial Estate, Karratha  
PO Box 835, Karratha, WA 6714

- Department of Environment  
and Conservation District Office  
Exmouth District  
20 Nimitz Street, Exmouth  
PO Box 201, Exmouth, WA 6707
- Shire of Ashburton Public Libraries:
  - Onslow (Shire Office, Second Ave)
  - Tom Price (Community Centre)
  - Paraburdoo (Paraburdoo Shopping Complex)
  - Pannawonica (Pannawonica Drive)
- Department of the Environment,  
Water, Heritage and the Arts Library  
John Gorton Building  
King Edward Tce  
Parkes, ACT 2600.

## Public Submissions

### Why write a submission?

A submission is a way to provide information, express your opinion and put forward your suggested course of action - including any alternative approach. It is useful if you indicate any suggestions you have to improve the proposal.

All submissions received by the EPA will be acknowledged. Electronic submissions will be acknowledged electronically. The proponent will be required to provide adequate responses to points raised in submissions. In preparing its assessment report for the Minister for the Environment, the EPA will consider the information in submissions, the proponent's responses and other relevant information. DEWHA will also be informed by public submissions and the proponent's responses in preparing its separate assessment report for the Minister for Environment Protection, Heritage and the Arts.

Submissions will be treated as public documents unless provided and received in confidence, subject to the requirements of the Freedom of Information Act 1992, and may be quoted in full or in part in each report.

# Invitation to Comment (cont'd)

## Why not join a group?

If you prefer not to write your own comments, it may be worthwhile joining with a group or other groups interested in making a submission on similar issues. Joint submissions may help to reduce the workload for an individual or group, as well as increase the pool of ideas and information. If you form a small group (up to 10 people) please indicate all the names of the participants. If your group is larger, please indicate how many people your submission represents.

## Developing a submission

You may agree or disagree with, or comment on, the general issues discussed in the Draft EIS/ERMP or the specific proposals. It helps if you give reasons for your conclusions, supported by relevant data. You may make an important contribution by suggesting ways to make the proposal environmentally more acceptable.

## When making comments on specific proposals in the Draft EIS/ERMP:

- Clearly state your point of view
- Indicate the source of your information or argument if this is applicable
- Suggest recommendations, safeguards or alternatives.

## Points to keep in mind

By keeping the following points in mind, you will make it easier for your submission to be analysed:

- Attempt to list points so that issues raised are clear. A summary of your submission is helpful
- Refer each point to the appropriate section, chapter or recommendation in the Draft EIS/ERMP
- If you discuss different sections of the Draft EIS/ERMP, keep them distinct and separate, so there is no confusion as to which section you are considering
- Attach any factual information you may wish to provide and give details of the source. Make sure your information is accurate.

## Remember to include:

- Your name
- Address
- Date
- Whether you want your submission to be confidential.

Public submissions close on **October 4, 2010**.

Public submissions for both the WA State process and the Commonwealth process will be coordinated by the WA EPA.

The EPA prefers submissions to be made electronically using one of the following:

- The submission form on the EPA's website: [www.epa.wa.gov.au/submissions.asp](http://www.epa.wa.gov.au/submissions.asp)
- By email to [submissions@epa.wa.gov.au](mailto:submissions@epa.wa.gov.au).

Alternatively, submissions can be:

- Posted to: Chairman, Environmental Protection Authority, Locked Bag 33, Cloisters Square, WA 6850, Attention: Peter Walkington
- Delivered to the Environmental Protection Authority, Level 4, The Atrium, 168 St Georges Terrace, Perth, WA 6000, Attention: Peter Walkington

or

- Faxed to (08) 6467 5562.

If you have any questions on how to make a submission, please ring the EPA assessment officer, Peter Walkington on (08) 6467 5412.

## Foreword

On behalf of Chevron Australia, I am pleased to present this Draft Environmental Impact Statement/Environmental Review and Management Programme for the proposed Wheatstone Project. As the Commonwealth and Western Australian governments have agreed to a coordinated environmental assessment process, this document is designed to meet the assessment requirements of both jurisdictions.

The Wheatstone Project is intended to bring significant benefits to Australia by underpinning a LNG and domestic gas hub at Ashburton North with significant growth potential for Chevron and third party natural gas. The creation of the hub will lower the economic limit to enable future developments, and increase the number of supply points for domestic gas. The Wheatstone Project will also provide an estimated 6,500 direct and indirect jobs during construction plus significant Australian industry participation.

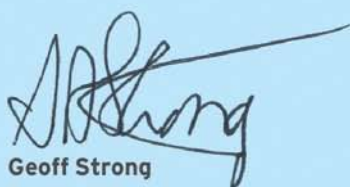
Chevron Australia, proponent of the Wheatstone Project, has been involved in managing existing oilfield operations in the Pilbara Region of Western Australia for more than 45 years. The management of these operations on a

Class A nature reserve is widely recognised as a demonstration of the successful co-existence of petroleum operations and the protection and maintenance of conservation values.

The environmental management strategies developed to avoid or mitigate the potential impacts of the Wheatstone Project will protect conservation and biodiversity values and enhance Chevron Australia's successful environmental stewardship in the Pilbara.

The potential beneficiaries of the Wheatstone Project range from communities in the Pilbara and the state of Western Australia to the whole of the Australian nation and our international customers.

Our success in managing petroleum operations, as well as our diligence in preparing this plan, demonstrates Chevron's commitment to meeting our environmental responsibilities, whilst also meeting national and international clean energy demands.



**Geoff Strong**  
General Manager Wheatstone Project  
Chevron Australia Pty Ltd



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## Wheatstone Project Abbreviations and Acronyms

Abbreviation	Meaning
ANZECC	Australian and New Zealand Environment and Conservation Council
AQIS	Australian Quarantine and Inspection Service
ARMCANZ	Australia New Zealand Standard Industry Classifications
ABU	Chevron Australasian Business Unit (previously ASBU)
BPPH	Benthic Primary Producer Habitat
BTEX	Benzene, toluene, ethyl-benzene and xylene
CEMP	Construction Environmental Management Plan
Condensate	Natural gas condensate
CPMP	Coastal Processes Management Plan
CRCP	Cane River Conservation Park
CSD	Cutter Suction Dredge
Cth	Commonwealth
CW	Cooling water
DBNGP	Dampier to Bunbury Natural Gas Pipeline
DEC	Western Australian Department of Environment and Conservation
DEMP	Decommissioning Environmental Management Plan
DEWHA	Commonwealth Department of the Environment, Water, Heritage and the Arts
DMP	Department of Mines and Petroleum
DO	Dissolved oxygen
DoF	Department of Fisheries
DoH	Department of Health
DRF	Declared Rare Flora
DSDMP	Dredging and Spoil Disposal Management Plan
EIS	Environmental Impact Statement
EMP	Environmental Management Plan
EP Act (WA)	<i>Western Australian Environmental Protection Act 1986</i>
EPA	Western Australian Environmental Protection Authority
EPBC Act (Cth)	<i>Commonwealth Environment Protection and Biodiversity Conservation Act 1999</i>
ERMP	Environmental Review and Management Programme
FEED	Front End Engineering Design
FID	Final Investment Decision
GHG	Greenhouse Gas
GS	Guidance Statement
ha	Hectare(s)
IMP	Introduced marine pest

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Abbreviation	Meaning
LEP	Levels of ecological protection
LNG	Liquefied Natural Gas
MARPOL	"Marine Pollution". Refers to the International Convention for the Prevention of Pollution From Ships, 1973 as modified by the Protocol of 1978.
MEG	Mono ethylene glycol
MFMP	Marine Fauna Management Plan
MMscfd	Million standard cubic feet per day
MOF	Materials Offloading Facility
MOPP	Marine Oil Pollution Plan
MTPA	Million tonnes per annum
NEPM	National Environment Protection Measure
NES	National Environmental Significance
NO <sub>2</sub>	Nitrogen dioxide
NORM	Naturally occurring radioactive material
NOPSA	National Offshore Petroleum Safety Authority
NWS	North West Shelf
O <sub>3</sub>	Ozone
OBC	Outcome-based Condition
OE	Operational Excellence
OEMP	Operations Environmental Management Plan
OEMS	Operational Excellence Management System
OPGGs Act (Cth)	Commonwealth <i>Offshore Petroleum and Greenhouse Gas Storage Act 2006</i>
PASS	Potential acid sulfate soils
PLF	Product Loading Facility
PM <sub>10</sub>	Particulate matter of 10 microns or less
PNEC	Predicted No Effect Concentration
PW	Produced water (including formation water)
SIA	Strategic Industrial Area
SO <sub>2</sub>	Sulfur dioxide
TPH	Total petroleum hydrocarbons
TSHD	Trailing Suction Hopper Dredge
TSS	Total suspended solids
VSP	Vertical seismic profiling
WHO	World Health Organisation

# Executive Summary

## 1.1 Introduction

Chevron Australia Pty Ltd (Chevron), as operator of the Wheatstone Project (Project), proposes to construct and operate a 25 million tonne per annum (MTPA) Liquefied Natural Gas (LNG) plant and a domestic gas (domgas) plant near Onslow on the Pilbara coast in Western Australia (WA) (Figure 1.1). The development is to be part of the Ashburton North Strategic Industrial Area (SIA) proposed by the Western Australian Government.

The Project comprises a range of offshore and onshore infrastructure components to recover gas from Petroleum Titles WA-253-P, WA-17-R, WA-356-P, and WA-16-R (Figure 1.1). An offshore process platform will provide initial treatment of the gas and natural gas condensate (condensate), which will then be transported via a subsea pipeline to an onshore LNG processing facility. The resultant LNG and condensate will be shipped to worldwide markets. Gas from the plant will be made available to the Western Australian domestic market via an onshore pipeline installation.

The development of the Project as a 25 MTPA multi-train LNG facility reduces the potential requirement for future expansion of Chevron’s gas-processing facilities in the Ashburton North SIA, and lessens the need for future LNG-related developments in the Pilbara; the establishment of a processing hub will facilitate development of additional offshore gas resources. These may be in the Carnarvon Basin and other areas, from both Chevron operated Petroleum Titles and those operated by other parties.

This Executive Summary has been prepared by Chevron and provides a summary overview of the information presented in the Wheatstone Draft Environmental Impact Statement /Environmental Review and Management Programme (EIS/ERMP). This includes:

- The Project development
- Site selection and development alternatives
- The existing environment
- Potential impacts and mitigation measures.

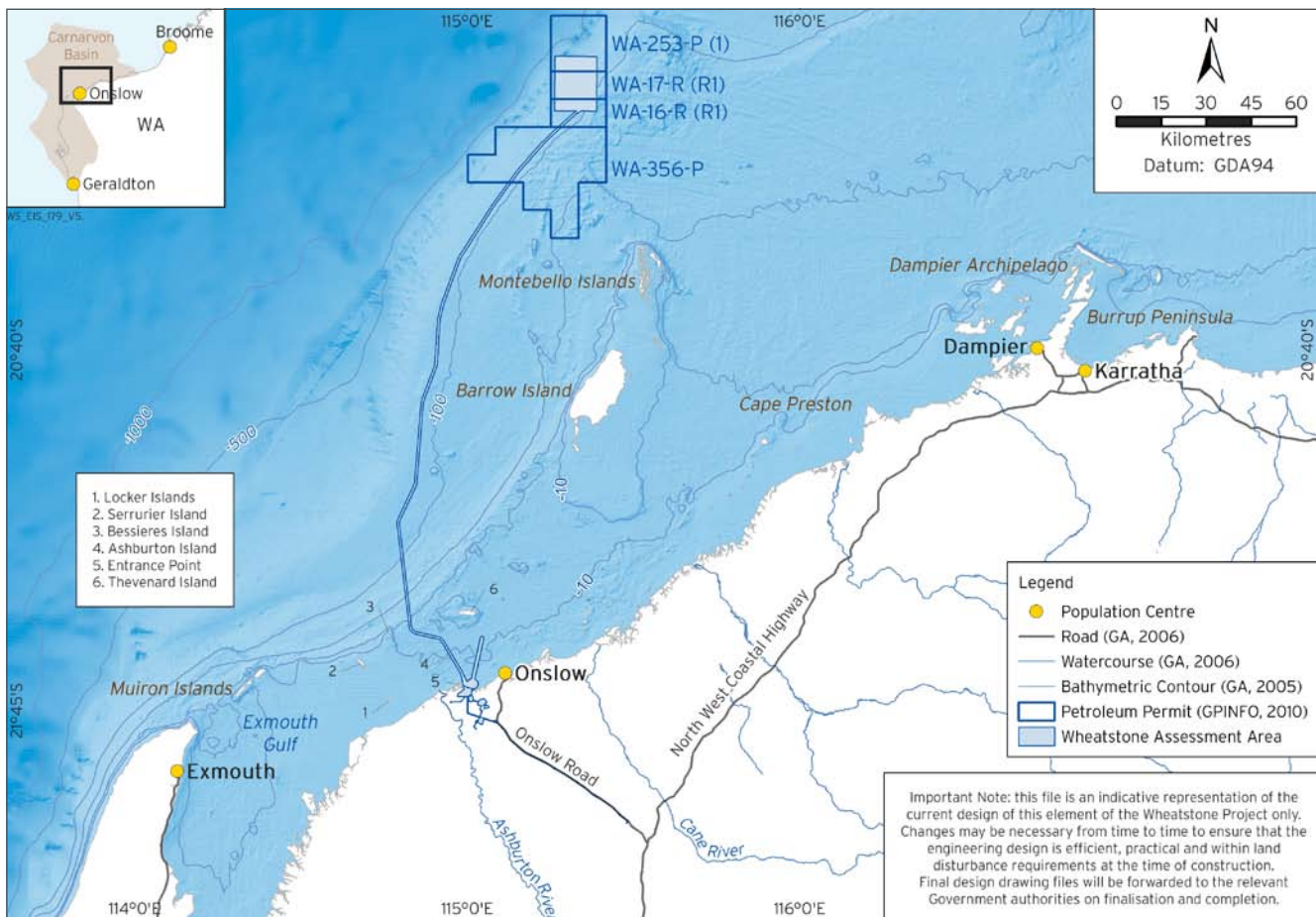


Figure 1.1: Location of the Wheatstone Project

The Draft EIS/ERMP has been prepared for the Project in accordance with the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and the Western Australian *Environmental Protection Act 1986* (EP Act). For the purposes of this document, the word "Project" is interchangeable with the word "Proposal", as used by the Western Australian Environmental Protection Authority (EPA), and also the term "Controlled Action" as defined under the EPBC Act (Cth).

Chevron has implemented a trial of the application of a risk-based approach for environmental impact assessment at the request of the EPA. The risk-based approach enables the potential impacts or hazards associated with Project activities to be evaluated on the basis of potential risk to the environment. Environmental investigations, assessment and mitigation can then be focused on the factors or receptors considered to be at High and Medium-level risk of adverse impact. Low and Very Low risks are also assessed but in less detail. Risk-assessment summary tables can be found at the end of this Executive Summary. These detail the risk rankings assigned to each aspect and factor for the construction and operations phases of the Project. They include a summary of potential impacts, mitigation and management measures and relevant assumptions.

## 1.2 Project Proponent

Chevron Corporation is an integrated energy company whose businesses are involved in every aspect of the global crude oil and natural gas industry. In 2009, the Chevron Corporation companies produced 2.7 million net oil-equivalent barrels per day from operations around the world. As of March 2009, net production of natural gas was more than 141 Mm<sup>3</sup> (5 billion cubic feet) per day. Chevron Corporation's businesses employ approximately 62 000 staff, support a network of more than 22 000 retail outlets on six continents and have invested in power generating facilities in the United States, Australia and across Asia.

Chevron Corporation, through its Australian subsidiary, Chevron, has been present in Australia for more than 50 years. With more than 1800 staff, Chevron manages its equal one-sixth interest in the North West Shelf Venture, operates the Barrow Island and Thevenard Island oilfields, and leads the development of the Gorgon and Wheatstone natural gas projects. Chevron is also a partner in the Browse liquefied natural gas development and a significant investor in exploration offshore north-west Australia. In addition, Chevron's Perth-based Global Technology Centre provides technology support and solutions to the company's operations in Australia and around the world.

## 1.3 Environmental and Social Commitment and Responsibility

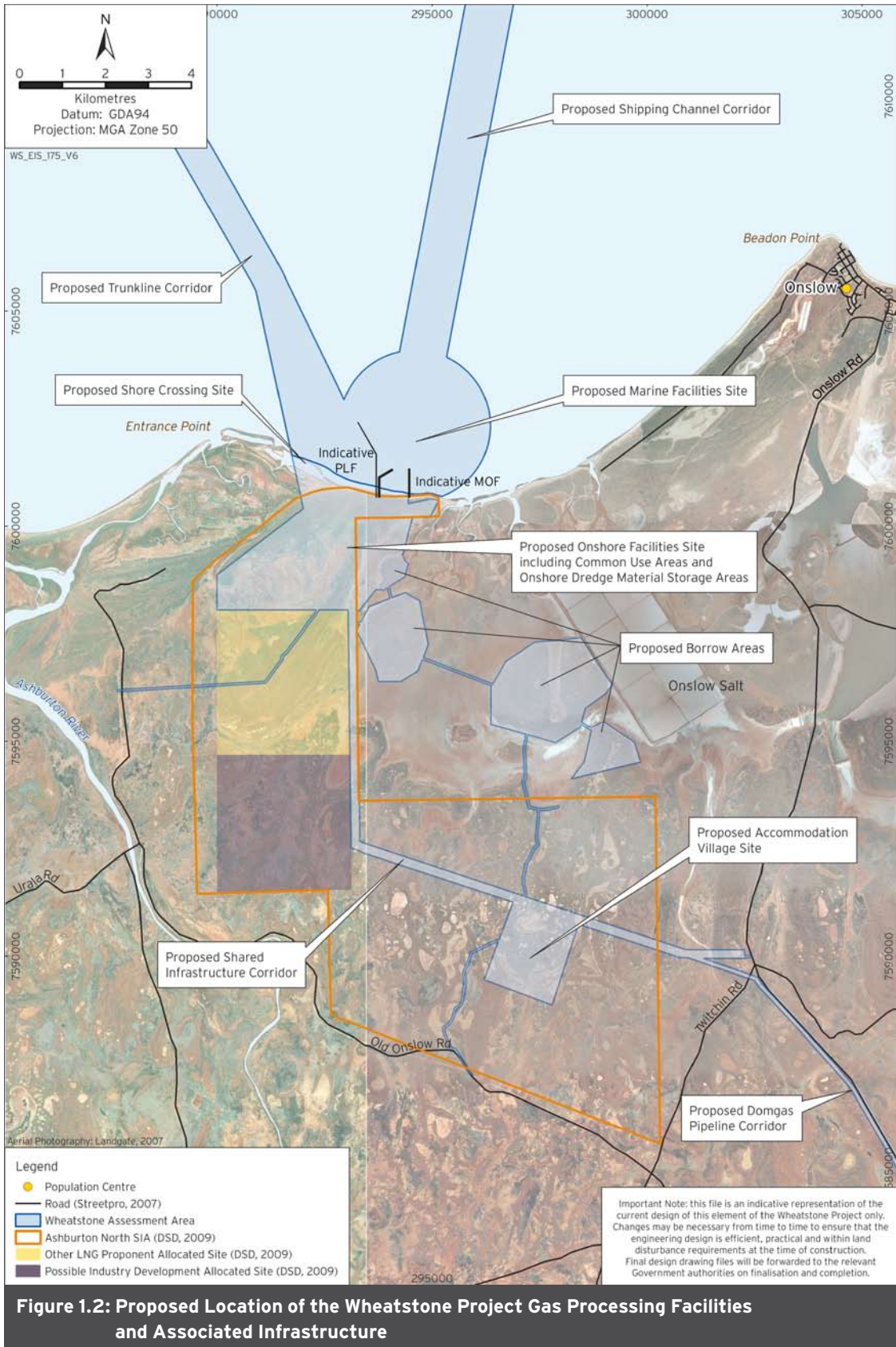
It is the policy of Chevron Corporation to protect the safety and health of people and the environment, and to conduct operations reliably and efficiently. The systematic management of safety, health, environment, reliability and efficiency to achieve world-class performance is defined as Operational Excellence (OE). Chevron Corporation's commitment to OE is embodied in The Chevron Way value "Protecting People and the Environment", which places the highest priority on health and safety, and the protection of assets and the environment.

In 2008, Chevron Corporation received attestation from Lloyd's Register Quality Assurance that the OE management system (OEMS) meets all requirements of the International Standards Organization's 14001 environmental management system standard and the Occupational Health and Safety Assessment Series management specification 18001, and that OEMS is implemented throughout the corporation. These standards are international benchmarks and demonstrate Chevron's commitment to world-class performance.

Chevron has developed a range of environmental management measures and controls collectively termed the Environmental Management Program (Program). The Program is designed to facilitate the implementation of Chevron's Strategic Australasia Business Unit (ABU) OEMS and ABU Policy 530 - Operational Excellence, and to meet legal requirements.

## 1.4 Project Description

In August 2004, a significant gas discovery was made at the Wheatstone-1 well in Chevron's solely held WA-253-P Petroleum Title, located offshore approximately 225 km north of Onslow in WA (Figure 1.1). This complemented the discovery in 2000 of natural gas in Petroleum Title WA-17-R, located approximately 10 km from WA-253-P. The Project will produce gas from Petroleum Titles WA-253-P and WA-17-R (held 100 per cent by Chevron companies), WA-356-P (held by third parties), and WA-16-R (held by Chevron companies and Shell Development Australia). Chevron proposes to construct and operate a 25 MTPA LNG plant and 625 million standard cubic feet per day (MMscfd) domestic gas (domgas) plant. The development is to be part of the Ashburton North SIA proposed by the Western Australian Government (Figure 1.2). The Project stands to generate significant employment opportunities: Approximately 3000 workers (maximum 5000) at the peak of construction activity in 2014 and



approximately 300 workers (maximum 400) during operations. The Wheatstone Project will provide an estimated 6500 direct and indirect jobs during construction plus significant Australian industry participation.

Approval is being sought for the design, construction, commissioning, operation and decommissioning phases of the Project. The Project's key characteristics include:

- Offshore production facilities with a nominal capacity of 9 MTPA LNG, including wells, subsea installations and offshore platforms
- An export pipeline (trunkline) to provide feed gas from the offshore production infrastructure to the onshore gas processing facility
- A gas processing and export facility, including 25 MTPA LNG processing facility and domestic gas processing plant, LNG and condensate product storage, power generation, water supply, waste disposal, and associated support facilities
- Marine facilities including a shipping channel, turning basin, Materials Offloading Facility (MOF) and Product Loading Facility (PLF)
- A multi-purpose infrastructure corridor, which will incorporate an access road to the site as well as the domestic gas pipeline connecting to the existing Dampier-to-Bunbury Natural Gas Pipeline (DBNGP)
- An accommodation village, access roads and supporting infrastructure.

The plant pad elevation will be raised and onshore fill material may need to be sourced from a third party quarry if it cannot be sourced locally from borrow areas. Any third-party quarries used to source the fill material will have the appropriate government licenses and approvals.

The Project is expected to have an operating life of at least 40 to 50 years. At the end of its useful life decommissioning will be required. In the lead up to this point, reuse and recycling opportunities for the Project components will be considered. For example, removal of equipment for use by a third party, or use of equipment left *in situ* for alternative uses. Where no feasible or practicable alternatives can be identified, the Project components will be decommissioned.

Infrastructure above the seabed will be designed for full removal, however a full assessment prior to decommissioning will be undertaken to assess if full removal is the most environmentally feasible option.

Although it is technically viable to remove subsea trunklines, they are likely to be flushed and left in place to limit impacts to the marine environment associated with the removal operation.

Typically the decommissioning activities will include:

- Decommissioning production facilities
- Flushing subsea facilities including pipelines, flowlines, manifolds and risers
- Decommissioning, suspension, plugging and abandoning wells
- Removal and/or leaving in situ of facilities as agreed with the regulator.

The decommissioning requirements for the Project will be agreed with the regulatory authorities closer to the time of decommissioning. A Decommissioning Management Plan will be developed and will consider:

- Condition of the marine and terrestrial environment
- International, National and State regulatory legislation and standards at the time of decommissioning
- Health and safety legislation and standards
- The land zoning plans and future land use options.

## 1.5 Development Timeline

Major Project components include Front End Engineering Design (FEED) in 2010, Final Investment Decision (FID) and construction commencing in 2011, and production scheduled to commence in 2016. The timing for the commencement of construction at Ashburton North is subject to the achievement of State and Commonwealth Government approvals, and internal approval processes. An indicative schedule for the Project is provided in Figure 1.3.

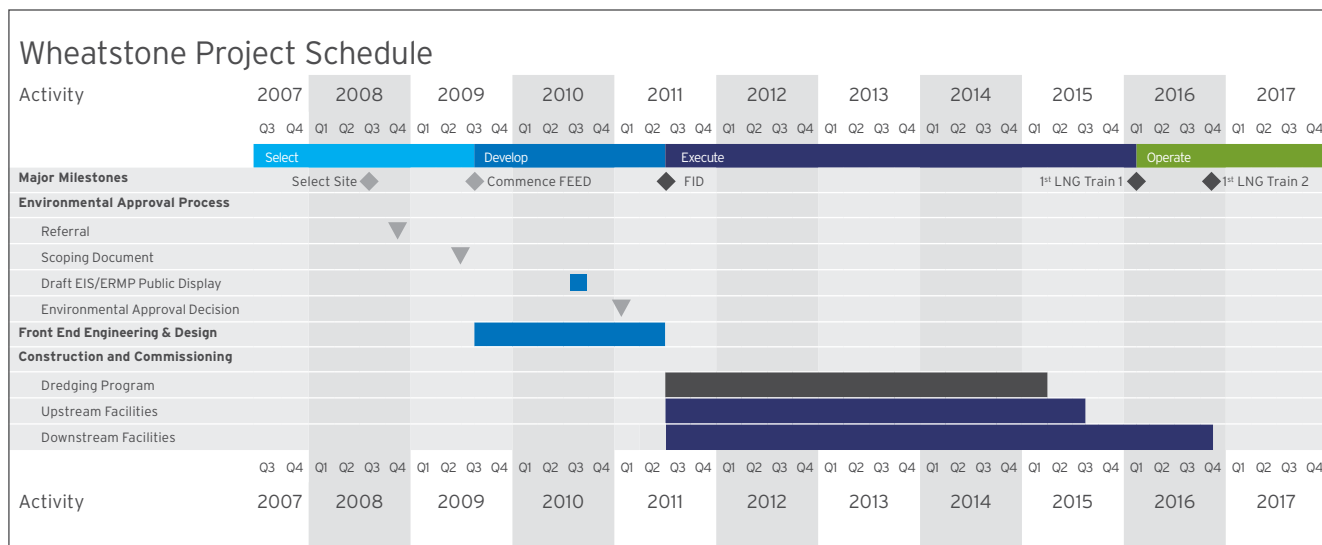


Figure 1.3: Indicative Schedule for Development of the Wheatstone Project (Trains 1 and 2)

\* Dates are subject to change as the Project develops.

\*\* Project detailed design to continue after FID

## 1.6 Project Objectives

The Project is aimed at bringing gas to international and domestic markets. It will be developed as a multiple-train gas project that will process gas for Chevron as well as third-party gas owners in the Carnarvon Basin and potentially other areas.

The primary objectives of the Project are to:

- Commercialise the hydrocarbon resources within Petroleum Titles WA-253-P, WA-17-R, WA-356-P and WA-16-R, and efficiently and reliably recover these resources
- Create a processing hub to facilitate development of additional offshore gas resources in the Carnarvon Basin and other areas, from both Chevron operated Petroleum Titles and those operated by other parties
- Provide an acceptable return on investment
- Provide an alternative and reliable source of LNG to international markets along with an additional secure source of domestic gas for the local market
- Manage all environmental, health, security and safety issues with Chevron Corporation standards and recognised global industry standards in mind.

## 1.7 Site Selection and Development Alternatives

A detailed evaluation of development alternatives concluded that a tie-back to a new on-shore LNG facility located at a greenfield site somewhere between the Burrup Peninsula and North West Cape was preferred. The reasons for this decision were:

- A new facility provided the potential for a strategic development for discoveries in the West Carnarvon Basin
- A new development “hub” would facilitate synergies with other proponents
- A new facility was not constrained by other proponents either technologically or spatially
- A new facility could be developed with proven technology and linked back to the domestic gas market
- Environmental and cultural heritage impacts could be reduced relative to third-party locations.

Chevron investigated a number of alternative locations for the on-shore LNG plant and associated facilities. In addition to its community engagement, Chevron made the final decision on site selection in close consultation with the Australian Commonwealth and Western Australian State



Governments. This process, which included consideration of matters of National Environmental Significance (NES), identified Ashburton North SIA as the preferred site, with the following key attributes:

- The least relative environmental and social constraints
- Heritage and third-party constraints but with lower relative risks than other sites
- An inundation risk attributed to low ground levels that can be mitigated by engineering solutions
- Comparable in cost to other sites, but lowest in the uncertainty range.

Although the “No Action” alternative would eliminate any environmental impacts associated with the proposed action, the need for additional supplies of natural gas would remain. The Project is considered to have significant economic advantages based on the volume of reserves discovered. Not developing would therefore result in the loss of significant socio-economic benefits for the Pilbara region, the State of Western Australia, the Commonwealth of Australia and Chevron.

## 1.8 Legal Framework for the Proposal

The Project will be located in both State and Commonwealth waters. The primary environmental legislation relating to its approval is the EP Act (WA) and the EPBC Act (Cth). The Draft EIS/ERMP has subsequently been prepared in accordance with the requirements of both the EP (WA) and EPBC (Cth) Acts.

In addition to these requirements, Chevron has considered both Australian and international guidance and regulations along with Chevron’s own policies and standards in the development of the Draft EIS/ERMP. Compliance with relevant environmental and social performance standards and Draft EIS/ERMP commitments will be implemented through the Wheatstone Environmental Management Program.

Safety requirements are addressed separately in accordance with National Offshore Petroleum Safety Authority (NOPSA) requirements and the State equivalent, Resources Safety.

## 1.9 Stakeholder Consultation

Chevron is undertaking a transparent stakeholder and community engagement process in the development of the EIS/ERMP. The engagement process is consistent with the *Interim Industry Guidelines to Community Involvement* and the *International Association for Public Participation Guidelines* for best practice in Social Impact Assessment.

The stakeholder consultation strategy is aligned with Chevron’s corporate values, which drive the company’s business to be conducted in a socially responsible and ethical manner. Consultation includes government agencies, non-government organisations, Indigenous organisations, Onslow residents, tourists visiting Onslow and the private sector.

The aim of the ongoing consultation for the Project and the associated impact assessment process is to:

- Provide a forum for stakeholders to participate, deliberate and contribute in a meaningful way to discussion; to raise concerns, and to provide suggestions and advice on the Project
- Provide opportunities for stakeholder input and feedback throughout the impact-assessment process in order to inform Project decision-making
- Broaden Chevron’s knowledge of the issues, concerns and opportunities that may arise in relation to the Project to enable the development of effective mitigation and enhancement strategies
- Allow Chevron to interact with stakeholders and find the best ways to increase benefits from the Project and reduce potential adverse impacts
- Capture and address stakeholder issues and concerns during development of the EIS/ERMP
- Consider stakeholder views in planning future consultation.

## 1.10 Existing Environment

### 1.10.1 Local Marine Environment

The marine waters in the Project area are characterised by variable levels of turbidity influenced by wind, tides and weather. These waters sometimes have naturally higher levels of turbidity due to cyclonic activity. Sediments in the east of the offshore field area are uniformly clayey, silty, medium sand with shell and coral fragments. In the north, west and south-west of the offshore field area, sediments are slightly finer in texture. The nearshore area is broadly characterised by silt and sand sheets overlying limestone. High levels of sediment are discharged from the Ashburton River.

No ecologically isolated, sensitive or unique benthic habitats have been found in the Project area. All benthic habitats in the Project area are widespread, and found throughout the nearshore and offshore Pilbara marine environment. Benthic Primary Producer Habitat (BPPH) include: reefs and shoals supporting hard corals and

macroalgae; patchy and low cover seagrass beds; and mangrove stands fringing creeks and lagoons. However, the dominant habitat, in terms of spatial extent, is unconsolidated sediment without vegetation cover.

EPBC Act (Cth) listed, threatened and migratory species of birds, marine mammals, reptiles and sharks/rays are known to be present in the nearshore and offshore Project area. These include Dugongs, sawfish and marine turtles. Humpback Whales are known to utilise the waters of the region between May and November. Marine turtles are present in the Project area and nest on offshore islands including Serrurier, Thevenard, Bessieres, Locker and Ashburton (Figure 1.1) during the summer. Low density nesting has been observed on the beach 4 km west of the onshore Project area but not in front of onshore infrastructure; beaches at the Ashburton North SIA site are unsuitable for nesting as they are inundated by spring tides.

The Project area is located in the Ashburton River Catchment where the surface water environment is characterised by local rainfall, runoff from upstream catchments and tidal variation. The Ashburton River, which has a shifting nature, makes a significant contribution to sediment deposition along the coast, particularly when it is in flood. Net alongshore sediment transport is generally considered to be from west to east and the entrance bar at Hooley Creek is dynamic.

### 1.10.2 Local Terrestrial Environment

The area surrounding the onshore component of the Project is dominated by topography consisting of undulating dunal systems, alluvial/colluvial plains and low-lying coastal systems. Areas of low relief are associated with the samphire and supra-tidal salt flats, claypans, tidal creeks and mangroves. There are three major identifiable soil groups/types encountered in the shallow soil profile for the Ashburton North and surrounds of the Shared Infrastructure Corridor study area. Although some metal concentrations exceed the relevant ecological threshold values, these metals are naturally occurring in the area and are not considered to pose an adverse risk to human health or ecological receptors. Potential acid sulfate soils (PASS) are present at shallow depths with a thickness ranging between 0.2 m and 3.5 m. They exist predominantly along the north-eastern extent of the Ashburton North SIA.

Ashburton North is predominantly a groundwater discharge zone associated with the regional Carnarvon Basin successions. The groundwater environment is characterised by shallow water table settings and mostly saline to hypersaline groundwater environments. The water table is closely linked with topography, with groundwater flow being a reflection of the surface water catchments.

Some comparatively high dissolved metals concentrations were evident, but these are considered to be representative of background conditions and are commensurate with the accumulation of salt in the local groundwater environment.

The Ashburton North SIA is located in the Ashburton River Delta, which is characterised as a coastal flood plain. The surface water characteristics are influenced by three main components: tidal inundation by seawater, localised rainfall events and flooding of the Ashburton River. When the Ashburton River is in flood, its flood waters will spill onto the floodplain and may significantly add to the stream flow in the drainage lines of the Project area. Surface water quality at Ashburton North is a mixture of tidal seawater and runoff from local catchments.

A total of 30 vegetation units were identified, which were generally defined as very good to excellent vegetation condition. However, several vegetation units were heavily infested with weeds. Most of the vegetation units are representative of vegetation in the locality, or are substantially degraded by the invasion of buffel grass (*Cenchrus ciliaris*), and are therefore considered to be of low conservation significance. Five of the 30 vegetation units are identified as having some degree of local significance, but no Threatened Ecological Communities listed under the EPBC Act (Cth) or the Western Australian *Wildlife Conservation Act 1950* (WC Act) occur. Additionally, no Priority Ecological Communities listed by the Western Australian Department of Environment and Conservation (DEC) were identified.

Three Priority flora species (*Eremophila forrestii* subsp. *viridis* [Priority 3], *Atriplex flabelliformis* [Priority 3] and *Triumfetta echinata* [Priority 3] as listed by the DEC) were identified within the Project area. There was also one Threatened Flora species, *Eleocharis papillosa* (Dwarf Desert Spike-rush), listed as Vulnerable under the EPBC Act (Cth) and as a Priority 3 flora species, and an additional Priority flora species (*Abutilon uncinatum* ms. [Priority 1]) found outside the Project area.

A total of 128 vertebrate fauna species were recorded, comprising 47 reptile species, four frog species, 60 bird species and 17 mammal species. Six fauna species of conservation significance, or secondary signs of these species, and three introduced mammal species were recorded. Surveys also determined that the Project area and surrounds do not support important numbers of migratory waterbirds. No short-range endemic invertebrate fauna taxa were identified, while 59 taxa of zooplankton and 82 taxa of macro-invertebrates were recorded in a study of the ephemeral claypans.

Surveys for subterranean fauna recorded no troglobitic fauna, and two species of stygofauna. It was determined that it was unlikely that those stygofauna taxa are only restricted to the study area. Therefore, the study suggested that a diverse or significant stygal community does not occur in the aquifers beneath the study area and surrounds.

Existing dust at Ashburton North is primarily wind-blown. Minor anthropogenic sources of dust include tourist or local vehicles visiting the area along the Old Onslow Road near the Ashburton River and the Old Onslow heritage area. Dust emissions generally exhibit a marked seasonal trend, related to the influence of the Pilbara's wet and dry seasons.

Minor sources of anthropogenic gaseous emissions do exist. However, these are considered inconsequential to the background air quality. Some of the minor emission sources include motor vehicles in the surrounding area of Onslow and some small-scale power generation facilities at Onslow and Onslow Salt.

### 1.10.3 Socio-economic and Cultural Environment

Onslow is located 1,386 kilometres north of Perth, in the Shire of Ashburton within the Pilbara region of Western Australia. It has a population of approximately 600, and a significant Indigenous population of around 37 per cent. The Thalanyji people are the native title holders for the onshore area around Onslow including the Ashburton North SIA. With development of the Project and other industrial operations in coming years, Onslow is expected to undergo significant change in population and socio-economic way of life.

Onslow is close to a number of natural resources and has a diverse economic base including fishing, salt, oil and gas, tourism and pastoral activities. Commercial fisheries include the Onslow Prawn Managed Fishery, Pilbara Managed Trap Fishery, North Coast Blue Swimmer Fishery, Pearl Oyster Managed Fishery, Pilbara Line Fishery, Mackerel Managed Fishery, Specimen Shell Managed Fishery and the Marine Aquarium Fish Managed Fishery.

Fishing is also one of the key recreational activities in Onslow and the town's proximity to the ocean and the Ashburton River attracts visitors in pursuit of recreational coastal activities. Many visitors stay for three to four months during the winter and camp along the Ashburton River. Visitors also use heritage trails and tours highlighting the town's rich history. For members of the Aboriginal community, hunting and gathering remains an important recreational and cultural activity. Although some hunting

and gathering takes place across the proposed Project area, it mostly occurs along the Ashburton River and to the east of the river.

Onslow was originally settled in 1883 and the Old Onslow Townsite is registered as place 3444 on the Western Australian Register of Heritage Places. The Heritage Council of Western Australia conservation area consists of a town site area, the line of a former tramway and jetty area. The site is also listed on the Shire of Ashburton's municipal inventory and is highly valued by Onslow residents. Aboriginal heritage surveys of the proposed plant site and surrounding areas have identified sites containing shell scatters, shell middens, evidence of grinding activities and artefacts. No ethnographic sites were identified.

Despite Onslow's range of economic and recreational activities, it is more socio-economically disadvantaged than the broader Shire of Ashburton and Pilbara region. Its remoteness also means social infrastructure and community services are limited. Neighbouring regional centres such as Exmouth and Karratha are approximately 350 km away and most community services are either provided by larger neighbouring towns, or flown in from elsewhere. For example, Onslow's hospital is staffed by nurses, visited by a rotation of general practitioners three times a week, and supported by specialist services flown in periodically.

## 1.11 Emissions from the Project

Emissions, discharges and wastes will be generated during the life of the Project. Identification of the potential sources and types of emissions and wastes has enabled an assessment of the volume and toxicity of each potential waste produced. This has also enabled the identification of areas where volumes could be reduced.

### 1.11.1 Greenhouse Gas and Energy Efficiency

Prior to commencing feasibility studies a high-level approach was taken in addressing issues of environmental importance. This included requirements to reduce greenhouse gas (GHG) emissions through design.

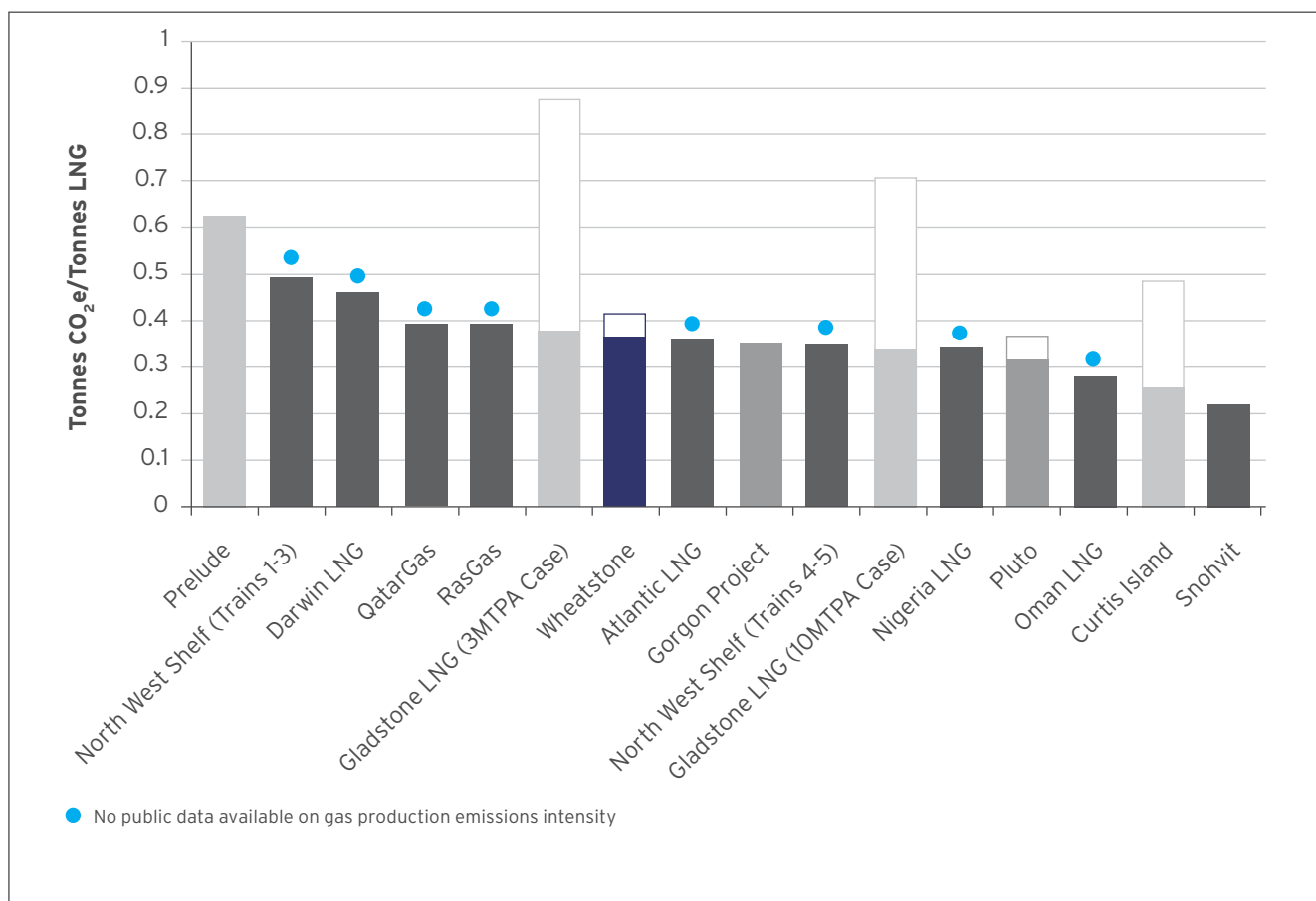
The following actions have been taken to manage the Project's GHG emissions:

- Selection of aero derivatives for gas turbines
- Selection of waste heat recovery units offshore from compressor gas turbines

- Selection of LNG process train technology and size so as to enable the consideration of aero derivative gas turbines
- The use of inlet air humidification (cooling) on the LNG process gas turbines in order to optimise gas turbine energy efficiency
- Waste heat recovery from the LNG compressor gas turbine exhausts to meet routine process heat requirements in the onshore gas processing facility
- Waste heat recovery from the gas turbine exhausts of the main generators on the offshore platform to meet specific heating requirements
- The use of sophisticated process control systems for continuous optimisation and integration between various components of the gas processing system
- The capture and use of energy recovered from the pressure let down in the liquefaction section of the onshore gas processing facility.

Estimates of GHG emissions have been compiled in a manner that is consistent with methodologies prescribed by the Commonwealth *National Greenhouse and Energy Reporting Act 2007*. These emissions estimates indicate that the Project could emit greenhouse gases with the global warming potential equivalent of up to 9.9 MTPA of carbon dioxide (a standard comparison measure).

Figure 1.4 shows the GHG emissions intensity associated with LNG processing for LNG projects currently in production as dark grey bars. The medium grey bars show the estimated LNG processing emissions intensity for the two Australian LNG projects that are currently under construction. Estimated LNG processing emissions intensity for other Australian LNG projects that are currently undergoing environmental impact assessment are represented by light grey bars. The estimated LNG processing emissions intensity of the Project is shown in dark blue.



**Figure 1.4: Benchmarked Greenhouse Gas Emissions Intensity**

Refer to Section 4.2.6 for further details on benchmarked GHG emissions performance including associated assumptions.

Where data on the emissions intensity of the associated gas production operations is available it is presented as an additional white bar. Projects where publicly available data on gas production emissions is not available are indicated with a blue circle.

A number of opportunities to further reduce the Project's GHG emissions have been identified and will be evaluated further during ongoing Project design and engineering.

### 1.11.2 Atmospheric Emissions

The Project is located in a remote area in the north-west of WA with limited man-made sources of atmospheric emissions. Existing industrial sources of air pollutants in the Onslow region are restricted to the Onslow Salt facility and other minor light industries in the Onslow township. Man-made emissions are anticipated to be low, compared to natural emissions. Due to the remoteness of the site there is limited data on existing air quality in the area. Chevron initiated a monitoring program in 2009 to collect data on the existing air quality in the region. This monitoring program is ongoing and is expected to continue through the construction phase.

The EPA and the DEC routinely apply National Environment Protection Measure (NEPM) standards and goals in WA. The EPA does not have current State-wide standards for ambient ground-level pollutant concentrations. However, the EPA has released a Draft State Environmental (Ambient Air) Policy, where it proposes that the NEPM standards (Schedule 1A and 1B) be applied across all areas of WA, excluding areas where a current environmental protection policy exists.

Predicted routine emissions modelling has predicted ground-level concentrations of nitrogen dioxide (NO<sub>2</sub>), ozone (O<sub>3</sub>), sulfur dioxide (SO<sub>2</sub>) and a particulate matter of 10 microns or less (PM<sub>10</sub>). All modelled emissions were well below NEPM guideline values: less than 5 per cent of the values at Onslow. The emissions during construction were considered to be transitory (short-term and generally mobile). The key emission during this phase is dust, which is further discussed in the Terrestrial Risk Assessment and Management section of this Executive Summary.

### 1.11.3 Light

#### 1.11.3.1 Offshore Facilities Light Emissions

The main sources of light during installation and dredging will be various vessels, drilling mobile offshore drilling units and installation platforms. Typically, white light such as fluorescent, metal halide and halogen is used on a 24-hour basis. During commissioning and operations, the main sources will be vessels, platform facility lighting and the flare system. The design reduces light spillage and the platform location is more than 140 km from the nearest mainland. The site is not near any known critical aggregation areas for cetaceans, turtles or birds. The Wheatstone Platform will not be visible from the mainland.

#### 1.11.3.2 Onshore Facilities Light Emissions

The Project will produce light emissions during construction, commissioning, operations and decommissioning. This light will be generated by Project activities, such as flaring and by lighting systems that provide safe areas of operation.

Light spill along the beach and dunes south-west of Entrance Point has been modelled and predicts illuminance along the dune crest peaking at 0.2 lux (the standard unit to measure illuminance). Light spill across the beach will generally be less than 0.15 lux (Figure 1.5).

From the results of the viewshed analysis and the lighting study it can be inferred that, under normal operating conditions at night, the onshore facility will be seen from Onslow as a dull glow on the horizon. Flaring events may be more visible but will occur infrequently. The PLF and MOF will have low levels of illumination. Light emissions are not expected to significantly impact the nesting productivity of turtles, discussed further in the Marine Risk Assessment and Management section, discussed further in Section 1.12.2

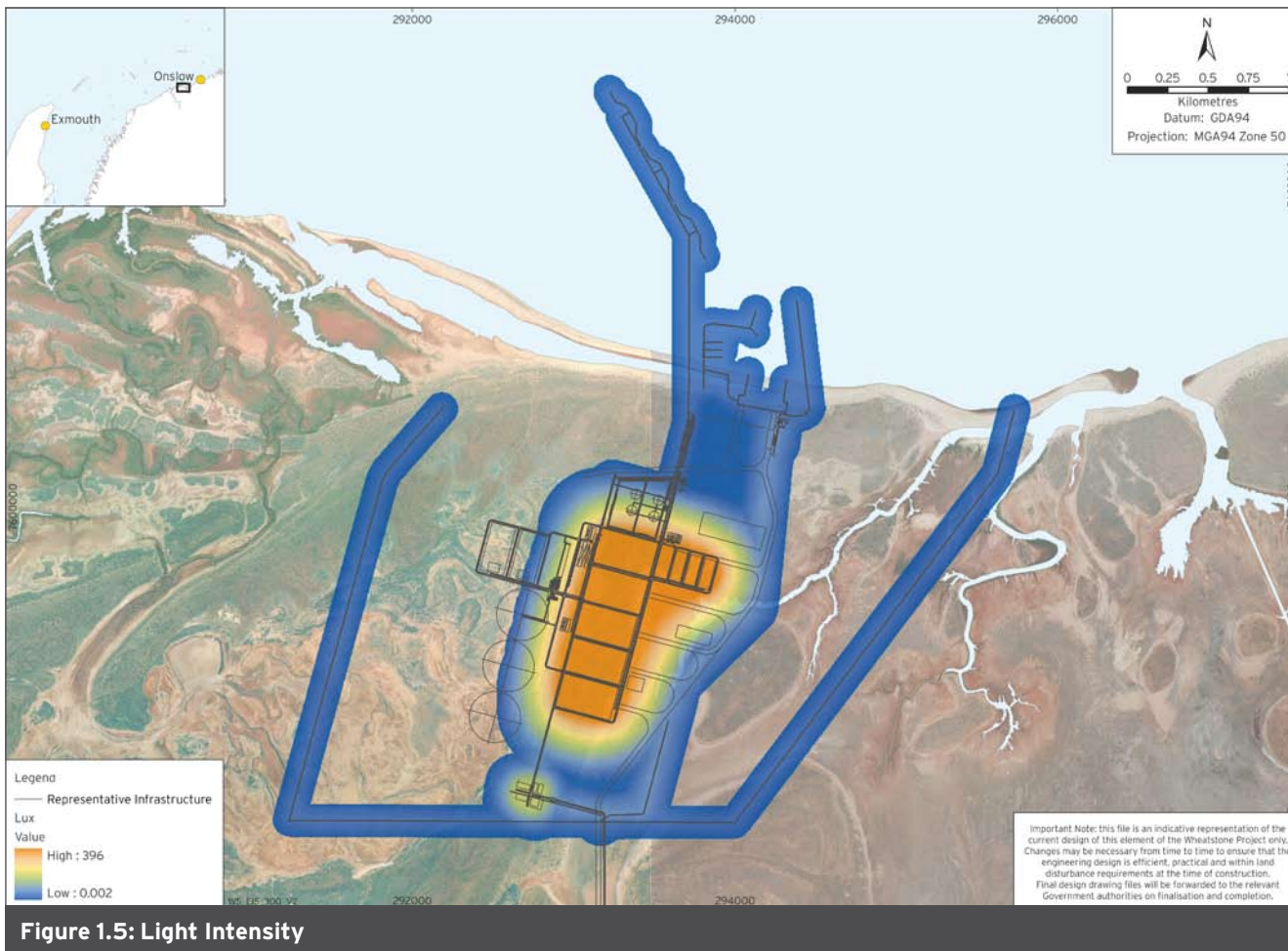


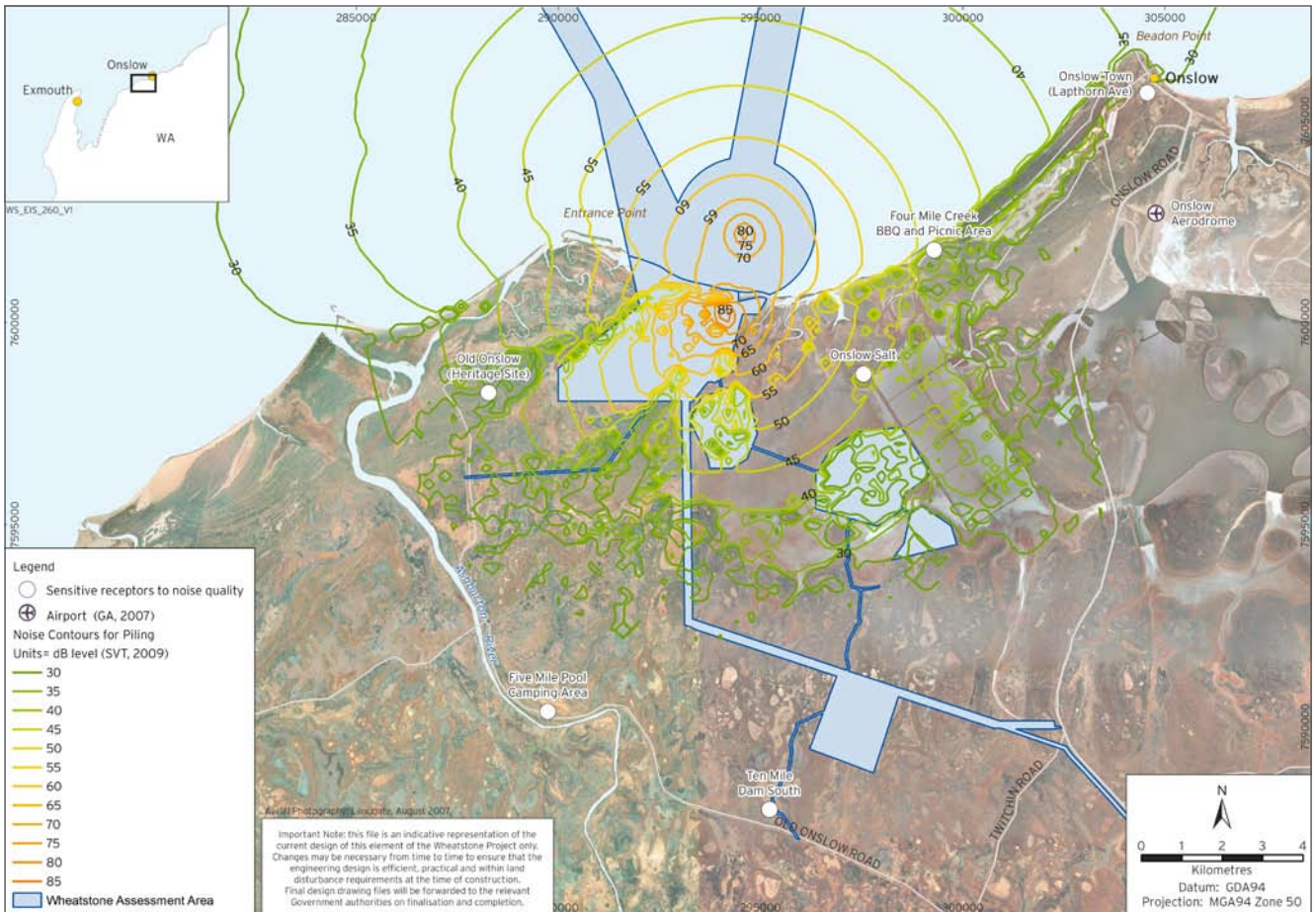
Figure 1.5: Light Intensity

### 1.11.4 Noise

The Pilbara region is characterised by mining and industrial centres separated by large distances. Regional towns are sparsely scattered throughout the Pilbara and tend to be hundreds of kilometres apart. There are also many pastoral stations scattered throughout the region. These properties are large and the homesteads are usually isolated from anthropogenic noise sources. Given the vast distances between receptors and noise sources in the Pilbara region, background noise is often very low. Continuous onshore noise monitoring was conducted over a two-week period at five sites considered by the Onslow community to be sensitive receptors. The Project will comply with the *Environmental Protection (Noise) Regulations 1997* during operations. Potential environmental impacts relating to noise are discussed in the Risk Assessment and Management section.

#### 1.11.4.1 Potential Onshore Noise Emissions during Construction

Onshore and nearshore foundation works will include the use of pile drivers, which may present significant potential noise source for Onslow. Up to ten pile drivers could be operating at the processing facility site for up to 18 months, while pile driving for construction of the export jetty and the MOF may involve two pile drivers for up to 14 months. Modelled noise emissions for the onshore processing facility predict that pile driving, under worst case conditions, may generate sound pressure levels in Onslow of 31 dB(A) (adjusted to 41 dB(A) if pile driving noise is impulsive). Modelled predicted noise contours for piling activities are shown in Figure 1.6.



**Figure 1.6: Predicted Noise Contours for Pile Driving During Construction**

**1.11.4.2 Potential Onshore Noise Emissions during Operations**

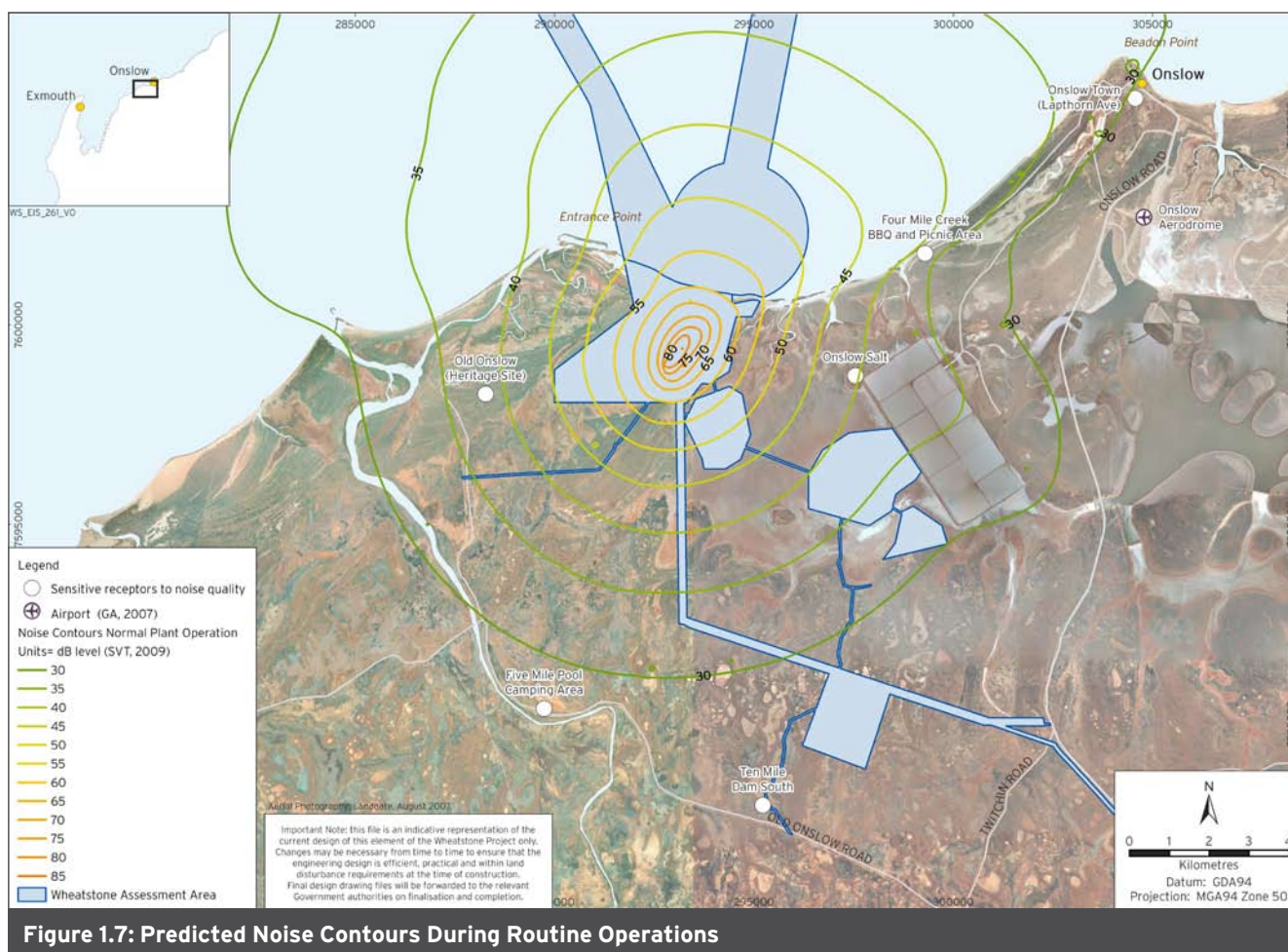
During the operations phase, sound pressure levels are likely to be dominated by the gas turbines, compressors and flares. Predicted noise contours for routine operations are shown in Figure 1.7. Non-routine operations represent approximately six per cent of plant availability. During upset conditions up to six flares (worst case scenario) may operate to maintain the facility within safe operational guidelines.

**1.11.5 Marine Discharges**

**1.11.5.1 Offshore Facilities Discharges**

The offshore facilities will discharge produced water, cooling water, brine, deck drainage, treated process water and treated wastewater. Wastewater (sewage and putrescible organic matter) will be treated in accordance with the International Convention for the Prevention of Pollution from Ships (MARPOL 73/78, Annex IV).

Produced water will be treated prior to being discharged to comply with the *Offshore Petroleum and Greenhouse Gas Storage Act 2006*. Potentially contaminated runoff and wastewater will be collected via a drainage system prior to treatment.



Discharges from the facility will undergo a range of degradation and dispersion processes. Direct dilution will occur in two phases: rapid near-field and slower far-field. The first phase is impacted by the discharge velocity / momentum and density differences between the discharge and surrounding water body. The second phase is far-field mixing which rely on natural processes of winds and waves inducing dilution. Distribution is determined by tidal flows, wind velocity and regional circulation patterns.

### 1.11.5.2 Onshore Discharges

Treated sewage and domestic grey water generated during the operations phase will be discharged through one of the nearshore ocean outfall pipelines. Volumes for discharge may range up to 435 m<sup>3</sup> per day. Treated domestic effluent may achieve a quality suitable to be recycled for dust suppression and vehicle wash water.

During operations, process waters will include reverse osmosis brines and filter backwash water, stormwater

contaminated with hydrocarbons, clean stormwater, hydrostatic test water, and produced water from offshore facilities. This water will be treated through different parts of the plant, depending upon the source and the level of contamination.

## 1.11.6 Waste Production and Management

### 1.11.6.1 Construction Wastes

During the construction phase a waste management area will be constructed to handle and segregate wastes prior to reuse, recycling or disposal. These wastes will be segregated by type and toxicity. The wastes will be stored in accordance with Australian standards and will be covered and banded, where appropriate.

A review of waste disposal options is currently underway. Wastes that are not reused, recycled or managed on site will be disposed of at an appropriately licensed facility, discussed further in the Waste Management section, discussed further in Section 1.11.6.3.



### 1.11.6.2 Operation Wastes

Wastes generated during the operations phase will be mainly related to spent process chemicals and consumables. Relatively minor quantities of “domestic” wastes will be generated after the completion of construction activities due to the significant reduction in onsite personnel. A waste management area is proposed for the operational phase, which will operate as described in this section.

Recyclable materials generated during the operations phase consist mainly of ferrous and non-ferrous scrap metal. Decontaminated inert wastes, such as ceramic balls and molecular sieves, form a significant portion of wastes that are uneconomic to recycle.

Controlled wastes during the operations phase will include a range of process chemicals and materials. These wastes will be appropriately transported (by a licensed carrier) for disposal at a facility licensed to handle controlled wastes.

### 1.11.6.3 Waste Management

Waste management in the Pilbara region is currently limited to:

- Shire operated Class II landfill disposal. Shire operated Class II landfills are generally unlined landfills that can accept inert wastes, putrescible wastes, compostable organics, bio-solids and certain special wastes, such as clinical waste. Class II landfills cannot accept controlled waste. Chevron is not intending to use these sites
- Transport of waste to Perth for recycling, treatment and/or disposal
- Disposal of waste to private, third-party, waste management service providers.

All solid wastes generated offshore during construction and operations will be transported to shore for onshore disposal. The only exception to this would be putrescibles organic matter and sewage. These will be treated in accordance with MARPOL requirements.

### 1.11.6.4 Local Facilities

A landfill south of the main town of Onslow was described as “nearing the end of its operational life” in the 2003 Onslow Structure Plan. Since this time, the Shire of Ashburton has employed consultants to identify new sites for a potential landfill. These sites are currently undergoing further investigation. Chevron will review the preferred location and construction of the planned landfill to determine if it is appropriate for use for the Project.

## 1.12 Environmental Risk Assessment and Management

### 1.12.1 Overview

The Pilbara region is environmentally varied and sparsely populated. It is characterised by a tropical/arid climate. To assess the existing marine, terrestrial and social environments of the Project area, a variety of detailed scientific surveys and studies have been undertaken. The information collected has provided a baseline with which to inform the assessment of potential impacts to marine, terrestrial and socio-economic and cultural environments resulting from Project development. Following guidance from the EPA, a risk assessment was conducted on each relevant aspect for each of the environmental factors (where applicable).

The impact assessment methodology undertaken during the assessment process provides a robust process for:

- Identifying potential interactions and impacts
- Predicting the consequence of an impact
- Predicting the likelihood of the consequence occurring
- Determining the potential level of inherent risk
- Developing mitigation and/or management measures
- Determining the potential level of residual risk
- Monitoring and reporting the effectiveness of the proposed mitigation measures.

A number of factors, identified during Scoping, were considered for marine, terrestrial and socio-economic and cultural environments. The sections below identify the residual risk, as defined in the draft EPA guidance, for each factor and discuss the predicted environmental outcome.

Risk-assessment summary tables can be found at the end of this Executive Summary. These detail the risk rankings assigned to each aspect and factor for both the construction and operations phase of the Project. They include a summary of potential impacts, mitigation and management measures and relevant assumptions. For details on the risk ranking procedure, including consequence and likelihood definitions specific to each factor, refer to Chapter 7, *Impact Assessment Methodology* and the relevant impact assessment chapters.

It should be noted that proposed Outcome-based Conditions (OBCs) have been developed for those factors assessed as either having a high residual risk, or which otherwise have a high conservation value. A set of Statutory Environmental Management Plans

(EMPs) will be finalised to demonstrate to the EPA and Department of the Environment Water Heritage and the Arts (DEWHA) how Chevron and its contractors will maintain an acceptable standard of environmental performance in areas of medium or high risk throughout the Project. Also, prior to Project construction, a set of Subsidiary EMPs will be developed for relevant work scopes and activities, which detail the specific mitigation measures and management actions which will be implemented to limit Project related impacts.

## 1.12.2 Marine Risk Assessment and Management

### 1.12.2.1 Water and Sediment Quality

The Australian and New Zealand Environment and Conservation Council and Agriculture and Resource Management Council of Australia and New Zealand (ANZECC/ARMCANZ) guidelines criteria for turbidity may be exceeded in nearshore waters during dredging and construction. Turbidity related to construction of the MOF and PLF may result in the persist during and possibly for a few hours after an activity.

Areas around the PLF and the MOF will be subject to ongoing disturbance and may be unable retain the requirements necessary to sustain a high Level of Environmental Protection (LEP) as defined by the Pilbara Coastal Water Quality Consultation Outcomes. It is proposed that a Moderate LEP be assigned to the nearshore and the offshore dredge material placement site D which occurs in State Waters. It is also proposed that a Moderate LEP be assigned to the waters within 1 km of the Project's nearshore infrastructure. It is further proposed that a Low LEP (200 radius mixing zone) be assigned to the discharge locations, one near the PLF, the other offshore in 20 m depth of water (note that the location of outfalls is indicative at present).

A minor increased load of nitrogen and phosphorus from the nearshore outfall is anticipated and unlikely to result in significant eutrophication effects to coastal waters. A substantially increased load of nitrogen and phosphorus from the offshore outfall is anticipated, although the relative increase offshore is minimal given the high natural background turnover in the open ocean. Water quality criteria including salinity, dissolved oxygen, temperature, nitrogen and phosphorus are predicted to remain close to background levels outside of the designated mixing zones and in accordance with related ANZECC Guidelines. The residual risk from the Project to water and sediment quality has been assessed as High.

### 1.12.2.2 Benthic Primary Producer Habitat

No reefs or shoals will be destroyed by the dredging program; the habitat 'hard substratum' will remain intact. Most coral reefs in the Project area are not predicted to suffer discernible levels of damage. However, up to 50 per cent of corals at Saladin Shoal, End-of-channel Shoal and a small reef northwest of Ward Reef, which are located closest to the dredge footprint, may suffer mortality. These impacts are unlikely to recover within five years. Nevertheless, recovery in the long term is highly likely because many adult coral colonies will survive and larvae will continue to arrive from unaffected source reefs up-current. Severe coral damage, defined as damaged coral assemblages unlikely to recover within five years, will be restricted to reefs and shoals closest to the dredge footprint.

Small reductions in the abundance and distribution of seagrasses is also anticipated, although rapid recovery is predicted once the dredging program ceases. A moderate proportion of the macroalgae dominated habitat in the Project area is predicted to be severely damaged as a results of the dredging campaign, but recovery is predicted in the long term. This habitat is widespread throughout the region. The construction of the Project plant and access road will result in the loss of intertidal algal mats and samphire habitat from the Hooley Creek ecosystem. The residual risk from the Project to BPPH has therefore been conservatively assessed as High.

### 1.12.2.3 Marine Fauna

Humpback Whales, Dugongs, dolphins, sawfishes, marine turtles and other threatened and migratory species are known to occur, at least seasonally, in the Project area. However, it is highly unlikely that Project activities will have a measurable effect on local populations of these taxa. No critical habitat for threatened or migratory species occurs in the Project area and thus critical habitat will not be directly and permanently impacted by Project activities. Indirect impact to some seagrass beds, potential feeding grounds for Dugongs, is predicted, but disturbance will be temporary and recovery rapid after the cessation of dredging. Although some activities, such as dredging and piling, are likely to result in the disturbance of individuals of some species, these activities will not result in population levels impacts. Light spill modelling suggests that turtles will not be deterred from nesting on islands in the vicinity of the Project. Some nesting turtles may be displaced from the lower-dune area to the higher-dune area of the Ashburton River Delta beach, although nesting productivity is unlikely to be affected. The residual risk from the Project to marine fauna has therefore been assessed as Medium.

#### 1.12.2.4 Coastal Processes

Although coastal processes hold no specific conservation value on their own, impacts causing change in coastal processes have the potential to impact the conservation values of nearby mangrove and algal mat communities. The main risks to coastal processes will result from the installation or nearshore and onshore coastal infrastructure. The proposed MOF breakwaters will interrupt the wave-driven alongshore sediment transport pathways, enhancing local shoreline variability and requiring sand management. In the long term, accretion is expected on the western side of the MOF breakwaters, but the direction of transport reverses slightly during winter months. In addition, tropical cyclones may transport large volumes of sediment in either direction. The change in sediment transport is expected to slow the recovery of beaches between the MOF and Beadon Creek after an erosion event, most likely caused by a tropical cyclone. The residual risk from the Project to coastal processes has therefore been conservatively assessed as Medium.

### 1.12.3 Terrestrial Risk Assessment and Management

#### 1.12.3.1 Soils and Landforms

The implementation of appropriate avoidance and management measures during construction and operational earthworks reduces the risks associated with exposure of PASS, such as acidity and mobilisation of heavy metals, and the occurrence of soil erosion. Potential spills and leaks are also considered to pose a low risk; they would be rapidly detected and minor, resulting in localised consequences only. The residual risk from the Project on soils and landforms is Low.

#### 1.12.3.2 Groundwater

Impacts to groundwater may occur from seepage of decant (seawater) from the onshore dredge placement area if the preferred option for disposal of dredge material offshore is not undertaken. The predicted impacts to the water table environment are local effects that are not likely to substantially propagate beyond the processing facility footprint. The residual risk from the Project on groundwater is Medium.

#### 1.12.3.3 Surface Water

There is a potential for impacts to surface water to occur through increased sediment loads and seepage water volume to drainage lines and creeks during construction earthworks, onshore dredge material placement (should this option be undertaken) and thereafter from unstable landforms. To mitigate these risks, a number of engineering solutions have been proposed. The predicted impacts to the surface water environment linked to Project are local

effects that should not propagate beyond the sub-catchments of the Ashburton River Delta. With the inclusion of the risks associated with the potential onshore dredge placement option, the Project poses a Medium level of residual risk.

#### 1.12.3.4 Flora and Vegetation

The residual risk from the Project on flora and vegetation is Medium, which is strongly based on the clearing of approximately 3100 ha of vegetation (maximum clearance scenario). A proportion of this will be rehabilitated immediately after completion of construction of the domgas pipeline. Approximately 546 ha of vegetation with high local conservation significance will be cleared. Disturbance of three known Priority 3 species (*E. forrestii* subsp. *viridis*, *A. flabelliformis* and *T. echinata*) may be necessary. Flora and vegetation present in the Project area are generally widespread and well represented in the surrounding region.

#### 1.12.3.5 Terrestrial Fauna

Six threatened fauna species or signs of these species were recorded within the study area. However, these are all highly mobile (with the exception of the Western Pebble-mound Mouse) and it is expected that the majority of individuals will move away from the Project area at the commencement of the construction phase. No species listed under the EPBC Act (Cth) are likely to be affected by the Project and it is considered highly unlikely that the conservation status of any fauna species will be affected.

The Project will require the “maximum-clearance-scenario” clearing of up to 3100 ha of terrestrial fauna habitat, a proportion of which will be rehabilitated immediately after completion of construction of the domgas pipeline. Removal of suitable habitat is likely to be the main impact on the six threatened terrestrial fauna species recorded within the Project area. All of the terrestrial fauna habitats to be cleared in the Project area are well represented in the locality and wider region, and are not of elevated conservation significance. The Project is therefore considered to have an overall Low residual risk to terrestrial fauna.

#### 1.12.3.6 Subterranean Fauna

Due to the absence of troglifauna, and the low likelihood of any communities being present, the Project will not have any impact upon their populations. Disturbance to stygofauna is not expected to have an impact to species on a population level and it is unlikely that any stygal species would be restricted to the Project area. The residual risk from the Project to subterranean fauna is Very Low.

#### 1.12.3.7 Air Quality

The location for the proposed processing facility is currently being considered as a potential 'processing hub' and, as such, there is the potential for additional gas processing facilities to be located at the Ashburton North SIA. Modelling was conducted to provide an indication of the reasonably foreseeable potential ground-level concentrations of pollutants with these additional gas processing facilities. Normal and non-routine emissions from the proposed Project operations are not expected to cause any significant air quality impacts within the study area. It is also not expected that any of the pollutants studied will exceed the relevant air-quality standards. Being mindful that further scientific work is required to determine uncertainties for modelling depositions, it is also determined that the deposition of NO<sub>2</sub> from the proposed gas processing facility would be insignificant. No discernable impacts on identified receptors are expected.

After the implementation of controls and with consideration of mitigating factors, the impacts from dust are likely to affect the surrounding environment on a very localised scale, primarily during the site vegetation clearance activities during site preparation. The residual risk from the Project to air quality is Low.

#### 1.12.4 Social Risk Assessment and Management

##### 1.12.4.1 European Cultural Heritage

There will be some Project impacts on European cultural heritage as a result of construction activities. However, all impacts on European cultural heritage sites and artefacts will be managed in accordance with relevant legislative requirements and the Old Onslow Townsite (3444) Development Impact Mitigation Plan, the provisions of which will be prepared in consultation with the Heritage Council of WA, the Shire of Ashburton and the Western Australian Maritime Museum.

##### 1.12.4.2 Aboriginal Cultural Heritage

There will be some impacts on Aboriginal cultural heritage values due to disturbance of certain identified Aboriginal heritage sites. Chevron will manage all impacts to these sites and any future impacts on Aboriginal cultural heritage values with the objective that any such impacts do not breach the *Aboriginal Heritage Act 1972* (AH Act [WA]). This may include obtaining all necessary Section 18 Notices. These measures will be undertaken with the objective of meeting the environmental protection objective for Aboriginal heritage.

##### 1.12.4.3 Local Fishing and Pearling

The Project will affect only a small proportion of the available commercial and recreational fishing areas in the region. Target fish species are well-represented in the region and permanent changes as a result of the Project should have negligible effect on fish abundance. Some impacts, such as those resulting from dredging or temporary exclusion zones, will only occur for a relatively short period of time. Other impacts, such as permanent exclusion zones around the LNG Plant, Multi User Facilities and Common User Infrastructure, will have an ongoing effect in the area. However, the effect should be localised.

There is potential for recreational fishing by the Project workforce to impact on commercial and recreational fishing in the area. There may also be permanent loss of access to Hooley Creek, a valued recreational fishing area. Even though it is a small area and there are numerous alternatives, it is culturally important to the Onslow community and tourists.

Overall, there is likely to be some disturbance to recreational use of the marine environment and there is likely to be some reduced access to valued recreational fishing areas. However, similar and superior recreational fishing locations exist in the area and pursuit of the sport remains viable. It is possible there will be some impacts on commercial fishing. However, Chevron will liaise with holders of commercial fishing licenses to manage any impacts identified. The residual risk from the Project on local fishing and pearling is Medium.

##### 1.12.4.4 Disturbance to Other Recreational Use

There will be some disturbance to other recreational use through exclusion zones, changed access, and minor impacts on tourist accommodation. However, similar recreational locations exist in the area and all current recreational activities can continue. In addition, there may be some additional recreation opportunities created through social investment funding.

The Project itself will have a limited direct and permanent impact on tourist accommodation. It is possible that the Project will induce impacts on tourist accommodation and hence affect the ability of tourists to enjoy the area for recreation. However, if this occurs it will be an indirect impact beyond the scope of Chevron's responsibility.

The residual risk from the Project on disturbance to other recreational use is Medium.

1.12.4.5 Public Amenity

Public amenity refers to how noise emissions, air emissions and visual impacts (including light emissions) impact on the amenity of a local area and affect the sense of well-being and quality of life of the community. For the purposes of this assessment, 'public' and 'community' includes Onslow residents, campers, tourists, other recreational users and nearby commercial land users. The overall residual risk from the Project on public amenity related to air emissions, noise emissions and visual impacts is Low.

Public Amenity: Noise

Noise from construction activities, including noise from activities such as earth moving and vehicle movements, is predicted to fall below guideline values. It is possible, but unlikely, that noise from pile driving could occasionally exceed noise levels at Onslow because its hammering sound is more intrusive than other noises. During operations, noise is only likely to be heard on a very localised and short-term scale and it is unlikely noise levels will be exceeded at Onslow. Noise will be managed as part of the Construction Environmental Management Plan (CEMP) and the Operations Environmental Management Plan (OEMP) and comply with government regulations. The residual risk from the Project on public amenity related to noise is Low.

Public Amenity: Air Emissions

Air emissions will generally consist of dust from vehicle movements and ground clearance, emissions from construction equipment, combustion of fuel gas in the gas turbines and flaring during upset or emergency conditions. The results of an air modelling assessment show that even under worst-case conditions air quality levels do not exceed guideline values. Air emissions will be managed as part of the CEMP and OEMP. The residual risk from the Project on public amenity related to air emissions is Low.

Public Amenity: Visual Impacts

The likelihood of changes to the visual character of the Project area is almost certain, due to the size of the facility. Table 1.1 lists the scale of the change at each viewpoint. A residual risk rating has not been assigned due to the subjective nature of values associated with visual amenity.

The offshore area that will be affected by the Project is very distant from any human settlements, and the gas-production facility would only be visible to passing ships. Under normal operating conditions at night, the onshore facility will be seen from Onslow as a dull glow on the horizon. Flaring events may be more visible but will occur infrequently, and the PLF and MOF will have low levels of illumination. A residual risk rating has not been assigned due to the subjective nature of values associated with visual amenity.

1.12.4.6 Health and Wellbeing

There is no statutory requirement to assess environmental outcomes on health and well-being in the EIS/ERMP. However, the Project's potential impacts on the health and well-being of the community will be assessed separately and will be evaluated by the Department of Health (DoH) and relevant experts facilitated through the DoH. In addition, Chevron will prepare safety cases for offshore, onshore and pipeline facilities and conduct qualitative and quantitative risk assessments of potential health and safety impacts to the public that could be posed by the Project. The Project will meet all legislative requirements and EPA guidelines relating to management of safety risks.

Table 1.1: Scale of Change to Visual Amenity

Viewpoint	Scale of Change
Ten Mile Dam South accommodation village area	Negligible
Ashburton River campsite	Minor
Old Onslow Cemetery	Moderate
Four Mile Creek beach	Moderate
Four Mile Creek river mouth	Minor
Nearshore recreational fishing area	Moderate
Onslow town; Simpson Street	Negligible

### 1.13 Hydrocarbon Leaks and Spills

A condensate and diesel leak and spill impact assessment was conducted for the Project. Hydrodynamic modelling determined the probability of released hydrocarbons reaching sensitive receptors such as mangroves and turtle nesting beaches for a variety of potential scenarios. The severity of the resulting impact is determined largely by the location of the leak or spill relative to the receptors, characteristics of the hydrocarbons, mitigation and the range of possible environmental conditions such as currents, wind and temperature and the relative sensitivity of a receptor. Factors identified to be most sensitive are BPPH and Marine Fauna. However, while the impacts can be severe, the overall risk is greatly diminished by the very low probability of a major hydrocarbon leak or spill occurring. Even if a leak or spill occurred, it is expected that the majority of any released condensate or diesel would evaporate within approximately 48 hours. A number of design features and management measures proposed provide a high capacity for prevention and containment.

An assessment was conducted to examine the risk to different facets of the marine and terrestrial environment from a potential rupture of LNG processing facilities or storage tank failure. Since LNG is odourless, colourless, non-combustible, non-corrosive and non-toxic, it will not pollute land or water resources. If it is spilled, either on land or water, it will form a pool and vaporize rapidly, dissipating into the atmosphere with no residual trace, although there is the potential for a flammable vapour cloud to form that would pose the risk of fire or explosion if it comes in contact with an ignition source. Due to the safety implications of such events there are multiple controls in place to ensure that the potential for a release of LNG is extremely remote. A detailed assessment of the potential risk of a failure will be undertaken as part of the Facility Safety Case, which will be completed prior to the commencement of operations. The proposed controls that will be incorporated into the design to mitigate against a release will be provided in the supplement to the EIS/ERMP.

### 1.14 Cumulative Impacts

A cumulative assessment was undertaken on the environmental and social factors examined in the Draft EIS/ERMP. The approach was via qualitative analysis and discussion, although quantification of air emissions and terrestrial footprint was included in the evaluation of cumulative effects where known, and therefore risk rankings were not undertaken. Table 1.2 shows the past, present and reasonably foreseeable future actions that were included.

The development of the Project as a 25 MTPA multi-train LNG facility reduces the potential requirement for future expansion of Chevron's gas-processing facilities in the Ashburton North SIA. In addition, the development of the Project as an LNG hub will lessen the need for future LNG-related port developments in the Pilbara. Therefore, the potential for future cumulative impacts not included in this assessment is reduced. Cumulative effects arising from the Project and other actions included in this assessment are considered to be either not significant or manageable through the incorporation of appropriate mitigation measures. This includes environmental and social factors, which incorporate the Ashburton Delta mangrove system, offshore island ecological communities, significant local coral reef assemblages and air-shed quality.

## 1.15 Wheatstone Environmental Management Program

### 1.15.1 Overview

The Wheatstone Environmental Management Program is structured into three tiers of management which reflects the cascading but interconnected nature of documentation required for Chevron to meet its environmental obligations. Figure 1.8 illustrates the hierarchy of management in the Wheatstone Environmental Management Program.

Tier 1 of the program comprises Chevron Corporation's OEMS as well as Chevron's ABU Policy 530 which is central to the implementation of the OEMS in Australia.

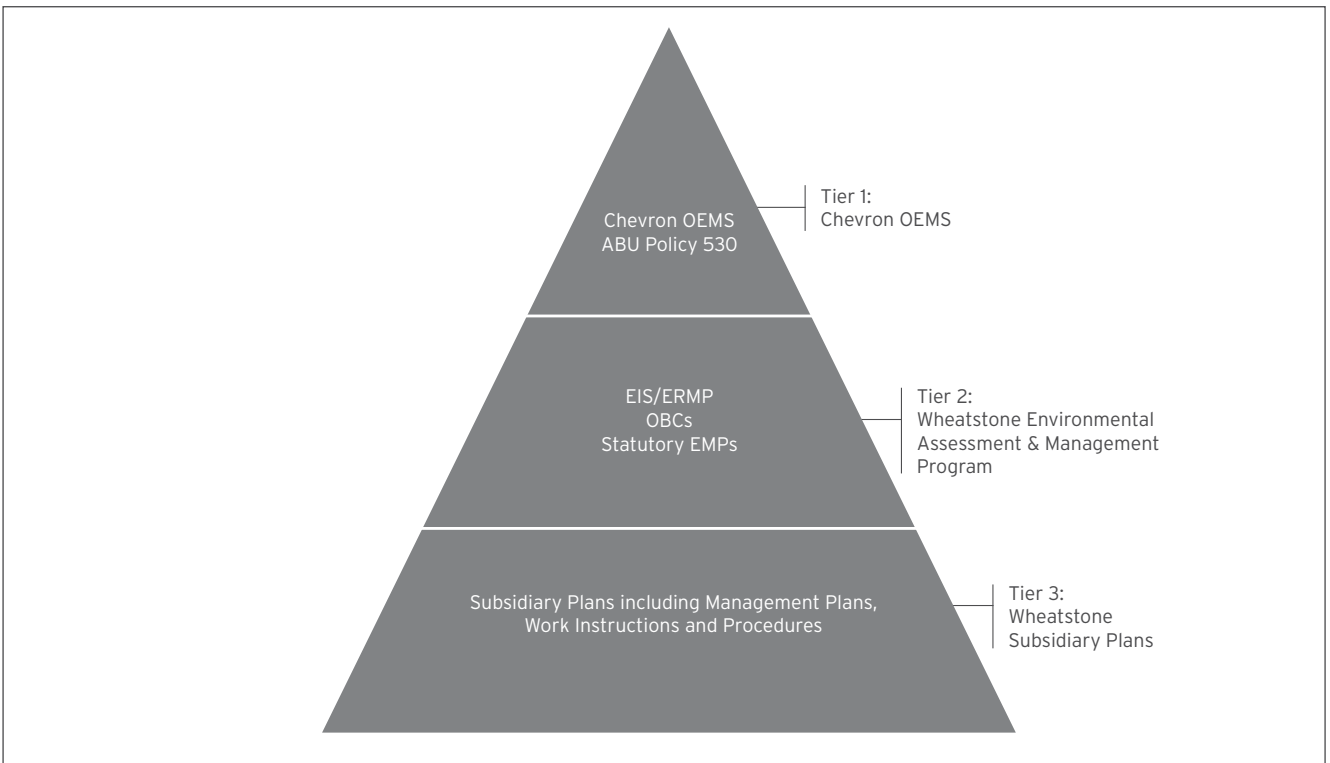
Tier 2 of the Environmental Management Program comprises a set of OBCs and associated Statutory EMPs. The list of proposed Statutory EMPs is based on regulatory triggers from the EP Act (WA), EPBC Act (Cth), or the specific project guidelines that have been approved by the EPA and DEWHA for this Project.

Tier 3 comprises a set of Subsidiary Plans which are defined as those environmental plans which are required by and/or impose relevant legal obligations on Chevron under legislation, but are not legally binding under the Ministerial Approvals of the EIS/ERMP. Management plans which are required for Chevron internal purposes but which are not legally binding in their own right are also included in the list of Subsidiary Plans. Subsidiary Plans will not be submitted for Ministerial Approval with the EIS/ERMP.

Key Western Australian and Commonwealth legislation relating to onshore, nearshore (State waters) and offshore (Commonwealth waters) components of the Project have been considered in developing Tier 3 of the Environmental Management Program.

**Table 1.2: Projects (Actions) Considered for Cumulative Assessment**

Development	Description
Wheatstone Project	Proposed 25 MTPA LNG plant, offshore infrastructure and associated development
BHP Billiton / Apache Macedon Gas Development (Macedon)	Proposed 200 million standard cubic feet per day (MMscfd) domestic gas (domgas) plant and offshore infrastructure
Exxon Mobil / BHP Billiton Scarborough (North West Shelf) Pilbara LNG Processing Plant (Scarborough)	Proposed 6 MTPA LNG plant, possibly with additional trestle and LNG tanker berth, and offshore infrastructure
Thevenard Island Facilities	Existing hydrocarbon production and storage facility
Tubridgi Gas Field and Griffin Gas Plant	Discontinued field 36 km <sup>2</sup> in area and two discontinued gas plants designated for removal
Onslow Salt 2.5 MTPA	2.5 MTPA, currently operating and producing salt from 8000 ha of salt ponds
Pastoral Leases	Existing Urala and Minderoo pastoral leases within the cumulative assessment study area
Commercial Fisheries	Primarily restricted to the existing inshore prawn fishery off Onslow
Recreational Fisheries	Currently conducted by local residents and visitors in coastal and nearshore areas
Onslow Town	Existing community of 600 to 900 people located 12 km from the Project



**Figure 1.8: Wheatstone Environmental Management Program**

**1.15.2 Proposed Outcome-based Conditions**

Proposed OBCs have been developed for those factors assessed as either having a high residual risk, or which otherwise have a high conservation value. Matters of NES, where different from WA-defined environmental factors, were also assessed using this approach. Chevron acknowledges that final content for any OBC for the Project will be determined by the WA Minister for the Environment.

To support the achievement of predicted environmental outcomes, each OBC, with the exception of OBC 7: Operational Marine Water and Sediment Quality Protection, is linked to an associated Statutory EMP, which are proposed for EPA review and DEWHA review/approval.

Table 1.3 lists the OBCs, and associated EMPs, that are proposed for the Project.

**1.15.3 Proposed Statutory EMPs**

The purpose of Statutory EMPs is to demonstrate to the EPA and DEWHA how Chevron and its contractors will maintain an acceptable standard of environmental performance in areas of medium or high risk throughout the Project. Statutory EMPs will set out the overarching objectives, strategies, performance criteria and relevant external guidance documents (such as EPA guidance statements) for all subsequent subsidiary plans.

This approach will also streamline the EMP review and approval process by providing EPA and DEWHA with fewer documents which require regulatory approval, without

reducing the level of confidence that the Project will successfully manage its environmental risks.

A summary of proposed Statutory EMPs developed/to be developed for the Project is provided in Table 1.4.

**1.15.4 Subsidiary Plans**

As planning and design associated with construction, commissioning, operations, and decommissioning phases are finalised, a set of additional or Subsidiary Plans are likely to be required for the implementation of the Project. Subsidiary Plans may include:

- Environmental plans which are required under legislation and/or impose relevant legal obligations on Chevron, but are not legally binding under the Ministerial Approvals of the EIS/ERMP.
- Management plans which are required for Chevron internal purposes but which are not legally binding in their own right.

Subsidiary Plans will be developed to satisfy regulatory requirements other than the EP and EPBC Acts, such plans will be submitted for regulatory approval to the relevant agencies independent of the submission of the EIS/ERMP.

Subsidiary Plans developed for internal purposes will manage environmental risks specifically related to the Project's various works programs. Such plans will contain relevant policies, processes and work procedures agreed to between Chevron and its contractors with the intention that practicable environmental management measures are implemented and monitored for their effectiveness.

**Table 1.3: Proposed Outcome-based Conditions**

#	Proposed Outcome-based Condition	Proposed Statutory Plan
1	Coastal Processes Protection	<i>Coastal Processes Management Plan</i>
2	Mangrove and Estuarine Habitat Protection	<i>Construction Environmental Management Plan</i>
3	Benthic Primary Producer Habitat Protection	<i>Dredge Spoil and Disposal Management Plan</i>
4	Marine Fauna Protection	<i>Marine Fauna Management Plan &amp; Dredge Spoil and Disposal Management Plan</i>
5	Terrestrial Flora and Vegetation Protection	<i>Construction Environmental Management Plan</i>
6	Terrestrial Fauna Protection	<i>Construction Environmental Management Plan</i>
7	Operational Marine Water and Sediment Quality Protection	N/A



Table 1.4: Statutory EMPs

Plan	Purpose	Draft
Marine Fauna Management Plan (MFMP)	The purpose of the MFMP is to reduce the risk of potential Project-attributable impacts to marine fauna as a result of marine based project activities such as nearshore installation (rock placement, piling, pipeline installation) and shipping associated with the Wheatstone Project.	Appendix O6
Dredging and Spoil Disposal Management Plan (DSDMP)	The purpose of the DSDMP is to reduce additional loss of benthic primary producer habitat (BPPH) to that specified in the ERMP for the nearshore coastal waters as a result of Chevron's dredging and spoil disposal operations.	Appendix S1
Coastal Processes Management Plan (CPMP)	The purpose of the finalised CPMP is to reduce potential Project-attributable impacts to coastal processes associated with the placement of project marine infrastructure of the Wheatstone Project.	Appendix T1
Construction Environmental Management Plan (CEMP)	The purpose of the CEMP is to reduce the Project-attributable impacts of onshore construction (vegetation clearing, earthworks, vehicle access) and nearshore installation (rock placement, piling, and shipping) associated with the Wheatstone Project.	Appendix U1
Operations Environmental Management Plan (OEMP)	The purpose of the OEMP is to reduce the Project-attributable impacts of onshore operations and associated activities including, LNG and Domgas production, FIFO operations, vehicle access and product shipping associated with the Wheatstone Project.	To Be Developed
Decommissioning Environmental Management Plan (DEMP)	The purpose of the DEMP is to reduce Project-attributable impacts of all activities associated with the shutdown and decommissioning of the Wheatstone Project at the end of the project lifespan.	To Be Developed

### 1.16 Conclusion

This Project presents the opportunity to provide an alternative and reliable source of LNG to international markets along with an additional secure source of domgas for the local market. The short-term economic benefits of the Project to Australia (employment opportunities and royalties to Government) are significant.

Chevron has prepared the Draft EIS/ERMP in consultation with DEWHA and the Western Australian EPA and in accordance with the EPBC Act (Cth), and the EP Act (WA).

At the request of the EPA, Chevron also agreed to implement a risk-based approach to the environmental assessment of the Project. The objectives and draft methodologies for risk-based EIA, described in the EPA draft guideline *Application of risk-based assessment in EIA 2009*, have been utilised in preparation of this document.

In addition to Commonwealth and State Government guidelines and Chevron corporate standards, the Project has adopted further standards to assist with the development of the EIS/ERMP. More specifically, the Project has applied EPA's recently released *Environmental*

*Assessment Guidelines - No. 4 Towards Outcome-based Conditions, Draft, December 2009.*

Based on the various legislation and guidelines outlined above, outcomes of the EIS/ERMP include the following:

- Given the design features and management measures proposed, it is concluded that the potential impacts associated with the Project will be environmentally acceptable
- The probability of a significant unplanned hydrocarbon release occurring is very low. In this unlikely event, resulting potential environmental impacts on sensitive intertidal habitats could be significant. However, the design features and management measures proposed provide a high capacity for prevention and containment.

In summary, it is concluded that the implementation of the design features, management controls and mitigation measures described within the Draft EIS/ERMP will enable potential significant impacts to environmental, matters of NES, and socio-economic or health aspects to be managed to acceptable levels.

**Table 1.5: Marine Risk Assessment Summary**

For details on the risk ranking procedure, including consequence and likelihood definitions specific to each factor, refer to Chapter 7, *Impact Assessment Methodology* and Chapter 8, *Marine Risk Assessment and Management*. Note that “C” refers to Consequence and “L” refers to Likelihood.

Factor	Phase	Aspect	Potential Impacts	Inherent Risk (from Scoping Document)		Comments/Assumptions (from Scoping Document)	Management and Mitigation Measures		Residual Risk		Comments/Assumptions (Relating to Residual Risk ranking)	Confidence Level and Justification	Potential Impacts to Matters of NES	EIS/ERMP Reference
				C	L		C	L	C	L				
Marine Water and Sediment Quality	Construction	Dredging: Construction dredging of the channel and berthing area.	<ul style="list-style-type: none"> <li>Increased turbidity and light attenuation exceeds water quality targets</li> </ul>	3	3	<ul style="list-style-type: none"> <li>Assumes this activity will result in a reduction in existing water quality</li> <li>The existing nearshore environment is seasonally highly turbid due to inputs from the Ashburton River</li> <li>Offshore water is more characteristic of clear oceanic waters with less turbidity and sedimentation than nearshore waters</li> <li>Potential need for community education regarding visibility of plume versus impact</li> </ul>	<ul style="list-style-type: none"> <li>Refer to DSDMP for complete list of mitigation measures</li> <li>Nearshore infrastructure location has been selected to reduce risks to sensitive water quality receptors where practicable</li> <li>During sediment transport by the Trailing Suction Hopper Dredge (TSHD) and barges, the level of the overflow pipe will be raised to its highest point to reduce the potential for spillage</li> <li>Hopper doors on the TSHD will be well maintained to reduce the potential for sediment loss during transport</li> <li>Well maintained and properly calibrated dredging equipment will be utilised</li> <li>Hopper dewatering will be confined to areas away from sensitive receptors, where reasonably practicable</li> <li>TSHDs will be fitted with a turbidity reducing valve within the overflow pipe</li> <li>Where sensitive receptors are at risk from TSHD dredging operations, restricted overflow may occur</li> <li>Monitor water quality to quantify temporal and spatial scale of impact associated with dredging in relation to baseline data</li> </ul>	4	1	<ul style="list-style-type: none"> <li>Large volumes of sediment to be dredged</li> <li>Dredging campaign duration is 3-4 years</li> <li>Impacts to water quality are predicted to be temporary</li> </ul>	Reasonable Modelling conducted	Not Applicable	Section 8.2 Appendix S1	
				Medium	High									
Marine Water and Sediment Quality	Construction	Dredging: Placement of dredge material nearshore and offshore	<ul style="list-style-type: none"> <li>Increased turbidity and light attenuation exceeds water quality targets</li> </ul>	4	2	<ul style="list-style-type: none"> <li>Dredge material placement sites selected to reduce risks to sensitive water quality receptors</li> <li>Diffusers will be utilised during offshore dredge material placement via the Cutter Suction Dredge (CSD)</li> <li>Fine material will be managed based on experience during the capital dredging program and will include selection of placement locations accordingly. When practicable, material with high fines content will be placed at placement sites in deeper waters</li> </ul>	4	2	<ul style="list-style-type: none"> <li>Large volumes of sediment will be dredged and dredge material placed offshore</li> <li>Dredging campaign duration is 3-4 years</li> <li>Impacts to water quality are predicted to be temporary</li> </ul>	Reasonable Modelling conducted and confirms impact predictions	Not Applicable	Section 8.2		
				Medium	Medium									

<p><b>Marine Water and Sediment Quality</b></p>	<p>Construction</p>	<p>Dredging: Placement of dredge material onshore</p>	<ul style="list-style-type: none"> <li>Increased turbidity and light attenuation due to decant water discharge exceeding applicable water quality targets</li> </ul>	<p>3</p>	<p>Medium</p>	<ul style="list-style-type: none"> <li>The onshore dredged material will be contained in a bunded area to reduce the risk of an unconfined release of seawater and sediments</li> <li>A drainage ditch (with sump and pump system) will be installed to collect and divert seepage away from the Ashburton Delta system</li> <li>Discharge of decant water from the onshore dredge material placement site will be via a controlled point which will include the use of a weir box to manage water height</li> <li>Discharge water will be monitored, with the objective of maintaining the discharge water quality into the nearshore area at a level not in excess of 250 mg/L Total Suspended Solids (TSS). However, this may be refined based on feedback information from monitoring programs</li> <li>Monitoring of decant water discharge will be undertaken with the objective of complying with the maximum turbidity limit of 250 mg/L TSS</li> </ul>	<p>4</p>	<p>2</p>	<p>Medium</p> <ul style="list-style-type: none"> <li>Increased turbidity resulting from decant water release will be temporary</li> <li>Receiving waters for decant water are seasonally turbid (Ashburton River flow and cyclones)</li> </ul>	<p>Not Applicable</p>	<p>Section 8.2</p>
<p><b>Marine Water and Sediment Quality</b></p>	<p>Construction</p>	<p>Nearshore Construction Activities: Construction of product loading facility (PLF) and rock placement for materials offloading facility (MOF) breakwater walls and trunkline trenching and stabilisation</p>	<ul style="list-style-type: none"> <li>Changes to turbidity and light attenuation</li> </ul>	<p>–</p>	<p>Not identified in Environmental Scoping Document</p>	<ul style="list-style-type: none"> <li>Nearshore infrastructure location has been selected to reduce risks to sensitive water quality receptors where practicable</li> <li>Activity will be undertaken in accordance with the CEMP which will be finalized prior to commencement of construction activities</li> <li>A DSDMP specific to trunkline trenching activities will be developed</li> </ul>	<p>6</p>	<p>1</p>	<p>Low</p> <ul style="list-style-type: none"> <li>Localised and temporary impacts on water quality</li> <li>Construction in a seasonally turbid marine environment (Ashburton River flow and cyclones)</li> </ul>	<p>Not Applicable</p>	<p>Section 8.2 Appendix U1</p>
<p><b>Marine Water and Sediment Quality</b></p>	<p>Construction</p>	<p>Nearshore Construction Activities: Nearshore trunkline trenching and stabilisation</p>	<ul style="list-style-type: none"> <li>Changes to turbidity and light attenuation</li> </ul>	<p>–</p>	<p>Not identified in Environmental Scoping Document</p>	<ul style="list-style-type: none"> <li>Refer to DSDMP for complete list of mitigation measures</li> <li>Trunkline route location has been selected to reduce risks to sensitive water quality receptors where practicable</li> <li>Use graded rock material with reduced fines content</li> </ul>	<p>4</p>	<p>2</p>	<p>Medium</p> <ul style="list-style-type: none"> <li>Impacts to water quality have been modelled conservatively due to uncertainty in dredging methodology</li> </ul>	<p>Not Applicable</p>	<p>Section 8.2 Appendix S1</p>

Factor	Phase	Aspect	Potential Impacts	Inherent Risk (from Scoping Document)		Comments/ Assumptions (from Scoping Document)	Management and Mitigation Measures		Residual Risk		Comments/ Assumptions (Relating to residual risk ranking)	Confidence Level and Justification	Potential Impacts to Matters of NES	EIS/ERMP Reference
				C	L		C	L	C	L				
Marine Water and Sediment Quality	Construction	Nearshore Construction Activities: Trunkline shore crossing by trenching	<ul style="list-style-type: none"> <li>Changes to turbidity and light attenuation</li> </ul>	-	-	Not identified in Environmental Scoping Document	<ul style="list-style-type: none"> <li>Activity will be undertaken in accordance with the CEMP which will be finalized prior to commencement of construction activities</li> <li>Use graded rock material with low fines content</li> </ul>	5	1	Medium	<ul style="list-style-type: none"> <li>Disturbance of the Ashburton East lagoon floor and adjacent seafloor will result in temporary elevated turbidity levels</li> </ul>	Reasonable Survey data available and information is adequate.	Not Applicable	Section 8.2 Appendix U1
								6	2	Low				
Marine Water and Sediment Quality	Construction	Nearshore Construction Activities: Trunkline shore crossing by microtunnelling	<ul style="list-style-type: none"> <li>Changes to turbidity and light attenuation</li> </ul>	-	-	Not identified in Environmental Scoping Document	<ul style="list-style-type: none"> <li>Trunkline shore crossing to be installed through microtunnelling</li> <li>Activity will be undertaken in accordance with the CEMP which will be finalized prior to commencement of construction activities</li> </ul>	4	3	Low	<ul style="list-style-type: none"> <li>Vessels will comply with the requirements of AQIS</li> </ul>	High Available information is adequate.	Not Applicable	Section 8.2
								5	2	Low				
Marine Water and Sediment Quality	Construction	Discharges from Onshore Construction: Construction discharges from the accommodation village, stormwater run-off and reverse osmosis brine.	<ul style="list-style-type: none"> <li>Exceedence of applicable water quality targets outside the mixing zone</li> </ul>	-	-	Not identified in Environmental Scoping Document	<ul style="list-style-type: none"> <li>All vessels under the control of the Proponent will comply with the International Convention on the Control of Harmful Anti-fouling Systems on Ships as monitored by Australian Quarantine and Inspection Service (AQIS)</li> <li>Activity will be undertaken in accordance with the CEMP which will be finalized prior to commencement of construction activities</li> <li>Nearshore discharge locations have been selected to reduce risks to sensitive water quality receptors</li> <li>Manage discharges by taking into account the threshold limits of the ANZECC/ARMCANZ guidelines</li> <li>Diffuser designed to optimise the dilution of the discharge within the marine environment.</li> <li>Mixing zone boundaries to be established and monitoring to achieve applicable water quality targets at mixing zone boundary</li> </ul>	5	2	Low	<ul style="list-style-type: none"> <li>The use of a diffuser to increase rapid dilution</li> <li>Construction discharges will be temporary</li> </ul>	Reasonable to Low Available information is adequate to inadequate	Not Applicable	Section 8.2 Appendix U1
								5	2	Low				

<p><b>Marine Water and Sediment Quality</b></p>	<p>Construction</p>	<p>Discharges from Offshore Construction</p>	<ul style="list-style-type: none"> <li>Exceedence of applicable ANZECC/ARMCANZ guidelines through discharge of drill cuttings and muds, sewage from vessels and hydrotest water</li> </ul>	<p><b>Low</b></p> <ul style="list-style-type: none"> <li>The risk assessment assumes potential of outfall line discharge to sea, which may include produced water (PW) and the potential for discharge of PW from platforms</li> <li>This assessment also assumes that the discharge into the environment will meet minimum standards. Assessment considered the size of the development (ultimate 25 MTPA plant), its operational life and potential for significant quantities of discharge</li> </ul>	<ul style="list-style-type: none"> <li>Compliance with Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009 as they apply from time to time</li> <li>Treatment in compliance with the International Convention for the Prevention of Pollution from Ships (MARPOL 73/78, Annex IV)</li> <li>Controlled release of hydrotest water to reduce the risk of toxicity impacts</li> </ul>	<p>4</p>	<p>3</p>	<p><b>Low</b></p>	<ul style="list-style-type: none"> <li>Discharges from offshore construction will comply with relevant Conventions and Regulations (Compliance with Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009, MARPOL)</li> <li>Construction discharges will be temporary</li> </ul>	<p>High</p> <p>Long term monitoring results available (from similar projects)</p>	<p>Not Applicable</p>	<p>Section 8.2</p>
<p><b>Marine Water and Sediment Quality</b></p>	<p>Operations</p>	<p>Maintenance Dredging</p>	<ul style="list-style-type: none"> <li>Increased turbidity and light attenuation exceeds water quality targets</li> <li>Mobilisation of contaminants during dredging leads to an exceedence of standards</li> </ul>	<p><b>Medium</b></p> <ul style="list-style-type: none"> <li>Assumes this activity will result in a reduction in existing water quality</li> <li>The existing nearshore environment is seasonally highly turbid due to inputs from the Ashburton River</li> <li>Offshore water is more characteristic of clear oceanic waters with less turbidity and sedimentation than nearshore waters</li> <li>Potential need for community education regarding visibility of plume versus impact</li> </ul>	<ul style="list-style-type: none"> <li>Surveys will be undertaken to confirm natural turbidity and sedimentation rates and contamination levels</li> </ul>	<p>5</p>	<p>3</p>	<p><b>Low</b></p>	<ul style="list-style-type: none"> <li>The predicted maintenance dredging volumes are low for the proposed life of the Project</li> <li>Maintenance dredging is predicted to be short term</li> </ul>	<p>Low</p> <p>No survey data</p> <p>No model verification possible at this time.</p>	<p>Not Applicable</p>	<p>Section 8.2</p>

Factor	Phase	Aspect	Potential Impacts	Inherent Risk (from Scoping Document)		Comments/ Assumptions (from Scoping Document)	Management and Mitigation Measures		Residual Risk		Comments/ Assumptions (Relating to Residual Risk ranking)	Confidence Level and Justification	Potential Impacts to Matters of NES	EIS/ERMP Reference
				C	L		C	L	Ranking					
Marine Water and Sediment Quality	Operations	Release of NORM	<ul style="list-style-type: none"> <li>Accumulated NORM in onshore process filters which may cause contamination</li> </ul>	-	-	Not identified in Environmental Scoping Document	<ul style="list-style-type: none"> <li>Use of a scale inhibitor to manage build-up of scale (and therefore naturally occurring radioactive material (NORM))</li> <li>An approved NORM Management Plan will be developed on identification of NORM</li> <li>Management and disposal of NORM in accordance with the Guidelines for the management of NORM in the oil &amp; gas industry (International Association of Oil and Gas Producers 2008)</li> </ul>	4	5	Very Low	<ul style="list-style-type: none"> <li>Where present, NORM will be managed to the required standards</li> </ul>	High Available information is adequate	Not Applicable	Section 8.2
								4	3	Low				
Marine Water and Sediment Quality	Operations	Vessel Movements	<ul style="list-style-type: none"> <li>Accumulation of anti-fouling paints in marine sediments.</li> </ul>	-	-	Not identified in Environmental Scoping Document	<ul style="list-style-type: none"> <li>All vessels under the control of the Proponent will comply with the International Convention on the Control of Harmful Anti-fouling Systems on Ships as monitored by AQIS</li> </ul>	4	3	Low	<ul style="list-style-type: none"> <li>Vessels will comply with the requirements of AQIS</li> </ul>	High Available information is adequate.	Not Applicable	Section 8.2
								5	2	Low				
Marine Water and Sediment Quality	Operations	Discharges from Onshore Operations: Nearshore discharge of wastewater, process wastewater, contact stormwater and RO brine	<ul style="list-style-type: none"> <li>Exceedence of applicable water quality targets outside the mixing zone</li> </ul>	-	-	Not identified in Environmental Scoping Document	<ul style="list-style-type: none"> <li>Refer to Chapter 12 for Draft OBCs for water quality</li> <li>End of pipe diffuser located at the PLF</li> <li>Manage discharges by taking into account the threshold limits of the ANZECC/ARMCANZ guidelines</li> <li>Mixing zone boundaries to be established and monitoring to achieve applicable water quality targets at mixing zone boundary</li> </ul>	5	2	Low	<ul style="list-style-type: none"> <li>The use of a diffuser to increase rapid dilution</li> </ul>	Reasonable to Low Not all available information is adequate	Not Applicable	Section 8.2 Table 12.10
								4	2	Medium				
Marine Water and Sediment Quality	Operations	Discharges from Onshore Operations: Discharge of PW from the LNG plant	<ul style="list-style-type: none"> <li>Exceedence of the targets for Predicted No Effect Concentration (PNEC) concentration outside the mixing zone</li> </ul>	-	-	Not identified in Environmental Scoping Document	<ul style="list-style-type: none"> <li>Refer to Chapter 12 for Draft OBCs for water quality</li> <li>Selection of outfall location and diffuser design for adequate dilution and dispersion of PW</li> <li>The Proponent will characterise PW, prior to the PW being brought onshore to determine appropriate dilution rates to achieve PNEC, to determine a discharge location and to determine a mixing zone area that is acceptable to the regulatory agencies EPA and DEWHA</li> <li>Diffuser design and size of mixing zone shall take into consideration the agreed target for PNEC</li> <li>Monitor PW concentrations prior to discharge</li> </ul>	4	2	Medium	<ul style="list-style-type: none"> <li>Discharges of PW will be managed to comply with relevant Regulations (Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009)</li> </ul>	Low Available information is inadequate	Not Applicable	Section 8.2 Table 12.10
								4	2	Medium				

Marine Water and Sediment Quality	Operations	Discharges from Offshore Operations	<ul style="list-style-type: none"> <li>Exceedence of targets for PNEC of PW.</li> </ul>	-	Not identified in Environmental Scoping Document	<ul style="list-style-type: none"> <li>Compliance with Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009</li> <li>The Proponent will determine PNEC for PW discharge through ecotoxicity testing and or benchmarking with similar NWS PW</li> <li>Periodic PW discharge testing with full chemical characterisation during operations</li> <li>Monitor PW concentrations prior to discharge</li> </ul>	4	2	Medium	<ul style="list-style-type: none"> <li>Discharges of PW will be managed to comply with relevant Regulations (Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009)</li> </ul>	Reasonable Modelling conducted but calibration shows occasional aberration from occurrences	Not Applicable	Section 8.2
Marine Water and Sediment Quality	Operations	Discharges from Offshore Operations	<ul style="list-style-type: none"> <li>Exceedence of targets for MEG and BTEX in PW during start-ups</li> </ul>	1		<ul style="list-style-type: none"> <li>Diffuser design and size of mixing zone shall take into consideration the target for PNEC</li> <li>Control rate, timing and characteristics of discharge of MEG with the objective of maintaining discharge water quality at a level not in excess of 50 mg/L local to the platform (or an agreed distance from the platform)</li> </ul>	4	1	High	<ul style="list-style-type: none"> <li>Discharges will occasionally exceed PNEC concentrations outside the mixing zone</li> </ul>	Reasonable Modelling conducted	Not Applicable	Section 8.2
Marine Water and Sediment Quality	Operations	Discharges from Offshore Operations	<ul style="list-style-type: none"> <li>Exceedence of targets for Cooling Water (CW)</li> </ul>	2		<ul style="list-style-type: none"> <li>Diffuser design and size of mixing zone shall take into consideration the target for CW plume</li> </ul>	4	2	Medium	<ul style="list-style-type: none"> <li>Discharges of CW will be managed to comply with relevant Regulations (Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009)</li> </ul>	Reasonable Modelling conducted	Not Applicable	Section 8.2
Marine Water and Sediment Quality	Operations	Discharges from Offshore Operations: Discharge of sewage and putrescible organic waste and brine	<ul style="list-style-type: none"> <li>Changes to background water and sediment quality</li> </ul>	3		<ul style="list-style-type: none"> <li>Treatment in compliance with the International Convention for the Prevention of Pollution from Ships (MARPOL 73/78, Annex IV)</li> </ul>	6	3	Very Low	<ul style="list-style-type: none"> <li>Discharges from offshore operations will be managed to comply with relevant Conventions (MARPOL)</li> <li>Rapid uptake of bioavailable nutrients by phytoplankton</li> </ul>	Reasonable Modelling conducted	Not Applicable	Section 8.2

Factor	Phase	Aspect	Potential Impacts	Inherent Risk (from Scoping Document)		Comments/Assumptions (from Scoping Document)	Management and Mitigation Measures		Residual Risk		Comments/Assumptions (Relating to residual risk ranking)	Confidence Level and Justification	Potential Impacts to Matters of NES	EIS/ERMP Reference
				C	L		C	L	C	L				
Marine Water and Sediment Quality	Operations	Leaks and Spills	<ul style="list-style-type: none"> <li>Nearshore leaks and spills entering the marine environment and degrading marine water and sediment quality</li> </ul>	3	4	<ul style="list-style-type: none"> <li>Risk assessment considered a highly mobile, high energy system</li> <li>Risk assessment based on a worst-case accumulation of contaminants in sediments from leaks</li> <li>Intertidal areas considered most sensitive to this impact</li> </ul>	<ul style="list-style-type: none"> <li>A Department of Mines and Petroleum (DMP) approved Marine Oil Pollution Plan (MOPP) will be implemented and relevant personnel will be trained in accordance with the MOPP</li> <li>The following measures will be used during drilling activities to reduce the risk of a subsea blowout:                             <ul style="list-style-type: none"> <li>Provision of numerous primary and secondary barriers (subsea safety valves, Production Master Valve, Swab Valve, Tree Cup, Production Shutdown Valve, Production Wing Valve etc)</li> <li>Well bore stability modeling for reservoir and overburden formations</li> <li>Specific and approved controls for work-over or re-entry operations</li> </ul> </li> </ul>	2	4	Medium	<ul style="list-style-type: none"> <li>The probability of large scale leaks and spills associated with nearshore infrastructure is low</li> <li>The ability to contain a nearshore leak or spill</li> <li>Condensate highly toxic to mangrove seedlings but evaporates rapidly compared with crude oil</li> <li>Implementation of the MOPP</li> </ul>	Reasonable Modelling conducted	Not Applicable	Section 8.2
	Operations	Leaks and Spills	<ul style="list-style-type: none"> <li>Offshore leaks and spills entering the marine environment and degrading marine water and sediment quality</li> </ul>	3	4	<ul style="list-style-type: none"> <li>Risk assessment considered a highly mobile, high energy system</li> <li>Risk assessment based on a worst-case accumulation of contaminants in sediments from leaks</li> <li>Intertidal areas considered most sensitive to this impact</li> </ul>	<ul style="list-style-type: none"> <li>Refer to "Nearshore leaks and spills entering the marine environment" above</li> </ul>	3	4	Low	<ul style="list-style-type: none"> <li>The probability of large scale leaks and spills associated with offshore infrastructure is low. Adoption of design practices to reduce the risk of spills</li> <li>Implementation of the MOPP</li> <li>Condensate and diesel rapidly evaporate and disperse in this environment, reducing the risk of impact to sensitive receptors</li> <li>Lack of water quality sensitive receptors at the offshore well</li> </ul>	Reasonable Modelling conducted	Not Applicable	Section 8.2



<b>Marine Water and Sediment Quality</b>	Additive Effects	• The sum of all potential Project-attributable impacts from all Project phases and aspects	-	Not identified in Environmental Scoping Document	• See above for proposed management/mitigation measures	4	1	<b>High</b>	<ul style="list-style-type: none"> <li>The risk ranking of the additive effects of all Project aspects is determined by the highest risk ranking of any individual aspect</li> <li>The high risk ranking of the additive effects is determined by the high risk ranking of the indirect impacts of construction dredging</li> </ul>	<b>Low</b>	Not Applicable	Section 8.2
		• Direct: Loss of sub-tidal BPPH through removal within Project area	3	<b>High</b>	<ul style="list-style-type: none"> <li>Level of critical loss will be determined once the management unit has been defined</li> <li>Risk ranking is based on</li> <li>Loss of marine BPPH</li> <li>Risk ranking assumes regular maintenance dredging</li> <li>Also considered potential flow-on effects to the fishing industry e.g. fish nursery and breeding areas</li> </ul>	• Nearshore infrastructure location based on presence or absence of BPPH and Marine Protected Areas	6	1	<b>Low</b>	<ul style="list-style-type: none"> <li>There is limited BPPH In, and immediately adjacent to the dredge area</li> </ul>	<b>Reasonable</b> Excellent survey data, modelling conducted	Not Applicable

Factor	Phase	Aspect	Potential Impacts	Inherent Risk (from Scoping Document)		Comments/Assumptions (from Scoping Document)	Management and Mitigation Measures		Residual Risk		Comments/Assumptions (Relating to Residual Risk ranking)	Confidence Level and Justification	Potential Impacts to Matters of NES	EIS/ERMP Reference
				C	L		C	L	C	L				
Benthic Primary Producer Habitat (BPPH)	Construction	Dredging	<ul style="list-style-type: none"> <li>Indirect: impact to BPPH due to increased turbidity, sedimentation and light attenuation leading to loss of BPPH in excess of acceptable levels as defined in EPA Guidelines.</li> </ul>	3	2	<ul style="list-style-type: none"> <li>Level of critical loss will be determined once the management unit has been defined</li> <li>Risk ranking is based on</li> <li>Loss of marine BPPH</li> <li>Risk ranking assumes regular maintenance dredging</li> <li>Also considered potential flow-on effects to the fishing industry e.g. fish nursery and breeding areas</li> </ul>	<ul style="list-style-type: none"> <li>Refer to DSDMP for complete list of mitigation measures</li> <li>Implementation of monitoring programs outlined in the DSDMP:</li> <li>Water quality monitoring located in areas of key sensitive receptors</li> <li>Coral health monitoring within the Zone of Partial Loss, with an associated tiered management response</li> <li>Contingency coral health monitoring within the Zone of Influence undertaken in the event that water quality triggers are exceeded, with an associated tiered management response</li> <li>Pre-spawning and post-spawning monitoring of coral gravity</li> <li>Monitoring of seagrass and other BPPH will be carried out pre and post dredging operations and during summer and winter to capture seasonality.</li> </ul>	4	1	High	<ul style="list-style-type: none"> <li>Large volumes of sediment to be dredged</li> <li>Dredging campaign duration is 3-4 years</li> <li>There is limited BPPH in, and immediately adjacent to, the dredge area</li> </ul>	Reasonable Excellent survey data, modelling conducted	Not Applicable	Section 8.3 Appendix S1
	Construction	Dredging: Dredge material placement offshore	<ul style="list-style-type: none"> <li>Direct: Loss of sub-tidal BPPH due to placement of dredge material directly on sea bed.</li> </ul>	6	1	Low	<ul style="list-style-type: none"> <li>Selection of dredge material placement sites to reduce risks to BPPH where practicable</li> </ul>	6	1	Low	<ul style="list-style-type: none"> <li>There is limited BPPH in, and immediately adjacent to, the placement sites</li> <li>Corals closest to placement sites monitored to confirm no adverse impacts from placement activities</li> </ul>	Reasonable Excellent survey data, modelling conducted	Not Applicable	Section 8.3

<p><b>Benthic Primary Producer Habitat (BPPH)</b></p>	<p>Construction</p>	<p>Dredging: Dredge material placement offshore</p>	<p>• Indirect: impact on BPPH due to increased turbidity, sedimentation and light attenuation.</p>	<p><b>High</b></p> <p>2</p>	<p>• Level of critical loss will be determined once the management unit has been defined</p> <ul style="list-style-type: none"> <li>• Risk ranking is based on                     <ul style="list-style-type: none"> <li>• Loss of marine BPPH</li> <li>• Risk ranking assumes regular maintenance dredging</li> <li>• Also considered potential flow-on effects to the fishing industry e.g. fish nursery and breeding areas</li> </ul> </li> </ul>	<p>• Refer to DSDMP for complete list of mitigation measures</p> <ul style="list-style-type: none"> <li>• Diffusers will be utilised during offshore dredge material placement via the CSD</li> </ul>	<p>2</p>	<p><b>Medium</b></p>	<p>• There is limited BPPH in, and immediately adjacent to, the placement sites</p> <ul style="list-style-type: none"> <li>• Corals closest to site monitored to confirm no adverse impacts from placement activities</li> </ul>	<p><b>Reasonable</b> Excellent survey data, modelling conducted</p>	<p>Not Applicable</p>	<p>Section 8.3 Appendix S1</p>
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Factor	Phase	Aspect	Potential Impacts	Inherent Risk (from Scoping Document)		Comments/Assumptions (from Scoping Document)	Management and Mitigation Measures		Residual Risk		Comments/Assumptions (Relating to residual risk ranking)	Confidence Level and Justification	Potential Impacts to Matters of NES	EIS/ERMP Reference
				C	L		C	L	C	L				
Benthic Primary Producer Habitat (BPPH)	Construction	Dredging: Dredge material placement onshore	<ul style="list-style-type: none"> <li>Indirect: impact on mangroves due to groundwater seepage and exceedence of acceptable levels due to increased turbidity and light attenuation from decant water discharge.</li> </ul>	3	2	<ul style="list-style-type: none"> <li>Level of critical loss will be determined once the management unit has been defined</li> <li>Risk ranking is based on</li> <li>Loss of marine BPPH.</li> <li>Risk ranking assumes regular maintenance dredging.</li> <li>Also considered potential flow-on effects to the fishing industry e.g. fish nursery and breeding areas.</li> </ul>	<ul style="list-style-type: none"> <li>Refer to DSDMP for complete list of mitigation measures</li> <li>Refer to Chapter 12 for Draft OBCs for BPPH and mangroves</li> <li>Placement site location selected to reduce risks to BPPH where practicable</li> <li>Discharge of decant water from the onshore dredge material placement site will be via a controlled point which will include the use of a weir box to control water height</li> <li>The onshore dredge material will be contained in a bunded area to reduce the risk of an unconfined release of seawater and sediments</li> <li>A drainage ditch (with sump and pump system) will be installed to collect and divert seepage away from the Ashburton River Delta system</li> <li>Monitoring of discharge water will be undertaken with the objective of complying with the maximum turbidity limit of 250 mg/L TSS</li> <li>A mangrove monitoring program will be designed and implemented to detect change to mangrove health and mangrove habitat condition. The monitoring program will include:                             <ul style="list-style-type: none"> <li>Mangrove tree species composition and density</li> <li>Mangrove tree health (canopy density and/or tree condition data)</li> <li>Groundwater/soilwater salinity and water table depth</li> <li>Sediment heights and ground levels</li> <li>Hydrocarbon and heavy metal concentration in mangrove sediments and selected mangrove-dependant fauna</li> <li>Diversity and abundance of mangrove-dependant fauna</li> <li>Mapping of mangrove habitat distribution and coastline movements</li> </ul> </li> </ul>	4	2	Medium	<ul style="list-style-type: none"> <li>Groundwater characteristics at mangrove locations not predicted to alter</li> <li>Monitoring of mangroves to confirm no adverse impacts</li> <li>Large buffer area between the onshore placement site and mangroves</li> <li>Sump to the south of the onshore dredge material placement site and thus well away from the mangroves to the west of the placement site</li> </ul>	Reasonable Excellent survey data, modelling conducted	Not Applicable	Section 8.3 Table 12.4 and 12.5 Appendix SI
				2	2			Medium						

(Cont'd)

Benthic Primary Producer Habitat (BPPH)	Construction	Vessel Movements	<ul style="list-style-type: none"> <li>Toxicity effects of anti-foulants on BPPH</li> <li>Introduction of marine pests</li> </ul>	3	4	<ul style="list-style-type: none"> <li>For this risk assessment the focus was on the introduction of non-indigenous species. The risk assessment was based on introduced species' subsequent impact on marine BPPH and biodiversity.</li> </ul>	<ul style="list-style-type: none"> <li>Refer to Chapter 9: Terrestrial Risk Assessment and Management relating to groundwater monitoring</li> <li>All vessels under the control of the Proponent will comply with the International Convention on the Control of Harmful Anti-fouling Systems on Ships as monitored by AQIS</li> </ul>	5	3	<ul style="list-style-type: none"> <li>Vessels will comply with the requirements of AQIS</li> </ul>	High Expert investigation studies	Not Applicable	Section 8.3
		Vessel Movements	<ul style="list-style-type: none"> <li>Discharge of ballast water</li> </ul>	3	4	<ul style="list-style-type: none"> <li>For this risk assessment the focus was on the introduction of non-indigenous species. The risk assessment was based on introduced species' subsequent impact on marine BPPH and biodiversity.</li> </ul>	<ul style="list-style-type: none"> <li>All vessels under the control of the Proponent will comply with AQIS ballast water discharge requirements (Australian Ballast Water Management Requirements V4 2008)</li> </ul>	5	3	<ul style="list-style-type: none"> <li>Vessels will comply with the requirements of AQIS</li> </ul>	High Expert investigation studies	Not Applicable	Section 8.3
	Construction	Onshore Construction Activities	<ul style="list-style-type: none"> <li>Direct loss of intertidal BPPH in excess of EPA Guidelines</li> </ul>	3	2	<ul style="list-style-type: none"> <li>Not identified in Environmental Scoping Document</li> </ul>	<ul style="list-style-type: none"> <li>Nearshore infrastructure location selected to reduce the risk of disturbance to BPPH where practicable</li> <li>In the event of sediment deposition, erosion, dust deposition, or groundwater alterations in mangrove habitat during construction activity exceeds background levels implement mitigation measures as defined in the DSDMP, CPMP and CEMP</li> <li>If clearing exceeds permitted area of disturbance of mangrove habitat:                             <ul style="list-style-type: none"> <li>Immediately cease clearing in mangrove areas</li> <li>Confirm mangrove habitat losses by survey and redefine clearing boundaries</li> <li>Investigate options for rehabilitation of mangrove habitat</li> <li>Identify the cause of excessive clearing, review work procedures and amend as necessary to reduce the risk of further exceedence of permitted clearing</li> </ul> </li> <li>A monitoring program will be implemented in order to monitor both the health of mangroves and the key factors maintaining the mangrove habitat</li> </ul>	3	2	<ul style="list-style-type: none"> <li>Intertidal BPPH in Project area will be permanently removed</li> <li>Exceedence of EPA GS No. 3 loss guidelines</li> </ul>	High Excellent survey data	Not Applicable	Section 8.3 Appendix S1 Appendix T1 Appendix U1

Factor	Phase	Aspect	Potential Impacts	Inherent Risk (from Scoping Document)		Comments/ Assumptions (from Scoping Document)	Management and Mitigation Measures		Residual Risk		Comments/ Assumptions (Relating to residual risk ranking)	Confidence Level and Justification	Potential Impacts to Matters of NES	EIS/ERMP Reference
				C	L		C	L	C	L				
Benthic Primary Producer Habitat (BPPH)	Construction	Onshore Construction Activities	<ul style="list-style-type: none"> <li>Indirect impacts to the Ashburton River delta mangrove system</li> </ul>			Not identified in Environmental Scoping Document	<ul style="list-style-type: none"> <li>Refer to Chapter 9 Section 9.8 Air Quality</li> <li>Nearshore outfall location selected to reduce risks to BPPH where practicable</li> <li>The following measures will be used during drilling activities to reduce the risk of a subsea blowout:                             <ul style="list-style-type: none"> <li>Provision of numerous primary and secondary barriers (subsea safety valves, Production Master Valve, Swab Valve, Tree Cup, Production Shutdown Valve, Production Wing Valve etc)</li> <li>Well bore stability modeling for reservoir and overburden formations</li> <li>Specific and approved controls for work-over or re-entry operations</li> <li>Exclusion zone around wellheads with no anchoring in exclusion area gazetted and on navigational charts</li> <li>Manage discharges by taking into account the threshold limits of the ANZECC/ARMCANZ guidelines</li> <li>Monitoring to confirm applicable water quality targets at mixing zone boundary</li> </ul> </li> </ul>	6	2	Low	<ul style="list-style-type: none"> <li>It is considered unlikely that a blowout will occur</li> <li>On application of mitigation measures for water quality, discharges should not impact upon mangrove habitat</li> </ul>	Reasonable Excellent survey data	Not Applicable	Section 8.3
	Construction	Offshore Construction Activities	<ul style="list-style-type: none"> <li>Direct disturbance to the seabed</li> </ul>	3	4	<ul style="list-style-type: none"> <li>Level of critical loss will be determined once the management unit has been defined</li> </ul>	<ul style="list-style-type: none"> <li>Nearshore infrastructure location selected to reduce the risk of disturbance to BPPH where practicable</li> </ul>	6	1	Low	<ul style="list-style-type: none"> <li>Offshore infrastructure location does not support BPPH</li> <li>Trunkline route location does not overlie significant areas of BPPH (a small area of seagrass will be temporarily impacted)</li> <li>Offshore and nearshore infrastructure location contains limited BPPH</li> </ul>	Reasonable Excellent survey data	Not Applicable	Section 8.3

<p><b>Benthic Primary Producer Habitat (BPPH)</b></p>	<p>Construction</p>	<p>Near-shore Construction Activities: Construction of PLF and rock placement for MOF breakwater walls</p>	<ul style="list-style-type: none"> <li>Indirect disturbance to the seabed from increased turbidity, sedimentation and light attenuation leading to loss of BPPH in exceedence of acceptable levels</li> </ul>	<p>-</p>	<p>Not identified in Environmental Scoping Document</p>	<ul style="list-style-type: none"> <li>MOF and PLF location selected to reduce the risk of loss of BPPH where practicable</li> <li>Use graded rock material with low fines content</li> <li>MOF and PLF mitigation covered under the CEMP</li> </ul>	<p>6</p>	<p>1</p>	<p><b>Low</b></p>	<ul style="list-style-type: none"> <li>Nearshore infrastructure location contains limited BPPH</li> </ul>	<p><b>Reasonable</b> Survey data available Available information is adequate</p>	<p>Not Applicable</p>	<p>Section 8.3</p>
<p><b>Benthic Primary Producer Habitat (BPPH)</b></p>	<p>Construction</p>	<p>Near-shore Construction Activities Trunkline trenching and trunkline stabilisation</p>	<ul style="list-style-type: none"> <li>Indirect disturbance to the seabed from increased turbidity, sedimentation and light attenuation leading to loss of BPPH in exceedence of acceptable levels</li> </ul>	<p>-</p>	<p>Not identified in Environmental Scoping Document</p>	<ul style="list-style-type: none"> <li>Trunkline route location selected to reduce risks to BPPH where practicable</li> <li>Use engineered rock material with low fines content</li> </ul>	<p>4</p>	<p>2</p>	<p><b>Medium</b></p>	<ul style="list-style-type: none"> <li>Impacts to BPPH have been modelled conservatively due to uncertainty</li> <li>BPPH will be temporarily impacted due to trunkline construction</li> <li>Ashburton mangrove habitat is of high conservation status</li> </ul>	<p><b>Reasonable</b> Survey data available Available information is adequate</p>	<p>Not Applicable</p>	<p>Section 8.3</p>

Factor	Phase	Aspect	Potential Impacts	Inherent Risk (from Scoping Document)		Comments/ Assumptions (from Scoping Document)	Management and Mitigation Measures		Residual Risk		Comments/ Assumptions (Relating to residual risk ranking)	Confidence Level and Justification	Potential Impacts to Matters of NES	EIS/ERMP Reference
				C	L		C	L	C	L				
Benthic Primary Producer Habitat (BPPH)	Construction	Near-shore Construction Activities Trunkline shore crossing by trenching	<ul style="list-style-type: none"> <li>Disturbance of mangrove habitat</li> </ul>	-	-	Not identified in Environmental Scoping Document	<ul style="list-style-type: none"> <li>Maintain tidal flows to eastern end of lagoon by use of temporary gap in sand spit.</li> <li>Contain sediment within rock groyne structures to reduce the risk of potential sediment smothering impacts on mangroves</li> <li>Disturbance area to be landscaped with the objective of re-instating to former topography</li> <li>Use engineered rock material with reduced fines content</li> <li>A DSDMP specific to trunkline trenching activities will be developed</li> </ul>	4	1	High	<ul style="list-style-type: none"> <li>The first trenching activity is predicted to have small impacts on juvenile mangroves and has a risk ranking of 'Medium'</li> <li>Trenching will result in disturbance of potential mangrove habitat</li> <li>Trenching will temporarily block water movement to some areas of the Ashburton East Lagoon</li> <li>Repeated trenching is predicted to damage older and more established mangroves, therefore the risk ranking is 'High'</li> <li>Ashburton mangrove habitat is of high conservation status</li> <li>Microtunnelling is the preferred option (see below)</li> </ul>	Reasonable Survey data available Available information is adequate	Not Applicable	Section 8.3
								6	2	Low				
Benthic Primary Producer Habitat (BPPH)	Construction	Near-shore Construction Activities Trunkline shore crossing by microtunnelling	<ul style="list-style-type: none"> <li>No impact predicted</li> </ul>				<ul style="list-style-type: none"> <li>No management or mitigation measures required</li> </ul>	6	2	Low	<ul style="list-style-type: none"> <li>Microtunnelling is not anticipated to cause impacts to BPPH, including mangrove habitat</li> <li>The entry and exit points of the microtunnelling have a low BPPH abundance</li> </ul>	Reasonable Survey data available Available information is adequate	Not Applicable	Section 8.3



Benthic Primary Producer Habitat (BPPH)	Construction	Discharge and Waste from Offshore Construction	<ul style="list-style-type: none"> <li>Turbidity and sediment changes</li> <li>Toxicity to biota</li> <li>Potential contamination with TPH and MEG.</li> <li>Increased turbidity, smothering, reduced dissolved oxygen (DO).</li> <li>Bioaccumulation of chemicals and trace metals in species / food chain.</li> <li>Exceedence of Commonwealth Regulations on TPH.</li> </ul>	5	4	<b>Very Low</b>	<ul style="list-style-type: none"> <li>This aspect does not include spills or accidental release of material</li> </ul>	<ul style="list-style-type: none"> <li>The Proponent will determine PNEC for PW discharge</li> <li>Compliance with <i>Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009</i></li> <li>Treatment in compliance with the International Convention for the Prevention of Pollution from Ships (MARPOL 73/78, Annex IV) (ref)</li> <li>Treatment of PW with the objective of meeting the requirements of the <i>Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009</i> as they apply for time to time</li> <li>Controlled release of hydrotest water to reduce potential for toxicity impacts</li> <li>Monitor PW concentrations prior to discharge</li> </ul>	6	2	<b>Low</b>	<ul style="list-style-type: none"> <li>Offshore infrastructure locations contain limited BPPH</li> </ul>	<b>High</b> Excellent survey data	Not Applicable	Section 8.3
	Construction	Discharges from Onshore Construction	<ul style="list-style-type: none"> <li>Increased metals and other contaminants.</li> <li>Increased turbidity, salinity, nutrients and algal blooms leading to loss or damage to BPPH in exceedence of acceptable levels.</li> </ul>	5	4	<b>Very Low</b>	<ul style="list-style-type: none"> <li>This aspect does not include spills or accidental release of material</li> </ul>	<ul style="list-style-type: none"> <li>Nearshore outfall location selected to reduce risks to BPPH where practicable</li> <li>Manage discharges by taking into account the threshold limits of the ANZECC/ARMCANZ guidelines</li> <li>Monitoring to confirm applicable water quality targets at mixing zone boundary</li> </ul>	6	1	<b>Low</b>	<ul style="list-style-type: none"> <li>Offshore infrastructure locations contain limited BPPH</li> </ul>	<b>Reasonable</b> Modelling conducted	Not Applicable	Section 8.3
	Operations	Discharges from Onshore Operations: Nearshore discharge of wastewater, process wastewater, contact stormwater and RO brine.	<ul style="list-style-type: none"> <li>Increased metals and other contaminants.</li> <li>Increased turbidity, salinity, nutrients and algal blooms leading to loss or damage to BPPH in exceedence of acceptable levels.</li> <li>Toxicity to BPPH</li> </ul>	5	4	<b>Very Low</b>	<ul style="list-style-type: none"> <li>This aspect does not include spills or accidental release of material</li> </ul>	<ul style="list-style-type: none"> <li>Refer to Chapter 9 Table 9.14 for surface water management and mitigation measures</li> <li>End of pipe diffuser located at the PLF</li> <li>Mixing zone location selected to reduce risks to BPPH where practicable</li> <li>Manage discharges by taking into account the threshold limits of the ANZECC/ARMCANZ guidelines</li> <li>Mixing zone boundaries to be established and monitoring to achieve applicable water quality targets at mixing zone boundary</li> </ul>	6	1	<b>Low</b>	<ul style="list-style-type: none"> <li>No BPPH at the point of discharge and within the mixing boundary</li> </ul>	<b>Reasonable</b> Modelling conducted Available information is adequate	Not Applicable	Section 8.3

Factor	Phase	Aspect	Potential Impacts	Inherent Risk (from Scoping Document)		Comments/Assumptions (from Scoping Document)	Management and Mitigation Measures		Residual Risk		Comments/Assumptions (Relating to residual risk ranking)	Confidence Level and Justification	Potential Impacts to Matters of NES	EIS/ERMP Reference
				C	L		C	L	Ranking					
Benthic Primary Producer Habitat (BPPH)	Operations	Discharges from Onshore Operations: Discharge of PW from the LNG plant	<ul style="list-style-type: none"> <li>Toxicity to BPPH</li> </ul>	5	4	<ul style="list-style-type: none"> <li>This aspect does not include spills or accidental release of material</li> </ul>	<ul style="list-style-type: none"> <li>Nearshore outfall location selected to reduce risks to BPPH where practicable</li> <li>Selection of outfall location and diffuser design for adequate dilution and dispersion of PW</li> <li>The Proponent will determine PNEC for PW discharge.</li> <li>Treatment of PW with the objective of meeting the requirements of the <i>Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009</i> as they apply for time to time</li> <li>Monitor PW concentrations prior to discharge</li> <li>Confirm adequacy of diffuser design and size of mixing zone</li> </ul>	6	2	<ul style="list-style-type: none"> <li>Low abundance of BPPH at the point of discharge and within the mixing boundary</li> <li>Discharges from onshore operations will be managed to comply with relevant <i>Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009</i></li> </ul>	Reasonable Modelling conducted Available information is adequate	Not Applicable	Section 8.3	
				Very Low	Low			Low						
Benthic Primary Producer Habitat (BPPH)	Operations	Discharge and Waste from Offshore Operations	<ul style="list-style-type: none"> <li>Toxicity to biota.</li> <li>Potential contamination with TPH and MEG</li> <li>Increased turbidity, smothering, reduced DO</li> <li>Bioaccumulation of chemicals and trace metals in species / food chain</li> <li>Exceedence of Commonwealth Regulations on TPH</li> </ul>	5	4	<ul style="list-style-type: none"> <li>This aspect does not include spills or accidental release of material</li> </ul>	<ul style="list-style-type: none"> <li>The Proponent will determine PNEC for PW discharge</li> <li>Compliance with <i>Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009</i></li> <li>Treatment in compliance with the International Convention for the Prevention of Pollution from Ships (MARPOL 73/78, Annex IV) (ref)</li> <li>Controlled release of hydrotest water to reduce potential for toxicity impacts</li> <li>Monitor PW concentrations prior to discharge</li> </ul>	6	2	<ul style="list-style-type: none"> <li>Offshore infrastructure locations contain limited BPPH</li> <li>Discharges and waste from offshore operations will be managed to comply with relevant Conventions and Regulations (<i>Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009, MARPOL</i>)</li> </ul>	High Excellent survey data and modelling conducted	Not Applicable	Section 8.3	
				Very Low	Low			Low						
Benthic Primary Producer Habitat (BPPH)	Operations	Vessel Movements	<ul style="list-style-type: none"> <li>Toxicity effects of anti-foulants on BPPH</li> <li>Introduction of marine pests</li> </ul>	3	4	<ul style="list-style-type: none"> <li>For this risk assessment the focus was on the introduction of non-indigenous species</li> <li>The risk assessment was based on introduced species' subsequent impact on marine BPPH and biodiversity</li> </ul>	<ul style="list-style-type: none"> <li>All vessels under the control of the Proponent will comply with the International Convention on the Control of Harmful Anti-fouling Systems on Ships as monitored by AQIS</li> </ul>	5	3	<ul style="list-style-type: none"> <li>Vessels will comply with the requirements of AQIS</li> </ul>	High Expert investigation studies	Not Applicable	Section 8.3	
				Low	Low			Low						
Benthic Primary Producer Habitat (BPPH)	Operations		<ul style="list-style-type: none"> <li>Discharge of ballast water</li> </ul>					5	3	<ul style="list-style-type: none"> <li>Vessels will comply with the requirements of AQIS</li> </ul>	High Expert investigation studies	Not Applicable	Section 8.3	

<p><b>Benthic Primary Producer Habitat (BPPH)</b></p>	<p>Operations</p>	<p>Leaks and Spills</p>	<ul style="list-style-type: none"> <li>Mortality of BPPH in Hookey Creek resulting from leak or spill from LNG processing plant</li> </ul>	<p><b>Medium</b></p> <ul style="list-style-type: none"> <li>This risk assessment assumes a worst-case major spill of condensate, potentially impacting on regionally significant mangrove habitat</li> </ul>	<p>4</p> <ul style="list-style-type: none"> <li>Implementation, where practicable, of relevant Australia Standards and Codes in the initial design integrity, process and utility equipment, materials handling and operating and maintenance procedures with the objective of reducing spills</li> <li>A DMP approved MOPP will be implemented and relevant personnel will be trained in accordance with the MOPP</li> <li>Clean up and remediation methods will be implemented in the event of a spill</li> <li>Monitoring as for 1.4 Placement of dredge material onshore</li> </ul>	<p>5</p>	<p><b>Very Low</b></p>	<ul style="list-style-type: none"> <li>Probability of large leaks or spills from onshore infrastructure is low</li> <li>The ability to rapidly contain a leak or spill from onshore infrastructure</li> <li>Condensate is toxic to mangrove seedlings, but evaporates more rapidly than crude oil</li> <li>Development of the MOPP</li> </ul>	<p>Reasonable Modelling conducted</p>	<p>Not Applicable</p>	<p>Section 8.3</p>
<p><b>Benthic Primary Producer Habitat (BPPH)</b></p>	<p>Operations</p>	<p>Leaks and Spills: Near-shore spills</p>	<ul style="list-style-type: none"> <li>Mortality of BPPH due to refueling work boats at the MOF, condensate spill during loading at PLF</li> </ul>	<p><b>Medium</b></p>	<p>1</p> <ul style="list-style-type: none"> <li>As for onshore spills entering the marine environment, above</li> </ul>	<p>5</p>	<p><b>Medium</b></p>	<ul style="list-style-type: none"> <li>Probability of large leaks or spills from nearshore infrastructure is low</li> <li>The ability to rapidly contain a leak or spill from nearshore infrastructure</li> <li>Condensate is toxic to mangrove seedlings, but evaporates more rapidly than crude oil</li> <li>Development and implementation of the MOPP</li> <li>Asburton mangrove habitat is of high conservation status</li> </ul>	<p>Reasonable Modelling conducted</p>	<p>Not Applicable</p>	<p>Section 8.3</p>

Factor	Phase	Aspect	Potential Impacts	Inherent Risk (from Scoping Document)		Comments/ Assumptions (from Scoping Document)	Management and Mitigation Measures		Residual Risk		Comments/ Assumptions (Relating to Residual Risk ranking)	Confidence Level and Justification	Potential Impacts to Matters of NES	EIS/ERMP Reference
				C	L		C	L	Ranking					
Benthic Primary Producer Habitat (BPPH)	Operations	Leaks and Spills: Offshore spills	Loss of well control resulting in loss of BPPH	2	4	<ul style="list-style-type: none"> <li>This risk assessment assumes a worst-case major spill of condensate, potentially impacting on regionally significant mangrove habitat</li> </ul>	<ul style="list-style-type: none"> <li>As for onshore spills entering the marine environment and</li> <li>The following measures will be used during drilling activities to reduce the risk of a subsea blowout:                             <ul style="list-style-type: none"> <li>Provision of numerous primary and secondary barriers (subsea safety valves, Production Master Valve, Swab Valve, Tree Cup, Production Shutdown Valve, Production Wing Valve etc)</li> <li>Well bore stability modeling for reservoir and overburden formations</li> <li>Specific and approved controls for work-over or re-entry operations</li> <li>Exclusion zone around wellheads with no anchoring in exclusion area gazetted and on navigational charts</li> </ul> </li> </ul>	2	5	<ul style="list-style-type: none"> <li>Probability of large leaks or spills from offshore infrastructure is low</li> <li>Development and implementation of the MOPP</li> <li>The large distance of the platform from intertidal BPPH</li> </ul>			Section 8.3	
				3	2			High						
Benthic Primary Producer Habitat (BPPH)	Additive Effects		The sum of all potential Project-attributable impacts from all Project phases and aspects	-		Not identified in Environmental Scoping Document	<ul style="list-style-type: none"> <li>See above for proposed management/mitigation measures</li> </ul>	3	2	<ul style="list-style-type: none"> <li>The risk ranking of the additive effects of all Project aspects is determined by the highest risk ranking of any individual aspect</li> </ul>	Low	Not Applicable	Section 8.3	
Marine Fauna	Operations	Physical Presence of Marine Infrastructure	Change to behaviour of protected marine fauna (including seabirds), impacts on migratory patterns, nesting and feeding, and loss and disturbance to habitats	4	2	<ul style="list-style-type: none"> <li>Risk assessment does not relate to shipping, vessels or construction</li> </ul>	<ul style="list-style-type: none"> <li>Nearshore infrastructure location selected to reduce risks to habitat critical (nesting, feeding and calving areas) for marine fauna such as Humpback Whales, Dugongs and turtles</li> <li>Aerial, boat and land based surveys to identify and map critical habitat for marine mammals and turtles prior to construction</li> </ul>	5	4	<ul style="list-style-type: none"> <li>Marine mammals and turtles occur in low densities in the vicinity of nearshore infrastructure</li> <li>Nearshore infrastructure location represents a very small amount of available habitat</li> </ul>	<b>Reasonable to High</b> Short-term and some long-term monitoring data available	No significant impact	Section 8.4	
				4	2			Very Low						

<b>Marine Fauna</b>	Operations	Physical Presence of Marine Infrastructure	<ul style="list-style-type: none"> <li>Changes in abundance for some fish taxa</li> </ul>	-	Not identified in Environmental Scoping Document	<ul style="list-style-type: none"> <li>Nearshore infrastructure location selected to reduce likelihood of fish aggregating in habitat critical (nesting, feeding and calving areas) for marine fauna</li> </ul>	3	<b>Very Low</b>	<ul style="list-style-type: none"> <li>Marine mammals and turtles occur in low densities in the vicinity of nearshore infrastructure</li> <li>Nearshore infrastructure location represents a very small amount of available habitat</li> </ul>	<b>Low</b> Uncertainties surrounding population response	No significant impact	Section 8.4
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Factor	Phase	Aspect	Potential Impacts	Inherent Risk (from Scoping Document)		Comments/Assumptions (from Scoping Document)	Management and Mitigation Measures		Residual Risk		Comments/Assumptions (Relating to residual risk ranking)	Confidence Level and Justification	Potential Impacts to Matters of NES	EIS/ERMP Reference
				C	L		C	L	C	L				
Marine Fauna	Construction	Dredging	<ul style="list-style-type: none"> <li>Entrainment of marine fauna (particularly juvenile turtles) resting on the seabed in the dredge</li> </ul>	-	-	<ul style="list-style-type: none"> <li>Not identified in Environmental Scoping Document</li> </ul>	<ul style="list-style-type: none"> <li>Refer to DSDMP for complete list of mitigation measures</li> <li>Refer to Chapter 12 for Draft OBC for Marine Fauna Protection</li> <li>Prior to commencement of dredging and dredge material management activities selected crew will receive training, which will include details on procedures in the event of turtle sighting, injury and/or death</li> <li>When operating with less than five metres under keel clearance, the dredge will initially move slowly through the area before commencing dredging so that the noise and vibration disturb marine turtles in the vicinity and encourage them to leave. This will only be applied on dredging in new areas and not once the work area has been established</li> <li>Dredge pumps will be stopped as soon as practicable after completion of dredging and where reasonably practicable the drag head will remain within four metres of the seabed until the dredge pump is stopped</li> <li>Management of cetacean interactions will be in accordance with the requirements specified under the <i>Australian National Guidelines for Whale and Dolphin Watching (2005)</i></li> <li>Release of healthy entrained turtles back to the marine environment and contact the DEC if an injured turtle is collected after being entrained</li> <li>In the event of turtle mortality incident, as a result of entrainment during dredging, revision of existing management measures will be investigated to ascertain whether additional measures may be put in place to reduce the potential for such incidents to occur in the future</li> </ul>	4	3	Low	<ul style="list-style-type: none"> <li>Marine mammals and turtles occur in low densities in near shore waters where dredging will occur</li> <li>Low entrainment rate during dredging campaigns</li> <li>Adoption of mitigation measures such as marine fauna observers and exclusion zones</li> </ul>	Reasonable Short-term monitoring data available	No significant impact	Section 8.4 Table 12.6 Appendix S1
								3	3	Low				

<p><b>Marine Fauna</b></p>	<p>Construction</p>	<p>Dredging</p>	<ul style="list-style-type: none"> <li>Loss of or disturbance to critical habitat associated with protected marine fauna</li> <li>Potential to directly impact marine fauna</li> <li>Disturbance and avoidance of area by protected marine fauna</li> <li>Heightened community concern</li> <li>Impacts on local tourism operators</li> </ul>	<p>3</p>	<p><b>Medium</b></p>	<ul style="list-style-type: none"> <li>Foraging habitat for turtles assumed to be most critical habitat at risk</li> <li>Assessed the likelihood of loss or disturbance to critical habitat important to protected marine fauna</li> </ul>	<p>4</p>	<p><b>Very Low</b></p>	<ul style="list-style-type: none"> <li>Humpbacks and Dugong observations throughout the works as part of the marine mammal management procedures</li> <li>Any incident involving the injury or mortality of turtles will be reported to the DEC and DEWHA within 48 hours of the incident occurring</li> <li>Refer to DSDMP for complete list of mitigation measures</li> <li>Refer to Chapter 12 for Draft OBC for BPPH</li> <li>Selection of navigation channel, MOF and placement sites to reduce risks to habitat critical (nesting, feeding and calving areas) for marine fauna such as Humpbacks, Dugongs and turtles</li> <li>Dredging and material placement will be conducted during favourable weather, tide and current conditions, as far as reasonably practicable, to reduce the risk of impact to marine fauna while in close proximity to sensitive areas</li> </ul>	<p><b>Reasonable</b> Short-term monitoring data available Modelling conducted</p>	<p>No significant impact</p>	<p>Section 8.4 Table 12.5 Appendix S1</p>
<p><b>Marine Fauna</b></p>	<p>Construction</p>	<p>Dredging</p>	<ul style="list-style-type: none"> <li>Loss of or disturbance to designated nearshore nursery habitat for prawns</li> </ul>	<p>2</p>	<p><b>Medium</b></p>	<ul style="list-style-type: none"> <li>As above</li> </ul>	<p><b>Medium</b></p>	<ul style="list-style-type: none"> <li>Disturbance to prawn nursery habitat, such as seagrass beds, is predicted to be short term; recovery is predicted to occur after cessation of dredging</li> <li>Other important nursery habitat, such as lagoons and creeks, will not be directly impacted</li> <li>Construction is a temporary activity</li> </ul>	<p><b>Reasonable</b> Short-term monitoring data available Modelling conducted</p>	<p>No significant impact</p>	<p>Section 8.4</p>	

Factor	Phase	Aspect	Potential Impacts	Inherent Risk (from Scoping Document)		Comments/Assumptions (from Scoping Document)	Management and Mitigation Measures		Residual Risk		Comments/Assumptions (Relating to residual risk ranking)	Confidence Level and Justification	Potential Impacts to Matters of NES	EIS/ERMP Reference
				C	L		C	L	C	L				
<b>Marine Fauna</b>	Construction	Construction Activities (marine): Construction of PLF and trunklines; rock placement and anchor placement	<ul style="list-style-type: none"> <li>Loss of, or disturbance to, habitat critical to marine fauna from seabed disturbance during nearshore construction</li> </ul>	-	-	Not identified in Environmental Scoping Document	<ul style="list-style-type: none"> <li>Selection of navigation channel, MOF and placement sites to reduce risks to habitat critical (nesting, feeding and calving areas) for marine fauna such as Humpbacks, Dugongs and turtles</li> <li>Construction will comply with the OPGGS Act (Cth) and the Petroleum (Submerged Lands) (Management of Environment) Regulations 1999 (as amended 2005) as they apply from time to time</li> </ul>	5	2	<b>Low</b>	<ul style="list-style-type: none"> <li>The proposed channel, MOF and placement sites do not traverse or support critical habitat for marine mammals and turtles</li> <li>Marine mammals and turtle occur in low densities in areas proposed for the PLF and trunkline</li> </ul>	Reasonable Short-term monitoring data available	No significant impact	Section 8.4
<b>Marine Fauna</b>	Construction	Construction Activities (marine): Installation of all offshore infrastructure	<ul style="list-style-type: none"> <li>Loss of, or disturbance to, habitat critical to marine fauna from seabed disturbance during offshore construction</li> </ul>	-	-	Not identified in Environmental Scoping Document	<ul style="list-style-type: none"> <li>Selection of navigation channel, MOF and placement sites to reduce risks to habitat critical (nesting, feeding and calving areas) for marine fauna such as Humpbacks, Dugongs and turtles</li> <li>Implementing an approved DEMP in accordance with the OPGGS Act (Cth) and the Petroleum (Submerged Lands) (Management of Environment) Regulations 1999 (as amended 2005) as they apply from time to time</li> </ul>	5	4	<b>Very Low</b>	<ul style="list-style-type: none"> <li>The location of the offshore infrastructure does not support critical habitat for marine mammals or turtles</li> </ul>	Reasonable Short-term monitoring data available	No significant impact	Section 8.4



<b>Marine Fauna</b>	Construction and Operations	Vessel Movements	<ul style="list-style-type: none"> <li>Injury or fatalities to Protected Marine Fauna due to interactions with vessels</li> <li>Changes to migratory patterns, foraging, breeding behaviour of protected fauna as a result of disturbance</li> <li>Heightened community/regulator concern</li> </ul>	<ul style="list-style-type: none"> <li>Considers capital and maintenance dredging</li> <li>Risk assessment considers it almost certain that, over the life of the Project, there will be interaction with protected marine fauna</li> <li>The consequence ranking considered the full 25 MTPA LNG plant capacity and the most sensitive species</li> </ul>	<ul style="list-style-type: none"> <li>Refer to DSDMP and MFMP for complete list of mitigation measures</li> <li>Refer to Chapter 12 for Draft OBC for Marine Fauna Protection</li> <li>The following management measures will be applied during construction and operation of near-shore infrastructure:                             <ul style="list-style-type: none"> <li>Prior to the commencement of dredging selected crew will receive training, which will include details on procedures in the event of sighting, injury and/or death of Protected Marine Fauna (e.g. Humpbacks, Dugong, turtles, dolphins)</li> <li>All sightings of Humpbacks and Dugong that result in management actions being implemented will be recorded</li> <li>The vessel master will maintain a log of observed in-water incidents or injured/dead turtles and marine mammals</li> <li>Humpbacks and Dugong observations and response procedures, including not commencing dredging or placement if whales or Dugongs are sighted within a 300m observation zone and ceasing dredging activities if whales or Dugongs enter a 100m exclusion zone</li> <li>A trained crew member will maintain a lookout, during daylight hours, for Humpbacks and Dugongs while dredge are moving to and from the dredge area to dredge material placement sites. If sighted, direction/speed will be adjusted to reduce the likelihood of impact (within the safety constraints of the vessel)</li> <li>Any incident involving the injury or mortality of turtles will be reported to the DEC and DEWHA within 48 hours of the incident occurring</li> </ul> </li> </ul>	4	3	<b>Low</b>	<ul style="list-style-type: none"> <li>Vessel speeds will be regulated</li> <li>The location of the proposed navigation channel does not support high densities of marine fauna (based on aerial surveys). Turtle densities are highest over offshore reefs</li> <li>Presence of large numbers of Humpbacks is seasonal</li> <li>The majority of Humpbacks remain in deepwater beyond the nearshore construction location</li> <li>Use of mitigation measures such as marine fauna observers and exclusion zones</li> </ul>	No significant impact	Reasonable Short-term monitoring data available	Section 8.4 Table 12.6 Appendix S1 2.0 Appendix O6
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Factor	Phase	Aspect	Potential Impacts	Inherent Risk (from Scoping Document)		Comments/Assumptions (from Scoping Document)	Management and Mitigation Measures		Residual Risk		Comments/Assumptions (Relating to residual risk ranking)	Confidence Level and Justification	Potential Impacts to Matters of NES	EIS/ERMP Reference
				C	L		C	L	C	L				
Marine Fauna	Construction and Operations	Vessel Movements	<ul style="list-style-type: none"> <li>Introduction of marine pest species to the marine environment</li> <li>Loss of biodiversity</li> </ul>	3	4	<ul style="list-style-type: none"> <li>Assessed in Environmental Scoping Document with both BPPH and Marine Fauna as the receptor</li> <li>For this risk assessment the focus was on the introduction of non-indigenous species</li> <li>The risk assessment was based on introduced species' impact on marine BPPH and biodiversity</li> <li>Public and fisheries concerns were considered as part of the assessment</li> </ul>	<ul style="list-style-type: none"> <li>Potential for re-alignment of LEP boundaries</li> <li>Implement Introduced Marine Pest (IMP) risk assessments, with the objective of assessment all construction vessels entering the nearshore area</li> <li>Vessels assessed as high or uncertain risk will be inspected prior to mobilisation</li> <li>If IMP are found vessels will be cleaned prior to mobilisation</li> <li>If vessel on site is found to have IMP, surveys will be conducted to determine if further actions is required</li> <li>All vessels under the control of the Proponent will comply with AOSIS ballast water discharge requirements (Australian Ballast Water Management Requirements V4.2008)</li> </ul>	5	3	Low	<ul style="list-style-type: none"> <li>Will reduce the risk for introducing marine pests</li> </ul>	Reasonable Available information is adequate	No significant impact	Section 8.4

<b>Marine Fauna</b>	Construction and Operations	Vessel Movements	<ul style="list-style-type: none"> <li>• Introduction of diseases and pathogens to aquaculture operations and commercial and recreational fisheries</li> <li>• Loss of biodiversity</li> <li>• Breach of marine biosecurity</li> </ul>	<ul style="list-style-type: none"> <li>• Assessed in Environmental Scoping Document with both BPPH and Marine Fauna as the receptor</li> <li>• For this risk assessment the focus was on the introduction of non-indigenous species</li> <li>• The risk assessment was based on introduced species' subsequent impact on marine BPPH and biodiversity</li> <li>• Public and fisheries concerns were considered as part of the assessment</li> </ul>	<ul style="list-style-type: none"> <li>• Potential for re-alignment of LEP boundaries</li> <li>• Implement introduced marine pest (IMP) risk assessments, with the objective of assessment all construction vessels entering the near shore area</li> <li>• Vessels assessed as high or uncertain risk will be inspected prior to mobilisation</li> <li>• If IMP are found vessels will be cleaned prior to mobilisation</li> <li>• If vessel on site is found to have IMP, surveys will be conducted to determine if further action is required</li> <li>• All vessels under the control of the Proponent will comply with AQIS ballast water discharge requirements (Australian Ballast Water Management Requirements V4 2008)</li> <li>• The Proponent will undertake marine pest monitoring and apply risk mitigation in relation to biosecurity that considers Department of Fisheries (DoF) protocols and procedures and the specific requirements of the Project</li> </ul>	<p>2</p>	<p>5</p>	<p><b>Low</b></p>	<ul style="list-style-type: none"> <li>• Will reduce the risk for introducing marine pests</li> </ul>	<p><b>Reasonable</b> Available information is adequate</p>	<p>No significant impact</p>	<p>Section 8.4</p>
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Factor	Phase	Aspect	Potential Impacts	Inherent Risk (from Scoping Document)		Comments/ Assumptions (from Scoping Document)	Management and Mitigation Measures		Residual Risk		Comments/ Assumptions (Relating to residual risk ranking)	Confidence Level and Justification	Potential Impacts to Matters of NES	EIS/ERMP Reference
				C	L		C	L	C	Ranking				
<b>Marine Fauna</b>	Construction and Operations	Increased Recreational Pressure (Fishing, Boating and Island Access)	<ul style="list-style-type: none"> <li>Overfishing of fish stock, resulting in stock decline, reduction in abundance and population health, altered trophic level, potential trophic cascade</li> </ul>	-	-	Not identified in Environmental Scoping Document	<ul style="list-style-type: none"> <li>Refer to the MFMP</li> <li>To reduce the potential for overfishing occurring in the Project area, the following action may be implemented:                             <ul style="list-style-type: none"> <li>Inform Project staff/contractors of recreational fishing Regulations</li> <li>The Proponent will work with the DoF to reduce potential risks to the existing recreational fishery</li> <li>Recreational boats and recreational vehicles will not be permitted within the workforce accommodation village or to travel on the access road from Onslow Road</li> <li>Behaviour standards to be expected from all construction workers will be clearly articulated in a Recreation Code of Conduct. Construction workers will be asked to sign the Code of Conduct</li> <li>A community feedback procedure will be established whereby any complaints from the community about unacceptable behaviour from construction workers will be investigated and, where necessary, action taken</li> </ul> </li> </ul>	3	3	Medium	<ul style="list-style-type: none"> <li>An increase in the level of recreational fishing activity</li> <li>A code of conduct will be developed to reduce the impact of fishers on local fish stocks</li> <li>Difficult to predict the potential fishing pressure associated with large numbers of people</li> </ul>	Low Uncertainties surrounding local status of fish stocks)	None known	Section 8.4 Appendix O6

<p><b>Marine Fauna</b></p>	<p>Construction and Operations</p>	<p>Increased Recreational Pressure (Fishing, Boating and Island Access)</p>	<ul style="list-style-type: none"> <li>Injury/mortality and/or disturbance to Dugongs and turtles due to vessel collision</li> </ul>	<p>-</p>	<p>Not identified in Environmental Scoping Document</p>	<ul style="list-style-type: none"> <li>Refer to MFMP</li> <li>Refer to Chapter 12 for Draft OBC for Marine Fauna Protection</li> <li>To reduce the potential for increased vessel strikes of Dugongs and turtles from increased recreational pressure the following action may be implemented:                             <ul style="list-style-type: none"> <li>Inform Project staff/contractors of DEC rules relating to the <i>Wildlife Conservation Act 1950</i> e.g. distance to keep from animals</li> <li>Recreational boats and recreational vehicles will not be permitted within the boundaries of the Project area or to travel on the access road from Onslow Road</li> <li>Behaviour standards to be expected from all construction workers will be clearly articulated in a Recreation Code of Conduct. Construction workers will be asked to sign the Code of Conduct</li> <li>A community feedback procedure will be established whereby any complaints from the community about unacceptable behaviour from construction workers will be investigated and, where necessary, action taken</li> </ul> </li> </ul>	<p>3</p>	<p>3</p>	<p><b>Medium</b></p>	<ul style="list-style-type: none"> <li>An increase in the level of recreational boating activity</li> <li>A code of conduct will be developed to reduce the impact of boaters on marine fauna</li> <li>Difficult to predict the level of potential recreational vessel activity associated with large numbers of people</li> </ul>	<p><b>Low</b> Uncertainties surrounding management</p> <p>Short-term monitoring data available but with gaps</p>	<p>Dugongs Turtles</p>	<p>Section 8.4 Table 12.6 Appendix O6</p>
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Factor	Phase	Aspect	Potential Impacts	Inherent Risk (from Scoping Document)		Comments/ Assumptions (from Scoping Document)	Management and Mitigation Measures		Residual Risk		Comments/ Assumptions (Relating to residual risk ranking)	Confidence Level and Justification	Potential Impacts to Matters of NES	EIS/ERMP Reference	
				C	L		C	L	C	Ranking					
Marine Fauna	Construction and Operations	Increased Recreational Pressure (Fishing, Boating and Island Access)	<ul style="list-style-type: none"> <li>Disturbance leading to reduced breeding success of nesting marine turtles and seabirds</li> <li>Interference with adult or hatching turtles</li> <li>Trampling of nests and burrows</li> <li>Erosion of suitable nesting areas</li> </ul>	-	-	Not identified in Environmental Scoping Document	<ul style="list-style-type: none"> <li>Refer to MFMP</li> <li>Refer to Chapter 12 for Draft OBC for Marine Fauna Protection</li> <li>To reduce impacts to Protected Marine Fauna (turtles and nesting birds on islands) from increased recreational pressure the following actions may be implemented:                             <ul style="list-style-type: none"> <li>Make existing mammal and turtle aerial sighting data available to DEC for planning purposes relating to recreational boating activity in the Onslow region</li> <li>Inform Project staff/contractors of DEC rules relating to offshore nature reserves e.g. domesticated animals (such as dogs and cats) will be prohibited on offshore islands/reserves</li> <li>The Proponent will work with the DEC to reduce potential risks from excessive recreational use of the islands within a 25km radius of Onslow</li> <li>Recreational boats and recreational vehicles will not be permitted within the workforce accommodation village or to travel on the access road from Onslow Road</li> <li>Behaviour standards to be expected from all construction workers will be clearly articulated in a Recreation Code of Conduct. Construction workers will be asked to sign the Code of Conduct</li> <li>A community feedback procedure will be established whereby any complaints from the community about unacceptable behaviour from construction workers will be investigated and, where necessary, action taken</li> </ul> </li> </ul>	3	3	Medium	<ul style="list-style-type: none"> <li>Increase in the level of recreational use of the islands</li> <li>A code of conduct will be developed to reduce the impact of recreationists on island fauna</li> <li>Difficult to predict the level of potential recreational vessel activity associated with large numbers of people</li> </ul>	Low	Uncertainties surrounding management (there is some information on island habitats and species of nesting birds and turtles available)	Turtles Seabirds	Section 8.4 Table 12.6 Appendix O6

<p><b>Marine Fauna</b></p>	<p>Construction and Operations</p>	<p>Increased Recreational Pressure (Fishing, Boating and Island Access)</p>	<ul style="list-style-type: none"> <li>Entanglement or ingestion of marine debris from recreational boats by marine fauna e.g. garbage, plastics, fishing line</li> </ul>	<p>-</p>	<p>Not identified in Environmental Scoping Document</p>	<ul style="list-style-type: none"> <li>Refer to MFMP</li> <li>Refer to Chapter 12 for Draft OBC for Marine Fauna Protection</li> <li>To reduce impacts to marine fauna from entanglement/ingestion of marine debris the following actions may be implemented:                             <ul style="list-style-type: none"> <li>Conservation induction programs will be run for employees and contractors (e.g. to include education of better disposal of fishing line and use of biodegradable fishing line)</li> <li>Recreational boats and recreational vehicles will not be permitted within the workforce accommodation village or to travel on the access road from Onslow Road</li> <li>Behaviour standards to be expected from all construction workers will be clearly articulated in a Recreation Code of Conduct. Construction workers will be asked to sign the Code of Conduct</li> <li>A community feedback procedure will be established whereby any complaints from the community about unacceptable behaviour from construction workers will be investigated and, where necessary, action taken</li> </ul> </li> </ul>	<p>5</p>	<p>3</p>	<p><b>Low</b></p>	<ul style="list-style-type: none"> <li>A code of conduct will be developed to reduce the impact of recreationists on the marine environment                             <ul style="list-style-type: none"> <li>Difficult to predict the level of potential recreational vessel activity associated with large numbers of people</li> </ul> </li> </ul>	<p><b>Reasonable</b> Available information is adequate</p>	<p>No significant impact</p>	<p>Section 8.4 Table 12.6 Appendix O6</p>
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Factor	Phase	Aspect	Potential Impacts	Inherent Risk (from Scoping Document)		Comments/Assumptions (from Scoping Document)	Management and Mitigation Measures		Residual Risk		Comments/Assumptions (Relating to residual risk ranking)	Confidence Level and Justification	Potential Impacts to Matters of NES	EIS/ERMP Reference
				C	L		C	L	C	L				
Marine Fauna	Operations	Discharges and Wastes from Nearshore Operations	Disturbance to protected marine fauna.	5	4	<ul style="list-style-type: none"> <li>This risk assessment assumes the minimum standards will be applied to wastewater discharges from onshore infrastructure and thus will not impact on protected marine fauna</li> </ul>	<ul style="list-style-type: none"> <li>Refer to Chapter 12 for Draft OBC for Marine Fauna Protection</li> <li>End of pipe diffuser located at the PLF</li> <li>Mixing zone boundaries to be established and monitoring to achieve applicable water quality targets at mixing zone boundary</li> <li>Selection of outfall location and diffuser design for adequate dilution and dispersion of PW</li> <li>The Proponent will determine PNEC for PW discharge</li> <li>Manage discharges by taking into account the threshold limits of the ANZECC/ARMCANZ guidelines</li> <li>Treatment of PW with the objective of meeting the requirements of the <i>Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009</i> as they apply for time to time</li> <li>Monitor PW concentrations prior to discharge</li> <li>Diffuser design and size of mixing zone shall take into consideration the target for PNEC</li> </ul>	5	4	<ul style="list-style-type: none"> <li>Modelling suggests that with the application of appropriate mitigation measures, discharges are unlikely to exceed ANZECC/ARMCANZ guidelines under most scenarios</li> <li>Outfall in location not supporting critical or sensitive habitat for marine fauna</li> <li>Discharges will be treated to meet government standards</li> </ul>	Reasonable Available information is adequate	No significant impact	Section 8.4 Table 12.6	
	Operations	Discharges and Wastes from Nearshore Operations	Increase in nutrients in water leading to eutrophication	-	-	Not identified in Environmental Scoping Document	<ul style="list-style-type: none"> <li>As above</li> </ul>	5	4	<ul style="list-style-type: none"> <li>Modelling suggests that with the application of appropriate mitigation measures, discharges are likely not to exceed ANZECC/ARMCANZ guidelines under most scenarios</li> <li>Outfall in location not supporting critical or sensitive habitat for marine fauna</li> <li>Discharges will be treated to meet government standards</li> </ul>	Reasonable Available information is adequate	No significant impact	Section 8.4	



<p><b>Marine Fauna</b></p>	<p>Operations</p>	<p>Routine Discharges from Offshore Activities</p>	<ul style="list-style-type: none"> <li>• Toxic effects to marine fauna from offshore discharges</li> </ul>	<p>5</p>	<p>4</p>	<p><b>Very Low</b></p>	<ul style="list-style-type: none"> <li>• This risk assessment assumes the minimum standards will be applied to wastewater discharges from offshore infrastructure and thus will not impact on protected marine fauna</li> <li>• The Proponent will determine PNEC for PW discharge through ecotoxicity testing</li> <li>• Compliance with the <i>Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009</i>, as they apply from time to time</li> <li>• Control rate, timing and characteristics of discharge of MEG with the objective of maintaining discharge water quality at a level not in excess of 50 mg/L local to the platform (or an agreed distance from the platform)</li> <li>• Monitor PW concentrations prior to discharge</li> </ul>	<p>4</p>	<p>5</p>	<p>4</p>	<p><b>Very Low</b></p>	<ul style="list-style-type: none"> <li>• Large volumes will be discharged, but the area of discharge is in deep water and highly mixed</li> <li>• There is no critical fauna habitat at risk from discharge in the near vicinity of the platform</li> <li>• Adoption of mitigation and monitoring commitments</li> <li>• Discharges will be treated to meet government standards</li> </ul>	<p>Reasonable Available information is adequate</p>	<p>No significant impact</p>	<p>Section 8.4</p>
<p><b>Marine Fauna</b></p>	<p>Operations</p>	<p>Leaks and Spills (Nearshore)</p>	<ul style="list-style-type: none"> <li>• Leaks or spills leading to the loss of habitat for marine fauna</li> </ul>	<p>5</p>	<p>4</p>	<p><b>Very Low</b></p>	<ul style="list-style-type: none"> <li>• This risk assessment assumes a worst-case major spill of condensate</li> <li>• The risk assessment assumes a worst-case adverse effects on a regionally significant stand of mangroves</li> <li>• Refer to DSDMP and MFMP for complete list of mitigation measures</li> <li>• Implementation, where practicable, of relevant Australia Standards and Codes in the initial design integrity, process and utility equipment, materials handling and operating and maintenance procedures with the objective of reducing spills</li> <li>• A DMP approved MOPP will be implemented and relevant personnel will be trained in accordance with the MOPP</li> <li>• Clean up and remediation methods will be implemented in the event of a spill</li> </ul>	<p>4</p>	<p>4</p>	<p><b>Low</b></p>	<ul style="list-style-type: none"> <li>• The risk of major spills associated with nearshore infrastructure is low</li> <li>• Condensate is highly evaporative</li> <li>• No turtle nesting beaches near PLF and MOF</li> <li>• Marine mammals and turtles occur in low densities near the PLF and MOF</li> <li>• Adoption of mitigation (approved MOPP) and monitoring commitments</li> <li>• Ability to contain and clean up spills</li> </ul>	<p>Reasonable Modelling conducted</p>	<p>No significant impact</p>	<p>Section 8.4 Appendix S1 Appendix O6</p>	

Factor	Phase	Aspect	Potential Impacts	Inherent Risk (from Scoping Document)		Comments/Assumptions (from Scoping Document)	Management and Mitigation Measures		Residual Risk		Comments/Assumptions (Relating to residual risk ranking)	Confidence Level and Justification	Potential Impacts to Matters of NES	EIS/ERMP Reference
				C	L		C	L	C	L				
Marine Fauna	Operations	Leaks and Spills (Nearshore)	<ul style="list-style-type: none"> <li>Disturbance to protected marine fauna</li> <li>Toxic effects to protected marine fauna</li> </ul>	3	4	<ul style="list-style-type: none"> <li>Risk ranking based on intertidal habitats and impacts of spills on seabirds, wading birds and turtles</li> <li>Worst-case risk based on condensate tank running aground and associated spill a few km from shore</li> </ul>	<ul style="list-style-type: none"> <li>Refer to DSDMP and MFMP for complete list of mitigation measures</li> <li>Implementation, where practicable, of relevant Australia Standards and Codes in the initial design integrity, process and utility equipment, materials handling and operating and maintenance procedures with the objective of reducing spills</li> <li>A DMP approved MOPP will be implemented and relevant personnel will be trained in accordance with the MOPP</li> <li>Clean up and remediation methods will be implemented in the event of a spill</li> <li>The following measures will be used during drilling activities to reduce the risk of a subsea blowout:                             <ul style="list-style-type: none"> <li>Provision of numerous primary and secondary barriers (subsea safety valves, Production Master Valve, Swab Valve, Tree Cup, Production Shutdown Valve, Production Wing Valve etc)</li> </ul> </li> <li>Well bore stability modeling for reservoir and overburden formations</li> <li>Specific and approved controls for work-over or re-entry operations</li> <li>Exclusion zone around wellheads with no anchoring in exclusion area gazetted and on navigational charts</li> </ul>	3	4	<ul style="list-style-type: none"> <li>The risk of major spills associated with nearshore infrastructure is low</li> <li>Condensate is highly evaporative</li> <li>No turtle nesting beaches near PLF and MOF</li> <li>Marine mammals and turtles occur in low densities near the PLF and MOF</li> <li>Adoption of mitigation (approved MOPP) and monitoring commitments</li> <li>Ability to contain and clean up spills</li> </ul>	Reasonable Modelling conducted	No significant impact	Section 8.4	
				C	L			C	L					Ranking

Marine Fauna	Operations	Leaks and Spills (Nearshore)	<ul style="list-style-type: none"> <li>Smothering and oiling of marine fauna</li> </ul>	3	4	Low	<ul style="list-style-type: none"> <li>Risk ranking based on impacts on intertidal habitats and impacts of spills on seabirds, wading birds and turtles</li> <li>Worst-case risk based on condensate tank running aground and associated spill a few km from shore</li> </ul>	<ul style="list-style-type: none"> <li>As above</li> </ul>	3	4	Low	<ul style="list-style-type: none"> <li>As above</li> </ul>	Reasonable Modelling conducted	No significant impact	Section 8.4	
Marine Fauna	Operations	Leaks and Spills (Offshore)	<ul style="list-style-type: none"> <li>Leaks or spills leading to the loss of habitat for marine fauna</li> </ul>	5	4	Very Low	<ul style="list-style-type: none"> <li>This risk assessment assumes a worst-case major spill of condensate</li> <li>The risk assessment assumes a worst-case adverse effects on a regionally significant stand of mangroves</li> </ul>	<ul style="list-style-type: none"> <li>As above</li> </ul>	4	4	Low	<ul style="list-style-type: none"> <li>The risk of major spills associated with offshore infrastructure is low</li> <li>Condensate is highly evaporative</li> <li>Marine mammals occur in low densities near the Platform</li> <li>Distance of platform from turtle nesting beaches and islands supporting seabirds</li> <li>Adoption of mitigation (approved MOPP) and monitoring commitments.</li> </ul>	<ul style="list-style-type: none"> <li>As above</li> </ul>	Reasonable Modelling conducted	No significant impact	Section 8.4
Marine Fauna	Operations	Leaks and Spills (Offshore)	<ul style="list-style-type: none"> <li>Disturbance to protected marine fauna</li> <li>Toxic effects to protected marine fauna</li> </ul>	3	4	Low	<ul style="list-style-type: none"> <li>Risk ranking based on impacts on intertidal habitats and impacts of spills on seabirds, wading birds and turtles</li> <li>Worst-case risk based on condensate tank running aground and associated spill a few km from shore</li> </ul>	<ul style="list-style-type: none"> <li>As above</li> </ul>	3	4	Low	<ul style="list-style-type: none"> <li>As above</li> </ul>	Reasonable Modelling conducted	No significant impact	Section 8.4	

Factor	Phase	Aspect	Potential Impacts	Inherent Risk (from Scoping Document)		Comments/Assumptions (from Scoping Document)	Management and Mitigation Measures		Residual Risk		Comments/Assumptions (Relating to residual risk ranking)	Confidence Level and Justification	Potential Impacts to Matters of NES	EIS/ERMP Reference
				C	L		C	L	C	L				
Marine Fauna	Operations	Leaks and Spills (Offshore)	Smothering and oiling of marine fauna	3	4	<ul style="list-style-type: none"> <li>Risk ranking based on impacts on intertidal habitats and impacts of spills on seabirds, wading birds and turtles</li> <li>Worst-case risk based on condensate tank running aground and associated spill a few km from shore</li> </ul>	<ul style="list-style-type: none"> <li>Refer to DSDMP and MFMP for complete list of mitigation measures</li> <li>Implementation, where practicable, of relevant Australia Standards and Codes in the initial design integrity, process and utility equipment, materials handling and operating and maintenance procedures with the objective of reducing spills</li> <li>A DMP approved MOPP will be implemented and relevant personnel will be trained in accordance with the MOPP</li> <li>Clean up and remediation methods will be implemented in the event of a spill</li> <li>The following measures will be used during drilling activities to reduce the risk of a subsea blowout:                             <ul style="list-style-type: none"> <li>Provision of numerous primary and secondary barriers (subsea safety valves, Production Master Valve, Swab Valve, Tree Cup, Production Shutdown Valve, Production Wing Valve etc)</li> <li>Well bore stability modeling for reservoir and overburden formations</li> <li>Specific and approved controls for work-over or re-entry operations</li> </ul> </li> <li>Exclusion zone around wellheads with no anchoring in exclusion area gazetted and on navigational charts</li> </ul>	3	4	<ul style="list-style-type: none"> <li>The risk of major spills associated with offshore infrastructure is low</li> <li>Condensate is highly evaporative</li> <li>Marine mammals occur in low densities near the Platform</li> <li>Distance of platform from turtle nesting beaches and supporting seabirds</li> <li>Adoption of mitigation (approved MOPP) and monitoring commitments</li> </ul>	Reasonable Modelling conducted	No significant impact	Section 8.4	
				C	L			C	L					Ranking

Marine Fauna	Construction	Noise and Vibration	<ul style="list-style-type: none"> <li>Altered distribution of fauna due to avoidance of area during noisy construction activities (piling, dredging, drilling)</li> <li>Behavioural effects to protected marine fauna</li> </ul>	4	<ul style="list-style-type: none"> <li>Likelihood of noise and vibration impacting marine fauna</li> <li>Nearshore environment considered to be the most sensitive habitat</li> <li>Regulatory and public perceptions considered as part of risk assessment</li> </ul>	<ul style="list-style-type: none"> <li>Refer to MFMP</li> <li>Refer to Chapter 12 for Draft OBC for Marine Fauna Protection</li> <li>Nearshore infrastructure location selected to reduce risks to critical habitat</li> <li>To reduce impacts to marine fauna the following actions will be implemented:                             <ul style="list-style-type: none"> <li>If a marine mammal or turtle enters the observation zone (500 m of an active pile hammer) the piling supervisor (or other individual) will be directed to monitor the movement of it in relation to the activity suspension zone (see below)</li> <li>Pile driving activities shall cease if a marine mammal or turtle is observed within the activity suspension zone (100 m of an active pile hammer)</li> <li>Where required site-specific noise modelling will be undertaken to validate or modify the adopted noise management zones for piling activity</li> <li>Measures to mitigate against the potential risks from vertical seismic profiling (VSP) will be developed (if required). These measures will consider seismic guidelines (DEWHA, 2008), and will be included in the draft Marine Fauna Management Plan included with the Supplementary EIS/ERMP</li> </ul> </li> </ul>	4	3	Low	<ul style="list-style-type: none"> <li>Marine mammals and turtles occur in low densities in the proposed PLF (piling) area</li> <li>No turtle nesting on beaches adjacent to piling activity</li> <li>Piling is a short term construction activity</li> <li>The adoption of mitigation measures such as fauna observers and observation zones</li> </ul>	Reasonable Short-term monitoring data available	No significant impact	Section 8.4 Table 12.6 Appendix 06
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Factor	Phase	Aspect	Potential Impacts	Inherent Risk (from Scoping Document)		Comments/Assumptions (from Scoping Document)	Management and Mitigation Measures		Residual Risk		Comments/Assumptions (Relating to residual risk ranking)	Confidence Level and Justification	Potential Impacts to Matters of NES	EIS/ERMP Reference
				C	L		C	L	C	L				
Marine Fauna	Operations	Noise and Vibration	<ul style="list-style-type: none"> <li>Altered distribution of fauna due to avoidance of area during noisy construction activities (dredging, drilling)</li> <li>Behavioural effects to protected marine fauna</li> </ul>	4	4	<ul style="list-style-type: none"> <li>Likelihood of noise and vibration impacting marine fauna environment considered to be the most sensitive habitat</li> <li>Regulatory and public perceptions considered as part of risk assessment</li> </ul>	<ul style="list-style-type: none"> <li>Refer to MFMP</li> <li>Refer to Chapter 12 for Draft OBC for Marine Fauna Protection</li> <li>Management measures will be implemented during maintenance dredging works as follows:                             <ul style="list-style-type: none"> <li>Prior to the commencement of maintenance dredging and dredge material placement selected crew will receive marine fauna training, which will include details on procedures in the event of sighting, injury and/or death of Protected Marine Fauna (e.g. Humpbacks, Dugong, turtles, dolphins)</li> </ul> </li> <li>All sightings of Humpbacks and Dugong that result in management actions being implemented will be recorded</li> <li>Humpback whale and Dugong observations and response procedures, including not commencing dredging or disposal if whales or Dugongs are sighted within a 300 m observation zone and ceasing dredging activities if whales or Dugongs enter a 100 m exclusion zone</li> <li>In the event that a Humpback or Dugong is sighted within the 100 m exclusion zone, dredging will cease until the individual has moved out of the 100 m exclusion zone or until no Humpbacks or Dugong have been observed within this zone for 10 minutes.</li> </ul>	6	2	<ul style="list-style-type: none"> <li>Marine mammals and turtles occur in low densities in the proposed dredging area</li> <li>No turtle nesting on beaches adjacent to dredging area</li> <li>The adoption of mitigation measures such as fauna observers and observation zones</li> </ul>	Reasonable Short-term monitoring data available	No significant impact	Section 8.4 Table 12.6 Appendix O6	
(Cont'd)														

Marine Fauna	Construction	Noise and Vibration	<ul style="list-style-type: none"> <li>Behavioural Changes, Injury or Mortality to Marine Fauna Associated with Blasting</li> </ul>	<p><b>Low</b></p>	Not identified in Environmental Scoping Document	<ul style="list-style-type: none"> <li>A lookout will be maintained, during daylight hours, for Humpbacks and Dugongs while dredge are moving to and from the dredge area to dredge material placement sites. If sighted, direction/speed will be adjusted to reduce the likelihood of impact (within the safety constraints of the vessel)</li> <li>Any incident involving the injury or mortality of turtles will be reported to the DEC and DEWHA within 48 hours of the incident occurring</li> </ul>	5	4	<p><b>Very Low</b></p>	<ul style="list-style-type: none"> <li>Blasting is unlikely to be required.</li> <li>If required, short term in duration.</li> <li>Many potential mitigation measures to reduce impacts to marine fauna.</li> </ul>	<p><b>Low</b> Available information is inadequate</p>	Section 8.4
Marine Fauna	Operations	Light Emissions (from Onshore Infrastructure)	<ul style="list-style-type: none"> <li>Attraction of marine turtle hatchlings</li> </ul>	<p><b>Medium</b></p>	<ul style="list-style-type: none"> <li>A preliminary study has shown that the plant site is of low significance for nesting</li> </ul>	<ul style="list-style-type: none"> <li>Refer to DSDMP and MFMP for complete list of mitigation measures</li> <li>Refer to Chapter 12 for Draft OBC for Marine Fauna Protection</li> <li>To reduce impacts to turtle hatchlings, light spill from construction and operation vessels operating nearby offshore islands and mainland beaches that support marine turtle nesting will be reduced, where reasonably practicable</li> <li>The Proponent will monitor onshore infrastructure-attributable changes to the sea-finding success of marine turtle hatchlings at rookeries on Ashburton Island and at the Ashburton delta beach for a period to be determined based on the initial monitoring results</li> <li>Monitoring will be conducted during construction, to coincide with planned flaring events to assess the effects of this activity on hatchling behaviour, particularly in relation to their orientation to the beach and sea-finding success</li> </ul>	4	3	<p><b>Low</b></p>	<p><b>Reasonable</b> Modelling conducted</p>	No significant impact	Section 8.4 Table 12.6 Appendix S1 3.0 Appendix O6

Factor	Phase	Aspect	Potential Impacts	Inherent Risk (from Scoping Document)		Comments/Assumptions (from Scoping Document)	Management and Mitigation Measures		Residual Risk		Comments/Assumptions (Relating to residual risk ranking)	Confidence Level and Justification	Potential Impacts to Matters of NES	EIS/ERMP Reference
				C	L		C	L	Ranking					
Marine Fauna	Operations	Light Emissions (from Onshore Infrastructure)	Interference with marine turtle nesting behavior	3	3	<ul style="list-style-type: none"> <li>A preliminary study has shown that the plant site is of low significance for nesting</li> </ul>	<ul style="list-style-type: none"> <li>Refer to DSDMP and MFMP for complete list of mitigation measures</li> <li>Refer to Chapter 12 for Draft OBC for Marine Fauna Protection</li> <li>To reduce impacts to turtle hatchlings, light spill from construction and operation vessels operating nearby offshore islands and mainland beaches that support marine turtle nesting will be reduced, where reasonably practicable</li> <li>The Proponent will monitor onshore infrastructure-attributable changes to the sea-finding success of marine turtle hatchlings at rookeries on Ashburton Island and at the Ashburton delta beach for a period to be determined based on the initial monitoring results</li> <li>Monitoring will be conducted during construction, to coincide with planned flaring events to assess the effects of this activity on hatchling behaviour, particularly in relation to their orientation to the beach and sea-finding success</li> </ul>	4	3	Low	<ul style="list-style-type: none"> <li>Closest nesting beach (Ashburton Delta) is &gt; 4 km from plant site</li> <li>Closest island rookery &gt; 8 km from plant site</li> <li>Modelling predicts low levels of illumination on nesting beaches</li> <li>Ashburton Delta nesting beach screened by high dunes</li> <li>Monitoring will be used to test prediction that flaring will not negatively influence hatchlings</li> </ul>	Reasonable Modelling conducted	No significant impact	Chapter 8.4
				4	3			Low						
	Marine Fauna	Operations	Light Emissions (from Onshore Infrastructure)	Attraction of seabirds creating potential for increased predation of hatchlings	-	-	Not identified in Environmental Scoping Document	<ul style="list-style-type: none"> <li>Onshore infrastructure location selected to reduce risks to critical habitat</li> </ul>	4	3	Low	<ul style="list-style-type: none"> <li>No turtle nesting on beaches near the plant site</li> <li>Closest nesting beach (Ashburton Delta) is &gt; 4 km from plant site</li> </ul>	Reasonable Modelling conducted	No significant impact
Marine Fauna	Additive Effects		The sum of all potential Project-attributable impacts from all Project phases and aspects	-	-	Not identified in Environmental Scoping Document	<ul style="list-style-type: none"> <li>See above for proposed management/mitigation measures</li> </ul>	4	2	Medium	<ul style="list-style-type: none"> <li>The risk ranking of the additive effects of all Project aspects is determined by the highest risk ranking of any individual aspect</li> </ul>	Reasonable	No significant impact	Section 8.4



<b>Coastal Processes</b>	Construction and Operations	Construction of Nearshore Infrastructure	<ul style="list-style-type: none"> <li>• Interruption of the non-cyclonic littoral sediment paths</li> <li>• Alteration of the entrance Regime of Hooley Creek</li> </ul>	-	Not identified in Environmental Scoping Document	<ul style="list-style-type: none"> <li>• Refer to CPMP for complete list of mitigation measures.</li> <li>• Refer to Chapter 12 for the OBC relating to Coastal Processes Protection.</li> <li>• Manage construction and operation activities to reduce, as far as practicable, nearshore infrastructure-attributable impacts on the physical integrity and functionality of coastal processes at Hooley Creek.</li> <li>• Mitigation will be instigated to maintain the integrity of the entrance regime of Hooley Creek if it is determined that the nearshore infrastructure, not a natural agent of disturbance, was the cause of the destabilization.</li> <li>• Mitigation measures may include sand management consisting of nourishment of the features. (Nourishment is the process of placing or pumping sand from elsewhere onto an eroding feature to reshape the existing beach).</li> <li>• Adaptive monitoring program to monitor changes to the spit width at Hooley Creek and all entrance bars from Ashburton River entrance to Beadon Creek.</li> <li>• The Proponent to prepare an annual coastal processes monitoring report. This report shall be made available to relevant agencies.</li> </ul>	4	2	<b>Medium</b>	<ul style="list-style-type: none"> <li>• Without sand supply from the west, the existing spit would erode over approximately 5-10 years</li> </ul>	<b>Reasonable</b> Available information is adequate	Not Applicable	Section 8.5 Table 12.3 Appendix T1
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Factor	Phase	Aspect	Potential Impacts	Inherent Risk (from Scoping Document)		Comments/Assumptions (from Scoping Document)	Management and Mitigation Measures		Residual Risk		Comments/Assumptions (Relating to residual risk ranking)	Confidence Level and Justification	Potential Impacts to Matters of NES	EIS/ERMP Reference
				C	L		C	L	C	L				
Coastal Processes	Construction and Operations	Construction of Nearshore Infrastructure	<ul style="list-style-type: none"> <li>Interruption of the non-cyclonic littoral sediment paths</li> <li>Erosion of Sunset Beach</li> </ul>			Not identified in Environmental Scoping Document	<ul style="list-style-type: none"> <li>Refer to CPMP for complete list of mitigation measures</li> <li>Manage construction and operation activities to reduce, as far as practicable, nearshore infrastructure-attributable impacts on the physical integrity of coastal processes and functionality at Sunset Beach</li> <li>Mitigation will be instigated to maintain the integrity of Sunset Beach if it is determined that the near shore infrastructure, not a natural agent of disturbance, was the cause of the erosion. Mitigation measures may include beach nourishment</li> <li>Adaptive monitoring program to monitor changes to beach profile and width</li> <li>The Proponent to prepare an annual coastal processes monitoring report. This report shall be made available to relevant agencies</li> </ul>	5	3	Low	<ul style="list-style-type: none"> <li>Structural control at Beadon Point limits the potential for erosion as a direct result of reduced sand supply</li> </ul>	Reasonable Available information is adequate	Not Applicable	Section 8.5 Appendix T1
	Construction and Operations	Construction of Nearshore Infrastructure	<ul style="list-style-type: none"> <li>Interruption of the non-cyclonic littoral sediment paths</li> <li>Erosion of Onslow Town Beach</li> </ul>			Not identified in Environmental Scoping Document	<ul style="list-style-type: none"> <li>Refer to CPMP for complete list of mitigation measures</li> <li>Refer to Disruption of non-cyclonic littoral sediment path: Erosion of Sunset Beach above</li> </ul>	4	3	Low	<ul style="list-style-type: none"> <li>The structurally controlled nature of this beach determines that a loss of supply would not cause erosion</li> </ul>	Reasonable Available information is adequate	Not Applicable	Section 8.5 Appendix T1

<p><b>Coastal Processes</b></p>	<p>Construction and Operations</p>	<p>Construction of Nearshore Infrastructure</p>	<ul style="list-style-type: none"> <li>• Interruption of the non-cyclonic littoral sediment paths</li> <li>• Destabilisation of Ashburton East chenier</li> </ul>	<p>-</p>	<p>Not identified in Environmental Scoping Document</p>	<ul style="list-style-type: none"> <li>• Refer to CPMP for complete list of mitigation measures</li> <li>• Refer to Chapter 12 for the OBC relating to Coastal Processes Protection</li> <li>• Manage construction and operation activities to reduce, as far as practicable, nearshore infrastructure-attributable impacts on the physical integrity and functionality of coastal processes at the East Ashburton Delta</li> <li>• Manage the volume of potential updrift capture of sediments on the west side of the MOF breakwaters</li> <li>• Mitigation will be instigated to maintain the integrity of the Ashburton East chenier if it is determined that the nearshore infrastructure, not a natural agent of disturbance, was the cause of the destabilisation</li> <li>• Sand management consisting of nourishment of the chenier</li> <li>• Adaptive monitoring program to monitor changes to Ashburton East chenier width</li> <li>• The Proponent to prepare an annual coastal processes monitoring report. This report shall be made available to relevant agencies</li> </ul>	<p>4</p>	<p><b>Low</b></p>	<ul style="list-style-type: none"> <li>• MOF breakwaters are likely to have negligible effect on ongoing sediment transport to the west of the MOF</li> </ul>	<p>Reasonable Available information is adequate</p>	<p>Not Applicable</p>	<p>Section 8.5 Table 12.3 Appendix T1</p>
<p><b>Coastal Processes</b></p>	<p>Construction and Operations</p>	<p>Construction of Nearshore Infrastructure</p>	<ul style="list-style-type: none"> <li>• Interruption of the cyclonic littoral sediment paths</li> <li>• Alteration of the entrance Regime of Hooley Creek</li> </ul>	<p>-</p>	<p>Not identified in Environmental Scoping Document</p>	<ul style="list-style-type: none"> <li>• Refer to CPMP for complete list of mitigation measures</li> <li>• Refer to Chapter 12 for the OBC relating to Coastal Processes Protection</li> <li>• Refer to Disruption of non-cyclonic littoral sediment path: Entrance Regime of Hooley Creek above</li> </ul>	<p>2</p>	<p><b>Medium</b></p>	<ul style="list-style-type: none"> <li>• Eastward downdrift erosion will cause massive change to the entrance morphology in the event of a significant cyclone</li> <li>• Similar impacts have occurred over an historic period</li> </ul>	<p>Reasonable Available information is adequate</p>	<p>Not Applicable</p>	<p>Section 8.5 Table 12.3 Appendix T1</p>

Factor	Phase	Aspect	Potential Impacts	Inherent Risk (from Scoping Document)		Comments/Assumptions (from Scoping Document)	Management and Mitigation Measures		Residual Risk		Comments/Assumptions (Relating to residual risk ranking)	Confidence Level and Justification	Potential Impacts to Matters of NES	EIS/ERMP Reference			
				C	L		C	L	C	Ranking							
Coastal Processes	Construction and Operations	Construction of Nearshore Infrastructure	<ul style="list-style-type: none"> <li>Interruption of the cyclonic littoral sediment paths</li> <li>Erosion of Sunset Beach</li> </ul>	-	-	Not identified in Environmental Scoping Document	<ul style="list-style-type: none"> <li>Refer to CPMP for complete list of mitigation measures</li> <li>Refer to Disruption of non-cyclonic littoral sediment path: Erosion of Sunset Beach above</li> </ul>	5	2	<ul style="list-style-type: none"> <li>In the event of a cyclone impacts to Sunset Beach will only be slightly increased</li> <li>The existing beach is sufficiently wide to withstand severe cyclone impact, and to recover</li> </ul>	Reasonable Available information is adequate	Not Applicable	Section 8.5 Appendix T1				
								4	2					<ul style="list-style-type: none"> <li>Interruption of the non-cyclonic littoral transport path will slow beach recovery following an erosion event</li> </ul>	Reasonable Available information is adequate	Not Applicable	Section 8.5 Appendix T1
								3	3								
5	4	<ul style="list-style-type: none"> <li>The sequence of events that will reduce hydraulic resistance of the breakout pathway are unlikely to occur</li> </ul>	Reasonable Available information is adequate	Not Applicable	Section 8.5 Table 12.3 Appendix T1												
5	4					<ul style="list-style-type: none"> <li>Refer to CPMP for complete list of mitigation measures</li> <li>Refer to Chapter 12 for the OBC relating to Coastal Processes Protection</li> <li>Manage construction and operation activities to reduce, as far as practicable, nearshore infrastructure-attributable impacts on the physical integrity and functionality of the fluvial pathway of the Ashburton River</li> <li>Mitigation will be instigated to maintain the integrity of the fluvial pathway of the Ashburton River if it is determined that the nearshore infrastructure, not a natural agent of disturbance, was the cause of the disruption</li> </ul>	Very Low	Not Applicable	Section 8.5 Table 12.3 Appendix T1								
5	4									<ul style="list-style-type: none"> <li>Refer to CPMP for complete list of mitigation measures</li> <li>Refer to Chapter 12 for the OBC relating to Coastal Processes Protection</li> <li>Manage construction and operation activities to reduce, as far as practicable, nearshore infrastructure-attributable impacts on the physical integrity and functionality of the fluvial pathway of the Ashburton River</li> <li>Mitigation will be instigated to maintain the integrity of the fluvial pathway of the Ashburton River if it is determined that the nearshore infrastructure, not a natural agent of disturbance, was the cause of the disruption</li> </ul>	Very Low	Not Applicable	Section 8.5 Table 12.3 Appendix T1				
5	4	<ul style="list-style-type: none"> <li>Refer to CPMP for complete list of mitigation measures</li> <li>Refer to Chapter 12 for the OBC relating to Coastal Processes Protection</li> <li>Manage construction and operation activities to reduce, as far as practicable, nearshore infrastructure-attributable impacts on the physical integrity and functionality of the fluvial pathway of the Ashburton River</li> <li>Mitigation will be instigated to maintain the integrity of the fluvial pathway of the Ashburton River if it is determined that the nearshore infrastructure, not a natural agent of disturbance, was the cause of the disruption</li> </ul>	Very Low	Not Applicable	Section 8.5 Table 12.3 Appendix T1												

(Cont'd)

<b>Coastal Processes</b>	Construction and Operations	Construction of Onshore Infrastructure	<ul style="list-style-type: none"> <li>Increased flows through channel (includes drainage)</li> <li>Reactivation of palaeochannels</li> </ul>	-	Not identified in Environmental Scoping Document	<ul style="list-style-type: none"> <li>Manage Project-attributable sedimentation during construction</li> <li>Channel cross-section monitoring</li> <li>The Proponent to prepare an annual coastal processes monitoring report. This report shall be made available to relevant agencies</li> </ul>	5	4	<b>Very Low</b>	<ul style="list-style-type: none"> <li>Reactivation has low environmental consequences</li> </ul>	Not Applicable	Section 8.5 Table 12.3 Appendix T1
<b>Coastal Processes</b>	Construction and Operations	Excavation of borrow pits	<ul style="list-style-type: none"> <li>Loss of geological heritage features</li> </ul>	-	Not identified in Environmental Scoping Document	<ul style="list-style-type: none"> <li>Refer to CPMP for complete list of mitigation measures</li> <li>Field surveys to be undertaken to confirm, where practicable, the geological heritage value of the Project area and identify features requiring protection</li> <li>During borrow pit excavation, mitigation will be implemented to reduce potential impacts to, and to protect, these features as reasonably practicable</li> </ul>	4	4	<b>Low</b>	<ul style="list-style-type: none"> <li>Geological heritage features exist in the Project area and require protection; however, mitigation measures will be put in place to reduce disturbance of these features</li> </ul>	Not Applicable	Section 8.5 Appendix T1
<b>Coastal Processes</b>	Additive Effects		<ul style="list-style-type: none"> <li>The sum of all potential Project-attributable impacts from all Project phases and aspects</li> </ul>	-	Not identified in Environmental Scoping Document	<ul style="list-style-type: none"> <li>See above for proposed management/mitigation measures</li> </ul>	5	1	<b>Medium</b>	<ul style="list-style-type: none"> <li>The risk ranking of the additive effects of all Project aspects is determined by the highest risk ranking of any individual aspect</li> </ul>	Not Applicable	8.5

**Table 1.6: Terrestrial Risk Assessment Summary**

For details on the risk ranking procedure, including consequence and likelihood definitions specific to each factor, refer to Chapter 7, *Impact Assessment Methodology* and Chapter 9, *Terrestrial Risk Assessment and Management*. Note that “C” refers to Consequence and “L” refers to Likelihood.

Factor	Phase	Aspect	Potential Impacts	Inherent Risk (from Scoping Document)		Comments/Assumptions (from Scoping Document)	Management and Mitigation Measures		Residual Risk		Comments/Assumptions (relating to residual risk ranking)	Confidence Level and Justification	Potential Impacts to Matters of NES	EIS/ERMP Reference
				C	L		C	L	C	L				
Soils & Landforms	Construction	Earthworks	<ul style="list-style-type: none"> <li>Degradation of soil quality through the disturbance of PASS (i.e. acidity and heavy metals)</li> <li>Soil erosion due to ground disturbance (i.e. wind and water)</li> </ul>	4	2	<ul style="list-style-type: none"> <li>Ranking based on potential physical changes to Hooley</li> <li>Creek and Ashburton River Delta</li> <li>ASS is not considered to be a significant risk to the terrestrial environment</li> <li>Health issues associated with mosquitoes and the design of any stormwater ponds will be investigated and controls will be incorporated into the design</li> </ul>	<ul style="list-style-type: none"> <li>Management of PASS material utilising best practice methods, as outlined in the CEMP</li> <li>Reduce dust generation through application of suppressant or soil stabiliser</li> <li>Installation of erosion control and flow diversion devices if required</li> </ul>	5	2	Low	<ul style="list-style-type: none"> <li>Project area has been refined to limit impacts to Hooley, Creek and Ashburton River Delta</li> <li>The Project area generally has a low risk of encountering PASS material</li> <li>Health issues are assessed in social impacts section</li> <li>The residual risk ranking has been obtained due to the excavation of the borrow sites being likely to lead to the minor erosion or loss of local landforms</li> </ul>	Reasonable Survey data available from one expert - complies with EPA Guidance. Available information is adequate.	Not Applicable	Section 9.2.5.1 Appendix U1
	Operations	Earthworks and Maintenance	<ul style="list-style-type: none"> <li>Degradation of soil quality through the disturbance of PASS (i.e. acidity and heavy metals)</li> <li>Soil erosion due to ground disturbance (i.e. wind and water)</li> </ul>	-	-	<ul style="list-style-type: none"> <li>Not identified in Environmental Scoping Document</li> </ul>	<ul style="list-style-type: none"> <li>Management of PASS material utilising best practice methods, to be outlined in the OEMP</li> <li>Reduce dust generation through application of suppressant or soil stabiliser</li> <li>Installation of erosion control and flow diversion devices if required</li> </ul>	6	4	Very Low	<ul style="list-style-type: none"> <li>Incidental earthworks associated with ongoing operations of the LNG plant facility and maintenance works will be required throughout the life of the Project</li> <li>The residual risk ranking has been obtained as it is unlikely that the operational earthworks and maintenance will lead to localised and short-term disturbances to well represented landforms. Furthermore, any disturbances can be readily remediated</li> </ul>	Reasonable Survey data available from one expert - complies with EPA Guidance. Available information is adequate.	Not Applicable	Section 9.2.5.2

<p><b>Soils &amp; Landforms</b></p>	<p>Construction and Operations</p>	<p>Leaks &amp; Spills- Storage, handling and transport</p>	<p>• Degradation of soil quality due to hydrocarbons spills</p>	<p>-</p>	<p>Not identified in Environmental Scoping Document</p>	<p>• Appropriate design, construction and maintenance of storage, handling and transfer infrastructure</p> <p>• A risk-based integrity assurance program for storage vessels and pipelines</p> <p>• Adequate and appropriate emergency response capability</p> <p>• Spill response procedures and training implementation</p>	<p>3</p>	<p>4</p>	<p><b>Low</b></p>	<p>• Leaks and spills are most likely to occur in association with pipeline or equipment failure, storage and handling of product, fuels and chemicals, waste storage and disposal</p> <p>• The residual risk ranking has been obtained by assessing the impacts of a major onshore spill or leak. It is anticipated that, with the adoption of management controls and mitigation measures, this event would be "Unlikely", but could perceptibly be of "Major" consequence</p>	<p><b>High</b></p> <p>Several expert investigations/studies.</p> <p>Excellent survey data</p>	<p>Not Applicable</p>	<p>Section 9.2.5.3</p>
<p>Additive Effects</p>	<p>• All of the above</p>	<p>-</p>	<p>Not identified in Environmental Scoping Document</p>	<p>-</p>	<p>• All of the above</p>	<p>5</p>	<p>2</p>	<p><b>Low</b></p>	<p>• The residual risk ranking has been obtained as it is likely that the Project will lead to local soil contamination that can be readily remediated; minor impacts to specific soil characteristics, and minor erosion or loss of local landforms</p>	<p><b>Reasonable</b></p> <p>Survey data available from one expert – complies with EPA guidance</p> <p>Available information is adequate</p>	<p>Not Applicable</p>	<p>Section 9.2.8</p>	

Factor	Phase	Aspect	Potential Impacts	Inherent Risk (from Scoping Document)		Comments/ Assumptions (from Scoping Document)	Management and Mitigation Measures		Residual Risk		Comments/ Assumptions (Relating to residual risk ranking)	Confidence Level and Justification	Potential Impacts to Matters of NES	EIS/ERMP Reference
				C	L		C	L	Ranking					
Groundwater	Construction	Earthworks- Dredge Material Placement Areas	<ul style="list-style-type: none"> <li>Mounding of the water table</li> <li>Altered salt loadings to the water table</li> <li>Seepage from the placement area</li> </ul>		-	Not identified in Environmental Scoping Document	<ul style="list-style-type: none"> <li>The placement area has been selected to reduce the footprint used</li> <li>Dredged material will be contained in a bunded area. Where practicable, placement in the eastern half of the placement area will be preferred to limit water levels in (and seepage from) the western half of the placement area</li> <li>Bunds will be designed to withstand erosion during inundation events</li> <li>Discharge of decant water during the first 18-24 months will be pumped via pipeline to a marine outfall</li> <li>Installation of a drainage ditch to collect and divert seepage</li> <li>Groundwater monitoring</li> </ul>	4	2	Medium	<ul style="list-style-type: none"> <li>The placement of material into the sites will promote trapping of fines in the settled material and reduce the amounts of fines in suspension</li> <li>Drainage of decant water over the placement area will be to the south away from the Ashburton Delta</li> <li>The residual risk ranking has been obtained as it is likely that the onshore placement of dredged material will lead to a local and major change in sub-catchment groundwater recharge patterns over a local area over the long term</li> </ul>	Reasonable Survey data available from one expert – complies with EPA guidance. Short term monitoring results available. Available information is adequate.	Not Applicable	Section 9.3.5.1
	Construction and Operations	Presence of Infrastructure - Presence of Plant Pad, Access Road, Infrastructure Corridor and Accommodation Village area	<ul style="list-style-type: none"> <li>Groundwater mounding</li> <li>Change in groundwater flow directions</li> <li>Change in groundwater quality</li> </ul>			Not identified in Environmental Scoping Document	<ul style="list-style-type: none"> <li>Monitoring bores</li> </ul>	4	4	Low	<ul style="list-style-type: none"> <li>The residual risk ranking has been obtained as it is unlikely that the presence of the infrastructure will lead to local and major change in sub-catchment groundwater recharge patterns over a local area over the long term</li> </ul>	Reasonable Survey data available from one expert – complies with EPA guidance. Short term monitoring results available. Available information is adequate.	Not Applicable	Section 9.3.5.2



<b>Groundwater</b>	Operation	Operational Spills and Leaks and Stormwater run-off	• Changes to quality of groundwater	3	3	Medium	<ul style="list-style-type: none"> <li>This assumes beneficial uses as well as an ecological value associated with the groundwater resources</li> </ul>	<ul style="list-style-type: none"> <li>Appropriate design, construction and maintenance of storage, handling and transfer infrastructure</li> <li>A regular testing program for storage vessels and pipelines</li> <li>Adequate and appropriate emergency response capability</li> <li>Spill response procedures and training</li> <li>Implementation of appropriate treatment and/or rehabilitation techniques where significant impacts to groundwater occurs</li> <li>Management controls will be implemented as part of the CEMP and the OEMP</li> </ul>	4	4	4	<ul style="list-style-type: none"> <li>The residual risk ranking has been obtained by assessing the impacts of a major onshore spill or leak. It is anticipated that, with the adoption of management controls and mitigation measures, this event would be "Unlikely", but could perceptibly be of "Moderate" consequence</li> </ul>	<ul style="list-style-type: none"> <li>Reasonable</li> <li>Survey data available from one expert - complies with EPA guidance.</li> <li>Short term monitoring results available.</li> <li>Available information is adequate.</li> </ul>	Not Applicable	Section 9.3.5.3 Appendix U1
<b>Groundwater</b>	Additive Effects		• All of the above	-	3	Medium	Not identified in Environmental Scoping Document	<ul style="list-style-type: none"> <li>All of the above</li> </ul>	4	2	2	<ul style="list-style-type: none"> <li>Additive risk ranking is based on the highest risk - impacts to groundwater from the onshore dredge placement area option</li> <li>The Project is considered to have an overall medium residual risk of significant impact on groundwater after the implementation of appropriate mitigation controls</li> </ul>	<ul style="list-style-type: none"> <li>Reasonable</li> <li>Survey data available from one expert - complies with EPA guidance</li> <li>Short-term monitoring results available</li> <li>Available information is adequate</li> </ul>	Not Applicable	Section 9.3.8

Factor	Phase	Aspect	Potential Impacts	Inherent Risk (from Scoping Document)		Comments/Assumptions (from Scoping Document)	Management and Mitigation Measures		Residual Risk		Comments/Assumptions (Relating to residual risk ranking)	Confidence Level and Justification	Potential Impacts to Matters of NES	EIS/ERMP Reference
				C	L		C	L	C	L				
Surface Water	Construction	Earthworks- Clearing and Disturbance of Surface Soils	<ul style="list-style-type: none"> <li>Increased runoff and erosion</li> <li>Increased mobility of sediments</li> <li>Increased sediment loads and sediment concentrations</li> </ul>			Not identified in Environmental Scoping Document	<ul style="list-style-type: none"> <li>Control measures may include engineering solutions such as perimeter bunds and culverts, sedimentation ponds, use of silt fences and placement of rock at the surface water release points</li> <li>A system of drains will be constructed to divert runoff from the Plant Pad to storm water sedimentation ponds</li> </ul>	5	2	Low	<ul style="list-style-type: none"> <li>Surface water in the local environment is regularly turbid; accordingly it may be assumed that these habitats are resilient to potential impacts from sediment in stream flow and tidal reaches of the local watercourse</li> <li>The residual risk ranking was obtained as it is likely that minor changes to local water resources, may result in local short-term and small reduction in water quality with no exceedence of baseline water quality levels</li> </ul>	Reasonable Short term monitoring results available. Available information is adequate.	Not Applicable	9.4.5.1
	Construction	Dredge Material Placement Area	<ul style="list-style-type: none"> <li>Changes to surface water quality and quantity</li> </ul>			Not identified in Environmental Scoping Document	<ul style="list-style-type: none"> <li>The placement area has been selected to reduce the footprint used.</li> <li>Dredged material will be contained in a bunded area</li> <li>Where practicable, placement in the eastern half of the placement area will be preferred to limit water levels in (and seepage from) the western half of the placement area</li> <li>Bunds will be designed to withstand erosion during inundation events</li> <li>Discharge of decant water during the first 18-24 months will be pumped via pipeline to a marine outfall</li> <li>Installation of a drainage ditch to collect and divert seepage</li> <li>Surface water monitoring</li> </ul>	4	2	Medium	<ul style="list-style-type: none"> <li>Impacts to marine environment from nearshore decant water disposal discussed and assessed in Chapter 8</li> <li>Impacts to surface water may not be measurable</li> <li>The dredge material is inert, thus the seawater would not accumulate dissolved salts except by evaporation processes (Cont'd)</li> </ul>	Reasonable Short term monitoring results available. Available information is adequate.	Not Applicable	Section 9.4.5.2



Factor	Phase	Aspect	Potential Impacts	Inherent Risk (from Scoping Document)		Comments/Assumptions (from Scoping Document)	Management and Mitigation Measures		Residual Risk		Comments/Assumptions (Relating to residual risk ranking)	Confidence Level and Justification	Potential Impacts to Matters of NES	EIS/ERMP Reference
				C	L		C	L	Ranking					
Surface Water	Additive Effects		<ul style="list-style-type: none"> <li>All of the above</li> </ul>			<ul style="list-style-type: none"> <li>Not identified in Environmental Scoping Document</li> </ul>	<ul style="list-style-type: none"> <li>All of the above</li> </ul>	C: 4 L: 2	Medium	<ul style="list-style-type: none"> <li>Additive risk ranking is strongly influenced by the highest risk - impacts to surface water from the onshore dredge placement area option</li> <li>The Project is considered to have an overall medium residual risk of significant impact on surface water after the implementation of appropriate mitigation controls</li> </ul>	<ul style="list-style-type: none"> <li>Reasonable</li> <li>Short term monitoring results available.</li> <li>Available information is adequate</li> </ul>	Not Applicable	Section 9.4.8	

<p><b>Flora &amp; Vegetation</b></p>	<p>Construction</p>	<p>Vegetation Clearing- Site Preparation and Site Access</p>	<ul style="list-style-type: none"> <li>Loss of flora and vegetation</li> <li>Erosion</li> <li>Spread of introduced flora</li> <li>Over-clearing</li> <li>Increased surface water runoff and velocity leading to increased sedimentation on vegetation outside of cleared area</li> </ul>	<p>3</p>	<p>3</p> <p><b>Medium</b></p> <ul style="list-style-type: none"> <li>Ranking the loss of conservation significant species (not individuals) and communities associated with vegetation clearing</li> <li>Risk ranking considered potential for domgas pipeline alignment through Cane River Conservation Park (CRCP)</li> <li>Declared Rare Flora (DRF) are unlikely to be present, based on surveys completed to date. Risk ranking was based on worst case; in the event that DRF are found in future surveys. Disturbance from pipeline construction to CRCP is not expected to sever communities as the domgas pipeline alignment is proposed to be parallel to existing road reserve where there is existing disturbance</li> </ul>	<p>4</p>	<p>2</p>	<p><b>Medium</b></p> <ul style="list-style-type: none"> <li>Implement vegetation clearing process</li> <li>Limit clearing to designated areas and clearly mark these areas</li> <li>Utilise previously cleared areas where practicable</li> <li>Implement vehicle hygiene procedures appropriate for the site</li> <li>Develop and implement an employee environmental education program/induction</li> <li>Develop flora and vegetation management as part of the CEMP</li> <li>Rehabilitate disturbed areas where practicable</li> <li>Weed management procedures</li> </ul>	<p>High</p> <p>Several expert investigations/ studies</p> <p>Excellent survey data.</p>	<p>Not Applicable</p> <p>Section 9.5.5.1 Appendix U1</p>
<p>The vegetation units and flora within the Project area are generally well represented throughout the local area and region or not restricted to the Project area</p> <ul style="list-style-type: none"> <li>No DRF located within Project area</li> <li>The residual risk ranking has been obtained as clearing of vegetation is likely to lead to a local long-term reduction in the abundance of a Commonwealth or WA Listed Flora species</li> </ul>										

Factor	Phase	Aspect	Potential Impacts	Inherent Risk (from Scoping Document)		Comments/ Assumptions (from Scoping Document)	Management and Mitigation Measures		Residual Risk		Comments/ Assumptions (Relating to residual risk ranking)	Confidence Level and Justification	Potential Impacts to Matters of NES	EIS/ERMP Reference
				C	L		C	L	Ranking					
Flora & Vegetation	Construction	Earthworks- Site Preparation and Trenching	<ul style="list-style-type: none"> <li>Introduction and/ or spread of introduced flora</li> <li>Changes to natural drainage patterns and ground water infiltration resulting in adverse impacts to vegetation</li> <li>Increased dust production resulting in smothering of undisturbed vegetation</li> <li>Mobilisation of acids and metals from oxidation of PASS</li> </ul>	-	-	Not identified in Environmental Scoping Document	<ul style="list-style-type: none"> <li>Implement vehicle hygiene procedures appropriate for the site</li> <li>Weed management procedures</li> <li>Surface water management such as drains, settlement ponds etc</li> <li>Dust suppression as required</li> <li>Implement PASS management measures</li> </ul>	5	2	Low	<ul style="list-style-type: none"> <li>This aspect assumes that all vegetation within the Project area has been removed (risk to vegetation from clearing assessed above)</li> <li>The residual risk ranking has been obtained as it is likely that earthworks could lead to an increase in the abundance of an existing non-native flora species within the Project area</li> </ul>	High Several Expert investigations/ studies Excellent survey data	Not Applicable	Section 9.5.5.2
	Construction and Operations	Vehicular activity- Site Access, Construction Vehicles on Site and Haulage Vehicles	<ul style="list-style-type: none"> <li>Direct impact as a result of off-road driving</li> <li>Introduction or spread of introduced flora species</li> <li>Increased erosion</li> <li>Increased dust emissions</li> </ul>	3	5	<ul style="list-style-type: none"> <li>Main concern is the spread of existing weeds beyond the site and ranking is based on this</li> <li>Surveys at the site have found Mesquite present</li> <li>The risk assessment assumes that effective quarantine and hygiene measures will be applied to manage the spread of weeds</li> </ul>	<ul style="list-style-type: none"> <li>Manage potential dust generation through implementation of measures to be outlined in the CEMP and OEMP.</li> <li>Clearly mark authorised access tracks and roads</li> <li>Construct access routes in a manner that reduces potential for erosion</li> <li>Weed management procedures</li> </ul>	6	3	Very Low	<ul style="list-style-type: none"> <li>The residual risk ranking has been obtained as vehicle activity could possibly result in a local short-term reduction in the abundance of a species or vegetation community</li> </ul>	High Several Expert investigations/ studies Excellent survey data	Not Applicable	Section 9.5.5.3 Appendix U1

<p><b>Flora &amp; Vegetation</b></p>	<p>Construction and Operations</p>	<p>Fire- Vehicle and Machinery Activity and Employee Activity (e.g. smoking)</p>	<ul style="list-style-type: none"> <li>Increased risk of fire resulting from increased vehicle and machinery activity</li> <li>Altered fire regimes resulting from increased incidence of fire leading to regional impact on species abundance and diversity</li> </ul>	<p>6</p>	<p><b>Very Low</b></p>	<ul style="list-style-type: none"> <li>Environment is subject to natural fires</li> <li>Risk assessment based on the likelihood of impacts of fire (caused by the Project) on flora and vegetation</li> <li>There will be management measures on site to contain fires</li> </ul>	<p>5</p>	<p>4</p>	<p><b>Very Low</b></p>	<ul style="list-style-type: none"> <li>Fire fighting and fire awareness training for project personnel</li> <li>Establish a continuous firebreak around the perimeter of the LNG plant through vegetation clearance</li> </ul>	<p>5</p>	<p>4</p>	<p><b>High</b></p> <p>Several Expert investigations/ studies</p> <p>Excellent survey data</p>	<p>Not Applicable</p>	<p>Section 9.5.5.4</p>
<p><b>Flora &amp; Vegetation</b></p>	<p>Operations</p>	<p>Air Emissions- Plant Operations and Vehicle Movements</p>	<ul style="list-style-type: none"> <li>Detriment to vegetation as a result of air emissions from the processing facility</li> </ul>	<p>5</p>	<p><b>Very Low</b></p>	<ul style="list-style-type: none"> <li>Risk assessment based on mangroves being the most sensitive receptor to ground level ozone (secondary pollutant)</li> <li>An Air Quality screening assessment (Ausplume Version 6.0) indicates that ground level ozone concentrations are unlikely to exceed environmental limits (NEPM) during normal operations</li> <li>Photochemical reactions associated with secondary pollutants that create the greatest impact on vegetation are likely to occur at levels below environmental limits - WHO Air Quality Guidelines for vegetation</li> </ul>	<p>6</p>	<p>4</p>	<p><b>Very Low</b></p>	<ul style="list-style-type: none"> <li>Management of the processing operation to reduce polluting emissions as low as reasonably practicable</li> <li>Regular maintenance of equipment for good performance and reduced emissions</li> <li>Planning of non-routine (planned) maintenance shutdowns to reduce emissions, where practicable</li> <li>Ongoing monitoring of emissions from the facility to determine the level of polluting emissions</li> <li>Implementation of remedial action should emission levels exceed agreed levels</li> </ul>	<p>6</p>	<p>4</p>	<p><b>High</b></p> <p>Several Expert investigations/ studies</p> <p>Excellent survey data</p>	<p>Not Applicable</p>	<p>Section 9.5.5.5</p>

Factor	Phase	Aspect	Potential Impacts	Inherent Risk (from Scoping Document)		Comments/Assumptions (from Scoping Document)	Management and Mitigation Measures		Residual Risk		Comments/Assumptions (Relating to residual risk ranking)	Confidence Level and Justification	Potential Impacts to Matters of NES	EIS/ERMP Reference
				C	L		C	L	C	L				
Flora & Vegetation	Construction	Alteration of Surface Water Drainage - Site Preparation, Earthworks and Presence of infrastructure	<ul style="list-style-type: none"> <li>Detriment to vegetation due to changes in surface drainage patterns</li> <li>Alterations to ground water infiltration</li> <li>Increased erosion leading to downstream impacts on remnant vegetation</li> </ul>	-	-	Not identified in Environmental Scoping Document	<ul style="list-style-type: none"> <li>Retain natural drainage where practicable</li> <li>Facilities designed to limit impacts to surface water systems.</li> <li>Monitor down-stream vegetation</li> </ul>	5	3	Low	<ul style="list-style-type: none"> <li>The residual risk ranking has been obtained as it is possible that alteration of surface water drainage could lead to a local long-term reduction in the abundance of a species or vegetation community outside of the Project area</li> </ul>	High Several Expert investigations/studies Excellent survey data	Not Applicable	Section 9.5.5.6
	Construction and Operations	Dust Suppression- Application of saline water or other suppressants for dust control	<ul style="list-style-type: none"> <li>Detriment to vegetation due to overspray or run-off of suppressants used for dust control</li> <li>Increased nutrient loading</li> <li>Increased potential for weed growth on disturbed ground because of availability of nutrients</li> </ul>	-	-	Not identified in Environmental Scoping Document	<ul style="list-style-type: none"> <li>Fringing vegetation monitoring</li> <li>A management plan will be developed as part of the CEMP and OEMP with the key objective to manage the generation of dust</li> <li>Specific dust control measures would also be implemented as part of the standard operation of the concrete batching plant</li> </ul>	5	3	Low	<ul style="list-style-type: none"> <li>The residual risk ranking has been obtained as it is possible that dust suppression could result in a local loss of a species or vegetation community outside of the project area</li> </ul>	High Several Expert investigations/studies Excellent survey data	Not Applicable	Section 9.5.5.7 Appendix U
Flora & Vegetation	Operations	Leaks & Spills- Vehicle Refuelling, Breakdowns and Plant Operations	<ul style="list-style-type: none"> <li>Detriment to vegetation due to changes to surface water and groundwater quality</li> <li>Direct impact of spills on vegetation</li> </ul>	4	3	<ul style="list-style-type: none"> <li>Risk assessment assumes that effective storage and management measures will be in place</li> </ul>	<ul style="list-style-type: none"> <li>Appropriate storage vessels, containment facilities, transfer equipment and handling methods</li> <li>Capture and treatment of runoff from operational areas, fuel farms and banded areas</li> <li>Appropriate spill response equipment, emergency response training and spill contingency planning</li> </ul>	4	4	Low	<ul style="list-style-type: none"> <li>The residual risk ranking has been obtained as it is unlikely that leaks and spills will have a short-term impact on native vegetation outside the Project area</li> </ul>	High Several Expert investigations/studies Excellent survey data	Not Applicable	Section 9.5.5.8



<p><b>Flora &amp; Vegetation</b></p> <p>Construction and Operations</p> <p>Dredge Material Placement Area- Seepage from Placement Area</p> <p>• Detriment to vegetation outside the plant footprint due to changes in surface and groundwater quality and quantity</p>	<p>-</p> <p>Not identified in Environmental Scoping Document</p>	<p>5</p> <p>3</p>	<p>Low</p> <p>• Monitoring bores</p> <ul style="list-style-type: none"> <li>• Monitoring and management program (as a part of the CEMP and the OEMP)</li> <li>• Containment and controlled release strategies including sediment ponds</li> <li>• Discharge via a control point (e.g. weir box)</li> <li>• The placement area has been selected to reduce the footprint used</li> <li>• Dredged material will be contained in a bunded area</li> <li>• Where practical, placement in the eastern half of the placement area will be preferred to limit water levels in (and seepage from) the western half of the placement area</li> <li>• Discharge of decant water during the first 18-24 months will be pumped via pipeline to a marine outfall</li> <li>• Installation of a drainage ditch to collect and divert seepage</li> </ul>	<p>High</p> <p>Several Expert Investigations/ studies</p> <p>Excellent survey data</p>	<p>Not Applicable</p>	<p>Section 9.5.5.9 Appendix U1</p>
<p><b>Flora &amp; Vegetation</b></p> <p>Additive Effects</p> <p>• All of the above</p>	<p>-</p> <p>Not identified in Environmental Scoping Document</p>	<p>4</p> <p>2</p>	<p>Medium</p> <p>• Flora and vegetation present in the Project area are generally widespread and well represented in the surrounding region</p> <ul style="list-style-type: none"> <li>• The residual risk ranking has been obtained as it is likely that a local long-term reduction in the abundance of a Commonwealth or WA Listed Flora species could occur within the Project area due to clearing during construction activities</li> </ul>	<p>High</p> <p>Several Expert Investigations/ studies</p> <p>Excellent survey data</p>	<p>Not Applicable</p>	<p>Section 9.5.8</p>

Factor	Phase	Aspect	Potential Impacts	Inherent Risk (from Scoping Document)		Comments/ Assumptions (from Scoping Document)	Management and Mitigation Measures		Residual Risk		Comments/ Assumptions (Relating to residual risk ranking)	Confidence Level and Justification	Potential Impacts to Matters of NES	EIS/ERMP Reference
				C	L		C	L	C	L				
Terrestrial Fauna	Construction	Vegetation Clearing - Site Preparation	<ul style="list-style-type: none"> <li>Loss or alteration of terrestrial fauna habitat</li> <li>Loss of populations</li> <li>Direct impact with machinery</li> <li>Fragmentation of terrestrial fauna habitat resulting in reduced area of habitat, altered behavioural patterns etc</li> </ul>	3	3	<ul style="list-style-type: none"> <li>A conservative approach was taken in the event that protected fauna species were present</li> <li>Habitats present are well represented within the local and regional area</li> </ul>	<ul style="list-style-type: none"> <li>Monitoring and management program as part of the CEMP</li> <li>Implement vegetation clearing process</li> <li>Rehabilitate disturbed areas where practicable</li> <li>Inspect cleared areas immediately for presence of injured animals</li> <li>Develop and implement an employee environmental education program/induction</li> </ul>	5	3	Low	<ul style="list-style-type: none"> <li>No impacts to the status of any threatened fauna are expected.</li> <li>Habitats present are well represented within the local and regional area.</li> <li>The residual risk ranking has been obtained as it is possible that a local short-term reduction in the abundance of a Commonwealth or WA Listed Fauna species could occur.</li> </ul>	High Several Expert investigations / studies Excellent survey data Long term monitoring results available	Not Applicable	Section 9.6.5.1 Appendix U1
				4	4	<ul style="list-style-type: none"> <li>Ranking is based on risk of fauna falling into the trenches</li> <li>Risk assessment assumes that effective management measures are in place</li> </ul>	<ul style="list-style-type: none"> <li>Monitoring and management program as part of the CEMP</li> <li>Conduct inspection of all open trenches and remove any trapped fauna. Provide escape routes from trenches, or fencing trenches off</li> <li>Develop and implement an employee environmental education program/induction</li> </ul>	5	3	Low	<ul style="list-style-type: none"> <li>No impacts to the status of any threatened fauna are expected.</li> <li>Habitats present are well represented within the local and regional area. The residual risk ranking has been obtained as it is possible that a local short-term reduction in the abundance of a terrestrial fauna species could occur.</li> </ul>	High Several Expert investigations / studies Excellent survey data Long term monitoring results available	Not Applicable	Section 9.6.5.2 Appendix U1

<b>Terrestrial Fauna</b>	Construction and Operations	Fire- Vehicle and Machinery Activity and Employee Activity (e.g. smoking)	<ul style="list-style-type: none"> <li>Increased risk of fire resulting from increased vehicle and machinery activity</li> <li>Altered fire regimes resulting from increased incidence of fire leading to regional impact on species abundance and diversity</li> </ul>	6	<b>Very Low</b>	<ul style="list-style-type: none"> <li>Environment is subject to natural fires</li> <li>Risk assessment based on the likelihood of impacts of fire (caused by the Project) on flora and vegetation</li> <li>There will be management measures on site to contain fires</li> </ul>	<ul style="list-style-type: none"> <li>Appropriate firefighting equipment on site, training of site personnel</li> <li>Establish a continuous firebreak around the perimeter of the LNG plant through vegetation clearance</li> <li>Conduct construction and operations in cleared areas, where practicable</li> <li>Carefully manage vehicle activity in high risk areas (e.g. long grass)</li> <li>Develop and implement an employee environmental education program/induction</li> </ul>	5	4	<b>Very Low</b>	<ul style="list-style-type: none"> <li>The residual risk ranking has been obtained as it is unlikely that fire will occur as a result of the Project, but would lead to a local short-term reduction in the abundance of a Commonwealth or WA Listed terrestrial Fauna species</li> </ul>	<b>High</b> Several Expert investigations / studies Excellent survey data Long term monitoring results available	Not Significant	Section 9.6.5.3
<b>Terrestrial Fauna</b>	Construction and Operations	Vehicle Activity- Site Access and On-site Movements	<ul style="list-style-type: none"> <li>Direct impact with vehicles</li> <li>Increased road kill resulting in attraction of scavengers (e.g. raptors) leading to more road kill</li> </ul>	5	<b>Low</b>	<ul style="list-style-type: none"> <li>Main concern is traffic onsite and travel to and from site</li> <li>Traffic will also be increased on existing roads</li> <li>Public perception was considered as part of assessment</li> </ul>	<ul style="list-style-type: none"> <li>Vehicles will be required to keep to authorised access tracks and roads and these will be clearly marked to facilitate this</li> <li>Reduced vehicle speeds, apply speed limits</li> <li>Develop and implement an employee environmental education program/induction</li> </ul>	5	2	<b>Low</b>	<ul style="list-style-type: none"> <li>The residual risk ranking has been obtained as it is possible that vehicle impacts may occur, and that this may lead to a local short-term reduction in the abundance of a Commonwealth or WA Listed terrestrial Fauna species.</li> </ul>	<b>High</b> Several Expert investigations / studies Excellent survey data Long term monitoring results available	Not Applicable	Section 9.6.5.4
<b>Terrestrial Fauna</b>	Operations	Flaring- Plant Operations	<ul style="list-style-type: none"> <li>Direct impact to birds roosting in infrastructure</li> </ul>	-	-	<ul style="list-style-type: none"> <li>Not identified in Environmental Scoping Document</li> </ul>	<ul style="list-style-type: none"> <li>Height of the stacks</li> <li>Residual heat of the stacks when not flaring</li> <li>Continuous pilot that may discourage birds from landing</li> <li>Heat and visible flame during flaring</li> </ul>	6	5	<b>Very Low</b>	<ul style="list-style-type: none"> <li>The residual risk ranking has been obtained as there is a remote likelihood that flaring could lead to a local short-term reduction in abundance of a terrestrial fauna species.</li> </ul>	<b>High</b> Several Expert investigations / studies Excellent survey data Long term monitoring results available	Not Applicable	Section 9.6.5.5

Factor	Phase	Aspect	Potential Impacts	Inherent Risk (from Scoping Document)		Comments/Assumptions (from Scoping Document)	Management and Mitigation Measures		Residual Risk		Comments/Assumptions (Relating to residual risk ranking)	Confidence Level and Justification	Potential Impacts to Matters of NES	EIS/ERMP Reference
				C	L		C	L	C	L				
Terrestrial Fauna	Construction and Operations	Noise Emissions- Plant Operations and Vehicle Movements	<ul style="list-style-type: none"> <li>Temporary localised behavioural changes (e.g. movement away from the plant site)</li> </ul>	5	3	<ul style="list-style-type: none"> <li>Project will comply with WA noise regulations to reduce the potential impact of noise beyond the site boundary.</li> </ul>	<ul style="list-style-type: none"> <li>Limit noise emissions where practicable</li> <li>To comply with Environmental Protection (Noise) Regulations 1997 and environmental objectives for noise emissions during construction activities, management and mitigation measures will be developed and implemented as part of the CEMP</li> <li>The current Project design and implementation of industry standard management measures enable noise levels to comply with government regulations</li> </ul>	5	3	<ul style="list-style-type: none"> <li>The residual risk ranking has been obtained as there is a possibility that a local short-term reduction in the abundance of a Commonwealth or WA Listed Fauna species could occur.</li> </ul>	<p><b>High</b></p> <p>Several Expert investigations / studies</p> <p>Excellent survey data</p> <p>Long term monitoring results available</p>	Not Applicable	Section 9.6.5.6 Appendix U1	
				4	3	<ul style="list-style-type: none"> <li>Risk assessment assumes that effective storage and management measures will be in place.</li> </ul>	<ul style="list-style-type: none"> <li>Appropriate storage vessels, containment facilities, transfer equipment and handling methods</li> <li>Capture and treatment of runoff from operational areas and bunded areas</li> <li>Spill response equipment, emergency response training and spill contingency planning</li> <li>Remove and remediate contaminated soil</li> <li>Develop and implement an employee environmental education program/induction</li> </ul>	5	4	<ul style="list-style-type: none"> <li>The residual risk ranking has been obtained as it is unlikely that a local short-term reduction in the abundance of a Commonwealth or WA Listed Fauna species could occur.</li> </ul>	<p><b>High</b></p> <p>Several Expert investigations / studies</p> <p>Excellent survey data</p> <p>Long term monitoring results available</p>	Not Applicable	Section 9.6.5.7	
Terrestrial Fauna	Construction and Operations	Light Emissions - Plant and General Operations, Accommodation Village	<ul style="list-style-type: none"> <li>Changes to behaviour of local terrestrial fauna populations</li> <li>Attraction to light sources as a result of insect accumulation resulting in increased incidence of road kill</li> <li>Long-term changes to terrestrial faunal assemblage as a result of increased food source</li> </ul>	-	-	Not identified in Environmental Scoping Document	<ul style="list-style-type: none"> <li>Light intensity will be limited to that necessary for the safe operation of the plant</li> </ul>	5	2	<ul style="list-style-type: none"> <li>It is assumed that lighting and light spill will be reduced wherever practicable and safe to do so in order to limit impacts to terrestrial fauna from light emissions.</li> <li>The residual risk ranking has been obtained as it is likely that a local short-term reduction in the abundance of a Commonwealth or WA Listed Fauna species could occur.</li> </ul>	<p><b>High</b></p> <p>Several Expert investigations / studies</p> <p>Excellent survey data</p> <p>Long term monitoring results available</p>	Not Applicable	Section 9.6.5.8	

<b>Terrestrial Fauna</b>	Construction and Operations	Waste Handling & Storage - Plant and General Operations, Accommodation Village	<ul style="list-style-type: none"> <li>Attraction of terrestrial fauna to waste resulting in increased incidence of road kill</li> <li>Increases in feral animal population (e.g. cats, wild dogs)</li> <li>Direct impact due to terrestrial fauna becoming trapped in waste facilities</li> </ul>	-	Not identified in Environmental Scoping Document	<ul style="list-style-type: none"> <li>Solid waste receptacles will have covers where practicable. Temporary containment facilities will be available to store waste during the early construction phases</li> <li>Waste reduction measures to be implemented where practicable</li> <li>Regular disposal of waste to reduce accumulation</li> <li>Management measures will be used to limit fauna access to stormwater ponds</li> </ul>	5	4	<b>Very Low</b>	<ul style="list-style-type: none"> <li>The residual risk ranking has been obtained as the management measures described for waste handling and storage are unlikely to lead to a local short-term increase in the abundance of an introduced animal.</li> </ul>	<b>High</b> Several Expert Investigations / studies Excellent survey data Long term monitoring results available	Not Applicable	Section 9.6.5.9
<b>Terrestrial Fauna</b>	Construction and Operations	Physical Infrastructure (Surface Water Drainage)- Construction of Road/ Causeway, Location of Plant Pad	<ul style="list-style-type: none"> <li>Changes to surface water volume and flows resulting in impacts to fauna habitat</li> <li>Impacts on fauna and fauna habitat due to changes in vegetation community composition and the drying out or inundation of areas</li> <li>Fauna and in particular birds may enter and become entrapped within sedimentation and other water collection ponds</li> </ul>	-	Not identified in Environmental Scoping Document	<ul style="list-style-type: none"> <li>Engineering and design solutions such as culverts, sedimentation ponds, a silt fence around the construction area and placement of rock at surface water release points to reduce erosion</li> <li>Quarantine procedures will be implemented for the Project</li> <li>Where practicable, ponds will be located within the perimeter fence and have floats and/or fauna egress mats to enable fauna to exit these water bodies</li> </ul>	4	3	<b>Low</b>	<ul style="list-style-type: none"> <li>Infrastructure will be designed to retain natural drainage features where practicable.</li> <li>The residual risk ranking has been obtained as it is possible that the physical presence of infrastructure could lead to a local long-term increase in the abundance of an introduced animal and cause a local long-term reduction of a Commonwealth or WA Listed Fauna species.</li> </ul>	<b>High</b> Several Expert Investigations / studies Excellent survey data Long term monitoring results available	Not Applicable	Section 9.6.5.10

Factor	Phase	Aspect	Potential Impacts	Inherent Risk (from Scoping Document)		Comments/ Assumptions (from Scoping Document)	Management and Mitigation Measures		Residual Risk		Comments/ Assumptions (Relating to residual risk ranking)	Confidence Level and Justification	Potential Impacts to Matters of NES	EIS/ERMP Reference
				C	L		C	L	C	L				
<b>Terrestrial Fauna</b>	Additive Effects		<ul style="list-style-type: none"> <li>All of the above</li> </ul>			Not identified in Environmental Scoping Document	<ul style="list-style-type: none"> <li>All of the above</li> </ul>	C: 4 L: 3	C: 3 L: <b>Low</b>	<ul style="list-style-type: none"> <li>Six threatened fauna species, or signs of these species, were recorded within the study area. However, they are generally highly mobile and it is expected that the majority of individuals will move away from the Project area at the commencement of the construction phase</li> <li>No species listed under the EPBC Act (Cth) are likely to be affected by the Project</li> <li>The residual risk ranking has been obtained as it is possible that a local long-term reduction of a Commonwealth or WA Listed Fauna species could occur</li> </ul>	High Several Expert investigations / studies Excellent survey data Long-term monitoring results available	Not Applicable	Section 9.6.8	

Subterranean Fauna	Construction	Vegetation Clearing - Site Preparation and Site Access	<ul style="list-style-type: none"> <li>Loss of habitat to the subterranean fauna habitat due to changes in the hydrology and hydrogeology of the area</li> </ul>	5	3	<p><b>Low</b></p> <ul style="list-style-type: none"> <li>For this risk assessment a conservative approach assumes a worst case scenario that subterranean fauna may be present</li> <li>Potential impacts on subterranean fauna, if present, from vegetation clearing is considered low</li> </ul>	6	3	<p><b>Very Low</b></p>	<ul style="list-style-type: none"> <li>Implement vegetation clearing process</li> <li>Develop flora and vegetation management as part of the CEMP</li> <li>Where practicable, vegetation and flora within the Project area will be retained should clearing not be essential</li> <li>Where practicable rehabilitate disturbed areas upon completion of activities</li> <li>Retain natural drainage where practicable</li> </ul>	<ul style="list-style-type: none"> <li>Only two species of stygofauna have been located within the Project area, and both species are likely to be widespread throughout the Pilbara. No troglofauna have been located</li> <li>The residual risk ranking has been obtained as it is possible that a short-term impact to subterranean fauna habitat could occur, although a full recovery would be expected</li> </ul>	High Excellent Survey Data	Not Applicable	Section 9.7.5.1
Subterranean Fauna	Construction	Earthworks - Site Preparation	<ul style="list-style-type: none"> <li>Loss of habitat due to compaction</li> </ul>	3	3	<p><b>Medium</b></p> <ul style="list-style-type: none"> <li>For this risk assessment a conservative approach assumes a worst case that rare subterranean fauna may be present</li> </ul>	6	3	<p><b>Very Low</b></p>	<ul style="list-style-type: none"> <li>Retain vegetation wherever practicable</li> <li>Bunds to prevent tidal inundation</li> <li>Surface water management such as drains, settlement ponds etc</li> <li>Dust suppression as required</li> <li>Implement PASS management measures</li> </ul>	<ul style="list-style-type: none"> <li>The residual risk ranking has been obtained as it is possible that a short-term impact to subterranean fauna habitat could occur, if an impact does occur, a full recovery is expected</li> </ul>	High Excellent Survey Data	Not Applicable	Section 9.7.5.1

Factor	Phase	Aspect	Potential Impacts	Inherent Risk (from Scoping Document)		Comments/Assumptions (from Scoping Document)	Management and Mitigation Measures		Residual Risk		Comments/Assumptions (Relating to residual risk ranking)	Confidence Level and Justification	Potential Impacts to Matters of NES	EIS/ERMP Reference
				C	L		C	L	Ranking					
Subterranean Fauna	Construction	Dredge Material Placement Area - Dewatering of Dredge Material	<ul style="list-style-type: none"> <li>Direct impacts due to changes in groundwater quality</li> <li>Localised changes to the subterranean fauna habitat due to changes in the hydrology and hydrogeology of the area</li> </ul>	-	-	Not identified in Environmental Scoping Document	<ul style="list-style-type: none"> <li>The placement area has been selected to reduce the footprint used</li> <li>Discharge of decant water during the first 18 to 24 months will be pumped via pipeline to a marine outfall</li> <li>Groundwater monitoring bores will be installed to detect any alteration of groundwater conditions that may indicate a potential risk to the Ashburton Delta system</li> </ul>	6	3	Very Low	<ul style="list-style-type: none"> <li>Only two species of stygofauna have been located within the Project area, and both species are likely to be widespread throughout the Pilbara. No troglofauna have been located</li> <li>The residual risk ranking has been obtained as it is possible that a short-term impact to subterranean fauna habitat could occur. If an impact does occur, a full recovery is expected</li> </ul>	High Excellent Survey Data	Not Applicable	Section 9.7.5.2 Appendix U1
	Operations	Operational Leaks & Spills - Vehicle Refuelling and Breakdowns, Plant Operations	<ul style="list-style-type: none"> <li>Direct impacts due to changes in groundwater quality</li> </ul>	3	3	<ul style="list-style-type: none"> <li>For this risk assessment a conservative approach assumes a worst case that rare subterranean fauna may be present.</li> </ul>	<ul style="list-style-type: none"> <li>Appropriate storage vessels, containment facilities, transfer equipment and handling methods</li> <li>Capture and treatment of run-off from operational areas, fuel farms and bunded areas</li> <li>Appropriate spill response equipment, emergency response training and spill contingency planning</li> </ul>	5	5	Very Low	<ul style="list-style-type: none"> <li>The residual risk ranking has been obtained there is a remote likelihood that a local loss of a small proportion of subterranean fauna habitat could occur</li> </ul>	High Excellent Survey Data	Not Applicable	Section 9.7.5.3
	Construction and Operations	Physical Presence of Infrastructure, (Surface Water Drainage)- Construction of Road/ Causeway, Location of Plant Pad	<ul style="list-style-type: none"> <li>Changes to surface water flows resulting in impacts to subterranean habitat</li> </ul>	-	-	Not identified in Environmental Scoping Document	<ul style="list-style-type: none"> <li>Retain natural drainage where practicable</li> <li>Facilities designed to limit impacts to surface water systems</li> <li>Culverts are incorporated into the hydrodynamic flow model for drainage crossings traversed by the road and infrastructure corridor</li> </ul>	6	3	Very Low	<ul style="list-style-type: none"> <li>The residual risk ranking has been obtained as it is possible that a short-term impact to subterranean fauna habitat could occur. If an impact does occur, a full recovery is expected</li> </ul>	High Excellent Survey Data	Not Applicable	Section 9.7.5.4



<p><b>Subterranean Fauna</b></p>	<p>Additive Effects</p>	<p>• All of the above</p>	<p>Not identified in Environmental Scoping Document</p>	<p>-</p>	<p>5</p>	<p>4</p>	<p><b>Very Low</b></p>	<ul style="list-style-type: none"> <li>There are no troglofauna within the survey area</li> <li>Only two species of stygofauna have been located within the Project area, and both species are likely to be widespread throughout the Pilbara</li> <li>Overall, the Project is considered to have an overall very low residual risk of having a significant impact on the subterranean fauna of the Project area</li> </ul>	<p><b>High</b> Excellent survey data</p>	<p>Not Applicable</p>	<p>Section 9.7.8</p>
<p><b>Air Quality</b></p>	<p>Construction</p>	<p>Dust generation - vegetation clearing</p>	<p>Not identified in Environmental Scoping Document</p>	<p>-</p>	<p>5</p>	<p>2</p>	<p><b>Low</b></p>	<ul style="list-style-type: none"> <li>Dust control measures will be undertaken during site clearance. These control measures will be implemented on a case by case basis and will be dependent on the activity involved and the prevailing weather conditions</li> <li>A management plan will be developed as part of the CEMP with the key objective to manage the generation of dust. A range of management controls and monitoring procedures will be applied as part of this management plan during key activities at the onshore development area</li> </ul>	<p><b>High</b> Long term monitoring results available</p>	<p>Not Applicable</p>	<p>Section 9.8.5.1 Appendix U1</p>

Factor	Phase	Aspect	Potential Impacts	Inherent Risk (from Scoping Document)		Comments/Assumptions (from Scoping Document)	Mitigations/Management		Residual Risk		Comments/Assumptions (Relating to residual risk ranking)	Confidence Level and Justification	Potential Impacts to Matters of NES	EIS/ERMP Reference
				C	L		C	L	Ranking					
<b>Air Quality</b>	Construction and Operations	Dust generation - vehicle activity	<ul style="list-style-type: none"> <li>Dust deposition leading to vegetation loss</li> </ul>	-	-	Not identified in Environmental Scoping Document	<ul style="list-style-type: none"> <li>Speed limits will be used in the construction area. This will assist in reducing dust generated by vehicle movements</li> <li>Early sealing of the site access roads will be investigated to assist in minimising dust generation caused by vehicle traffic</li> <li>A management plan will be developed as part of the CEMP with the key objective to manage the generation of dust. A range of management controls and monitoring procedures will be applied as part of this management plan during key activities at the onshore development area</li> </ul>	6	4	<b>Very Low</b>	<ul style="list-style-type: none"> <li>The site preparations involve site clearing and the import of material. The nature of the material is not yet known, however is likely to require dust management during handling</li> <li>The residual risk ranking has been obtained as it is likely that a short-term impact to ground-level concentrations at identified sensitive receptors represent a small increase over the baseline conditions</li> </ul>	High Long term monitoring results available	Not Applicable	Section 9.8.5.1 Appendix U1
<b>Air Quality</b>	Construction and operations	Dust generation - concrete batching plant	<ul style="list-style-type: none"> <li>Dust deposition leading to vegetation loss</li> </ul>	-	-	Not identified in Environmental Scoping Document	<ul style="list-style-type: none"> <li>Batching plant will be located away from sensitive receptors, where practicable. Standard dust control measures from batching plants will be implemented</li> <li>Specific dust control measures may be implemented as part of the standard operation of the concrete batching plant</li> <li>A management plan will be developed as part of the CEMP with the key objective to manage the generation of dust. A range of management controls and monitoring procedures will be applied as part of this management plan during key activities at the onshore development area</li> </ul>	4	4	<b>Low</b>	<ul style="list-style-type: none"> <li>The site preparations involve site clearing and the import of material. The nature of the material is not yet known, however is likely to require dust management during handling</li> <li>The residual risk ranking has been obtained as it is likely that a short-term impact to ground-level concentrations at identified sensitive receptors representing an increase over the baseline conditions</li> </ul>	Reasonable Available information is adequate	Not Applicable	Section 9.8.5.1 Appendix U1

<p><b>Air Quality</b></p>	<p>Construction</p>	<p>Dust generation - transport of material</p>	<p>• Dust deposition leading to vegetation loss</p>	<p>-</p>	<p>Not identified in Environmental Scoping Document</p>	<p>5</p>	<p>4</p>	<p><b>Very Low</b></p>	<p>• Speed limits will be in place in construction areas. Any material with the potential to generate windblown dust during transportation to and from the construction area will be covered</p> <p>• A management plan will be developed as part of the CEMP with the key objective to manage the generation of dust. A range of management controls and monitoring procedures will be applied as part of this management plan during key activities at the onshore development area</p>	<p>• The site preparations involve site clearing and the import of material. The nature of the material is not yet known, however is likely to require dust management during handling</p> <p>• The residual risk ranking has been obtained as it is likely that a short-term impact to ground-level concentrations at identified sensitive receptors represent a small increase over the baseline conditions</p>	<p><b>High</b> Long term monitoring results available</p>	<p>Not Applicable</p>	<p>Section 9.8.5.1 Appendix U1</p>
<p><b>Air Quality</b></p>	<p>Construction and Operations</p>	<p>Dust generation - wind erosion of bare surfaces</p>	<p>• Dust deposition leading to vegetation loss</p>	<p>-</p>	<p>Not identified in Environmental Scoping Document</p>	<p>5</p>	<p>4</p>	<p><b>Very Low</b></p>	<p>• Ground clearance leading to the exposure of bare surfaces will be avoided, where practicable</p> <p>• Stockpiles, if required, will have appropriate dust control measures. Stockpiles will be located, wherever practicable, away from sensitive receptors</p> <p>• A management plan will be developed as part of the CEMP with the key objective to manage the generation of dust. A range of management controls and monitoring procedures will be applied as part of this management plan during key activities at the onshore development area</p>	<p>• The site preparations involve site clearing and the import of material. The material is not yet known, however is likely to require dust management during handling</p> <p>• The residual risk ranking has been obtained as it is likely that a short-term impact to ground-level concentrations at identified sensitive receptors represent a small increase over the baseline conditions</p>	<p><b>High</b> Long term monitoring results available</p>	<p>Not Applicable</p>	<p>Section 9.8.5.1 Appendix U1</p>

Factor	Phase	Aspect	Potential Impacts	Inherent Risk (from Scoping Document)		Comments/Assumptions (from Scoping Document)	Mitigations/Management		Residual Risk		Comments/Assumptions (Relating to residual risk ranking)	Confidence Level and Justification	Potential Impacts to Matters of NES	EIS/ERMP Reference
				C	L		C	L	C	L				
Air Quality	Construction	Other atmospheric emissions	<ul style="list-style-type: none"> <li>Reduction of air quality leading to human health and environmental impacts</li> </ul>	5	1	<ul style="list-style-type: none"> <li>Ranking considered potential community concerns, and further detailed modelling will be taken</li> </ul>	<ul style="list-style-type: none"> <li>All equipment will be well maintained and comply with Australian Standards and Regulations</li> <li>Clearing activities will be reduced, where practicable</li> </ul>	6	5	<ul style="list-style-type: none"> <li>Other atmospheric emissions during the construction phase are likely to be associated with marine vessel engines, additional airline flights to and from Onslow and from vehicles and equipment required to support construction</li> <li>The residual risk ranking has been obtained as there is only a remote chance that there will be measurable air quality impacts associated with other atmospheric emissions generated during construction</li> </ul>	<p><b>Low</b></p> <p>No modelling conducted</p>	Not Applicable	Section 9.8.5.1	
Air Quality	Operations	Air Emissions	<ul style="list-style-type: none"> <li>Reduced air quality as a result of emission of pollutants from the facility during processing leading to impacts on human health and the environment</li> </ul>	5	1	<ul style="list-style-type: none"> <li>Ranking considered potential community concerns, and further detailed modelling will be taken</li> </ul>	<ul style="list-style-type: none"> <li>Management of the processing operation to reduce polluting emissions as low as reasonably practicable</li> <li>Regular maintenance of equipment for good performance and reduced emissions</li> <li>Planning of non-routine (planned) maintenance shutdowns to reduce emissions, where practicable</li> <li>Ongoing monitoring of emissions from the facility to determine the level of polluting emissions</li> <li>Implementation of remedial action should emission levels exceed agreed levels</li> </ul>	5	4	<ul style="list-style-type: none"> <li>The residual risk ranking has been obtained as there is only a remote chance that there will be measurable air quality impacts from air emissions associated with the operations</li> <li>The residual risk ranking has been obtained as it is likely that a short-term impact to ground-level concentrations at identified sensitive receptors represent a small increase over the baseline conditions</li> </ul>	<p><b>Reasonable</b></p> <p>Available information is adequate</p>	Not Applicable	Section 9.8.5.2	

Air Quality	Additive Effects	<ul style="list-style-type: none"> <li>All of the above</li> </ul>	-	Not identified in Environmental Scoping Document	<ul style="list-style-type: none"> <li>All of the above</li> </ul>	5	2	<p><b>Low</b></p>	<ul style="list-style-type: none"> <li>The additive risk ranking has been obtained as it is likely that a short-term impact to ground-level concentrations at identified sensitive receptors represent a small increase over the baseline conditions; and there is only a remote chance that there will be measurable air quality impacts associated with the Project</li> </ul>	<p><b>Reasonable</b> Available information is adequate</p>	Not Applicable	Section 9.8.8
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**Table 1.7: Social Risk Assessment Summary**

For details on the risk ranking procedure, including consequence and likelihood definitions specific to each factor, refer to Chapter 7, *Impact Assessment Methodology* and Chapter 10, *Social Risk Assessment and Management*. Note that “C” refers to Consequence and “L” refers to Likelihood.

Factor	Phase	Aspect	Potential Impacts	Inherent Risk (from Scoping Document)		Comments/Assumptions (from Scoping Document)	Management and Mitigation Measures		Residual Risk		Comments/Assumptions (relating to residual risk ranking)	Confidence Level and Justification	Potential Impacts to Matters of NES	EIS/ERMP Reference
				C	L		C	L	C	L				
<b>Recreational Fishing</b>	Construction	Dredging	<ul style="list-style-type: none"> <li>Reduced recreational fishing opportunity due to decreased fish stocks as a consequence of clearing critical habitats</li> </ul>	3	3	<ul style="list-style-type: none"> <li>Level of impact to be determined through detailed consultation with fishery authorities and dependency analysis of local fishers in potential exclusion zones</li> </ul>	<ul style="list-style-type: none"> <li>Dredging impacts will be managed through a DSDMP</li> <li>Chevron will evaluate the suitability of investment in recreation activities and facilities for the general community as part of its future social investment strategy</li> </ul>	5	3	<ul style="list-style-type: none"> <li>Critical habitats will recover from dredging impacts</li> <li>No habitats in the area are known to be critical for the ongoing success of marine fauna populations</li> <li>Turbidity impacts on water quality during dredging operations are considered unlikely to significantly affect fisheries in the area</li> <li>Target fish species are well represented in the local and regional area</li> </ul>	<p><b>Reasonable</b> Modelling conducted and survey data available</p>	Not Applicable	Section 10.4 Appendix S1	

<p><b>Recreational Fishing</b></p>	<p>Construction</p>	<p>Fishing by Project workforce</p>	<p>• Reduced catch due to fishing by Project workforce in local waters and offshore islands</p>	<p>-</p>	<p>Not identified in Environmental Scoping Document</p>	<p>• Boats and recreational vehicles will not be permitted within the workforce accommodation village or the access road from the Onslow Road</p> <p>• Behaviour standards to be expected from all construction workers will be clearly articulated in a Recreation Code of Conduct. Construction workers will be asked to sign the Code of Conduct</p> <p>• A community feedback procedure will be established whereby any complaints from the community about unacceptable behaviour from construction workers will be investigated and where necessary appropriate action taken</p> <p>• Chevron will work with the WA Department of Fisheries to reduce potential risks to the existing recreational fishery</p> <p>• Chevron will work with the WA Department of Environment and Conservation to reduce potential risks from excessive recreational use of the islands within a 25km radius of Onslow</p> <p>• For safety reasons, recreational activities such as fishing will not be permitted within the nearshore exclusion zones (for example, MOF and PLF)</p>	<p>3</p>	<p>3</p>	<p><b>Medium</b></p>	<p>• Target fish species are well represented in the local and regional area, however the low productivity of oceanic waters in the Pilbara means it is possible (although unlikely) that fish populations could be overfished. Therefore, Chevron has proposed a number of management measures to reduce the impact of fishing by the Project workforce in local waters and nearshore islands</p>	<p><b>Reasonable</b> Available information is adequate Extent of access restrictions currently uncertain</p>	<p>Not Applicable</p>	<p>Section 10.4</p>
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Factor	Phase	Aspect	Potential Impacts	Inherent Risk (from Scoping Document)		Comments/ Assumptions (from Scoping Document)	Management and Mitigation Measures		Residual Risk		Comments/ Assumptions (Relating to residual risk ranking)	Confidence Level and Justification	Potential Impacts to Matters of NES	EIS/ERMP Reference
				C	L		C	L	C	L				
<b>Recreational Fishing</b>	Operations	Physical Presence of Infrastructure	<ul style="list-style-type: none"> <li>Reduced recreational fishing opportunity as a result of restricted access</li> </ul>	3	3	<ul style="list-style-type: none"> <li>Level of impact to be determined through detailed consultation with key stakeholders.</li> </ul>	<ul style="list-style-type: none"> <li>For safety reasons, recreational activities such as fishing will not be permitted within the nearshore exclusion zones (for example, MOF and PLF)</li> <li>Chevron will evaluate the suitability of investment in recreation activities and facilities for the general community as part of its future social investment strategy</li> </ul>	3	3	Medium	<ul style="list-style-type: none"> <li>It is likely that access to Hooley Creek by land will no longer be possible due to safety exclusion zones</li> <li>Some restricted access due to exclusion zones is required for public safety</li> </ul>	<p><b>Reasonable</b> Available information is adequate Extent of access restrictions currently uncertain</p>	Not Applicable	Section 10.4
<b>Recreational Fishing</b>	Operations	Fishing by Project workforce	<ul style="list-style-type: none"> <li>Reduced catch due to fishing by Project workforce in local waters and offshore islands</li> </ul>	-	3	<p>Not identified in Environmental Scoping Document</p> <ul style="list-style-type: none"> <li>Chevron will work with the WA Department of Fisheries to reduce potential risks to the existing recreational fishery</li> <li>Chevron will work with the WA Department of Environment and Conservation to reduce potential risks from excessive recreational use of the islands within a 25km radius of Onslow</li> <li>For safety reasons, recreational activities such as fishing will not be permitted within the nearshore exclusion zones (for example, MOF and PLF)</li> </ul>	3	3	Medium	<ul style="list-style-type: none"> <li>Potential impacts on recreational fishing by the Project workforce will be significantly less during the operations phase</li> <li>Target fish species are well represented in the local and regional area, however the low productivity of oceanic waters in the Pilbara means it is possible (although unlikely) that fish populations could be overfished. Therefore, Chevron has proposed a number of management measures to reduce the impact of fishing by the Project workforce in local waters and nearshore islands</li> </ul>	<p><b>Reasonable</b> Available information is adequate Extent of access restrictions currently uncertain</p>	Not Applicable	Section 10.4	



<p><b>Recreational Fishing</b></p>	<p>Additive Effects</p>	<ul style="list-style-type: none"> <li>• Reduced catch due to Project-related ecological changes, exclusion zones, restricted access, vessel movements or fishing by Project workforce</li> </ul>	<p>-</p>	<p>Not identified in Environmental Scoping Document</p>	<ul style="list-style-type: none"> <li>• Boats and recreational vehicles will not be permitted within the workforce accommodation village or the access road from the Onslow Road</li> <li>• Behaviour standards to be expected from all construction workers will be clearly articulated in a Recreation Code of Conduct. Construction workers will be asked to sign the Code of Conduct</li> <li>• A community feedback procedure will be established whereby any complaints from the community about unacceptable behaviour from construction workers will be investigated and where necessary appropriate action taken</li> <li>• Chevron will work with the WA Department of Fisheries to reduce potential risks to the existing recreational fishery</li> <li>• Chevron will work with the WA Department of Environment and Conservation to reduce potential risks from excessive recreational use of the islands within a 25km radius of Onslow</li> <li>• For safety reasons, recreational activities such as fishing will not be permitted within the nearshore exclusion zones (for example, MOF and PLF)</li> <li>• Chevron will evaluate the suitability of investment in recreation activities and facilities for the general community as part of its future social investment strategy</li> <li>• Dredging impacts will be managed through a DSDMP</li> </ul>	<p>3</p>	<p>3</p>	<p><b>Medium</b></p>	<ul style="list-style-type: none"> <li>• Dredging impacts will be episodic and affects will be limited to the area of dredging</li> <li>• Exclusion zones will only affect a small proportion of fishing areas</li> <li>• Target fish species are well represented in the local and regional area, however the low productivity of oceanic waters in the Pilbara means it is possible (although unlikely) that fish populations could be overfished. Therefore, Chevron has proposed a number of management measures to reduce the impact of fishing by the Project workforce in local waters and nearshore islands</li> </ul>	<p>Reasonable Available information is adequate</p> <p>Extent of access restrictions currently uncertain</p>	<p>Not Applicable</p>	<p>Section 10.4 Appendix S1</p>
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Factor	Phase	Aspect	Potential Impacts	Inherent Risk (from Scoping Document)		Comments/Assumptions (from Scoping Document)	Management and Mitigation Measures		Residual Risk		Comments/Assumptions (Relating to residual risk ranking)	Confidence Level and Justification	Potential Impacts to Matters of NES	EIS/ERMP Reference
				C	L		C	L	Ranking					
Commercial Fishing & Pearling	Construction	Dredging	<ul style="list-style-type: none"> <li>Reduced commercial catch due to:                             <ul style="list-style-type: none"> <li>Decreased fish stocks as a consequence of clearing critical habitats, increased turbidity, sedimentation and light attenuation or other ecological changes that result from dredging</li> <li>Temporary exclusion zones during dredging or increased vessel movements</li> <li>Decreased fish stocks as a consequence of clearing critical habitats</li> </ul> </li> </ul>	3	3	<ul style="list-style-type: none"> <li>Level of impact to be determined through detailed consultation with fishery authorities and dependency analysis of local fishers in potential exclusion zones</li> </ul>	<ul style="list-style-type: none"> <li>Dredging impacts will be managed through a DSDMP.</li> <li>Chevron will create a commercial fishing industry liaison role to liaise between Chevron and commercial fishers</li> </ul>	3	3	<ul style="list-style-type: none"> <li>Dredging impacts will be episodic and impacts will be limited to the area of dredging</li> <li>Exclusion zones during dredging will be temporary and impacts will only affect a small proportion of fishing areas</li> <li>Critical habitats will recover from dredging impacts</li> <li>Target fish species are well represented in the local and regional area</li> <li>None of the coral-obligate fish species in the area are known to be endemic to the Project area and affected populations will recover through recruitment from surrounding areas once the habitat has recovered</li> </ul>	<p><b>Reasonable</b></p> <p>Modelling conducted and survey data available</p>	Not Applicable	Section 10.4 Appendix S1	
	Construction	Construction Activities	<ul style="list-style-type: none"> <li>Reduced catch due to restricted access (exclusion zones)</li> </ul>	-	4	<ul style="list-style-type: none"> <li>Not identified in Environmental Scoping Document</li> <li>For safety reasons, recreational activities such as fishing will not be permitted within the nearshore exclusion zones (for example, MOF and PLF)</li> </ul>	<ul style="list-style-type: none"> <li>Chevron will create a commercial fishing industry liaison role to liaise between Chevron and commercial fishers</li> </ul>	4	4	<ul style="list-style-type: none"> <li>Target fish species are well represented in the local and regional area and fishing activities can relocate to other sections of the fisheries</li> <li>Exclusion zones will only affect a small proportion of fishing areas</li> </ul>	<p><b>Reasonable</b></p> <p>Available information is adequate</p> <p>Importance/presence of nurseries, related changes to productivity of fisheries and full footprint of development is uncertain</p>	Not Applicable	Section 10.4	

<b>Commercial Fishing &amp; Pearling</b>	Construction	Fishing by Project Construction Workforce	<ul style="list-style-type: none"> <li>Reduced catch due to fishing by construction workers in local waters and near shore islands</li> </ul>	-	Not identified in Environmental Scoping Document	<ul style="list-style-type: none"> <li>Chevron will work with the WA Department of Fisheries to reduce potential risks to the existing recreational fishery</li> <li>Chevron will work with the WA Department of Environment and Conservation to reduce potential risks from excessive recreational use of the islands within a 25km radius of Onslow</li> </ul>	4	3	<b>Low</b>	<ul style="list-style-type: none"> <li>Target fish species are well represented in the local and regional area, however the low productivity of oceanic waters in the Pilbara means it is possible (although unlikely) that fish populations could be overfished. Therefore, Chevron has proposed a number of management measures to reduce the impact of fishing by the Project workforce in local waters and nearshore islands</li> </ul>	<b>Reasonable</b> Available information is adequate Extent of access restrictions currently uncertain	Not Applicable	Section 10.4
<b>Commercial Fishing &amp; Pearling</b>	Operations	Physical Presence of Infrastructure	<ul style="list-style-type: none"> <li>Reduced commercial catch as a result of restricted access</li> <li>Reduced commercial catch due to permanent damage to critical habitats affecting stocks of available for fishers</li> </ul>	<b>Medium</b>	<ul style="list-style-type: none"> <li>Level of impact to be determined through detailed consultation with key stakeholders</li> </ul>	<ul style="list-style-type: none"> <li>Chevron will create a commercial fishing industry liaison role to liaise between Chevron and commercial fishers</li> </ul>	4	4	<b>Low</b>	<ul style="list-style-type: none"> <li>Target fish species are well represented in the local and regional area</li> <li>Exclusion zones will only affect a small proportion of fishing areas</li> <li>Information on sustainable fishing practices will be included in the induction of the construction workforce</li> </ul>	<b>Reasonable</b> Available information is adequate Importance/presence of nurseries, related changes to productivity of fisheries and full footprint of development is uncertain	Not Applicable	Section 10.4

Factor	Phase	Aspect	Potential Impacts	Inherent Risk (from Scoping Document)		Comments/Assumptions (from Scoping Document)	Management and Mitigation Measures		Residual Risk		Comments/Assumptions (Relating to residual risk ranking)	Confidence Level and Justification	Potential Impacts to Matters of NES	EIS/ERMP Reference
				C	L		C	L	Ranking					
Commercial Fishing & Pearling	Operations	Operational Activities including Maintenance Dredging	<ul style="list-style-type: none"> <li>Reduced catch due to fishing by operational workers in local waters and nearshore islands</li> <li>Changed community identity if commercial fishing industry declines in Onslow</li> <li>Reduced commercial catch due to decreased fish stocks as a consequence of clearing critical habitats</li> </ul>	-	-	Not identified in Environmental Scoping Document	<ul style="list-style-type: none"> <li>Chevron will create a commercial fishing industry liaison role to liaise between Chevron and commercial fishers</li> <li>Chevron will work with the WA Department of Fisheries to reduce potential risks to the existing recreational fishery</li> <li>Chevron will work with the WA Department of Environment and Conservation to reduce potential risks from excessive recreational use of the islands within a 25km radius of Onslow</li> <li>Dredging impacts will be managed through a DSDMP</li> <li>There will be a role within Chevron who will liaise with commercial fishers on dredging and other marine construction activities</li> </ul>	4	3	Low	<ul style="list-style-type: none"> <li>Information on sustainable fishing practices will be included in the induction of the operational workforce</li> <li>Chevron will monitor key community social indicators</li> </ul>	Reasonable Available information is adequate Modelling conducted and survey data available	Not Applicable	Section 10.4 Appendix S1
	Additive Effects		<ul style="list-style-type: none"> <li>Reduced catch due to Project-related ecological changes, exclusion zones, restricted access, vessel movements or fishing by Project workforce</li> </ul>	-	3	Medium	<ul style="list-style-type: none"> <li>Chevron will create a commercial fishing industry liaison role to liaise between Chevron and commercial fishers</li> <li>Dredging impacts will be managed through a DSDMP</li> <li>Chevron will work with the WA Department of Fisheries to reduce potential risks to the existing recreational fishery</li> <li>Chevron will work with the WA Department of Environment and Conservation to reduce potential risks from excessive recreational use of the islands within a 25km radius of Onslow</li> <li>For safety reasons, recreational activities such as fishing will not be permitted within the nearshore exclusion zones (for example, MOF and PLF)</li> </ul>	3	3	Medium	<ul style="list-style-type: none"> <li>Dredging impacts will be episodic and affects will be limited to the area of dredging</li> <li>Exclusion zones will only affect a small proportion of fishing areas</li> <li>Target fish species are well represented in the local and regional area</li> <li>Information on sustainable fishing practices will be included in the induction of the construction and operational workforces</li> </ul>	Reasonable Available information is adequate	Not Applicable	Section 10.4 Appendix S1

<b>Recreation</b>	Construction	Dredging	<ul style="list-style-type: none"> <li>Reduced marine recreational activity due to exclusion zones or reduced visibility as a result of increased silt in creeks, waterways and sea</li> <li>Temporary reduction of marine recreational activities due to temporary exclusion zones or reduced visibility as a result of increased silt in creeks, waterways and sea during maintenance dredging</li> </ul>	5	2	<b>Low</b>	<ul style="list-style-type: none"> <li>Level of impact to be determined through consultation with recreational users</li> </ul>	5	1	<b>Medium</b>	<ul style="list-style-type: none"> <li>Social investment funding will be available for community projects</li> </ul>	<p><b>Reasonable</b></p> <p>Modelling conducted. Extent of exclusion zones currently uncertain</p>	Not Applicable	Section 10.5
<b>Recreation</b>	Construction	Housing of Construction Workforce	<ul style="list-style-type: none"> <li>Reduced access to temporary tourism accommodation due to use of accommodation by construction workforce</li> </ul>	5	2	<b>Low</b>	<ul style="list-style-type: none"> <li>Not identified in Environmental Scoping Document</li> </ul>	5	2	<b>Low</b>	<ul style="list-style-type: none"> <li>All workers associated with the Project will be housed at the accommodation village. There may be some short-term impacts while the accommodation village is being constructed.</li> </ul>	<p><b>Reasonable</b></p> <p>Available information is adequate</p>	Not Applicable	Section 10.5
<b>Recreation</b>	Construction	Housing of Residents who Relocate due to Economic Opportunities	<ul style="list-style-type: none"> <li>Reduced access to temporary tourism accommodation due to use of accommodation by workforce of infrastructure and/or construction projects induced by the Project</li> </ul>	5	3	<b>Medium</b>	<ul style="list-style-type: none"> <li>Not identified in Environmental Scoping Document</li> </ul>	3	3	<b>Medium</b>	<ul style="list-style-type: none"> <li>All workers associated with the Project will be housed at the accommodation village. There may be some short-term impacts while the accommodation village is being constructed.</li> </ul>	<p><b>Low</b></p> <p>No modelling conducted and available information is inadequate</p>	Not Applicable	Section 10.5

Factor	Phase	Aspect	Potential Impacts	Inherent Risk (from Scoping Document)		Comments/Assumptions (from Scoping Document)	Management and Mitigation Measures		Residual Risk		Comments/Assumptions (Relating to residual risk ranking)	Confidence Level and Justification	Potential Impacts to Matters of NES	EIS/ERMP Reference
				C	L		C	L	Ranking					
<b>Recreation</b>	Operations	Housing of Residents who Relocate due to Economic Opportunities	<ul style="list-style-type: none"> <li>Reduced access to temporary tourism accommodation due to population growth induced by the Project</li> <li>Reduced access to temporary tourism accommodation due to use of accommodation by workforce of infrastructure and/or construction projects induced by the Project</li> </ul>	-	-	<ul style="list-style-type: none"> <li>Not identified in Environmental Scoping Document</li> </ul>	<ul style="list-style-type: none"> <li>Management of population growth is beyond Chevron's control and therefore is not within Chevron's scope of responsibility</li> <li>Management of other projects' workforces is not within Chevron's control or scope of responsibility</li> </ul>	3	3	Medium	<ul style="list-style-type: none"> <li>The private sector will respond to demand for temporary and permanent housing</li> <li>Government will release land for new housing construction</li> </ul>	Low	Not Applicable	Section 10.5
<b>Recreation</b>	Operations	Physical Presence of Infrastructure	<ul style="list-style-type: none"> <li>Reduced access to recreation areas due to exclusion zones, leading to loss of recreational value</li> </ul>	-	-	<ul style="list-style-type: none"> <li>Not identified in Environmental Scoping Document</li> </ul>	<ul style="list-style-type: none"> <li>Chevron will evaluate the suitability of investment in recreation activities and facilities for the general community as part of its future social investment strategy</li> </ul>	5	1	Medium	<ul style="list-style-type: none"> <li>Social investment funding will be available for community projects</li> </ul>	Reasonable	Not Applicable	Section 10.5
<b>Recreation</b>	Operations	Operational Activities	<ul style="list-style-type: none"> <li>Reduced access to temporary tourism accommodation due to use of accommodation by operational workforce</li> </ul>	-	-	<ul style="list-style-type: none"> <li>Not identified in Environmental Scoping Document</li> </ul>	<ul style="list-style-type: none"> <li>Project impacts on tourism accommodation will be reduced through provision of accommodation for all workers associated with the Project</li> </ul>	5	4	Very Low	<ul style="list-style-type: none"> <li>All workers associated with the Project will be housed at the operational village. There may be some short-term impacts while the accommodation village is being constructed</li> </ul>	Reasonable	Not Applicable	Section 10.5

<p><b>Recreation</b></p>	<p>Additive Effects</p>	<ul style="list-style-type: none"> <li>• Reduced access to recreation areas due to temporary or permanent exclusion zones, leading to loss of recreational value</li> <li>• Reduced access to temporary tourism accommodation due to use of accommodation by Project construction or operational workforce; population growth induced by the Project; or use of accommodation by workforce of infrastructure and/or construction projects induced by the Project</li> </ul>	<p>-</p>	<p>Not identified in Environmental Scoping Document</p>	<p>3</p>	<p>3</p>	<p><b>Medium</b></p> <ul style="list-style-type: none"> <li>• Chevron will evaluate the suitability of investment in recreation activities and facilities for the general community as part of its future social investment strategy</li> <li>• Project impacts on tourism accommodation will be reduced through provision of accommodation for all workers associated with the Project</li> <li>• Management of population growth is beyond Chevron's control and therefore is not within Chevron's scope of responsibility</li> <li>• Management of other projects' workforce is not within Chevron's control or scope of responsibility</li> </ul>	<ul style="list-style-type: none"> <li>• Social investment funding will be available for community projects</li> <li>• All workers associated with the Project will be housed at the construction village. There may be some short-term impacts while the accommodation village is being constructed</li> <li>• The private sector will respond to demand for temporary and permanent housing</li> <li>• Government will release land for new tourist accommodation and/or temporary work camp facilities</li> </ul>	<p><b>Low</b></p> <p>Available information on Chevron workforce is reasonable, however no modelling undertaken for additional population growth</p>	<p>Not Applicable</p>	<p>Section 10.5</p>
<p><b>Noise</b></p>	<p>Construction</p>	<p>Construction Activities</p>	<p>2</p>	<p>Project will comply with WA noise regulations to reduce the potential impact of noise beyond the site boundary</p> <ul style="list-style-type: none"> <li>• Regulatory and public perceptions considered as part of the risk assessment</li> </ul>	<p>4</p>	<p>4</p>	<p><b>Low</b></p> <ul style="list-style-type: none"> <li>• Construction activities will comply with Environmental Protection (Noise) Regulations 1997</li> <li>• Noise will be managed as part of the CEMP. The management plan will focus on noise to surrounding receptors beyond the site boundary</li> </ul>	<ul style="list-style-type: none"> <li>• Industry standard traffic controls will be in place</li> <li>• Noise levels during construction will comply with EPA guidance</li> <li>• Uncertainties exist around pile driving program of works</li> </ul>	<p><b>Reasonable</b></p> <p>Survey data available from one expert - complies with EPA guidance</p>	<p>Not Applicable</p>	<p>Section 10.6 Appendix U1</p>

Factor	Phase	Aspect	Potential Impacts	Inherent Risk (from Scoping Document)		Comments/Assumptions (from Scoping Document)	Management and Mitigation Measures		Residual Risk		Comments/Assumptions (Relating to residual risk ranking)	Confidence Level and Justification	Potential Impacts to Matters of NES	EIS/ERMP Reference
				C	L		C	L	C	L				
Noise	Operations	Operations Activities	<ul style="list-style-type: none"> <li>Diminished quality of life due to acoustic emissions that are audible from key receptor points and diminish quality of life / sense of serenity</li> </ul>	5	2	<ul style="list-style-type: none"> <li>Project will comply with WA noise regulations to reduce the potential impact of noise beyond the site boundary</li> <li>Regulatory and public perceptions considered as part of the risk assessment</li> </ul>	<ul style="list-style-type: none"> <li>Operational activities will comply with Environmental Protection (Noise) Regulations 1997</li> </ul>	4	4	Low	<ul style="list-style-type: none"> <li>Noise levels during construction will comply with Environmental Protection (Noise) Regulations 1997</li> <li>Uncertainties exist around pile driving program of works</li> </ul>	Reasonable Survey data available from one expert - complies with EPA guidance	Not Applicable	Section 10.6
	Additive Effects		<ul style="list-style-type: none"> <li>Diminished quality of life due to acoustic emissions that are audible from key receptor points</li> <li>Stress-related impacts on community well-being as a result of acoustic emissions</li> </ul>	-	-	<ul style="list-style-type: none"> <li>Not identified in Environmental Scoping Document</li> </ul>	<ul style="list-style-type: none"> <li>Construction and operational activities will comply with Environmental Protection (Noise) Regulations 1997</li> <li>Noise will be managed as part of the CEMP. The management plan will focus on noise to surrounding receptors beyond the site boundary</li> </ul>	4	4	Low	<ul style="list-style-type: none"> <li>Noise levels during construction will comply with Environmental Protection (Noise) Regulations 1997</li> <li>Uncertainties exist around pile driving program of works</li> </ul>	Reasonable Survey data available from one expert - complies with EPA guidance	Not Applicable	Section 10.6 Appendix U1
Air Emissions	Construction	Construction Activities	<ul style="list-style-type: none"> <li>Increased respiratory disease due to increased emissions</li> <li>Decreased public amenity due to increased air emissions</li> </ul>	5	3	<ul style="list-style-type: none"> <li>Will be managed in accordance with outcome of consultation activities regarding current uses and values</li> </ul>	<ul style="list-style-type: none"> <li>Dust will be managed as part of the CEMP, including mitigation measures as detailed in Chapter 9, Terrestrial Risk Assessment and Management</li> <li>Industry standard traffic management controls will be in place</li> </ul>	5	3	Low	<ul style="list-style-type: none"> <li>Air emissions will generally consist of dust from vehicle movements and ground clearance and emissions from construction equipment</li> <li>Air quality will comply with the EPA Guidance for the Assessment of Environmental Factors                             <ul style="list-style-type: none"> <li>- prevention of air quality impacts from land development sites - No.18, 2000</li> </ul> </li> <li>Industry standard traffic management controls will be in place</li> </ul>	Reasonable Survey data available from one expert - complies with EPA guidance	Not Applicable	Section 10.6
	Construction													



Air Emissions	Operations	Operations	Decreased public amenity due to increased air emissions	5	Low	<ul style="list-style-type: none"> <li>Will be managed in accordance with outcome of consultation activities regarding current uses and values</li> </ul>	<ul style="list-style-type: none"> <li>Dust will be managed as a part of the OEMP</li> </ul>	5	3	Low	<p>The main activities likely to generate air emissions during operations are the following:</p> <ul style="list-style-type: none"> <li>Combustion of fuel gas in the gas turbines</li> <li>Firing during upset or emergency conditions</li> <li>Dust generated during routine maintenance</li> <li>The Project will comply with State Environmental (Ambient Air) Policy 009, Draft Policy for Public and Stakeholder Comment. (EPA 2009)</li> </ul>	<p><b>Reasonable</b> Survey data available from one expert - complies with EPA guidance.</p>	Not Applicable	Section 10.6
Air Emissions	Additive Effects	Decreased public amenity due to increased air emissions	-	5	Low	Not identified in Environmental Scoping Document	<ul style="list-style-type: none"> <li>Dust will be managed as part of the CEMP</li> <li>Industry standard traffic management controls will be in place</li> </ul>	5	3	Low	<p>Air quality will comply with the EPA Guidance for the Assessment of Environmental Factors</p> <ul style="list-style-type: none"> <li>prevention of air quality impacts from land development sites - No.18, 2000</li> <li>Compliance with State Environmental (Ambient Air) Policy 009, Draft Policy for Public and Stakeholder Comment. (EPA 2009)</li> </ul>	<p><b>Reasonable</b> Survey data available from one expert - complies with EPA guidance.</p>	Not Applicable	Section 10.6

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