



Wheatstone Project

Environmental Scoping Document

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WHEATSTONE PROJECT

Environmental Scoping Document

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1.0 INTRODUCTION

1.1 Background

Chevron Australia Pty Limited (Chevron), as operator of the Wheatstone Project (Project) proposes to construct and operate a multi-train Liquefied Natural Gas (LNG) and domestic gas (Domgas) plant near Onslow on the Pilbara Coast to process gas from various offshore fields in the West Carnarvon Basin. The Project is referred to as the Wheatstone Project and "Ashburton North" is the proposed site for the LNG and Domgas plants. The Wheatstone Project will produce petroleum from petroleum titles WA-253-P and WA-17-R, which are held 100% by Chevron companies. Petroleum production from petroleum title WA-16-R, which is held by Chevron companies and by Shell Development Australia, may also supply petroleum to the Wheatstone Project. Petroleum Titles WA-253-P, WA-17-R and WA-16-R are in Commonwealth waters (Petroleum Titles). All other components of the Project are encompassed within an area referred to as the "potential Project footprint".

The initial Project is expected to consist of two LNG processing trains, each with a capacity of between 4 and 7 million tonnes per annum (MTPA). Approval is being sought for the maximum capacity of the plant of 25 MTPA for the site. The Domgas plant will have a capacity equal to 15% of LNG sales.

The Western Australian (WA) Environmental Protection Authority (EPA) has assigned an Environmental Review and Management Program (ERMP) level of assessment to the Wheatstone Project. The Commonwealth Department of Environment, Water, Heritage and the Arts (DEWHA) deemed the Project to be a controlled action to be assessed by an Environmental Impact Statement (EIS). Chevron will undertake the State and Commonwealth assessments through a parallel/coordinated approach. This Environmental Scoping Document has been prepared as part of the assessment process and in accordance with EPA and Commonwealth guidance and procedures. The document is based on the Ashburton North site and has been prepared to satisfy the requirements of both jurisdictions (Scoping and Guidelines). A single impact assessment document (EIS/ERMP) will be produced to satisfy both jurisdictions' requirements.

The referrals for the Project, submitted in September 2008, included three alternative locations and described the site selection process which was then being undertaken. This process has now resulted in Ashburton North being selected as the preferred Project site. The EPA Service Unit (EPA SU) has requested that Chevron prepare the Environmental Scoping Document (ESD) based on one site only.

1.2 Purpose of Environmental Scoping Document

The purpose of the Environmental Scoping Document is to define the scope of the impact assessment and define the specific studies and methodologies that Chevron will conduct to support the assessment. It has been prepared in accordance with the WA EPA Environmental Impact Assessment (Part IV Division 1) Administrative Procedures 2002 (Environmental Protection Authority, 2002), the WA EPA Guide to Preparing an Environmental Scoping Document (Environmental Protection Authority, 2007a), the WA EPA Application of Risk Based Assessment in EIA (Environmental Protection Authority, 2008) and the Commonwealth Guidelines for the Content of a Draft EIS/ERMP (Department of the Environment, Water, Heritage and the Arts, 2008).

Chevron, in collaboration with the WA EPA, has agreed to apply a risk based approach to the scoping and environmental assessment of the Wheatstone Project. This approach

provides for the potential environmental impacts or hazards associated with the Project activities to be considered on the basis of potential risk to the environment. Environmental investigations and assessment can then be focused towards the high and medium environmental risks resulting from the Project.

1.3 Key Project Issues for Environmental Assessment

Based on the outcomes of the risk based scoping, a preliminary assessment has been undertaken to identify the key development activities and potential impacts that will be the focus of the formal assessment process. These activities will require detailed evaluation to determine effective management during both construction and operation.

The project activities and potential impacts identified during the preliminary assessment are presented in Section 5, which addresses the approach to risk based scoping. The key activities and potential impacts can be summarised as:

- ◆ Large scale capital and maintenance dredging program, including spoil disposal, to create the navigational channel, turning basin and port facilities required for export tankers servicing the facilities, and the potential impacts on local marine water quality, sensitive marine benthic communities and marine wildlife.
- ◆ Preparation, construction and operation of the onshore and marine facilities, including jetties, offloading facilities, and flood protection and the potential impact on the natural terrestrial and marine coastal processes, as well as potential impacts on sensitive ecological communities dependant on these natural processes, such as mangrove communities and clay pans.
- ◆ Processing operations that result in emissions of 10 to 15 million tonnes of greenhouse gas per annum over the life of the project once the project achieves its full 25 MTPA capacity.

1.4 Proponent Details

Name of Proponent

Chevron Australia Pty Ltd (Chevron)

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2.0 PROJECT JUSTIFICATION AND SITE SELECTION

2.1 Project Justification and Alternatives

The Wheatstone Project is a strategic development to bring gas to international and domestic markets. It is being developed as a multiple train gas precinct that will be able to process West Carnarvon Basin gas for Chevron and third-party gas owners.

The use of existing or current proposed developments in the region was considered in the evaluation of potential sites for developing the Wheatstone, Iago and other potential gas fields in the Basin. These options were discounted as they would be restricted in their capacity to process the required volume of gas in the near term and result in higher incremental development costs for West Carnarvon gas resources. A site screening and selection process was undertaken to locate a new "greenfield" site that would also be suitable for multi-user LNG infrastructure.

If the Project were not to proceed, the primary impact would be the loss of economic benefits to Western Australia, the Pilbara region and the nation. The construction phase alone will provide approximately 3000 jobs at Onslow with additional jobs in Perth, offshore Australia and other regional centres nationally. The other key consequence of not developing is the loss of a significant source of domestic gas supply to Western Australia.

2.2 Site Selection Process

A site screening and selection process was completed to determine the most appropriate site for the Wheatstone Project. Ashburton North, approximately 12 km south-west of Onslow, was selected as the most appropriate site. The detailed Site Selection Reports have been submitted to the EPA and DEWHA. The site screening and selection process will be discussed in the EIS/ERMP. A high-level summary of the steps completed for the site selection process is outlined as follows and in Figure 1.

Phases 1 and 2 - Internal site screening

A desktop screening process, including literature review, database search, and constraint mapping against a number of environmental, social and technical criteria, was used to identify possible sites on the Pilbara coast. Initially, six possible locations were identified which were studied further and narrowed to three possible locations.

The three locations, Ashburton North, Onslow Strategic Industrial Area (SIA) and Cape Preston, were referenced in the State and Commonwealth Environmental Referrals for the Wheatstone Project.

Phase 3 - Community and stakeholder engagement

Community and specific stakeholder groups were engaged to evaluate the site screening process and the suitability of a preferred location. Identification of issues that warrant further consideration in the Project was also recorded. The approach adopted for this engagement exercise derives from and builds on prior LNG site selection studies undertaken in the north west of Western Australia.



Figure 1: Overview of the Site Selection Process

Independent Review

Two independent reviewers from the John Curtin Institute of Public Policy were contracted to observe the site consultation process and provide an independent opinion on the methodology used and transparency of the site screening and selection process. These reports have been provided to the EPA and DEWHA

Designation of Ashburton North as a Strategic Industrial Area

In the course of the site selection process, planning of a location for gas processing facilities was highlighted as a matter of strategic importance, particularly with regard to ensuring that an appropriate site should be capable of being used by multiple parties and that key infrastructure, such as access roads, shipping channels and materials offloading facility (MOF) should be able to be shared.

The Premier and Minister for State Development for Western Australia, Colin Barnett, has subsequently committed to reserving land at Ashburton North for Chevron and other third parties to further investigate the feasibility of developing proposed LNG and domestic gas processing plants.

Mr. Barnett announced in December 2008 that a Strategic Industrial Area (SIA) would be created at Ashburton North. Development options for the Ashburton North SIA would include new LNG facilities in the North-West to aid the development of gas reserves in the Carnarvon Basin and Exmouth Gulf. The State Government is now proceeding with planning for the industrial use of the Ashburton North site. "This will include a port precinct and multi-user facilities on the coastal strip, and a multi-user infrastructure corridor" (ref Media Release from Minister for State Development Dec 19 2008).

3.0 PROJECT DESCRIPTION

3.1 Overview

The Wheatstone Project will produce petroleum from petroleum titles WA-253-P and WA-17-R, which are held 100% by Chevron companies. Petroleum production from petroleum title WA-16-R, held by Chevron companies and by Shell Development Australia, may also supply petroleum to the Wheatstone Project.

The titles are located approximately 145 km offshore from the mainland, approximately 100 km north of Barrow Island and 225 km north of Onslow.

The Ashburton North site is located approximately 12 km south-west of Onslow along the Pilbara coast, within the Shire of Ashburton. The locations of the proposed site and three Petroleum Titles are illustrated in Figure 2.

The Project will require the installation of gas gathering, export and processing facilities in Commonwealth and State Waters and on land. The Project will produce up to 25 MTPA, with the initial development expected to consist of two LNG processing trains each with a capacity of 4 to 7 MTPA.

A separate but co-located Domestic Gas (Domgas) plant will form part of the Project. The Domgas plant will have a capacity equal to 15% of LNG sales. The development of the Domgas plant also includes onshore pipeline installation to tie-in to the existing infrastructure of the Dampier-to-Bunbury Natural Gas Pipeline (DBNGP).

The gas and condensate will be processed offshore prior to transport to shore for LNG processing. The resultant LNG and condensate will be exported to worldwide markets, and Domgas will be sold into the domestic market. Additional offshore gas resources will supply feed gas to the initial or additional LNG trains. These resources are expected to come from other suitable fields in the region. These may be tied into the offshore gas gathering facilities installed as part of the initial Project or may require new facilities. Future offshore extractions and tie-ins will be the subject of separate assessments and approvals.

3.2 Summary of Project Key Characteristics

The key characteristics of this Project are based on development concepts that are currently under consideration. A summary of these components is outlined in Table 3.1. Specific details for the upstream (offshore) and downstream (onshore and nearshore) components are outlined in Sections 3.3 to 3.5. Changes to these components may occur depending on the final concept selected. Any changes that do occur will be assessed in the EIS/ERMP and approved as necessary.

Table 3.1: Indicative Key Characteristics

Aspect	Element	Description of Elements
Offshore (Upstream Infrastructure)		
Wells	Petroleum Titles	Approximately 18 to 35 (occurring over several drilling programs)
Wellhead platforms (WHP)	Number of platforms	Up to two
Subsea Wellheads and Manifolds	Number of manifolds	Six to 10
Central Processing Platform Complex (CPP)		One
Compression Platform (if not part of the CPP)	Number of platforms	One
Interfield Pipelines (between WHP, subsea manifolds and CPP)	Pipelines, flowlines and risers	Interfield pipelines, flowlines and risers connecting wellheads and manifolds to offshore facilities
Export Pipeline (from Wheatstone/lago field to Onshore)	Number of pipelines	Up to two pipelines with diameters ranging from 0.91m (36") to 1.2m (48"), each up to 225 km in length
2 nd shore approach for future Chevron development Hub access	Number of pipelines and pipeline shore crossings	One further export pipeline shore crossing with diameter ranging from 0.61 m (24") to 1.2 m (48") with one additional MEG pipeline shore crossing with diameter ranging from 0.15 m (6") to 0.3 m (12"). Pipelines will be up to 50 km in length
Shoreline crossings for future offshore access into Hub	Number of additional pipeline crossings	Up to two further export pipeline shore crossings with diameters up to 1.2 m (48"), two additional MEG pipeline shore crossings with diameters up to 0.3 m (12"). Additional utility pipeline shore crossings with diameters up to 0.3 m (12") and two additional control umbilical shore crossings with diameters up to 0.2 m (8")
Water outfall pipeline	Number of pipelines	One with diameter ranging from 0.2 m (8") to 0.41 m (16"), up to 50 km in length
Onshore (Downstream Infrastructure)		
Onshore LNG Plant	Total capacity	25 MTPA
	LNG Train size	4 to 7 MTPA
	Ultimate number of LNG trains	Up to six
	LNG tank size	120,000 to 180,000 m ³ per tank. Up to five tanks
	Condensate tank size	Up to 60,000 m ³ per tank. Up to four tanks
	Site access road (from Onslow Road to the site)	Approximately 15 to 20 km
	Power generation	Up to 400 MW
	Water usage	Up to 1.5 GL/annum
Domgas Plant	Plant Capacity	15% of LNG capacity - the DOMGAS Plant capacity will increase as LNG production increases. Each one MTPA of LNG export equals 20 TJ (terrajoules) per day dogmas.
	Domestic Pipeline	Approximately 65 to 90 km from Ashburton North to the Dampier-to-Bunbury Natural Gas Pipeline (pending final routing) ranging in diameter from 0.51 m (20") to 0.91 m (36")
Materials Offloading Facility (MOF)	Breakwater Causeway length	Approximately 0 to 3 km
	MOF length	Approximately 0.2 to 1.0 km
	MOF access	Constructed channel approximately 2 to 5

		km long x 0.1 to 0.3 km wide
	Dredging for MOF	Approximately 750,000 to 2,000,000 m ³ (volume exclusive of future maintenance dredging)
LNG & Condensate Jetty	Jetty length	Approximately 0 to 5 km (As an alternative a sub-sea cryogenic line option to remote loading dolphins is being evaluated)
	Jetty access	Constructed channel approximately 18 to 25 km long x 0.25 to 0.4 km wide
	Dredging (including ship channel and turning basin)	Approximately 25,000,000 to 40,000,000 m ³ . Usable material will be utilised as fill for the plant site (volume exclusive of future maintenance dredging)
Construction Camp (and associated utilities)	Number of personnel	3000 to 5000
Operations Camp (and associated utilities)	Number of personnel	Approximately 300
Potential fill source	Quarry and/or borrow pit	To be determined

3.3 Offshore (Upstream) – Key Components

Upstream facilities will be installed to access the gas and gas condensate reserves and to partially process these reservoir fluids offshore prior to transportation to an onshore plant for LNG processing. These upstream facilities will be located in Commonwealth waters with water depths ranging from 70 to 200 m.

The proposed concept currently includes up to four offshore platform structures consisting of up to two Wellhead Platforms (WHP), a Central Processing Platform Complex (CPP) and a possible compression platform if not included as part of the CPP. Concept selection is based on the Project meeting technical, environmental, safety and economic outcomes. Figure 3 provides an illustrative representation of the layout of the key upstream infrastructure assuming one WHP and one CPP.

A number of activities and infrastructure will be required regardless of the finalised upstream concept. These common features comprise the following:

- ◆ Drilling of approximately 18 to 35 wells in the Petroleum Titles.
- ◆ Offshore production/gathering system comprising a number of gas flowlines, manifolds, and injection lines used to supply chemical treatments to the wellheads, as well as control/power umbilical lines and fibre optic communication cables to shore.
- ◆ Installation and operation of wellhead and central processing platforms. These facilities are likely to include equipment that removes some of the produced formation water to dehydrate the gas and condensate prior to export, so as to prevent gas hydrate formation and to maintain hydrocarbon flows. Produced formation water will be managed either by reinjection or by treatment and overboard discharge. The platforms will require a flare to manage excess gas during abnormal operating conditions (emergencies and upset conditions).
- ◆ Offshore compression equipment will be required possibly during the later stages of field life.
- ◆ Trunk pipeline(s) to transport gas, gas condensate and remaining produced water from the CPP to the onshore plant. Up to two export pipelines with estimated diameters from 0.91 m (36 inch) to 1.2 m (48 inch). The trunk pipelines will be approximately 225 km long (exact length will depend on the final location of the onshore facilities and pipeline routing).
- ◆ Installation of up to two further export pipeline shore crossings, up to 1.2 m (48 inch) in diameter with an associated 0.2 m (8 inch) diameter MEG pipeline, laid to allow future tie-ins from other gas fields. These pipelines will be laid from the LNG plant and extend offshore to a point beyond the depth required for stabilisation.
- ◆ Pipeline stabilisation for protection in shallower water. This is expected to be achieved by a combination of trenching and/or rock armouring.

Development of other gas fields that may tie into the Project facilities in future will be the subject of separate Commonwealth approvals.

3.4 Onshore (Downstream) – Key Components

Once onshore, the gas, condensate and water will enter the main processing plant. Figure 4 provides an illustrative representation of the layout of the key downstream infrastructure. This is illustrative only and does not represent final layout. Certain key

components of infrastructure will be designated “multi-user” as part of the development of the site as a Strategic Industrial Area.

The key components for processing will comprise:

- ◆ Processing of the reservoir fluid to separate the hydrocarbon gas, hydrocarbon liquid, and water streams.
- ◆ Pre-treatment of the gas stream to remove gases such as reservoir carbon dioxide, water and other contaminants from the feed gas.
- ◆ LNG trains to liquefy the gas to produce liquefied natural gas.
- ◆ A Nitrogen Rejection Unit for removal of nitrogen from the product.
- ◆ LNG storage onshore and loading facilities consisting of full containment LNG storage tanks and loading arms at the jetty head. The loading lines will be either over a jetty or by subsea lines to an offshore loading facility.
- ◆ Domgas plant to treat the feed gas to meet domestic gas specifications in deliveries through pipelines to the existing domestic gas network and/or directly to local users via dedicated gas pipelines. The Domgas pipeline will provide the necessary infrastructure to connect the petroleum fields to the existing Domgas supply network via the nearby Dampier-to-Bunbury Natural Gas Pipeline (DBNGP).
- ◆ Condensate stabilisation unit to meet the specifications for the condensate product which is subsequently sent to storage.
- ◆ Condensate storage and loading facilities including loading lines either over a jetty or by subsea lines to an offshore loading facility.

The key components for export will include:

- ◆ Port facilities including jetties to cater for LNG and condensate tankers, material offloading facility (MOF) to cater for construction materials and support vessels. The MOF will be either constructed as an inland harbour or as part of the offshore harbour.
- ◆ Navigation channel and turning basin to allow safe access to the loading jetty for condensate and LNG tankers. This channel will require dredging. The volumes to be dredged will depend on the available water depths at the selected location. Initial screening studies indicate the volumes to be dredged may range from 25 to 40 million cubic metres (exclusive of future maintenance dredging). A portion of suitable dredge material may be used in the plant construction as fill, if practicable.

3.5 Supporting Facilities and Activities

Facilities and activities required to support construction, commissioning and operation of the upstream facilities include:

- ◆ Various offshore marine vessels providing a range of services, including supply of materials.
- ◆ Mobile drilling facilities to supply drilling equipment and carry out drilling of offshore wells.
- ◆ Construction/installation vessels for transportation of offshore fixed installations as detailed in the Key Characteristics Table (Table 3.1).
- ◆ Offshore disposal of hydrotest (treated, inhibited) water for the export pipeline.

Facilities and activities required to support construction and operation of the downstream facilities include:

- ◆ Access roads to the site, from the site to the construction camp and from the main Onslow road to the camp.

- ◆ Utilities and general facilities such as power, fuel gas system, diesel, instrument air, plant air, nitrogen, fibre optic communication cables and flare systems for the normal operation of the onshore processing facilities.
- ◆ Fill for the plant site which may be directly excavated from within the Project area, sourced from third-party quarries or dredged material, or from a combination of these.
- ◆ Water supply which may be from groundwater abstraction or from a seawater desalination plant, or a combination of both.
- ◆ Drainage and waste water treatment.
- ◆ Storage facilities for chemicals, fuel, and materials.
- ◆ Temporary lay-down areas for modules and other equipment for the construction of the initial facilities as well as future facilities.
- ◆ Construction camp to support construction of the processing facilities. The construction camp will provide accommodation and service infrastructure for the construction labour. The construction camp is likely to be built in a phased approach, with sections occupied while others are under construction.
- ◆ Accommodation blocks for operations personnel.
- ◆ Upgrades to the existing Onslow airport are expected to be required. It is noted, however, that the Shire of Ashburton is considering building a new airport about 15 km south of the existing facility.

Some facilities are expected to be temporary and will be required only during the construction phase, and others will be required during both the construction and operational phases of the Project.

The estimated footprint for the current downstream Project and key supporting facilities is outlined in Table 3.2. Current estimates are that approximately 30% of this total is unlikely to be disturbed or may be readily rehabilitated post construction.

Table 3.2: Estimated Project Footprint Areas

Land Parcel	Facilities Description	Approximate Area (Hectares)
Coastal Area (onshore portion)	<ul style="list-style-type: none"> • Materials Offloading Facility^a • Products Jetty^a • Shipping Channel and Turning Basin^a • Chevron Products Tanks^b • Common-User Access Road from coast to Onslow Road^b • Pipeline Corridor from coast to Onslow Road^b • Supply Base^b 	<ul style="list-style-type: none"> a) up to 150 ha b) up to 620 ha
Chevron Plant site and Construction Camp	<ul style="list-style-type: none"> • Chevron Construction Camp • LNG Processing Trains and Domgas Plant 	<ul style="list-style-type: none"> • Up to 300 ha • Up to 500 ha
Miscellaneous	<ul style="list-style-type: none"> • Telecommunications base • Domestic gas pipeline route from Onslow Road to Dampier to Bunbury Pipeline 	<ul style="list-style-type: none"> • Not determined at this stage • Up to 250 ha
Offshore sub-sea	<ul style="list-style-type: none"> • Platforms • Export Pipeline and Shore Crossings (including water outfall and 2nd shore approach areas) 	<ul style="list-style-type: none"> • Up to 1.6 ha per platform • Up to 400 ha (assumes 10 m wide corridor from field plus up to 50 m separation nearshore)

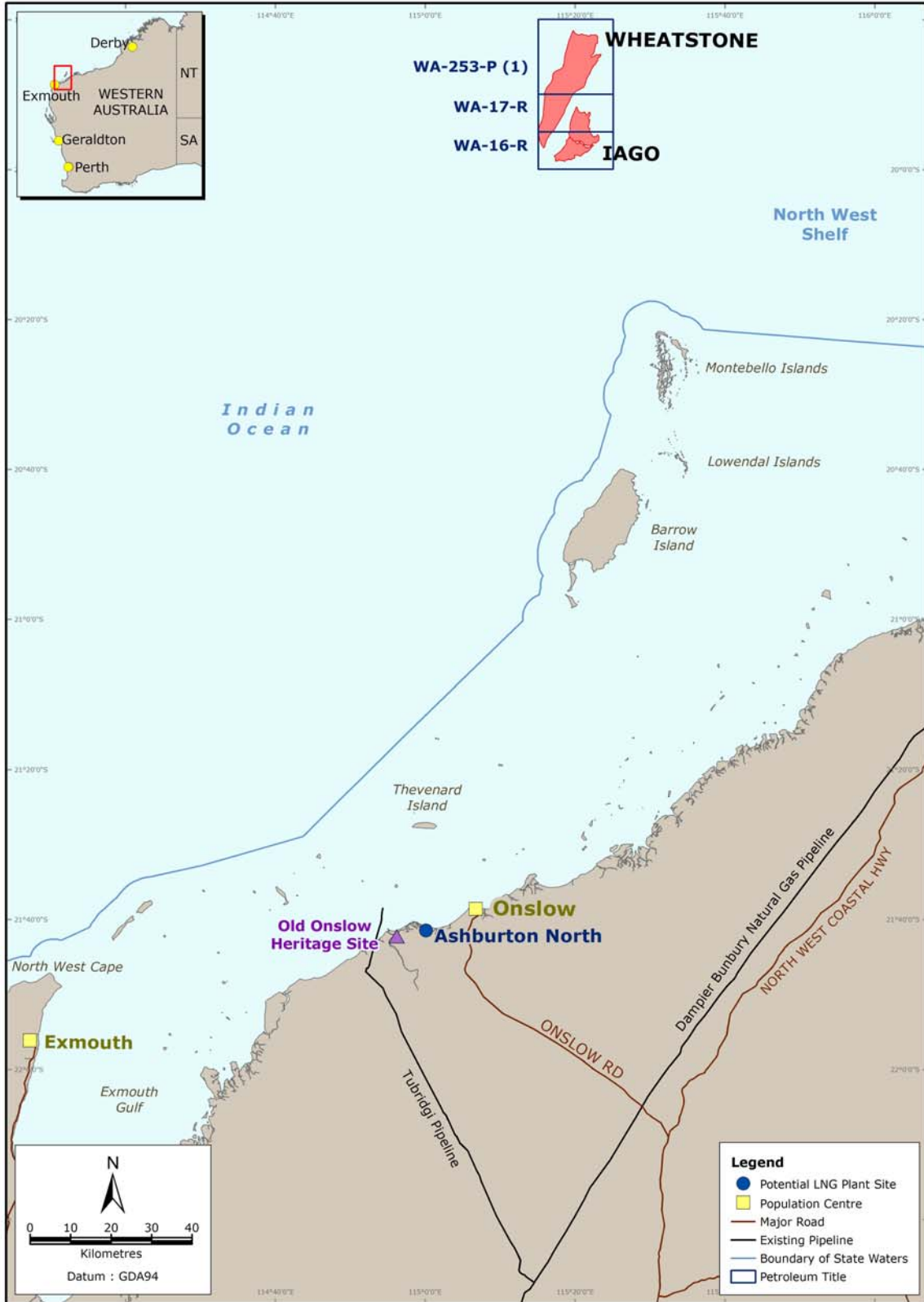


Figure 2: Location of Wheatstone Project

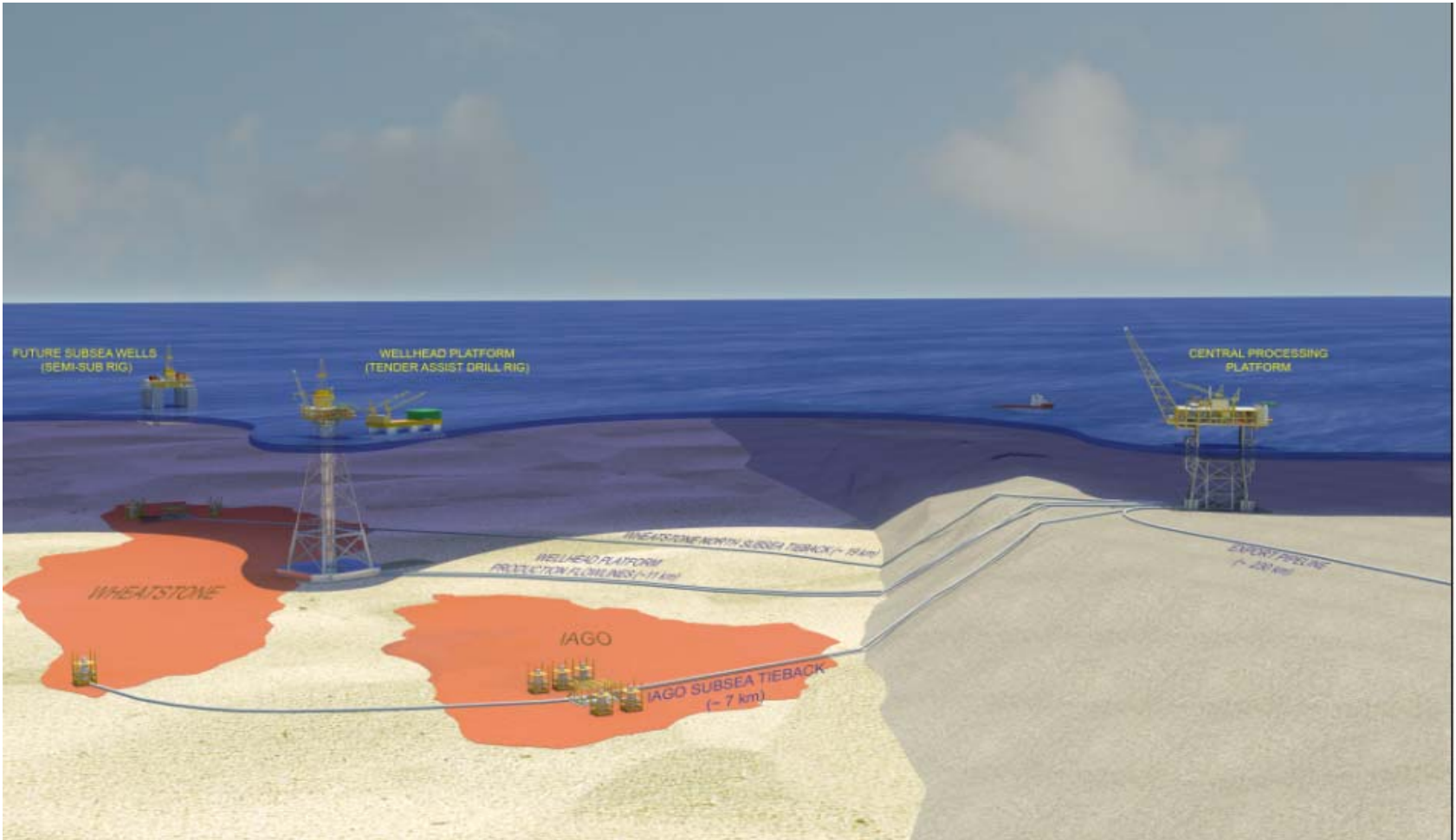


Figure 3: Illustrative Representation of Key Upstream Infrastructure
Note this is illustrative only and does not represent final layout of facilities

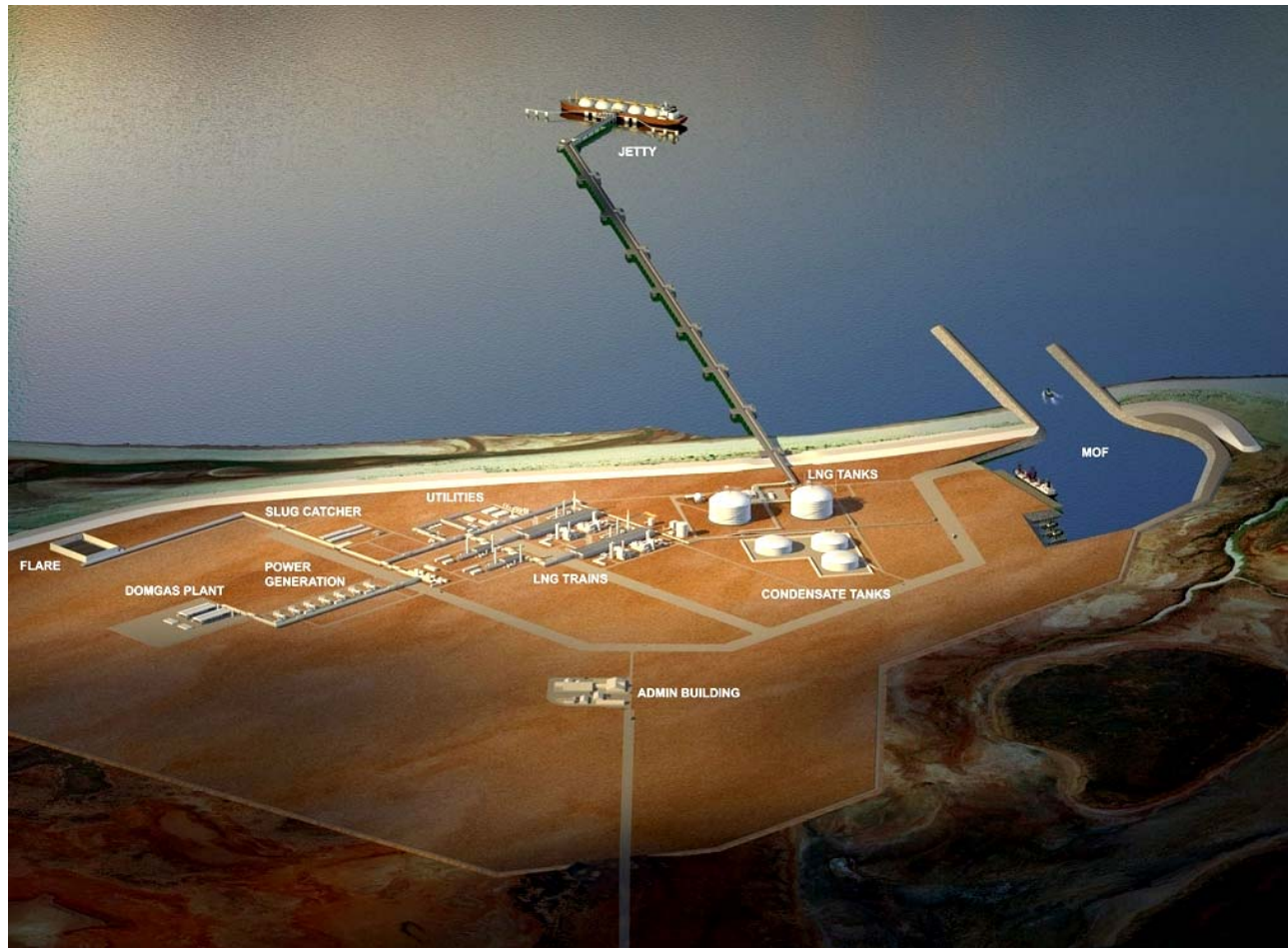


Figure 4: Illustrative Representation of Downstream Infrastructure
Note this is illustrative only and does not represent final layout of facilities

4.0 REGIONAL SETTING

This section provides a summary overview of the natural and social environment of the Project study area based on a review of readily available reports, observations from preliminary site inspections conducted to date, and experience of the region by the authors.

4.1 Project Locality

The Project study area described in this section is located in the NW Pilbara region of Western Australia. It extends from the deepwater marine environment of the Petroleum Titles, (located approximately 60 km NNW of the Montebello Islands) and down past the west coast of Barrow Island, across the shallow nearshore shelf between Thevenard and Serrurier Islands, to the nearshore and coastal environment located approximately 40 km either side of the proposed LNG plant site (located immediately north of the Ashburton River delta). It also includes the terrestrial environment inland as far as the Dampier-to-Bunbury Natural Gas Pipeline in the vicinity of two potential pipeline alignments.

The nearest population centres are Onslow (12 km to the NE), Exmouth (100 km to the SW) and Dampier/Karratha (some 200 km to the NE). The proposed LNG plant is located within the Shire of Ashburton.

The region experiences a tropical arid climate with a mild, dry winter and a hot and wet summer. Summer rains are generally the result of thunderstorm activity and occasional cyclones. Prevailing winds during summer are from the western sector (SW-NW) and from South to East in winter. Cyclones can occur anytime between November and April, are not infrequent, and are frequently accompanied by very strong winds, storm surge, intense rainfall and flooding of rivers and coastal plains.

4.2 Social Environment

European settlement of the area began in the 1880s with the establishment of pastoral stations along the Ashburton River and the development of goldmines in the hinterland. By 1925, a port facility was established at the mouth of the Ashburton River but due to repeated flooding of the town and siltation of the river, visiting ships started loading and unloading at the deeper waters of Beadon Creek. Hence Onslow was relocated to its present site.

By the 1990s Onslow had developed into a small settlement servicing the oil and gas industry, various fisheries, seasonal tourism, nearby pastoral stations, and a recently established solar salt industry.

Today, the population of Onslow fluctuates between 550 and 750 residents (ABS 2006: 573 people). However, the population increases to about 2500 during the mild winter months when it is visited by "grey nomads" (usually travelling retirees), recreational fishermen and tourists. Diving and fishing on the reefs that fringe many of the islands in the region is a popular pastime during this period, as is fishing and crabbing in nearshore mangroves.

4.2.1 Native Title and Aboriginal Heritage

An estimated 53% of the Onslow population is indigenous to the area, from the Thalanyji, Yindjibarndi and Banyjima language groups. The Thalanyji people are the native title holders of the land in the Onslow area including the Ashburton North site. It is possible

that there will be Aboriginal Heritage Sites within the Project footprint area. The Registered midden site Amethyst 07 is within the Ashburton North Site (Department of Indigenous Affairs, 2008).

4.2.2 Land Use and Tenure

Primary economic activities in the area are pastoral activities, commercial fishing, tourism, salt production operations and oil production. Coastal land is located within the Urala pastoral lease which is held by BHP Billiton. Further east, a lease is held by the Onslow Solar Salt project. There are two existing ports (Onslow Salt and Thevenard Island) and a small boat harbour with storm moorings is located in Beadon Creek to service the local commercial and recreational fishermen and charter boat operators.

Oil is produced from a number of small fields located in shallow waters offshore Onslow. These include the Saladin, Coaster, Roller and Skate fields. Further offshore are the BHPB operated Griffin oilfield, the Chevron operated Barrow Island operations and the proposed Gorgon gas field development, and Apache's Varanus Island operations. Oil and gas processing, storage and shipping facilities are located on Barrow, Thevenard, Airlie and Varanus islands. Gas gathering pipelines from the Griffin and Roller fields come ashore to the west of Onslow, near Urala Station.

Tourism is highly seasonal and restricted to the winter period. A local charter vessel services the Mackerel Islands Resort accommodation on Thevenard Island and Direction Island and provides for fishing, diving and whale watching activities. Charter and tourist boats, particularly from Exmouth and Dampier, cater for fishing trips and visits to offshore islands, including the Montebello Islands. Local beaches are used for recreational activities including fishing, four-wheel driving and camping.

The Onslow Structure Plan (Western Australian Planning Commission 2003) through public consultation has identified that Onslow residents are supportive of further industrial development in their region and has set aside large areas of land to the west of the town for future industrial development.

The existing land uses and tenure of the potential Project area are identified in Table 4.1 below.

Table 4.1: Existing Land Use and Tenure within Project Footprint

Project Area	Current Land Use and Tenure
Ashburton North (proposed plant site)	Urala Pastoral Lease held by BHP Billiton Heritage Council WA Place No HWA/03444 (Old Onslow Tramway and Jetty site) A Petroleum Exploration Permit and several Mineral Exploration Licenses also exist over the site
Onshore Domgas pipeline*	Likely to traverse several Pastoral Leases, potentially also the Cane River Conservation Park
Offshore marine	Various Petroleum Titles in Commonwealth Waters
Nearshore marine	Shire of Ashburton Reserve for Harbour Purposes State Waters Commercial Fisheries (see below)

4.2.3 Commercial Fisheries

There are approximately ten Western Australian Fisheries in the North-West bioregion including a Prawn Fishery (Department of Fisheries, 2007). A small prawn fishery comprising four licences has operated out of Onslow for many years trawling in nearshore waters between Exmouth Gulf and the Mangrove Islands, to the east of Onslow. Other fisheries target demersal scale fish by line and trap, and pelagic fish (mackerel) by line.

The proposed Project area overlaps four Commonwealth managed fisheries zones for the Western Tuna and Billfish, North West Slope Trawl, Western Deepwater Trawl and Skipjack Tuna Fisheries (Department of Fisheries, 2007).

4.2.4 Heritage and Conservation Areas

The Ashburton North site is approximately 4 km from the Old Onslow Townsite heritage place (Heritage Council of WA Place 03444). This place is listed on the 'State Register of Heritage Places' and is protected under the *Heritage of Western Australia Act* (1990). The Townsite was established in 1885 and abandoned in 1925 because of repeated flooding and siltation of the river mouth. (Heritage Council of Western Australia, 2008). The heritage place contains various ruins including the old jail, cemetery and hospital. The site of the old jetty and a section of the old tramway (also part of HWA/03444) are within the Ashburton North site (Figure 5).

There are no National Parks, Nature Reserves, Wetlands of International Significance (including Ramsar sites) or any wetland of importance as listed by DEC within the proposed Project footprint. Neither are there any current Marine Protected Areas, World Heritage Properties, nor National Heritage Properties that could be adversely affected by the Project.

There are a number nearshore island Nature Reserves adjacent to the Project footprint, most of which support turtle nesting activities. A Marine Park encloses the waters of Ningaloo Reef and Muiron Islands to the west, and a Marine Management Area encloses the shallow waters of Barrow Island to Montebello Shoals to the north-east. It is highly unlikely that either Barrow Island Nature Reserve or Barrow Island Marine Park will be adversely affected by the Wheatstone Project. Its proximity is depicted in Figure 6.

There is potential for the Domgas pipeline to traverse the Cane River Conservation Park (Figure 5). Preliminary discussions with DEC have indicated that this area possesses landform types that provide representation of the Pilbara Bioregion, which is the basis of its tenure type.

4.3 Terrestrial Environment

The Project area experiences a tropical arid climate, with an average daily temperature of 31 °C and average annual rainfall of 274 mm. The region experiences two distinct seasons which can be characterised as a cool, dry winter, and a hot, wet summer. During winter, prevailing winds are from the east and as a result nearshore seas are calm and waters are clear. During summer, the prevailing winds are southerly, and cause water turbidity nearshore. Trichodesmium blooms frequently occur during summer. Cyclones and runoff occasionally also add to this nearshore turbidity. The majority of rainfall is received between January and June, and the area is prone to cyclones between November and April (Bureau of Meteorology, 2008).

The majority of the Project footprint area is situated within the Cape Range subregion of the Carnarvon Bioregion. There is the potential that the onshore Domgas pipeline may be aligned through the Roebourne subregion of the Pilbara Bioregion. This is relevant to assessing regional significance during the proposed environmental investigations.

4.3.1 Geology

At a regional scale, the Project area lies north of the Gascoyne sub-basin and on the Peedamullah Shelf. Surficial geology comprising unconsolidated alluvial and colluvial sediments of the Ashburton River system dominate the landscape. It is anticipated that the local stratigraphic profile comprises sandy Quaternary sediments overlying sandy-to-clayey alluvium with possible deposits of Calcrete, underlaid by Tertiary sandstone and limestone. The deeper Cretaceous sediments typically comprise of shallow siltstone overlying coarse grained basal Birdrong Sandstone.

4.3.2 Hydrogeology and Groundwater

It is anticipated that the general hydrogeology at the Ashburton North site comprises a shallow, unconfined, sand-and-limestone aquifer associated with the coastal dune. A groundwater table of between 4 and 10 m below ground surface is expected. Groundwater yields within this aquifer are expected to be low and result in variable lenses of brackish quality.

4.3.3 Topography and Surface Hydrology

The terrain is flat to undulating with steep slopes in areas. The elevation ranges from 3 to 29 m above sea level. The Ashburton North site is located in a floodplain delta that is influenced by the Ashburton River and Hooley Creek. The area is subject to flooding and storm surge and there is an extensive floodplain that periodically becomes inundated, usually associated with tropical cyclone events. Consequently the gas plant site will need substantial fill to raise the level of the land.

Flows in the drainage lines of the proposed site are influenced by an interrelationship between water course, location, floodplains, claypans and a suite of longitudinal and network sand dunes. The claypans fill with freshwater after rainfall inundation. The ecological importance of these is noted in Section 4.3.6. The waters of the river mouth and adjacent creeks are tidal and marine for most of the year, only becoming estuarine during flood events. Fresh water extends from a weir upstream of the road crossing located about 8 km inland from the coast. The river floods most years, but the duration and volume of the river discharge varies depending on whether or not a cyclone event has resulted in intense rainfall within the catchment. When that does occur, the river can discharge for many weeks and deposit substantial sediment load into the nearshore marine environment.

The Ashburton River is heavily influenced by rainfall with flow occurring only after heavy rainfall. During high rain and flood events, extremely high turbidity levels are observed in the delta through deposition of sediments from the Ashburton River. The mouths of the Ashburton River and Hooley Creek are tidal.

4.3.4 Soils and Landforms

The terrain is flat to undulating with steep slopes in areas. The elevation ranges from 3 to 29 m above sea level. The Ashburton North site is located on the Ashburton River delta, a complex system of sand spits, cheniers, tidal flats, salt flats, distributary channels and coastal dune barriers. The low-lying areas are subject to inundation and storm surge (Onshore Environmental Consultants, 2008).

Soils of the coastal fringe consist mainly of saline loams with shelly sand. Inland of the coastal zone are extensive plains dominated by neutral and alkaline red earths. Some of the plains contain hard alkaline red soils with both cracking and non cracking clay soils (Onshore Environmental Consultants, 2008).

4.3.5 Flora

The Project footprint is located within the Carnarvon Bioregion. The Project area and the surrounds have been disturbed from pastoral and industrial activity, and suffer weed proliferation and feral animals. Vegetation at the Ashburton North site includes chenopod and samphire shrublands, hummock grasslands and mangroves. These habitats are understood to be widespread along the Pilbara coastline. Preliminary flora studies have indicated that no Declared Rare or Priority Flora species are present (Onshore Environmental Consultants, 2008).

The Ashburton North site neighbours the Ashburton River Delta stand of regionally significant mangroves (outside designated industrial areas and associated port areas) (Figure 6).

A DEC database search indicates there are no known Threatened Ecological Communities or Protected Ecological Communities within the Project footprint area.

4.3.6 Fauna

A search of Western Australia DEC records has indicated that there are no known Threatened Ecological Communities or Protected Ecological Communities within the Project footprint. Sporadic occurrences of threatened bird, reptile and mammal species have been recorded along the Pilbara coast, including within the Project footprint.

It is possible that subterranean fauna (stygofauna and troglofauna) are present as their presence is characteristic of coastal areas of the Cape Range subregion and Pilbara Bioregion. The dominance of a clay-and-sand environment may limit their presence at this particular location.

Short-range endemic species that inhabit the site are not well understood but are expected to be representative of surrounding populations in the region. Claypan areas in the Pilbara Bioregion are reported to support rich invertebrate (crustacean) populations, following periods of freshwater inundation (DEC, A. Pinder, pers.comm.).

4.3.7 EPBC Listed Terrestrial Fauna

Terrestrial EPBC listed species that may be present include Olive Python, Pilbara Leaf-nosed Bat, Mulgara, Northern Quoll and a number of migratory and residential bird species. The full list of EPBC listed species that may be present within the Project footprint area is attached as Table A3.1 in Appendix 3.

Results from preliminary field studies indicate that waterbird numbers (including migratory species) are low along the coast in the vicinity of the Project footprint and that the significance of the project area and adjacent coastline for migratory waterbirds and waterbirds in general, appears to be low. This is potentially due to the majority of the tidal environment possessing a sandy substrate which is more sterile compared with substrates of silts and clays (Bamford Consulting Ecologists, 2008).

4.4 Marine Environment

4.4.1 Bathymetry

The marine environment in which the Project is situated extends from the upper intertidal zone at the mainland, through to depths of 200 m, encompassing the upper part of the continental slope and the nearshore component of the continental shelf. Offshore Onslow, the nearshore continental shelf is shallow (<20 m) and approximately 35 km wide, measured from the shoreline to a depth of 20 m. Further offshore water depths increase to 50 m within about 7 km and to 100m within a further 10 km. The gas fields occur in water depths of between 70 and 200 m and the submarine pipeline will traverse the upper slope of the continental shelf at water depths of between 50 and 100 m, before crossing the nearshore shelf to a shore crossing at the mainland. The nearshore shelf is shallow and has a variable topography that includes flat submarine plains and many small sea-mounts and islands supporting a varied abundance of reef habitat.

4.4.2 Intertidal Habitat

The intertidal habitats at Ashburton North and surrounds comprise sandy beaches and clayey estuarine sediments. Preliminary field investigations of these habitats of the Ashburton North indicate a low diversity of infauna species and that no rare or protected species are present. The sandy beaches are representative of the Pilbara coastline in that they have low diversity and productivity levels. (Barry Wilson, pers. comm., 2008).

Many of the nearshore islands are surrounded by shallow intertidal platforms (e.g. Thevenard). These are sand veneered and primarily support macroalgae and scattered ephemeral seagrass species. Limestone pavement is exposed at Onslow near Beadon Point and in other places along the coast. Many of the coral reefs in the area are likely to be exposed for short periods at low spring tide.

4.4.3 Nearshore Habitat

The nearshore area is defined as the marine environment from low water mark to 20 metre bathymetric contour, approximately 7 km offshore. This is described as the Pilbara (nearshore) IMCRA Region (Figure 6). The broad area is recorded as having high diversity of infauna from intertidal mudflats and sandflats associated with fringing mangals in bays and lagoons. (Commonwealth of Australia, 2006). Due to the highly turbid water from the suspended sediments associated with large tidal range and infrequent cyclonic activity, the nearshore area lacks significant benthic primary producer habitat (Commonwealth of Australia, 2006.) It is believed to be characterised by macroalgae on hard substrates, mudflats and sandy bottoms with ephemeral seagrass occurring in shallows. A DEWHA database search resulted in three small seagrass patches on the eastern side of Thevenard Island. Coral communities are known to occur in localised areas, such as Ashburton Island and Ward Reef, approximately 5 km from the coast.

In the course of the impact assessment, habitat mapping will be carried out to define the Benthic Primary Producer Habitat Management Unit and enable assessment of the significance of dredging impacts.

4.4.4 Deepwater Habitat

The Petroleum Titles are located 145 km offshore from the mainland, (approximately 100 km north of Barrow Island) in water depths of around 200 m. The deepwater environment is defined as the offshore marine environment from the 20 metre bathymetric contour. This is the outer part of the North-West Shelf, an oceanic region off the Pilbara and

Kimberley coasts. The ocean in this region is recorded as having diverse benthic invertebrate communities and fish fauna. (Commonwealth of Australia, 2006). These depths are below the photic zone and so preclude the presence of benthic primary producers. Demersal and benthic fish communities are likely to be present (Commonwealth of Australia, 2006).

4.4.5 Key Marine Ecosystem Processes and Dynamics

The key processes affecting the development and distribution of marine flora and fauna in the region are physical:

- ◆ **Substrate** - The majority of benthic species are confined either to hard or soft substrates, with very few equally successful in both. The distribution of unconsolidated sediments versus rock (pavement, reef, etc.) and the stability of this relationship plays a significant role in determining the distribution, diversity and abundance of benthic species. Islands and reefs also provide shelter/protection from wave action allowing growth of seagrasses and mangroves, species susceptible to erosion, in their lee.
- ◆ **Sea Temperature** - Tropical species live closer to their upper thermal tolerance limit, which for many species is close to 40 °C. During summer, temperatures in nearshore shallows often reach 33 to 34 °C. Temperature is also a trigger for breeding activity in many species.
- ◆ **Light** - Light is a requirement for benthic primary production by seagrasses, algae and corals. The frequent high turbidity experienced nearshore to Onslow may affect the distribution of primary producers (seagrasses, algae and corals), which are light dependent. Nearshore waters tend to be clearer during winter than summer, when onshore westerly winds cause wave disturbance of nearshore sediments. Large *Trichodesmium* algal blooms also occur throughout the region during summer.
- ◆ **Tides and Ocean Currents** - Oceanic currents are responsible for nutrient distribution and larval transport. Tides in the region are semi-diurnal with a maximum range of 3 m. Currents tend to be shore parallel with a speed of 1 to 2 knots and reversing on each tidal cycle. Currents weaken offshore in deeper waters. In deep waters offshore (100 m) regional currents tend to dominate.
- ◆ **Winds** - Winds cause wave action that results in the redistribution of sediments and increases turbidity in the water column. These changes impact on the depths at which benthic primary producers can survive. Cyclonic winds and the waves they generate may cause physical damage to coral reefs, algal and seagrass beds, and result in redistribution of sediments – including the exposure and covering of subtidal pavements. The wave and swell climate varies as one progresses further offshore.
- ◆ **Rainfall** - Inland rainfall is primarily responsible for input of terrestrial sediments to the nearshore waters of the Project area via river discharge. These events cause large-scale turbidity of nearshore waters over a period of months.

The nearshore marine environment of the region experiences severe change and stress on an episodic basis as a result of the passage of cyclones. These cyclones cause storm surge, waves and currents that rip algae and seagrasses from the seafloor and damage coral reefs and also modify the coastline. Huge volumes of rainfall may also be received on the hinterland, which results in flooding and river discharge into nearshore waters. On such occasions, it is not unusual to see turbid waters extend offshore past Thevenard Island and for 30 to 50 km downstream of the Ashburton.

4.4.6 EPBC Listed Marine Fauna

Green and Flatback turtles are known to nest along the Pilbara coastline and on the offshore islands, particularly the Serrurier, Muirion and Thevenard, and Barrow islands. Sea turtles mate in spring and start nesting in early summer through to autumn. The EPBC search result displayed six species of marine turtle that may be present within the potential Project footprint. The EPBC search result also suggested that dugongs may migrate through the area. A number of threatened seabirds may also migrate through or inhabit the area.

EPBC search results indicated that nine species of migratory cetaceans, including Blue, Southern Right and Humpback whales, occur in the area, with the Exmouth Gulf being an important resting area for Humpbacks from July to September. The migration of Humpback Whales occurs through the region between June and October.

Whalesharks have been recorded in the vicinity of the Petroleum Titles and visit the Ningaloo Reef area between March and June.

The full list of EPBC listed species that may be present within the Project footprint area is attached as Table A3.1 in Appendix 3.

4.4.7 Commonwealth Marine Area

The EPBC Act requires an assessment of impacts of the Project on the Commonwealth marine area. For this project, the Commonwealth marine area that may be impacted is considered to be represented by the location of the Petroleum Titles and the proposed pipeline routes to shore. Potential impacts from activities related to the installation and operation of the Project will be addressed in the EIS/ERMP.

These include:

- ◆ Disturbance of the seabed
- ◆ Discharges and subsequent changes in water quality
- ◆ Impacts on other users of the area
- ◆ Potential impacts on important amenities, navigation, culturally or historically significant sites, or on habitats of threatened or migratory species
- ◆ Potential risk of pest species becoming established in the Commonwealth marine area
- ◆ Changes in air quality.

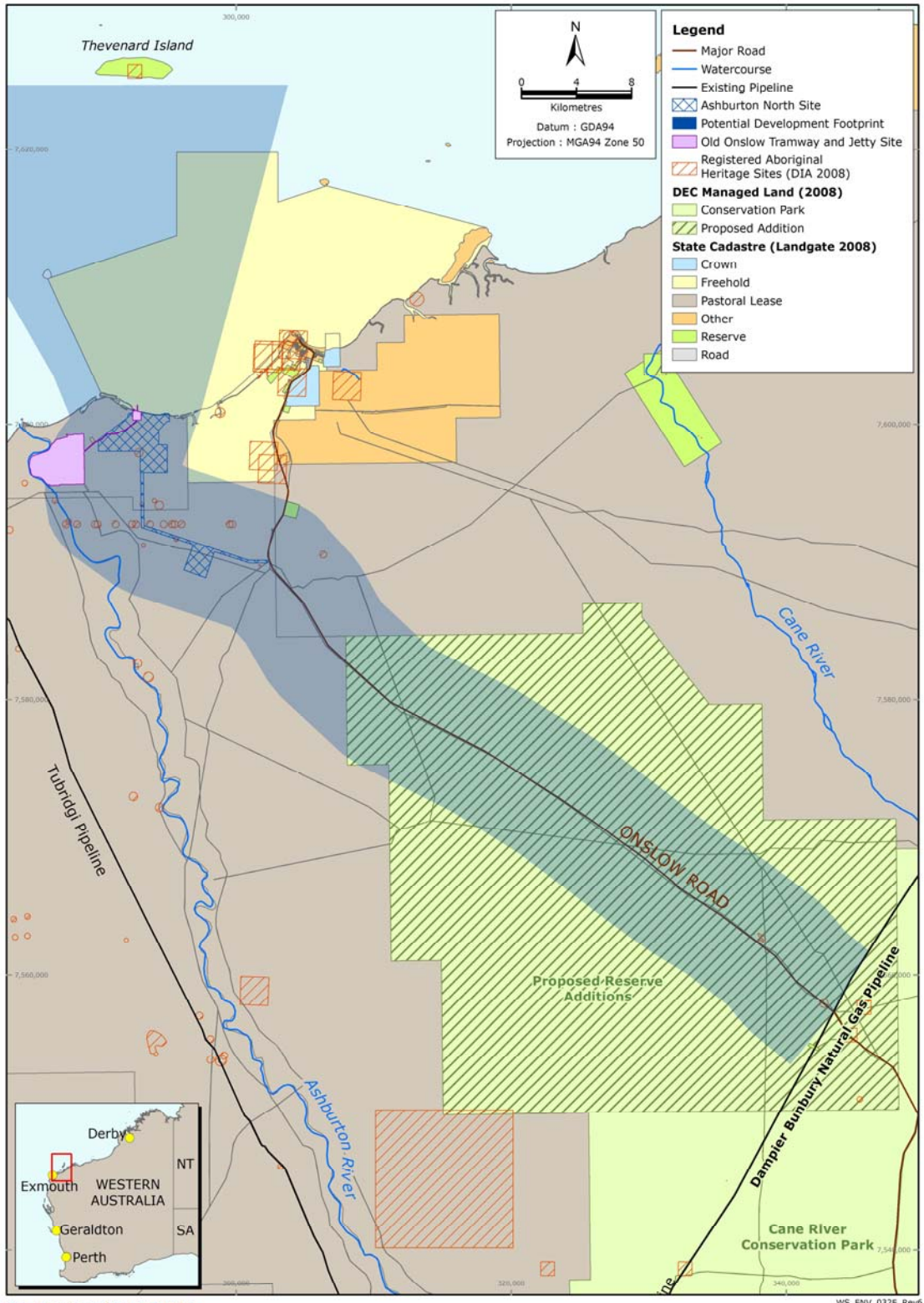


Figure 5: Potential Development Footprint and Surrounding Land Use of the Project Area

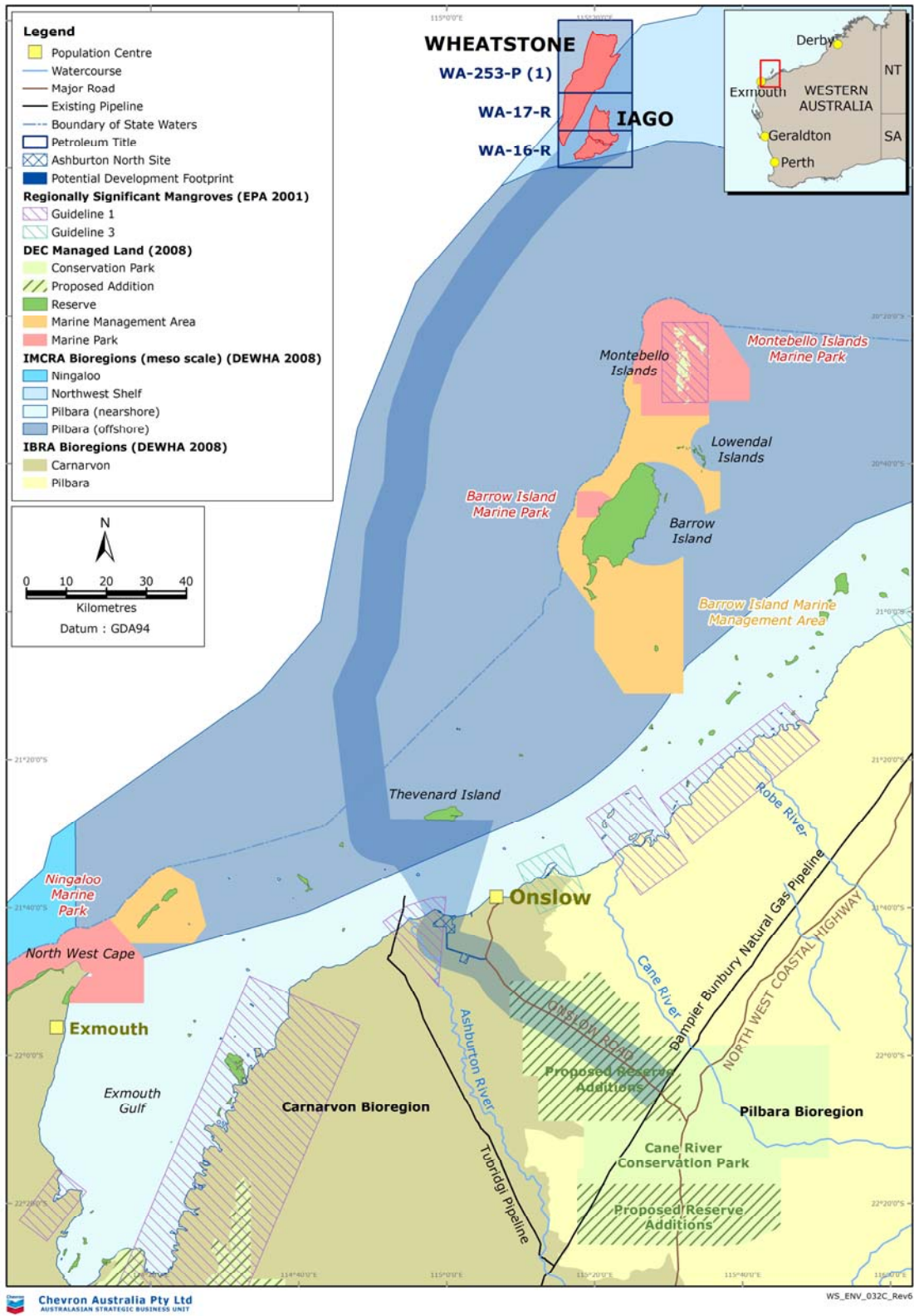


Figure 6: Physical Environment of the Project Area

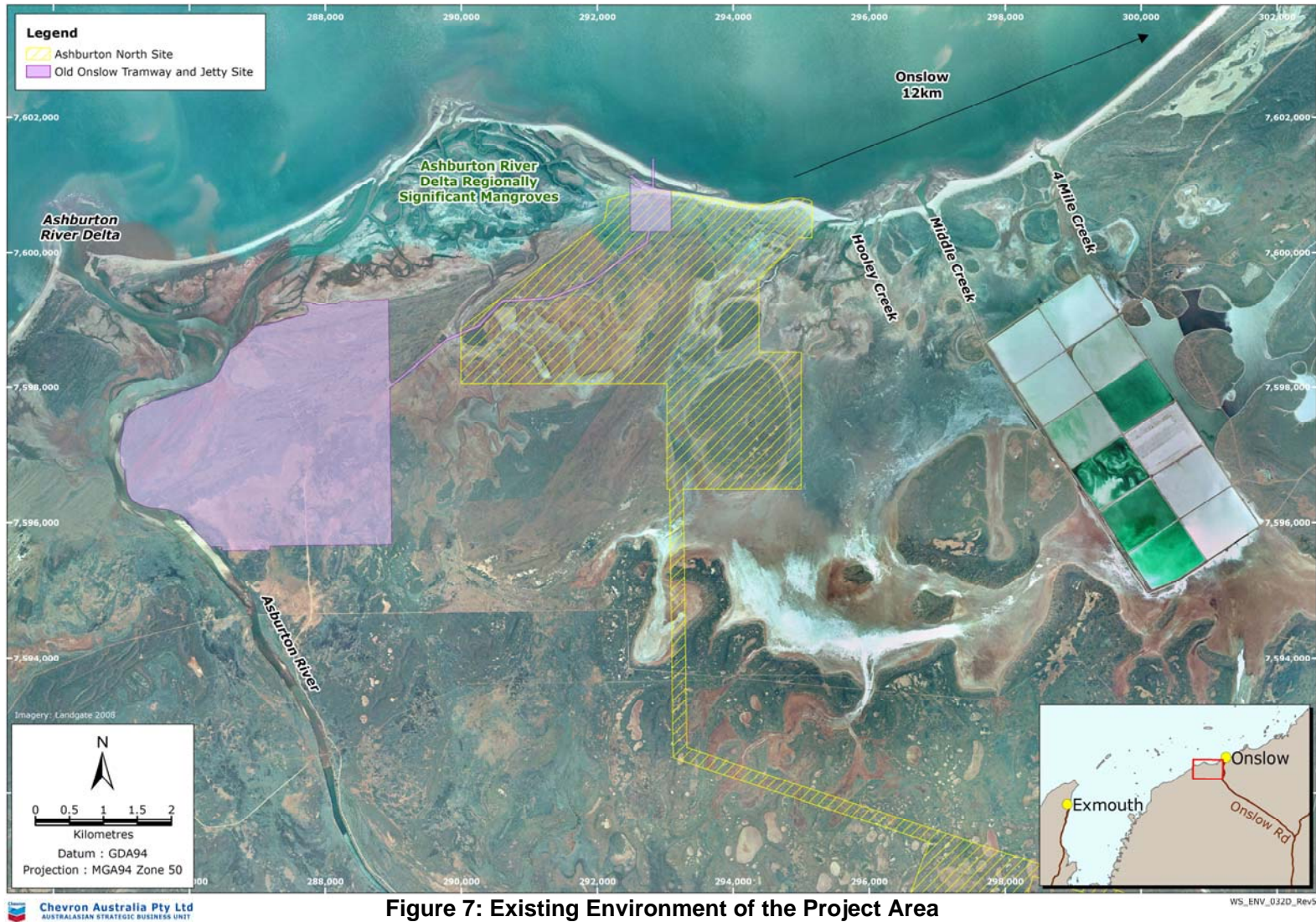


Figure 7: Existing Environment of the Project Area

5.0 RISK BASED SCOPING APPROACH

5.1 Introduction

The EPA developed draft guidelines entitled *Application of risk-based assessment in EIA* (EPA 2008) and requested Chevron apply this approach to the Wheatstone environmental assessment. A risk based approach consistent with these draft guidelines has been applied to the scoping phase and will be applied to the subsequent phases of the assessment.

Environmental risk assessment is a process that evaluates the likelihood and consequence of environmental impacts occurring as a result of a factor's (receptor) exposure to one or more aspects (project activities). "Consequence" is defined by the EPA as "an indication of the magnitude of an environmental impact resulting from an environmental aspect". "Likelihood" is "the probability or frequency of an impact or consequence occurring and takes into consideration the probability and frequency of the following:

- ◆ The environmental aspect occurring
- ◆ The environmental factor being exposed to the environmental impact
- ◆ The environmental factor being affected" (EPA 2008).

Application of this approach in scoping allows a subsequent detailed assessment to focus on those aspects that present higher potential risk to the environment.

5.2 Risk Based Scoping Methodology

The preliminary risk assessment completed for the scoping phase was undertaken in accordance with the principles and guidelines contained in the AS/NZS 4360:2004 - Risk Management and the EPA draft guidelines.

The methodology was as follows:

1. Identification of the relevant aspects (stressor/activity) of the Project.
2. Identification of associated environmental and related social factors (receptors) based on knowledge of the environment from desktop reviews, preliminary studies of the local area and the collective experience of the study team both within the area and from similar large-scale projects.
3. Examination of relevant guidance statements, policies, legislative requirements and community values and uses associated with individual factors.
4. Review and use of the consequence (Table A1.1) and likelihood definitions (Table A1.3) provided in the EPA draft guidelines. The study team decided to follow the definitions provided in the draft EPA guidelines. However, guidelines and policy documents were reviewed to further define the term "environmental limits" in the consequence tables. An example of numerical thresholds for environmental limits related to air emissions is provided in Table A1.2.
5. Review of the EPA risk matrix and consideration of a Wheatstone-specific risk matrix. The study team decided to adopt the EPA's risk matrix (Table A1.4).

6. Completion of two internal Risk Assessment workshops in which:
 - a. Risk ranking was determined by first establishing the associated potential consequence and then assigning the likelihood of the aspect impacting on the environmental or social factor. Public perceptions and government policy were also considered when assigning likelihood and consequence rankings.
 - b. The likelihood and consequences of the aspect and associated environmental factor was then plotted on the risk matrix to determine a final risk outcome.
 - c. Risk rankings were determined with the assumption that minimum standards would be met (e.g. complying with legislative and corporate requirements) but without the implementation of any additional mitigation which may result from the detailed risk assessment under the EIS/ERMP. Risk assessment workshop participants included engineering team disciplines, Chevron environmental and social impact advisors and specialist environmental and socio-economic consultants.
7. Defining (and in some cases initiating) the environmental studies (both modelling and field investigations) required to address uncertainties and support the detailed impact assessment which will be undertaken for the EIS/ERMP. The team also summarised the assumptions that were made for each risk ranking.
8. Completion of three facilitated workshops held with external stakeholders on February 17, March 4 and March 16, 2009, to present Chevron's application of the risk-based approach, initial risk rankings and components of the draft Scoping Document. The workshops proved valuable by resulting in:
 - a. The development of a more detailed and easier to follow risk ranking table. ([Table A1.5](#))
 - b. Changes to four risk rankings.
 - c. More robust assumptions for each risk ranking.
 - d. An additional column in [Table A1.5](#), representing confidence level and uncertainties.
 - e. An adjustment to the list of factors.
 - f. Development of a "Factors Table" (Table 5.1) summarising the relevant aspects, risk rankings and proposed studies for each environmental and social factor.
 - g. A discussion on the content of this Scoping Document and the evaluation of additive and cumulative effects.
 - h. Addition of aspects which could result in potential impacts on individual factors.
 - i. Clarification of what biophysical or social components are included under each factor in Table 5.1.

5.3 Risk Based Scoping Results

The scoping risk ranking matrix in Table A1.4 includes five risk ranking criteria, which is consistent with the five rankings proposed by the EPA in the draft guidelines *Application of risk-based assessment in EIA*:

- Extreme Risk:** Modification of proposal may be required. Further detailed investigations and detailed discussion in EIS/ERMP. Detailed discussion and agreement with EPA/DEWHA or other government departments on proposed studies.
- High Risk:** Further detailed investigations and detailed discussion in EIS/ERMP. Detailed discussion and agreement with EPA/DEWHA or other government departments on proposed studies.
- Medium Risk:** Further studies required and discussion in EIS/ERMP. Detailed discussion and agreement with EPA/DEWHA and other government departments on studies.
- Low Risk:** Brief discussion in EIS/ERMP. To be addressed in subsequent Environmental Management Plans, works approvals and licences for the Project. Studies may be undertaken and reported in the EIS/ERMP if confidence level is low.
- Very Low Risk:** Very brief notation in the EIS/ERMP. To be addressed in subsequent Environmental Management Plans, works approvals and licences for the Project.

The results from the initial scoping risk assessment for the Wheatstone Project are provided in [Table A1.5](#). The risk assessment resulted in risk rankings for four of the above categories. No extreme risks were identified. The “High” risk rankings included:

Environmental Factor	Environmental Aspect
Benthic Primary Producer Habitat (BPPH)	Dredging
Physical Marine Environment	Dredging
Physical Marine Environment	Physical presence of marine infrastructure
Onslow Community	Construction activities (workforce)

An additional 25 interactions between individual factors and individual aspects resulted in a risk ranking of “Medium”. As noted above, these will also be assessed in the detailed risk ranking in support of the EIS/ERMP. Each environmental (biophysical) factor had at least one “Medium” or “High” risk association. Although potential impacts on European Heritage did not include a “High” or “Medium” risk ranking, a study to identify and assess potential impacts of the Project on European Heritage will be undertaken.

Greenhouse Gas (GHG) emissions have been identified as an issue of regulatory significance and will be treated in the EIS/ERMP in the same manner as aspects rated as having a “High” ranking. Unlike other emissions from the proposed Project, GHG will not

have a local impact upon the environment but contribute to global levels of GHG in the atmosphere. Australia is well advanced in implementing a policy of regulating GHG emissions, including those from the Wheatstone Project, under the Carbon Pollution Reduction Scheme.

The results of the scoping risk assessment for each environmental and social factor are provided in [Table A1.5](#). The proposed scopes of work for proposed investigations (desktop, modelling and field investigations) are also described in Table 5.1. Further detailed risk assessment will be conducted during the environmental impact assessment phase to inform engineering decisions and guide appropriate management measures to reduce risks to acceptable levels. This will include:

- ◆ Validating the risk based scoping results and reassessing risk levels.
- ◆ Completing a detailed risk assessment for each medium and higher level risk.
- ◆ Determining additional management measures/mitigation to reduce risks to acceptable levels.

5.3.1 EPBC Act Considerations

The risk assessment approach to environmental assessment focuses on those risks identified as significant, nominally the medium to high risks. The assessment will also address EPBC Act considerations, specifically Matters of National Environmental Significance (NES). Matters of NES are identified in the left hand column of [Table A1.5](#) and the studies that address Matters of NES are presented in [Table A1.5](#) and Table 5.1.

Matters of NES will be addressed to the level of detail required under both the EPBC Act and the *Guidelines for the Content of a Draft Environmental Review and Management Programme/Environment Impact Statement* which are included as Appendix 5.

5.4 Proposed Modelling Studies and Field Investigations

The local region around the Ashburton North site has been the subject of several environmental investigations in recent years, including a series of terrestrial surveys for the adjacent Onslow Salt Project, annual mangrove surveys and previous site environmental survey assessments conducted for resource sector project investigations in adjacent areas.

Activities associated with the Project have the potential to impact the local terrestrial, subterranean, intertidal and marine environments, local air quality and the wider air shed. Table 5.1 provides a brief overview of the studies proposed for each environmental and social factor. While the focus is on implementing studies to better evaluate “High” and “Medium” risks, areas of high uncertainty (or low confidence) associated with a “Low” risk ranking will also be the subject of detailed investigations. This may change the risk ranking during the detailed risk assessment under the EIS/ERMP. For example, if a field study detects rare or listed flora or fauna that were not initially anticipated, a “Low” ranking could be changed to a “Medium” or “High”. Conversely, if detailed field studies do not identify such species, a risk ranking may be reduced.

Some studies have already been commenced to provide sufficient seasonal baseline information to support the impact assessment process and align with the Project schedule. The environmental studies will be supplemented by social studies and stakeholder consultation (see Section 7.0).

Table 5.1 does not attempt to provide a detailed overview of proposed investigations. Where applicable, the study will comply with the relevant EPA guidance document, which is referenced in Table 5.1. Where this guidance is not available, the proposed study is briefly outlined in the table and will be developed and implemented in consultation with the EPA, DEWHA or appropriate State or Commonwealth department.

Figure 5 outlines the potential Project Area. The studies will be focused within or adjacent to this area and the survey/investigation areas will be refined as the Project footprint is defined in more detail. In addition, several terrestrial field studies will also include samples from the Ashburton North industrial estate beyond the footprint of the proposed Wheatstone Project.

The risk rankings did not result in the elimination or reduction in scope of any field and/or modelling studies which would be required under a traditional EIS/ERMP.

Potential risks associated with noise, dust and other atmospheric emissions from the Project on the public will be assessed as a component of the environmental studies. The following key socio-economic factors will also be addressed in the EIS/ERMP:

- ◆ Cultural Aboriginal and European Heritage
- ◆ Traffic
- ◆ Fishing and pearling
- ◆ Other recreational users
- ◆ Socio-economic benefits
- ◆ Public risk and amenity.

5.4.1 Independent Review of Selected Studies

A number of studies in the scope of the Wheatstone EIS/ERMP have been selected to undergo independent review to support the assessment process. The issues to be independently reviewed are those that have been categorised as “High” potential risk and /or require modelling to support Project decision making on levels of, and acceptability of environmental impacts. In addition, due to the proximity of the Project (12 km) to Onslow and the potential for community concern regarding atmospheric emissions impacts on health, the modelling of atmospheric emissions will also be independently reviewed.

The studies that will be subject to independent review for the Project are as follows:

- ◆ Marine Environmental Hydrodynamic Modelling
- ◆ Tolerance Limits for Key Marine Environmental Receptors
- ◆ Atmospheric Emissions Characterisation and Assessment (impacts on air quality).

The independent reviewers have not yet been selected and will be discussed with specialists in the EPASU, DEWHA and appropriate government departments. An independent review of the Site Selection Process has already been undertaken.

Table 5.1: Environmental Factors, Risk Rankings and Proposed studies

Environmental and Social Factor (Receptor)	Environmental and Social Objective	Relevant Aspects (Stressor/Project Activity)	Risk Ranking	Investigations Proposed
<p>Benthic Primary Producer Habitat (BPPH) BPPH in the vicinity of the Wheatstone Project is distributed sparsely and at discrete locations within the study area. The main BPPH in the study area include sparse macroalgae, corals and mangroves along the shoreline. Seagrasses are sparsely distributed and ephemeral. The macroalgae occur in greatest abundance on all the shallow shoals and platforms which surround the offshore islands (e.g. Thevenard, Twin Islands). The fringes of such platforms are frequently colonised by corals, but not always. For example, corals occur along the south and northeast sides of the Thevenard Island platform but are sparse along other parts. Corals also occur on shoals and sea mounts located near the 10m isobath (e.g. Roller Shoal, Saladin Shoal, Ward Reef). Mangroves are located along the mainland coast in the Ashburton Delta, Beadon Creek and adjacent creeks through to Coolgra Point. They also occur around the Mangrove Islands located further east.</p> <p>Most of the seafloor in the vicinity of the proposed channel (and between the mainland shore and Thevenard Island) is comprised of relatively barren sand and silts. Sponge and whip gardens do occur sporadically where hard substrate forms the seafloor - usually close to shore.</p>	<p>To maintain ecological function, abundance, biodiversity, productivity and geographic distribution of marine primary producers and their habitats</p> <p>To effectively address stakeholder concerns in relation to any impacts on marine fauna</p>	<ul style="list-style-type: none"> • Dredging • Physical presence of marine infrastructure • Vessel Movements • Construction activities • Discharges • Leaks and spills 	<p>High Low</p> <p>Low Low Very Low Medium</p>	<p>Benthic Habitat Mapping Grid mapping of subtidal habitats, intertidal habitats including islands and limestone platforms; delta and associated mangal communities; includes seasonal variation and identification of reference sites. Understand post-cyclone succession. Review survey results in terms of time since a cyclone disturbance.</p> <p>Marine Fauna Assessment Field surveys to assess critical species habitat, seasonal use</p> <p>Receptor Thresholds Development of mortality threshold limits (sedimentation/turbidity/light) for sensitive BPPH receptors.</p> <p>Dredge Plume Impacts Hydrodynamic modelling of sediment transport using validated model to simulate dredge plan and dredge log and derived PSDs obtained by geotechnical investigation along channel. Subsequent analysis of model output to derive zones of impact and influence using derived BPPH mortality thresholds.</p> <p>Assessment of BPPH Loss Application of EPA guidance No: 29 including definition of acceptable Management Unit, estimation of previous BPPH loss and calculation of percentage cumulative loss within MU.</p> <p>Authorized Discharges, Spills and Leaks Assessment based on anticipated plant design and operations and inventory of potential leaks and spills</p> <p>Spill and Discharge Modelling Hydrodynamic and water quality modelling in the vicinity of plant site and platform</p> <p>Social Impact Assessment (SIA) Assessment of local uses and values, through consultation with key stakeholders in the Onslow community (SIA study)</p>
<p>Marine fauna (includes EPBC listed, fish and benthic infauna) Protected Marine Fauna known to occur in the region include turtles, cetaceans, and dugong. Green turtles are common around the offshore islands where nesting occurs in abundance. Flatback Turtles are known to nest mainly along the mainland coast but at low density. Humpback Whales are known to move through the region on their northern and southern migrations to and from the Kimberley. Exmouth Gulf is known to be an important resting area for these whales with peak numbers occurring between July and September. Blue Whales are known to occur in the deep waters offshore.</p> <p>The deepwater environment is within the outer part of the North West shelf, an oceanic region off the Pilbara and Kimberley coasts. The ocean in this region is recorded as having diverse benthic invertebrate communities and fish fauna.</p>	<p>To maintain the abundance, biodiversity, productivity and geographic distribution of marine fauna</p>	<ul style="list-style-type: none"> • Dredging • Physical presence of marine infrastructure • Vessel movements (Protected marine fauna) • Vessel movements (other marine fauna including fisheries) • Construction activities • Discharges (EPBC) • Leaks and spills • Visual Impact (light emissions) • Acoustic emissions during operations and construction 	<p>Medium Medium</p> <p>Medium</p> <p>Low</p> <p>Low Very Low Low Medium</p> <p>Low</p>	<p>Turtle Surveys Assessment of habitat use onshore and on islands for breeding during respective species' breeding seasons Assessment of previously identified potential nesting and foraging areas for predominant flatback species using drop-camera survey techniques.</p> <p>Marine Mammals Continuous acoustic logging at sites approximately 20 km and 30 km offshore from plant site and a tracking grid on Wheatstone site Repeat marine mega fauna aerial surveys conducted to assess migration and use patterns.</p> <p>Fisheries Description of existing fisheries and identification of any potential risks (e.g. habitat loss; coastal process and flood plain changes) arising from the project during both construction and operation</p> <p>Noise Assessment of marine noise emissions arising from construction and operational activities and assessment of risk to marine fauna</p> <p>Emissions, discharges, spills Assessment of light emissions, authorised discharges, spills and leaks, and assessment of risks to marine fauna and associated</p>

Environmental and Social Factor (Receptor)	Environmental and Social Objective	Relevant Aspects (Stressor/Project Activity)	Risk Ranking	Investigations Proposed
				<p>habitat use. Refer to Sediment plume modelling.</p> <p>Benthic Infauna Survey Map and characterise benthic infauna to be impacted by the project.</p>
<p>Water and sediment quality (Marine) Inland rainfall is primarily responsible for input of terrestrial sediments to the nearshore waters of the Project area via river discharge. These events cause large-scale turbidity of nearshore waters over a period of months.</p> <p>Nearshore waters tend to be clearer during the winter than in summer when onshore westerly winds cause wave disturbance of nearshore sediments. Offshore waters tend to be clear.</p> <p>Contaminant levels in water and sediment is expected to be near background and representative of uncontaminated coastal and marine areas off the Pilbara coast.</p>	<p>To maintain the quality of water and marine sediments so that existing and potential environmental values, including ecosystem maintenance are protected</p> <p>The "Pilbara Coastal Water Quality Consultation Outcomes" and the "WA State Water Quality Management Strategy" will be important documents in establishing and meeting 'Environmental Values' and 'Environmental Quality Objectives'</p>	<ul style="list-style-type: none"> Dredging Discharges including dewatering and waste Leaks and spills Physical presence of infrastructure Potential production of Naturally Occurring Radioactive Material (NORMs) 	<p>Medium</p> <p>Low</p> <p>Low</p> <p>Low</p>	<p>Water Quality Baseline Monitoring program (space/time) using loggers includes salinity, temperature, TSS, turbidity, particle size distribution, optical transmission, and optical volume scattering function. Discrete sampling of analytes and physico-chemical parameters to capture seasonal and spatial variation.</p> <p>Surface Sediment Baseline Full suite of analytes with spatial coverage and sufficient statistical power for dredge area and proposed disposal sites</p> <p>Geotechnical Investigation Spatial core analysis to depth of dredging in proposed dredge and pipeline corridors; includes particle size distribution, suite of analytes and acid sulphate soil analyses</p> <p>Subsurface Geology Further investigation of the subsurface geology will be undertaken to determine the likely occurrence of NORMs.</p>
<p>Physical marine environment The Wheatstone Project is located on a predominantly sandy coastline overlying beach rock adjacent to the Ashburton River Delta which is a Holocene feature still developing. The river is a major source of sediment load into the nearshore marine environment at times of heavy flooding - usually after cyclones. During such events the coast also experiences storm surge which can mobilise large volumes of coastal sediment. Construction of navigation channels, LNG offloading jetties and breakwaters to protect the MOF, all present potential barriers to alongshore sediment transport.</p>	<p>To maintain the integrity and stability of the coast, seafloor, intertidal environment and tidal creeks</p>	<ul style="list-style-type: none"> Dredging Physical presence of marine infrastructure 	<p>High</p> <p>High</p>	<p>Metocean Baseline Wave and current data collection program at three locations in Study Area to cover critical seasons.</p> <p>Coastal Processes (includes modelling) Describe historic coastline development and active coastal processes and model impacts of different design options of proposed coastal infrastructure to determine potential impacts on coastal stability and Ashburton delta mangroves as per EPA Guidance No:1. Test potential mitigation and management strategies.</p> <p>Catchment Flood Patterns Storm surge modelling, modelling of the flooding patterns for Ashburton River and Hooley Creek; Ashburton River sediment load discharge monitoring and modelling during flood events</p> <p>Coastal Geomorphology Assessment Describe geomorphic components of coast between the mouths of the Ashburton River and Middle Creek, and extending inshore from low water to the approximate landward limit of spring tidal inundation, processes currently operating and historical analysis of development to determine rates and patterns of sediment movement under different conditions</p> <p>Social Impact Assessment Assessment of recreational/tourism use of the area around the Ashburton river mouth (SIA study)</p>
<p>Flora and vegetation (includes native flora species and native flora communities) The Project footprint is located within the Carnarvon Bioregion. The project area and the surrounds have been disturbed from pastoral and industrial activity, and suffer weed proliferation and feral animals. Vegetation</p>	<p>To maintain the abundance, diversity, geographic distribution and productivity of flora at species and ecosystem levels through the</p>	<ul style="list-style-type: none"> Vegetation clearing Dust emissions Fire Air Emissions Vehicular activity (including workforce) 	<p>Medium</p> <p>Low</p> <p>Very Low</p> <p>Very Low</p> <p>Low</p>	<p>Terrestrial flora and vegetation Complete flora baseline surveys (Level 2 surveys) to identify presence of threatened flora species, vegetation communities, introduced species, threatened ecological communities (EPA Guidance No: 51) within the project footprint and outside of footprint to provide regional context. Map and describe vegetation and</p>

Environmental and Social Factor (Receptor)	Environmental and Social Objective	Relevant Aspects (Stressor/Project Activity)	Risk Ranking	Investigations Proposed
<p>at the Ashburton North site includes chenopod and samphire shrublands, hummock grasslands and mangroves. These habitats are understood to be widespread along the Pilbara coastline. Preliminary flora studies have indicated that no Declared Rare Flora species are present. One Priority 3 species <i>Triumfetta echinata</i> was observed during the preliminary flora studies (Onshore Environmental Consultants, 2008.)</p> <p>DEC database search indicates that there are no known Threatened Ecological Communities or Protected Ecological Communities within the Project footprint area.</p>	<p>avoidance or management of adverse impacts and improvement in knowledge.</p>	<ul style="list-style-type: none"> Groundwater abstraction (includes effects on groundwater hydrology) Spills and leaks 	<p>Medium</p> <p>Low</p>	<p>communities.</p> <p>Determine the conservation significance of flora and vegetation in a local and regional context, considering EPA Position Statement No: 3 "Terrestrial Biological Surveys as an Element of Biodiversity Protection".</p> <p>Complete wet season flora baseline surveys (Level 2 surveys) to identify presence of significant flora species, vegetation communities, introduced species, threatened ecological communities</p> <p>Complete impact assessment of the proposed footprint on the local and regional significance of flora and vegetation communities, including potential secondary impacts such as changes to surface water drainage.</p> <p>Groundwater Characterise the baseline groundwater hydrology, quality and groundwater flow, including installation of groundwater bores.</p> <p>If the option of groundwater abstraction is selected, assess bore yields and potential abstraction impacts and risks, including modelling to assist in the assessment of potential impacts on flora and vegetation.</p>
<p>Terrestrial fauna A search of Western Australia DEC records has indicated that there are no known Threatened Ecological Communities or Protected Ecological Communities within the Project footprint. Sporadic occurrences of Threatened bird, reptile and mammal species have been recorded along the Pilbara coast including within the Project footprint.</p> <p>Terrestrial EPBC listed species that may be present include olive python, Pilbara leaf-nosed bat, mulgara, northern quoll and a number of migratory and residential bird species.</p> <p>Results from preliminary field studies indicate that waterbird numbers (including migratory species) are low along the coast in the vicinity of the Project footprint and that the significance of the project area and adjacent coastline for migratory waterbirds and waterbirds in general, appears to be low. This is potentially due to the majority of the tidal environment possessing a sandy substrate which is more sterile compared with substrates of silts and clays (Bamford Consulting Ecologists, 2008).</p>	<p>To maintain the abundance, diversity, geographic distribution and productivity of vertebrate fauna at species and ecosystem levels through avoidance or management of adverse impacts and improvement of knowledge.</p>	<ul style="list-style-type: none"> Vegetation clearing Construction earthworks Fire Vehicular activity (including workforce) Acoustic emission Spills and leaks Flaring 	<p>Medium</p> <p>Low</p> <p>Very Low</p> <p>Low</p> <p>Low</p> <p>Low</p>	<p>Terrestrial Mobile Fauna Surveys Complete fauna baseline surveys (Level 2 surveys) to identify terrestrial habitats and associated ecological communities including terrestrial mammalian, avian (including migratory birds) herpetofauna and feral animals (EPA Guidance No. 56).</p> <p>Determine the conservation significance of the fauna habitats and communities. Complete impact assessment of the proposed footprint on the local and regional significance of fauna species and habitats, including potential secondary impacts such changes to surface water drainage.</p> <p>Spills and Leaks Assessment based on anticipated plant design and operations and inventory of potential leaks and spills.</p> <p>Flaring Continuous flaring is not proposed under normal operating conditions. A review of flaring and flare types will be undertaken during detailed design and will consider potential impacts on fauna.</p>
<p>Terrestrial short range endemic (SRE) fauna Short range endemic species that inhabit the site are not well understood but are expected to be representative of surrounding populations in the region.</p>	<p>To maintain the abundance, diversity, geographic distribution and productivity of SRE fauna at species and</p>	<ul style="list-style-type: none"> Vegetation clearing Construction earthworks Fire Vehicular activity 	<p>Medium</p> <p>Medium</p> <p>Very Low</p> <p>Low</p>	<p>SRE Field Surveys Complete SRE fauna baseline surveys (Level 2 surveys) to identify terrestrial SRE fauna habitats and associated ecological communities (EPA Guidance No. 56).</p>

Environmental and Social Factor (Receptor)	Environmental and Social Objective	Relevant Aspects (Stressor/Project Activity)	Risk Ranking	Investigations Proposed
<p>Claypan areas in the Pilbara Bioregion are reported to support rich invertebrate populations, following periods of freshwater inundation (DEC, A. Pinder, pers.comm.).</p>	<p>ecosystem levels through avoidance or management of adverse impacts and improvement of knowledge.</p>	<ul style="list-style-type: none"> Spills and leaks 	<p>Low</p>	<p>Conduct surveys within claypan areas following seasonal rains using the most appropriate techniques (based on consultation with the DEC) to identify aquatic fauna and associated ecological communities.</p> <p>Determine the conservation significance of the SRE fauna habitats and communities.</p> <p>Complete impact assessment of the proposed footprint on the local and regional significance of SRE fauna species and habitats.</p> <p>Spills and Leaks Assessment based on anticipated plant design and operations and inventory of potential leaks and spills.</p>
<p>Subterranean fauna It is possible that subterranean fauna (stygofauna and troglofauna) are present as their presence is characteristic of coastal areas of the Cape Range subregion and Pilbara Bioregion. The dominance of clay and sandy soils, as well as a potentially saline environment, may limit their presence within the Project footprint.</p>	<p>To maintain the diversity of subterranean fauna through avoidance of adverse impacts to their habitats and bio-physical processes that support them, and improvement of knowledge.</p>	<ul style="list-style-type: none"> Vegetation clearing Construction earthworks Groundwater abstraction Spills and leaks 	<p>Low Medium Medium Medium</p>	<p>Subterranean Fauna Investigations Complete subterranean fauna investigations at targeted bore locations based on likely habitats (within direct footprint and outside of footprint) and suitable geological formations (EPA Guidance No. 54).</p> <p>Determine the conservation significance of the subterranean fauna.</p> <p>Complete impact assessment of the proposed footprint on the local and regional significance of the subterranean fauna.</p> <p>Groundwater Characterise the baseline groundwater hydrology, quality and groundwater flow, including installation of groundwater bores.</p> <p>If the option of groundwater abstraction is selected, assess bore yields and potential abstraction impacts and risks, including modelling to assist in the assessment of potential impact on subterranean fauna habitat.</p> <p>Spills and Leaks Assessment based on anticipated plant design and operations and inventory of potential leaks and spills. Assessment of spills and leaks and assessment of risks to subterranean fauna.</p>
<p>Soils and landform The terrain is flat to undulating with steep slopes in areas. The elevation ranges from 3 m to 29 m above sea level. The Ashburton North site is located on the Ashburton River delta, a complex system of sand spits, cheniers, tidal flats, salt flats, distributary channels and coastal dune barriers. The low-lying areas are subject to inundation and storm surge (Onshore Environmental Consultants, 2008.)</p> <p>Soils of the coastal fringe consist mainly of saline loams with shelly sand. Inland of the coastal zone are extensive plains dominated by neutral and alkaline red earths. Some of the plains contain hard alkaline red soils with both cracking and non cracking clay soils (Onshore Environmental Consultants, 2008).</p>	<p>To maintain the integrity, ecological functions and environmental values of landforms</p>	<ul style="list-style-type: none"> Construction earthworks (includes secondary impacts to surface water) 	<p>Medium</p>	<p>Acid Sulphate Soils (ASS) Complete desktop assessment of ASS and complete opportunistic sampling as part of groundwater/subterranean fauna bore investigations. Depending of results of desktop assessment and targeted sampling a detailed sampling program will be completed.</p> <p>Surface Water Assessment Complete a surface water assessment, including baseline surface water hydrology, baseline flood study and development of a conceptual surface water control system</p> <p>Develop a 2D hydrodynamic model for the Hooley Creek Catchment (baseline and infrastructure)</p> <p>Soil Characterisation Characterisation of baseline soil conditions and laboratory analysis</p>

Environmental and Social Factor (Receptor)	Environmental and Social Objective	Relevant Aspects (Stressor/Project Activity)	Risk Ranking	Investigations Proposed
Soils within the project area have been classified as either having a "high to moderate", "moderate to low" and "no known risk" of ASS occurring" (WAPC Planning Bulletin 64).				for specific parameters. Source of fill material required for the project is unknown. Depending on the source of fill, sampling of the material will be undertaken.
<p>Ambient air quality The ambient air quality in the area is not well known. However, it is a greenfield location with limited nearby industry.</p> <p>The proposed development will produce emissions from power generation and other activities associated with processing gas to LNG. These emissions have the potential to affect the local air quality by increasing the level of ground level pollutants.</p> <p>During construction some ground clearance, stockpiling and vehicle movement may occur. This has the potential to generate dust emissions.</p>	To manage emissions such that they do not adversely affect environmental values, or the health, welfare and amenity of people and land uses by meeting statutory requirements and agreed standards	<ul style="list-style-type: none"> Air emissions Air quality (upset conditions) 	Medium Low	<p>Emission Inventory Review design and identify key sources of emissions and potential for emissions control technology.</p> <p>Potential dust emissions sources will be identified and management and control measures will be developed</p> <p>Modelling Studies An Air Quality screening assessment (Ausplume Version 6.0) has been undertaken.</p> <p>Undertake detailed modelling of emissions. This model will use meteorological data and emission data to develop contour plots of key pollutants. These plots will be compared against relevant standards to determine the potential risk of air pollution on flora, fauna and the local community.</p> <p>Field Studies Diffusion tube survey will be undertaken for key pollutants to obtain background data</p>
<p>Atmospheric greenhouse gas concentrations The proposed development will require power to process and refrigerate the gas to a standard that is suitable for sale. This processing will require power. The power generating equipment for the development will produce Greenhouse Gases.</p>	To reduce greenhouse gas emissions to levels as low as economically practicable in the context of the economic incentive provided by the introduction of the Carbon Pollution Reduction Scheme.	<ul style="list-style-type: none"> Air emissions 	Medium	<p>Emissions Inventory Identify potential emission sources.</p> <p>Prepare emissions inventory detailing key sources and volumes of the main greenhouse gasses.</p> <p>An assessment of opportunities for reducing greenhouse emissions will be undertaken, taking into account market forces introduced by carbon permitting</p>
<p>Surface water Flows in the drainage lines of the proposed site are influenced by an interrelationship between water course, location, floodplains, claypans and a suite of longitudinal and network sand dunes. The claypans fill with freshwater after rainfall inundation. The waters of the river mouth and adjacent creeks are tidal and marine for most of the year, only becoming estuarine during flood events. Fresh water extends from a weir upstream of the road crossing located about 8 km inland from the coast. The river floods most years, but the duration and volume of the river discharge varies depending on whether or not a cyclone event has resulted in intense rainfall within the catchment. When that does occur, the river can discharge for many weeks and deposit substantial sediment load into the nearshore marine environment.</p>	To maintain the quantity and quality of surface water so that existing and potential environmental values, including ecosystem maintenance are protected.	<ul style="list-style-type: none"> Groundwater abstraction Spills and leaks 	Medium Medium	<p>Surface Water Assessment Complete a surface water assessment, including baseline surface water hydrology, baseline flood study and development of a conceptual surface water control system.</p> <p>Flood Levels Determine flood water levels using 2D model and evaluate potential impacts of the Project on flood levels and the environment. Characterise baseline groundwater hydrology and quality.</p> <p>Groundwater If the option of groundwater abstraction is selected, develop a regional conceptual ground water model for the water supply borefield.</p> <p>Coastal Surveys Intertidal and nearshore habitat baseline surveys to capture freshwater and sediment discharge.</p> <p>Acid Sulphate Soils</p>

Environmental and Social Factor (Receptor)	Environmental and Social Objective	Relevant Aspects (Stressor/Project Activity)	Risk Ranking	Investigations Proposed
				Complete desktop assessment of ASS and complete opportunistic sampling as part of groundwater/subterranean fauna bore investigations. Depending of results of desktop assessment and targeted sampling a detailed sampling program will be completed
<p>Groundwater It is anticipated that the general hydrogeology at the Ashburton North site comprises a shallow unconfined sand and limestone aquifer associated with the coastal dune. A groundwater table of between 4 and 10 m below ground surface is expected. Groundwater yields within this aquifer are expected to be low and result in variable lenses of brackish groundwater quality.</p>	To maintain the quantity and quality of groundwater so that existing and potential environmental values, including ecosystem maintenance are protected	<ul style="list-style-type: none"> Spills and leaks Groundwater abstraction (see flora and fauna above) 	<p>Medium Medium</p>	<p>Groundwater Characterise the baseline groundwater hydrology, quality and groundwater flow, including installation of groundwater bores.</p> <p>If the option of groundwater abstraction is selected, assess bore yields and potential abstraction impacts and risks, including modelling.</p> <p>Acid Sulphate Soils Complete desktop assessment of ASS and complete opportunistic sampling as part of groundwater/subterranean fauna bore investigations. Depending of results of desktop assessment and targeted sampling a detailed sampling program will be completed.</p> <p>Spills and Leaks Assessment based on anticipated plant design and operations and inventory of potential leaks and spills. Subterranean fauna.</p>
<p>European Heritage (Non-Aboriginal Cultural Heritage) The Ashburton North site is approximately 4 km from Old Onslow Townsite heritage place (Heritage Council of WA Place 03444). The Old Onslow Townsite was established in 1885 and abandoned in 1925 because of repetitive flooding and siltation of the river mouth. (Heritage Council of Western Australia, 2008.) The heritage place contains various ruins including the old jail, cemetery and hospital. The site of the old jetty and a section of the old tramway (also part of HWA/03444) is within the Ashburton North site</p>	To comply with requirements of the <i>Heritage of Western Australia Act 1990</i> and <i>Australian Heritage Council Act 2003</i>	<ul style="list-style-type: none"> Vegetation clearing 	Low	<p>European Heritage Study Complete a European Heritage Study to identify and assess potential impacts of the Project on European Heritage (SIA study).</p> <p>Assessment of local uses and values, including any European Heritage values, through consultation with key stakeholders in the Onslow community (SIA study)</p>
<p>Aboriginal Cultural Heritage (Ethnographic and Archaeological) An estimated 53% of the Onslow population is indigenous to the area, from the Thalanyji, Yindjibarndi and Banyjima language groups. The Thalanyji people are the determined native title holders of the land in the Onslow area including the Ashburton North site. It is possible that there will be Aboriginal Heritage Sites within the Project footprint area. The Registered 'Amethyst 07' midden site is within the Ashburton North Site (DIA, 2008.)</p>	To comply with the <i>Aboriginal Heritage Act 1972</i> and where practicable, to avoid or prevent adverse effects on the area's cultural associations due to Project-related changes to the biological and physical environment.	<ul style="list-style-type: none"> Vegetation clearing 	Medium	<p>Aboriginal Cultural Heritage Study Complete an Aboriginal Cultural Heritage Study including archaeological and ethnographic surveys and consultation with the Thalanyji and the Department of Indigenous Affairs. Undertake an Aboriginal SIA to identify relevant social and cultural values associated with the project area (SIA study)</p>
<p>Local Fishing (commercial and recreational) and Pearling Industry There are approximately ten Western Australian Fisheries in the North West bioregion including a Prawn Fishery. (DoF, 2007). A small prawn fishery comprising only four licences has operated out of Onslow for many years trawling in nearshore waters between Exmouth Gulf and the Mangrove Islands east of Onslow. Other fisheries target demersal scale fish by</p>	<p>To reduce impacts on the commercial and recreational uses of the area</p> <p>To avoid compromise of existing and planned recreational uses</p>	<ul style="list-style-type: none"> Dredging Physical presence of marine infrastructure Vessel movements 	<p>Medium Medium Medium</p>	<p>Fishing and Pearling Study Assess and describe potential impacts to existing commercial and recreational fishing and aquaculture uses through completion of a Fishing and Pearling Study that includes consultation with local commercial and recreational fishers potentially affected by the Project.</p> <p>Introduced Marine Species Undertake baseline survey to determine absence or presence of</p>

Environmental and Social Factor (Receptor)	Environmental and Social Objective	Relevant Aspects (Stressor/Project Activity)	Risk Ranking	Investigations Proposed
<p>line and trap, and pelagic fish (mackerel) by line.</p> <p>The proposed Project area overlaps four Commonwealth managed fisheries zones for the Western Tuna and Billfish, North West Slope Trawl, Western Deepwater Trawl and Skipjack Tuna Fisheries. (DoF, 2007.)</p>				<p>Introduced Marine Species</p>
<p>Disturbance to Other Recreational Use Tourism is highly seasonal and restricted to winter. A local charter vessel services the Mackerel Island's Resort accommodation on Thevenard Island and Direction Island and provides for fishing, diving and whale watching activities. Charter and tourist boats, particularly from Exmouth and Dampier, cater for fishing trips and visits to offshore islands, including the Montebello Islands. Local beaches are used for recreational activities including fishing, four-wheel driving and camping.</p>	<p>To reduce impacts on other recreational and industry uses of the area.</p>	<ul style="list-style-type: none"> • Dredging • Vessel movements • Water Quality • Noise • Light emissions 	<p>Low Low Medium Low Low</p>	<p>Values and Use Assessment Assess and describe potential impacts to other recreational and relevant industry users through completion of a Values and Use Assessment that includes consultation with local stakeholders potentially affected by the Project (SIA study)</p> <p>Recreational Use study Undertake studies to determine potential impacts on sensitive habitats including island, from increased recreational use from an influx of construction and operational staff.</p> <p>Visual impact modelling study Values, Use and Issues Assessment – consultation with local Onslow residents to identify potentially sensitive receptors to visual impacts (SIA study).</p> <p>Noise assessment Baseline noise monitoring to be undertaken. Noise modelling assessment to be performed for construction and operations noise.</p>
<p>Public Amenity The proposed location of the onshore plant is approximately 12 km south of the Onslow township, in an area north of the Ashburton River. The location of the site has been partly selected to reduce potential public amenity impacts.</p> <p>The construction and operation of the project has the potential to generate emissions of noise and dust and will alter the visual landscape.</p>	<p>To reduce potential visual, acoustic and dust impacts associated with the project and its activities on the local Onslow community and key users in the project area</p>	<ul style="list-style-type: none"> • Dust emissions • Visual impacts • Acoustic emissions during operations and construction 	<p>Low (community) Very Low (other users) Medium Low</p>	<p>Visual impact modelling study Values, Use and Issues Assessment – consultation with local Onslow residents to identify potentially sensitive receptors to visual impacts (SIA study).</p> <p>Noise assessment Baseline noise monitoring to be undertaken. Noise modelling assessment to be performed for construction and operations noise.</p> <p>Values, Use and Issues Assessment Consultation with local Onslow residents to identify any potentially sensitive receptors to dust impacts (SIA study).</p>
<p>Onslow Community (Risk) The Onslow community has been characterised as a small fishing hamlet, with the presence of only one main industrial user – Onslow Salt. Tourism is also important, particularly in winter. These characteristics have contributed to the sense of community/well-being of residents in the local area.</p> <p>The project has the potential to generate a range of emissions, such as gaseous pollutants including hydrocarbons. Public safety aspects could involve gas plant and pipeline explosions, road traffic and restricted access to particular areas for recreational and other</p>	<p>To reduce public safety and any significant health risks/impacts associated with the project on the Onslow community and relevant industry/infrastructure uses</p>	<ul style="list-style-type: none"> • Air emissions • Vehicular activities • Leaks and spills 	<p>Medium Medium Low</p>	<p>Quantitative Public Risk Assessment Health Impact Assessment (SIA Study) involving consultation with key health sector stakeholders and the Onslow community to gain an understanding of potential health and safety issues.</p> <p>Health Impact Assessment To identify relevant health issues associated with the Project; to predict levels of exposure to identified health concerns; and identify appropriate strategies to address health impacts (if required).</p> <p>Traffic Study Identify existing traffic movements, including road, marine and air,</p>

Environmental and Social Factor (Receptor)	Environmental and Social Objective	Relevant Aspects (Stressor/Project Activity)	Risk Ranking	Investigations Proposed
uses.				<p>the potential increase in traffic associated with the Project and potential management measures to reduce impacts of increased traffic (SIA study)</p> <p>Consultation with the Onslow community, the Shire of Ashburton and other relevant government authorities to gain an understanding of potential traffic impacts resulting from the Project.</p>

5.4.2 Uncertainty and Assumptions

As this scoping risk assessment was completed early in the stages of the Project and detailed baseline environmental data was not available, there was some uncertainty in assigning a risk outcome for several of the factor/aspect interactions. Uncertainty was addressed by completing the risk assessment using conservative assumptions. For example, if there was some doubt over whether or not an important factor would be found in the area, that factor was considered to be present unless subsequent field studies indicate otherwise. In addition, the studies outlined in Table 5.1 are designed to address the uncertainties provided in [Table A1.5](#) for each risk ranking.

For factors that could be adversely affected by aspects related to planned activities inherent to the Project (e.g. vegetation clearing, physical presence of infrastructure, air emissions) the risk was assessed by initially determining a conservative consequence of the activity and then determining the likelihood of that consequence occurring (versus simply the likelihood of the event occurring).

For the environmental factors that could be adversely affected by unplanned events (e.g. hydrocarbon spills), the risk assessment was based on the worst-case scenario of cumulative hydrocarbon spills.

Other assumptions applied during the risk assessment process are recorded in the right hand column of [Table A1.5](#).

5.5 Cumulative and Additive Effects

The EPA draft guidelines *Application of risk-based assessment in EIA* provides the following guidance for the evaluation of cumulative effects:

- ◆ “Determine cumulative risk level for each key environmental factor after taking all reasonable and practicable measures to reduce risk levels to each key environmental factor arising from environmental aspects of the proposal to the range of very low to medium”.

The first step in the proposed approach to cumulative effects assessment for the EIS/ERMP will be to examine the additive effects from the different aspects which could result in an impact to an individual factor. For example, flora and vegetation would be subject to potential environmental effects from the following aspects:

- ◆ Vegetation clearing
- ◆ Dust emissions
- ◆ Fire
- ◆ Air Emissions
- ◆ Vehicular activity (including workforce)
- ◆ Groundwater abstraction (includes effects on groundwater hydrology)
- ◆ Spills and leaks

The additive effects from the above on flora and vegetation will be evaluated within the EIS/ERMP. This will be accomplished for each factor.

The Commonwealth DEWHA has provided “Guidelines for the Content of a Draft Environmental Review and Management Programme/Environmental Impact Statement” (see Appendix 5). Under the section entitled “Specific Content”, Chevron is required to determine “how the action relates to any other actions (of which the proponent should be reasonable aware) that have been, or are being, taken or that have been approved in the region affected by the action”.

Chevron proposes to undertake two approaches for the above. The marine and coastal portion of the Wheatstone Project has been scoped to include multiple-user coastal infrastructure. The Wheatstone Project will include jetties, a dredged channel and a Marine Offloading Facility (MOF) that may be shared by all users of a 25 MT LNG facility in the Ashburton North industrial estate. Assessing this facility will address most additive or cumulative effects. Other local users, such as Onslow Salt, the town of Onslow and the fishery, will be included in the evaluation of cumulative effects.

The approach to evaluating potential terrestrial cumulative effects will be focussed on the 25 MT LNG plant, but will include an evaluation of existing uses (for example, the town and Onslow Salt) and the footprint of projects which have been referred for assessment. This will largely be a qualitative assessment of cumulative effects, however, quantification of the total estimated terrestrial footprint (and resultant loss of flora and fauna habitat) and estimated regional air emissions may be undertaken.

5.6 Environmental Management Plans

The requirement for Environmental Management Plans (EMP) will be based on the outcomes of the detailed Risk Assessment which will be presented in the EIS/ERMP. The detailed Risk Assessment will identify the requirement for additional management measures to ensure risks are reduced to acceptable levels. Where appropriate, these management measures may include the development of a specific EMP for those aspects that are considered to have the greatest potential environmental risk. If aspect specific EMPs are required, they will be included in the ERMP/EIS and would be developed further upon completion of detailed engineering. An example of where an aspect specific EMP is likely to be required is the large scale dredging programme associated with the project.

In addition to management plans for specific aspects, EMPs will be produced for the key phases of the development, such as construction, operation and decommissioning. The content and format of these plans will meet both State and Commonwealth requirements.

6.0 ASSESSMENT PROCESS

6.1 Overview

The Wheatstone Project was referred to the EPA under *the Environmental Protection Act 1986* (EP Act) and the level of assessment was set as an ERMP in October 2008. The relevant environmental factors indicated by the EPA in their level of assessment were:

- ◆ Terrestrial flora and fauna
- ◆ Marine flora and fauna
- ◆ Greenhouse gases
- ◆ Other gaseous emissions
- ◆ Liquid and solid waste
- ◆ Noise
- ◆ Light
- ◆ Public Risk

The proposal was referred to the DEWHA under the Commonwealth *Environment Protection Biodiversity and Conservation Act* (EPBC Act). In October 2008 DEWHA determined that the proposal was a controlled action and the level of assessment was set at EIS. DEWHA determined that the proposal may have significant impact on the following Matters of National Environmental Significance (NES):

- ◆ Listed threatened species and communities (section 18 and 18A)
- ◆ Listed migratory species (sections 20 and 20A)
- ◆ Commonwealth marine areas (section 23 and 24A).

6.2 Assessment Approach

The Wheatstone EIS/ERMP will be prepared to meet both the EPA *Guidelines for Preparing a Public Environmental Review/Environmental Review and Management Programme* (2007) and the DEWHA *Guidelines for the Content of a Draft Environmental Review and Management Programme/Environmental Impact Statement* (2008) (see Appendix 5). It will be assessed by a parallel/coordinated approach by the State EPA and Commonwealth DEWHA.

6.3 Project and Assessment Schedule

Chevron's proposed schedule for the environmental approvals process is provided in Table 6.1.

Table 6.1: Proposed Approval and Project Schedule

Assessment Process	Schedule Timing
Submission of Scoping Document	March 2009
EPA SU and DEWHA review of Scoping Document	March/April 2009
EPA SU approves Scoping Document for public release	April 2009
Public Review of Scoping Document	April 2009
EPA approve final Scoping Document and DEWHA finalises guidelines	May 2009
Completion of Phase 1 environmental surveys/investigations	Aug 2008 to Aug 2009
Consultation Program	Jan 2008 ongoing
Submission of draft EIS/ERMP document to the EPA SU and DEWHA	November 2009
EPA SU and DEWHA approval of draft EIS/ERMP release for public review	February 2010
Public Review Period of EIS/ERMP	March to May 2010
Chevron provides supplement/response to public submissions EIS/ERMP	May/June 2010
EPA releases assessment and report	August 2010
Appeal period on EPA's report and recommendations	August 2010
State Minister Decision	October 2010
Commonwealth Minister Decision	October 2010

6.4 Key Legislation

In addition to the key requirements identified below, there are other Acts, Policies and Guidelines that apply to this proposal. These are summarised in Appendix 3.

6.4.1 State

The EP Act is the principal statute for environmental protection in the state of Western Australia. The Wheatstone Project will be assessed under Part IV of the Act.

Part V of the EP Act includes the requirement for a Vegetation Clearing Permit for the clearing of native vegetation. Under the *Environmental Protection (Clearing of Native Vegetation) Regulations 2004* clearing is exempt from requiring a permit if it is clearing to implement a proposal which has been approved under Part IV of the Act and is in accordance with the conditions of the approval, thus Chevron is not required to submit a separate Vegetation Clearing Permit for the Wheatstone Project.

Part V of the Act also requires Works Approvals and Environmental licences for prescribed activities under the *Environmental Protection Regulations 1987*. The Wheatstone Project will be prescribed as Category 34 – Oil or Gas Refining.

6.4.2 Commonwealth

The *Environment Protection Biodiversity and Conservation Act* (EPBC Act) is the principal statute for actions which may have a significant impact on matters of national environmental significance. The Wheatstone Project will be assessed under this Act.

In addition to the Commonwealth EPBC Act, as the Wheatstone Project involves sea dumping, a sea dumping permit will be required under the *Environmental Protection (Sea Dumping) Act 1981*. Aspects related to the Sea Dumping Permit for dredge spoil

disposal will be assessed as part of the environmental impact assessment under the EPBC Act, as agreed with DEWHA. A draft Sea Dumping Permit was submitted to DEWHA at the same time as the EPBC Referral.

7.0 STAKEHOLDER CONSULTATION

7.1 Stakeholder Consultation Strategy

Chevron is undertaking transparent stakeholder and community engagement throughout the EIS/ERMP process and the construction and operation of the Project. A stakeholder consultation program has been developed that is consistent with the *Interim Industry Guidelines to Community Involvement* (Department of Environment 2003). Consultation will be undertaken both to assist the completion of the EIS/ERMP but also as an integral part of a Social and Health Impact Assessment.

7.2 Aims of consultation

The aims of the consultation for the Project and the impact assessment process are to:

- ◆ Inform stakeholders such that they have adequate knowledge of the Project for their needs
- ◆ Provide opportunities for stakeholders to comment throughout the impact assessment process and engage in meaningful dialogue
- ◆ Broaden Chevron's knowledge of the issues, opportunities and concerns that may arise with the Project
- ◆ Consider and address issues raised by stakeholders and provide feedback to stakeholders

7.3 Stakeholder Identification

The stakeholder consultation program involves consultation with a range of stakeholders including government, non-government, indigenous and non-indigenous organisations and the private sector. The stakeholders identified to date for the Project are listed in Appendix 4.

7.4 Stakeholder Consultation Completed to date

A summary of stakeholder consultation completed to date is provided in Appendix 4, Table A5.1. Stakeholder consultation has primarily included Project briefings and site selection briefings and workshops.

Discussions with key technical sections of the DEC in relation to the scopes and methodologies associated with the high and medium environmental factors for the Project have also been completed. Meetings have been held with the DEC Environmental Management Branch, the Air Quality Branch and the Marine Ecosystems Branch.

Workshops were held on February 17, March 4 and March 16 2009 to present Chevron's application of the risk-based approach for the Wheatstone Project, the initial results of the scoping risk assessment and components of the Scoping Document. The results of these workshops are briefly provided in Section 5.2.

7.5 Planned EIS/ERMP Consultation

Stakeholder engagement will continue as an integral part of the Project. In particular discussions will be held with key identified stakeholders as part of the scoping and EIS/ERMP preparation process. This will be accomplished in both formal and informal meetings with individual government departments or officials, community stakeholders and environmental groups, and in broader facilitated workshops similar to those

conducted during the scoping process. The level of engagement on each key question identified during the EIS-ERMP will vary according to project design constraints and level of risk to decision quality. In most instances this would involve public participation to a level of *Consult* (as defined by the *Interim Industry Guidelines to Community Involvement* (DoE 2003) and the International Association of Public Participation framework).

A comprehensive social and health impact assessment study being run in parallel to the EIS-ERMP will include:

- ◆ Identification of community and stakeholder concerns about environmental matters
- ◆ Systematic addressing of those concerns in project design and management commitments
- ◆ Preparation of periodic newsletters for the community and other interested parties.

The scope of the social impact assessment will include studies to address:

- ◆ Community use and values assessment
- ◆ Fishing and pearling
- ◆ Public utilities
- ◆ Local skills
- ◆ Population modelling
- ◆ Economic assessment
- ◆ Traffic planning
- ◆ Health impact assessment.

Stakeholders will also have a formal opportunity to comment on the EIS/ERMP during the statutory public review periods.

8.0 ABBREVIATIONS

Abbreviation	Long Title
ARMCANZ	Agriculture and Resource Management Council of Australia and New Zealand
ANZECC	Australia and New Zealand Environment and Conservation Council
ASS	Acid Sulphate Soils
BPPH	Benthic Primary Producer Habitat
CPP	Central Processing Platform
DBNGP	Dampier-to-Bunbury Natural Gas Pipeline
DEC	Department of Environment and Conservation
DEWHA	Department of Environment, Water, Heritage and the Arts
DIA	Department of Indigenous Affairs
DoW	Department of Water
DoE	Department of Environment
EPBC Act	Environment Protection Biodiversity and Conservation Act
EIS	Environmental Impact Statement
EP Act	Environmental Protection Act
EPA	Environmental Protection Authority
ERMP	Environmental Review and Management Programme
ESD	Environmental Scoping Document
FEED	Front End Engineering Design
GHG	Greenhouse Gas
IBRA	Interim Biogeographic Regionalisation of Australia
IMCRA	Integrated Marine and Coastal Regionalisation of Australia
LNG	Liquefied Natural Gas
MNES	Matters of National Environmental Significance
MOF	Material Offloading Facility
MSCF/D	million standard cubic feet per day
MTPA	million tonnes per annum
NES	National Environmental Significance
NORM	Naturally Occurring Radioactive Material
PFW	Produced Formation Water
PECs	Protected Ecological Communities
ROV	Remotely Operated Vehicle
SIA	Strategic Industrial Area
SRE	Short Range Endemics
tcf	trillion cubic feet
TECs	Threatened Ecological Communities
WA	Western Australia
WHP	Well Head Platform

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APPENDIX 1: SCOPING RISK ASSESSMENT

Table A1.1: Environmental Consequence Definitions

Consequence Category	Definition
Catastrophic - 1	Human fatalities
	Loss of ecosystem function across a wide area
	Extinction of a species regionally
	Loss of major portion of a critical asset at the regional level
Massive - 2	Significant loss of a critical asset, plant communities, benthic habitat or significant species at a regional level
	Well in excess of an environmental limit
	A critical asset is more significantly affected
	Chronic or acute effects on a significant portion of a human population
	Extinction of a species locally
Major - 3	Chronic or acute effects on some sensitive humans (asthmatics)
	Significant loss of significant species at the local level
	A critical asset is less significantly affected
	Habit of significant fauna is significantly affected.
	Vegetation communities significantly affected at regional level
	Near an environmental limit
Moderate - 4	Sub-lethal impacts to highly sensitive humans (e.g. exercising asthmatics)
	Significant deterioration/loss of vegetation communities at a local level
	A high value asset is significantly affected
	A critical asset is affected but not significantly
	A significant species is affected but not significantly
	Significantly below an environmental limit
Minor - 5	Nuisance to humans
	May cause adverse effects in sensitive individuals
	Small number (<5%) of individuals in the local population of non-significant species or plant communities may be affected.
	Will not affect a critical asset
	Well below (50%) of an environmental limit
Negligible/ slight - 6	No nuisance or health effect on any humans
	Very small number of individuals (<1.0%) in local population of non-significant species or plant communities may be affected.
	Will not affect a critical or high value asset
	No significant addition to background level, Non-detectable change

Table A1.2: Environmental Limits for Air Emissions

Greenhouse Gas Reporting Thresholds							
Threshold	Facility			Group			
	emit	consume		emit	consume		
	25 kt	100 TJ		125 kt	500 TJ		
National Environmental Protection Measures (NEPM) Air Quality Standards							
Ambient Air Quality	CO	NO₂	O₃	SO₂	Pb	PM₁₀	PM_{2.5}
<i>Averaging period</i>	$\mu\text{g}/\text{Nm}^3$						
8 hrs	11,243						
1 hr		246	214	571			
4 hrs			171				
1 day				228		50	25
1 year		62		57	0.5		8
National Environmental Protection Measures (NEPM) Air Quality Guidelines							
Air toxics	benzene	Benzo(a)py	Formaldehyde	Toluene	Xylenes		
<i>Averaging period</i>	$\mu\text{g}/\text{Nm}^3$						
1 day			53	4,111	1,184		
1 year	10	0.0003		411	947		
Vegetation Protection Guidelines (ANZECC and WHO)							
Averaging period	ANZECC	WHO Guideline					
	All	NO₂		SO₂			
		Crops	All	Crops	Native		
	$\mu\text{g}/\text{Nm}^3$						
12 hrs	3.7	1.6					
1 day	2.9	1.5					
7 days	1.7	0.8					
30 days	0.84	0.4					
90 days	0.5	0.25					
1 year			30	30	20		

Table A1.3: Measures of Likelihood

Likelihood category	Definition
1- Almost certain	Common repeating occurrence, ongoing Will occur most often Planned occurrence/action
2 - Likely	Will probably occur in most circumstances There is at least 50% chance that it may happen
3 - Possible	Might occur at some time Could occur but not often 5% chance it could happen
4 - Unlikely	Unusual occurrence Unexpected
5 – Rare/improbable	May occur only in exceptional circumstances Unheard of

Table A1.4: EPA Risk Matrix

		Consequence category					
		6	5	4	3	2	1
		Negligible	Minor	Moderate	Major	Massive	Catastrophic
Likelihood category	1 - Almost certain	Low	Medium	High	Extreme	Extreme	Extreme
	2 - Likely	Low	Low	Medium	High	Extreme	Extreme
	3 - Possible	Very Low	Low	Low	Medium	High	Extreme
	4 - Unlikely	Very Low	Very Low	Low	Low	Medium	High
	5 - Remote	Very Low	Very Low	Very Low	Low	Low	Medium

	Extreme Risk:	Modification of proposal may be required. Further detailed investigations and detailed discussion in EIS/ERMP. Detailed discussion and agreement with EPA/DEWHA or other government departments on proposed studies.
	High Risk:	Further detailed investigations and detailed discussion in EIS/ERMP. Detailed discussion and agreement with EPA/DEWHA or other government departments on proposed studies.
	Medium Risk:	Further studies required and discussion in EIS/ERMP. Detailed discussion and agreement with EPA/DEWHA and other government departments on studies.
	Low Risk:	Brief discussion in EIS/ERMP. To be addressed in subsequent Environmental Management Plans, works approvals and licences for the Project. Studies may be undertaken and reported in the EIS/ERMP if confidence level is low.
	Very Low: Risk	Very brief notation in the EIS/ERMP. To be addressed in subsequent Environmental Management Plans, works approvals and licences for the Project.

Table A1.5: Preliminary Risk Assessment Results

Reference column (Matters of National Environmental Significance)	Aspect (Stressor/Project Activity)	Project Component	Environmental Factor (Receptor)	Potential Impacts	Standard Controls	Likelihood	Consequence	Risk High Medium Low Very Low	Confidence Level	Proposed Studies	Primary Guidance Material (not intended to be inclusive)	Comments/Assumptions
1A MNES	Dredging <ul style="list-style-type: none"> Capital (acute) and maintenance (chronic) Seabed dredging Spoil disposal Subsea pipe installation 	<ul style="list-style-type: none"> Navigational channel, marine offloading facility, turning basin Dredge spoil disposal sites (State or Commonwealth Waters) Pipeline corridors (State and Commonwealth Waters) 	Benthic Primary Producer Habitat (BPPH) Surveys indicated intertidal area does not have a diverse or abundant BPPH Surveys indicated subtidal areas have low abundance and diversity of BPPH	Critical loss of or disturbance to marine BPPH	Marine facilities layout to take into account the location of BPPH Dredging and pipelay management plan to identify mitigation measures to reduce impacts on BPPH	2	3	H	Low level Uncertainties: Dredge spoil transportation and settling characteristics As yet unknown whether dredge spoil sites will be in State or Commonwealth Waters	Further surveys are required to ascertain the seasonal abundance of BPPH and to understand marine productivity Modelling and geotechnical surveys are required to determine transport characteristics of marine sediments Impact assessment undertaken to determine impacts on BPPH	EPA Guidance Statements No 1, 29 and 34 Australian and New Zealand Guidelines for Marine and Freshwater Marine Water Quality The National Assessment Guidelines for Dredging	Level of critical loss will be determined once the management unit has been defined Risk ranking is based on loss of marine BPPH Risk ranking assumes regular maintenance dredging Also considered potential flow-on effects to the fishing industry e.g. fish nursery and breeding areas
1B MNES		<ul style="list-style-type: none"> Navigational channel, marine offloading facility, turning basin Dredge spoil disposal sites (State or Commonwealth Waters) Pipeline corridors (State and Commonwealth Waters) 	Protected marine fauna Initial surveys indicate nearshore area is not important to protected marine fauna Reefs around small Islands (such as Thevenard) are noted as part of their listing on the Register of National Estate (Place ID 10050)	Loss of or disturbance to critical habitat associated with protected marine fauna Potential to directly impact marine fauna Disturbance and avoidance of area by protected marine fauna Heightened community concern Impacts on local tourism operations	Design of dredging program and pipelay operations to reduce risk of entrapment of marine fauna	3	3	M	Reasonable level Uncertainties: Presence or absence of critical habitats for protected marine fauna Importance of the nearshore waters as migratory pathway or foraging area	Undertake field investigations to identify and map key habitats (foraging and inter nesting) and species, including abundance and seasonal variations Marine fauna survey to determine presence, distribution and seasonal variation Modelling is required to determine transport characteristics of marine sediments Impact assessment undertaken to determine impacts from sediments on marine protected fauna and their habitats Identification of local uses and social values	EPA Guidance Statements No 1, 29 and 34 Australian and New Zealand Guidelines for Marine and Freshwater Marine Water Quality The National Assessment Guidelines for Dredging	Foraging habitat for turtles assumed to be most critical habitat at risk Assessed the likelihood of loss or disturbance to critical habitat important to protected marine fauna
1C MNES		<ul style="list-style-type: none"> Navigational channel, marine offloading facility, turning basin Pipeline corridors (State and Commonwealth Waters) 	Physical marine environment Sub-tidal, intertidal and foreshore (coastal processes) Initial surveys indicate coastal zone highly dynamic	Impacts on mangroves due to changes to seabed and foreshore profile, and changes to sediment dynamics resulting in increased accretion and or	Marine facilities layout to take into account the coastal process and the importance of these processes for	2	3	H	Low level Uncertainties: The impact of dredging on coastal processes has not been thoroughly evaluated	Modelling is required to determine transport characteristics of marine sediments, and coastal processes Impact assessment undertaken to determine impacts from	EPA Guidance Statements No 1, 29 and 34 Australian and New Zealand Guidelines for Marine and Freshwater Marine Water Quality	Assumes nearshore dredging works will have an impact on coastal processes Main concerns are impacts on mangroves in Ashburton River Delta

Reference column (Matters of National Environmental Significance)	Aspect (Stressor/Project Activity)	Project Component	Environmental Factor (Receptor)	Potential Impacts	Standard Controls	Likelihood	Consequence	Risk High Medium Low Very Low	Confidence Level	Proposed Studies	Primary Guidance Material (not intended to be inclusive)	Comments/Assumptions
			with complex and active sediment transport processes	erosion	key habitats Design of dredging program and pipelay operations to reduce risk of entrapment of marine fauna					sediments on BPPH, particularly mangrove communities	The National Assessment Guidelines for Dredging	
1D MNES		<ul style="list-style-type: none"> • Navigational channel, marine offloading facility, turning basin • Dredge spoil disposal sites • Pipeline corridors (State and Commonwealth Waters) 	<p>Water quality</p> <p>Available water-quality data supports the understanding that the nearshore marine waters have seasonally high turbidity and sedimentation levels</p> <p>The deeper and intertidal waters around the offshore islands are more representative of clear oceanic waters</p>	<p>Critical reduction in water quality (turbidity, oxygen depletion, light attenuation, nutrients and other contaminants)</p> <p>Visual impacts associated with turbidity from dredge plumes causing community/regulator concern</p>	Dredging and pipelay management plan to identify mitigation measures to maintain water quality	3	3	M	<p>Reasonable level</p> <p>Uncertainties: Further understanding is required on background water quality levels and seasonal variations in these levels</p> <p>Dredge spoil transportation and settling characteristics</p>	Water quality monitoring, dredge spoil and coastal processes modelling to determine the level of reduction in water quality, and frequency, duration and significance of this reduction in water quality. Identification of local uses/values/issues	<p>EPA Guidance Statements No 1, 29 and 34</p> <p>Australian and New Zealand Guidelines for Marine and Freshwater Marine Water Quality</p> <p>The National Assessment Guidelines for Dredging</p>	<p>Assumes this activity will result in a reduction in existing water quality</p> <p>The existing nearshore environment is seasonally highly turbid due to inputs from the Ashburton River</p> <p>Offshore water is more characteristic of clear oceanic waters with less turbidity and sedimentation than nearshore waters</p> <p>Potential need for community education regarding visibility of plume versus impact</p>
1E MNES		<ul style="list-style-type: none"> • Marine offloading facilities • Offshore platforms (Commonwealth Waters) • Offshore pipelines (Commonwealth Waters) 	<p>Local fishing and pearling industry</p> <p>(Recreational and commercial)</p>	<p>Dredging impacting distribution of fish stocks and nursery areas</p> <p>Potential changes to access for existing commercial and recreational users</p>	<p>Consultation with local fishing industry and recreational users</p> <p>Dredging and pipelay management plan to identify mitigation measures to maintain water quality</p>	3	3	M	<p>Reasonable level</p> <p>Uncertainties: Current values and uses in the project area</p> <p>Aggregate fisheries data readily available but local data is uncertain and industry perceptions uncertain</p>	<p>Identification of local uses and values</p> <p>Assess and describe potential impacts to existing commercial and recreational fishing and aquaculture users through completion of a Fishing and Pearling Study that includes consultation with local commercial and recreational fisheries that may be affected by the Project</p> <p>Consultation with local community and relevant stakeholders</p> <p>Identification of local marine traffic movements</p>	EPA Guidance Statement No. 33	Level of impact to be determined through detailed consultation with fishery authorities and dependency analysis of local fishers in potential exclusion zones
1F MNES		<ul style="list-style-type: none"> • Marine offloading facilities • Offshore platforms (Commonwealth Waters) • Offshore pipelines (State and Commonwealth Waters) 	Disturbance to other local recreational users	Dredging activities impacting on current local recreational users	Consultation with local recreational users	2	5	L	<p>Low level</p> <p>Uncertainties: Extent of industry and employment is unknown</p>	<p>Identification of local uses and values</p> <p>Consultation with local community and relevant stakeholders</p>	EPA Guidance Statement No. 33	Level of impact to be determined through consultation with recreational users

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2A MNES	Physical presence of marine infrastructure • After installation and construction	<ul style="list-style-type: none"> Marine offloading facilities Jetties offshore facilities (Commonwealth Waters) Subsea pipelines (State and Commonwealth Waters) 	Benthic Primary Producer Habitat (BPPH) Within the direct footprint of the marine infrastructure Surveys indicated intertidal area does not have a diverse or abundant BPPH Nearshore surveys indicated subtidal areas have low abundance and diversity of BPPH Reefs around small Islands (such as Thevenard) are noted as part of their listing on the Register of National Estate (Place ID 10050)	Critical loss of or disturbance to marine BPPH	Marine facilities layout to take into account the presence of BPPH	1	6	L	Reasonable level Uncertainties: Extent and location of BPPH	Marine benthic surveys at the Project footprint	EPA Guidance Statements No 1, 29 and 34 Australian and New Zealand Guidelines for Marine and Freshwater Marine Water Quality	Level of critical loss impacts will be determined once the management unit has been defined The risk assessment assumes that marine BPPH have already been disturbed as part of dredging and general marine construction activities This assessment is purely based on the presence of infrastructure
2B MNES		<ul style="list-style-type: none"> Marine offloading facilities Jetties Beach crossing for subsea pipeline 	Physical marine environment Longshore flows, coastal process and adjacent marine habitats (includes intertidal habitats) Initial surveys indicate coastal zone highly dynamic with complex and active sediment transport processes Reefs around small Islands (such as Thevenard) are noted as part of their listing on the Register of National Estate (Place ID 10050)	Alteration of hydrodynamic, geomorphic processes and local currents leading to impacts on critical habitats such as mangroves and other BPPH	Detailed coastal processing modelling will be undertaken to understand coastal process and develop engineering mitigation should coastal process be potentially impacted	2	3	H	Low level Uncertainties: Existing coastal processes	Coastal processes modelling and surveys to support engineering mitigation measures	EPA Guidance Statements No 1, 29 and 34	Risk assessment based on the actual presence of pipeline, marine infrastructure, platforms, jetty etc Assessment based on most significant impacts from a solid structure option which interferes with sediment dynamics Risk assessment considered impacts to ecological as well as physical processes
2C MNES		<ul style="list-style-type: none"> Marine offloading facilities Jetties Offshore facilities (Commonwealth waters) Subsea pipelines (Commonwealth waters) 	Protected marine fauna Available data indicate the project area is not a critical habitat for protected marine fauna	Change to behaviour of protected marine fauna (including seabirds), impacts on migratory patterns, nesting and feeding, and loss and disturbance to habitats	Location of proposed facilities will take into consideration important habitats. Management measures will be put in place to manage potential impact during construction.	2	4	M	Reasonable level Uncertainties: Presence or absence of critical habitats for protect marine fauna	Further surveys are required to confirm absence of critical habitats for protect marine fauna		Risk assessment does not relate to shipping, vessels or construction
2D MNES		<ul style="list-style-type: none"> Marine offloading facilities – exclusion zones 	Local fishing and pearling industry (Commercial and recreational)	Potential reduction of access due to general exclusion zones Potential loss of habitat for targeted species of fish and invertebrates Potential loss of recreational fishing	Consultation with local commercial and recreational fishing groups Appropriate placement of infrastructure with regard to other users	3	3	M	Reasonable level Uncertainties: Importance/presence of nurseries, related changes to productivity of fisheries and full footprint of development	Assess and describe potential impacts on existing commercial and recreational fishing and aquaculture users through completion of a Fishing and Pearling Study that includes consultation with local commercial and recreational fisheries that may be affected	EPA Guidance Statement No. 33	Level of impact to be determined through detailed consultation with key stakeholders

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				areas / severance of beach access						Identify and assess important fisheries habitat Consultation with local community and relevant stakeholders to identify local uses and values Identification of local marine traffic movements		
3A MNES	Vessel Movements Dredgers, shipping, pipeline lay vessels or barges for construction and operation	<ul style="list-style-type: none"> Marine offloading facilities Offshore platforms (Commonwealth waters) Offshore pipelines (Commonwealth waters) 	Protected marine fauna Most sensitive species considered to be foraging turtles, migratory whales and dugong Available data indicate the project area is not a critical habitat for protected marine fauna	Injury or fatalities to protected marine fauna due to interactions with vessels Changes to migratory patterns, foraging, breeding behaviour of protected fauna as a result of disturbance Heightened community/regulator concern	Vessel speed limits Marine fauna monitors on vessels during construction Marine mammal management plan	2	4	M	Reasonable level Uncertainties: Presence or absence of critical habitats for protected marine fauna	Further surveys are required to confirm absence of critical habitats and migratory patterns of protected marine fauna Consultation with local community and relevant stakeholders, including NGOs, tourist operators and indigenous groups, to identify local values		Considers capital and maintenance dredging Risk assessment considers it almost certain that, over the life of the Project, there will be interaction with protected marine fauna The consequence ranking considered the full 25 MTPA LNG plant capacity and the most sensitive species
3B MNES		<ul style="list-style-type: none"> Marine offloading facilities – exclusion zones 	Local fishing and pearling industry (Commercial and recreational)	Increased activity in area from construction could reduce access	Consultation with local commercial and recreational fishing groups	3	3	M	Reasonable level Uncertainties: Importance/presence of nurseries, related changes to productivity of fisheries and full footprint of development	Identification of local uses and values Assess and describe potential impacts on existing commercial and recreational fishing and aquaculture uses through completion of a Fishing and Pearling Study that includes consultation with local commercial and recreational fisheries Identification of local marine traffic movements		Level of impact to be determined through detailed consultation with fishery authorities and use patterns of local recreational and fishers and any other industry users in potential exclusion zones.
3C MNES		<ul style="list-style-type: none"> Marine offloading facilities Offshore platforms (Commonwealth waters) Offshore pipelines (Commonwealth waters) 	Other local recreational users	Dredging activities impacting on current local recreational users	Consultation with local recreational users	2	5	L	Reasonable level Uncertainties: Importance/presence of nurseries, hydrological flow related changes to productivity of fisheries and full footprint of development Current values and	Identification of local uses and values Consultation with local community and relevant stakeholders	EPA Guidance Statement No. 33	Level of impact to be determined through detailed consultation with fishery authorities and dependency analysis of local fishers in potential exclusion zones

Reference column (Matters of National Environmental Significance)	Aspect (Stressor/Project Activity)	Project Component	Environmental Factor (Receptor)	Potential Impacts	Standard Controls	Likelihood	Consequence	Risk High Medium Low Very Low	Confidence Level	Proposed Studies	Primary Guidance Material (not intended to be inclusive)	Comments/Assumptions
									uses in the project area			
3D MNES		<ul style="list-style-type: none"> Marine offloading facilities Jetties Offshore platforms (Commonwealth waters) Offshore pipelines (Commonwealth waters) 	<p>Benthic Primary Producer Habitat (BPPH) and marine fauna Including fisheries</p> <p>Introduction of non-indigenous species, resulting in loss of biodiversity, and introduction of disease to fisheries</p> <p>Reefs around small Islands (such as Thevenard) are noted as part of their listing on the Register of National Estate (Place ID 10050)</p>	<p>Loss of biodiversity</p> <p>Introduction of disease to fisheries</p>	Marine quarantine measures, including ballast controls	4	3	L	<p>Reasonable level</p> <p>Uncertainties: Further surveys required to confirm absence of critical habitats for BPPH and protected fauna</p>	<p>Extent and location of BPPH; marine fauna surveys</p> <p>Consultation with local community and relevant stakeholders</p>		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 primary producers and biodiversity. Public and fisheries concerns were considered as part of the assessment.
4A MNES	Construction activities	<ul style="list-style-type: none"> Marine offloading facilities Offshore pipelines (Commonwealth waters) 	<p>Benthic Primary Producer Habitat (BPPH)</p> <p>Surveys indicated intertidal area does not have a diverse or abundant BPPH</p> <p>Nearshore surveys indicated subtidal areas have low abundance and diversity of BPPH</p>	Critical loss of or disturbance to marine BPPH	Placement of offshore facilities and drilling locations will take into consideration presence, abundance and diversity of benthic communities	4	3	L	<p>Reasonable Level</p> <p>Uncertainties: Extent and location of BPPH</p>	Marine benthic surveys at the project footprint	EPA Guidance Statements No 1, 29 and 34	Level of critical loss will be determined once the management unit has been defined
4B MNES		<ul style="list-style-type: none"> Offshore platforms (Commonwealth waters) Offshore drilling (Commonwealth waters) 	<p>Benthic infauna</p> <p>(Offshore at the drilling locations)</p> <p>Available data indicate offshore areas have low abundance and diversity of benthic communities</p>	Localised loss or smothering of benthic communities	<p>Placement of offshore facilities and drilling locations will take into consideration presence and abundance of diverse benthic communities</p> <p>Drilling mud will be recycled. Water-based mud will be recycled during drilling operations and will be discharged at the end of well in accordance with Australian requirements.</p> <p>Oil-based muds will not be used</p> <p>Synthetic-based muds</p>	1	6	L	<p>Reasonable Level</p> <p>Uncertainties: Presence, abundance and diversity of benthic communities</p> <p>Require information on well locations and cuttings size</p>	<p>Marine benthic surveys at the offshore location</p> <p>Cutting dispersion modelling</p>		<p>Almost certain impacts on benthic communities from drilling discharges (drilling muds and cuttings)</p> <p>Data from other locations indicate that the zone of influence will be localised to within 50 m of individual wells and within a few km of multiple well platforms</p>

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					will be recycled and returned to shore for processing							
5A MNES	Discharges Licenced and/or approved discharges into the marine environment, including sewage and treated oily stormwater (excludes dewatering and leachates)	<ul style="list-style-type: none"> Stormwater treatment facilities RO Plant Sewage treatment facilities Produced Formation Water (Commonwealth waters) Cooling Water (Commonwealth waters) 	Benthic Primary Producer Habitat (BPPH) Nearshore surveys completed to date, indicate low abundance of BPPH in the nearshore Reefs around small Islands (such as Thevenard) are noted as part of their listing on the Register of National Estate (Place ID 10050)	<p>Critical loss of or disturbance to BPPH</p> <p>Toxicity effects from discharges</p> <p>Increased nutrients and eutrophication from discharges</p>	Strict control measures and prescriptive standards for licenced marine discharge will need to be met	4	5	VL	Reasonable level Uncertainties: Extent and location of BPPH	Marine benthic surveys at the project footprint	EPA Guidance Statements No 1, 29 and 34	<p>Level of critical loss and resultant impacts will be determined once the management unit has been defined</p> <p>This aspect does not include spills or accidental release of material</p>
5B MNES		<ul style="list-style-type: none"> Stormwater treatment facilities RO Plant Sewage treatment facilities Produced Formation Water (Commonwealth waters) Cooling Water (Commonwealth waters) 	Protected marine fauna Available data indicate the project area is not a critical habitat for protected marine fauna	Disturbance to protected marine fauna	Strict control measures and prescriptive standards for licenced marine discharge will need to be met	4	5	VL	Reasonable level Uncertainties: Presence or absence of critical habitats for protected marine fauna	Further surveys are required to confirm absence of critical habitats for protected marine fauna		This risk assessment assumes the minimum standards will be applied to wastewater discharges from the onshore facilities and from the platform and this minimal standard will not impact on protected marine fauna
5C MNES		<ul style="list-style-type: none"> Stormwater treatment facilities RO Plant Sewage treatment facilities Produced Formation Water Cooling Water Produced sand 	Water and sediment quality	<p>Permanent reduction in water quality, and contaminants in sediments leading to loss of ecological integrity</p> <p>Production of Naturally Occurring Radioactive Material (NORMs)</p>	<p>Strict control measures and prescriptive standards for licenced marine discharge will need to be met</p> <p>If NORMs are identified strict safety and waste disposal controls will be developed</p>	4	3	L	Reasonable level Uncertainties: Background water quality levels	<p>Baseline water and sediment quality surveys to be undertaken</p> <p>Review of subsurface geology to determine the likelihood of NORM's production.</p>	<p>EPA Guidance Statements No 1, 29 and 34</p> <p>Australian and New Zealand Guidelines for Marine and Freshwater Marine Water Quality</p> <p>The Western Australian State Water Quality Management Strategy; and The Marine Series MR1 Pilbara Coastal Water Consultation Outcomes – Environmental Values and Environmental Quality Objectives (Department of Environment, 2006)</p>	The risk assessment assumes potential of outfall line discharge to sea, which may include produced water and the potential for discharge of produced formation water from platforms. 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.
6A MNES	Leaks and spills (Acute/chronic/cumulative) (Plant, pipelines and platform)	<ul style="list-style-type: none"> Marine offloading facilities Offshore facilities (Commonwealth waters) LNG Plant Accommodation camp Offshore pipelines (Commonwealth waters) 	BPPH (habitat for fauna)	Leaks or spills leading to the loss of habitat	A suite of containment controls will be implemented, including bunding, pipeline corrosion controls and integrity inspections,	4	2	M	Reasonable level Uncertainties: Final design of offshore processing facilities Potential pollution pathways	<p>Marine benthic surveys</p> <p>Marine oil spill trajectory modelling</p> <p>Assessment of potential sources of leaks and spills and development of control and management measures</p>	<p>EPA Guidance Statements No 1, 29 and 34</p> <p>Australian and New Zealand Guidelines for Marine and Freshwater Marine Water Quality</p>	<p>This risk assessment assumes a worst-case major spill of condensate</p> <p>The risk assessment considered worst-case adverse effects on a regionally significant stand of mangroves</p>

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					emergency response procedures, and monitoring for chronic leaks							
6B MNES		<ul style="list-style-type: none"> Marine offloading facilities Offshore facilities LNG Plant Accommodation camp Offshore pipelines 	<p>Protected marine fauna</p> <p>Available data indicate the project area is not a critical habitat for protected marine fauna</p> <p>Reefs around small Islands (such as Thevenard) are noted as part of their listing on the Register of National Estate (Place ID 10050)</p>	<p>Disturbance to protected marine fauna</p> <p>Toxic effects to protected marine fauna</p>	As above	4	3	L	<p>Reasonable level</p> <p>Uncertainties: Final design of offshore processing facilities</p> <p>Potential pollution pathways</p>	<p>Marine oil spill trajectory modelling</p> <p>Assessment of potential sources of leaks and spills and development of control and management measures</p>	<p>EPA Guidance Statements No 1, 29 and 34</p> <p>Australian and New Zealand Guidelines for Marine and Freshwater Marine Water Quality</p>	<p>Risk ranking based on impacts on intertidal habitats and impacts of spills on seabirds, wading birds and turtles</p> <p>Worst -case risk based on condensate tank running aground and associated spill a few km from shore</p>
6C MNES		<ul style="list-style-type: none"> Marine offloading facilities Offshore facilities (Commonwealth waters) LNG Plant Accommodation camp Offshore pipelines (Commonwealth waters) 	<p>Water and sediment quality</p>	<p>Permanent reduction in water quality and contamination of sediments</p>	As above	4	3	L	<p>Reasonable level</p> <p>Uncertainties: Existing water quality, and sediment characteristic</p>	<p>Marine survey of physical parameters (Water quality, sediment profile, infauna)</p>	<p>EPA Guidance Statements No 1, 29 and 34</p> <p>Australian and New Zealand Guidelines for Marine and Freshwater Marine Water Quality</p>	<p>Risk assessment considered a highly mobile, high energy system</p> <p>Risk assessment based on a worst-case accumulation of contaminants in sediments from a chronic leak</p> <p>Intertidal areas considered most sensitive to this impact</p>
6D		<ul style="list-style-type: none"> Marine offloading facilities LNG Plant Accommodation camp Offshore pipelines 	<p>Onslow Community</p>	<p>Risks to human health</p>	<p>A suite of containment controls will be implemented, including bunding, pipeline corrosion controls and integrity inspections, emergency response procedures, and monitoring for chronic leaks</p>	4	3	L	<p>High level (The plant design is based on known technologies)</p>	<p>Quantitative / public risk assessment to determine the level of offsite risk to human life that could be imposed on surrounding environs due to proposed Project and to demonstrate that potential offsite risks resulting from the proposed Project are tolerable and meet the EPA criteria for industrial developments</p>	<p>EPA Guidance Statement No. 2 EPA Guidance Statement No. 3 EPA Guidance Statement No. 33</p>	<p>Level of concern re health impacts and extent of public risk to be determined through consultation with key stakeholders in the health sector at state, regional and local levels</p> <p>Further technical assessments to be undertaken as appropriate to address any significant health and safety issues</p> <p>DoH personnel to be involved in scoping and feedback phases of assessment</p>

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7A	Vegetation clearing during construction	<ul style="list-style-type: none"> LNG plant Onshore pipelines Roads Accommodation camp 	<p>Native flora species</p> <p>Area is currently used for pastoral activity and weeds are abundant</p> <p>Surveys completed to date have not found DRF. One P3 species was found in previous surveys completed within the project area</p>	<p>Loss of flora species (including conservation significant species)</p> <p>Removal of topsoil and seed reserves</p>	<p>Reduce clearing footprint as far as reasonably practicable</p> <p>Develop suitable guidelines, procedures for ground disturbance and clearing</p>	3	3	M	<p>Reasonable level</p> <p>Uncertainties: Presence of species and communities of conservation significance</p>	Complete post-wet season Level 2 flora baseline surveys to identify presence of significant flora species, vegetation communities, and introduced species within local and regional context	<p>EPA Position Statement No.2</p> <p>EPA Position Statement No. 3</p> <p>EPA Draft Guidance Statement No. 51</p>	<p>Ranking the loss of conservation significant species (not individuals) associated with vegetation clearing</p> <p>Risk ranking considered potential for Domgas pipeline alignment through Cane River Conservation Park</p> <p>Declared Rare Fauna (DRF) are considered 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.</p>
7B		<ul style="list-style-type: none"> LNG plant Onshore pipelines Roads Accommodation camp 	<p>Native flora communities</p> <p>Area is currently used for pastoral activity and weeds are abundant</p> <p>Surveys completed to date have not found DRF. One P3 species was found in previous surveys completed within the project area</p> <p>There are no known Threatened or Protected Ecological Communities (TECs or PECs) within the footprint</p> <p>The closest TEC or PEC is Camerons Cave Troglitic Community (Exmouth), more than 94 km away</p>	<p>Loss of vegetation associations and habitat</p> <p>Removal of topsoil and seed reserves</p>	<p>Reduce clearing footprint as far as reasonably practicable</p> <p>Develop suitable guidelines, procedures for ground disturbance and clearing</p> <p>Domgas pipeline alignment through DEC-managed estate (proposed addition to Cane River Conservation Park) to be parallel to existing road reserve where there is existing disturbance</p>	3	3	M	<p>Reasonable level</p> <p>Uncertainties: Presence of species and communities of conservation significance</p>	Complete Level 2 flora baseline surveys to identify presence of significant flora species, vegetation communities, and introduced species within local and regional context.	<p>EPA Position Statement No.2</p> <p>EPA Position Statement No. 3</p> <p>EPA Draft Guidance Statement No. 51</p>	<p>Ranking the loss of conservation significant communities associated with vegetation clearing</p> <p>Disturbance from pipeline construction to Cane River Conservation Park 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</p> <p>Risk ranking considered potential for Domgas pipeline alignment through Cane River Conservation Park</p>
7C MNES		<ul style="list-style-type: none"> LNG plant Onshore pipelines Roads Accommodation camp 	<p>Terrestrial (mobile) fauna</p> <p>Native and feral</p>	<p>Direct displacement loss or change to habitat leading to a loss of individuals of one or more species</p> <p>Reduced connectivity of fauna populations</p> <p>Increased competition for</p>	<p>Reduce clearing footprint as far as reasonably practicable</p> <p>Establish hygiene and quarantine management guidelines and procedures</p> <p>Develop</p>	3	3	M	<p>Low level</p> <p>Uncertainties: Presence of priority fauna species or EPBC listed species</p>	Complete Level 2 flora and fauna baseline surveys to identify terrestrial habitats and associated ecological communities including terrestrial vertebrate fauna and feral animals	EPA Draft Guidance Statement No 56	<p>A conservative approach was taken in the event that protected fauna species were present</p> <p>Habitats present are well represented within the local and regional area</p>

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				resources in adjacent areas Increased numbers in feral animal population	suitable guidelines, procedures for ground disturbance and clearing							
7D		<ul style="list-style-type: none"> LNG plant Accommodation camp 	Terrestrial short range endemic (SRE) fauna	Direct displacement, loss or change to habitat leading to a loss in species	<p>Reduce clearing footprint as far as reasonably practicable</p> <p>Establish hygiene and quarantine management guidelines and procedures</p> <p>Develop suitable guidelines, procedures for ground disturbance and clearing</p>	3	3	M	<p>Low level</p> <p>Uncertainties: Presence of SRE within the disturbance footprint of the project</p> <p>Presence of suitable SRE habitats</p> <p>Degree of connectivity of clay pans and endemism</p>	Complete Level 2 fauna baseline surveys to identify terrestrial habitats and associated ecological communities including short range endemics and claypan invertebrates	EPA Draft Guidance Statement No 56	<p>Unlikely that there will be a loss of conservation significant species</p> <p>Observations from previous cyclonic and flooding events suggest connectivity of claypans. However, this risk assessment has been based on a conservative approach and assumes that short-range endemic species are present until the results of the proposed studies become available.</p>
7E		<ul style="list-style-type: none"> LNG Plant Onshore pipelines Roads Accommodation camp 	Subterranean fauna	Removal of organic/nutrient input	Reduce clearing footprint as far as reasonably practicable	3	5	L	<p>Low level</p> <p>Uncertainties: Presence of subterranean fauna</p> <p>Rare subterranean species that may only occur in this region</p>	<p>Complete subterranean fauna investigations at targeted bore locations based on likely habitats and suitable geological formations</p> <p>Complete six-month sampling of stygofauna and troglofauna</p>	EPA Draft Guidance Statement No 54	<p>For this risk assessment a conservative approach assumes a worst case that subterranean fauna may be present</p> <p>Potential impacts on subterranean fauna, if present, from vegetation clearing is considered low</p>
7F		<ul style="list-style-type: none"> LNG Plant Onshore pipelines Roads Accommodation camp 	Aboriginal Cultural Heritage (Ethnographic and Archaeological)	Loss or disturbance to sites, features and species of cultural significance	<p>Consultation with Thalanyji and other representatives of the local indigenous community to identify existing cultural values and potential protection measures for these values</p> <p>Where necessary, obtain clearance under the Aboriginal Heritage Act 1972</p> <p>Development of vegetation</p>	3	3	M	<p>Reasonable level</p> <p>Uncertainties: Presence and type of Aboriginal Heritage sites</p> <p>The location and community values</p>	Complete Aboriginal Cultural Heritage Studies including archaeological and ethnographic surveys and consultation with the Thalanyji and the Department of Indigenous Affairs (DIA)	EPA Guidance Statement No. 41	Note that this risk could occur during other components of the construction process, such as excavation and infill of material, but has not been repeated as the proposed studies will be relevant to all construction activities

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					clearing procedures and training of construction contractors							
		<ul style="list-style-type: none"> Workforce 	Conservation values	Loss of, or impact on conservation values	Develop a series of workforce management measures to reduce impacts on conservation values Develop and implement environmental awareness programs for workforce	5	3	L	Reasonable Level: Uncertainties: Capacity to manage visitors to remote offshore islands	Mapping of use and social values Workforce population modelling		Assumes a 3,000 person peak workforce during construction and up to 300 people during operation
7G		<ul style="list-style-type: none"> LNG Plant Onshore pipelines Roads Accommodation camp 	Non-Aboriginal Cultural Heritage Old Onslow Heritage Site* <ul style="list-style-type: none"> Tramway Jetty *Actual townsite is not within the potential footprint	Loss of or disturbance to sites of archaeological and non-Aboriginal cultural significance, namely the Old Onslow Heritage Site Physical survey / site inspection to determine location and significance of existing artefacts Consultation with relevant heritage stakeholders as appropriate such as the Heritage Council of Western Australia and the Shire of Ashburton	Desktop review of existing heritage documents and project documentation to identify potential impacts on Old Onslow Heritage Site Physical survey / site inspection to determine location and significance of existing artefacts Consultation with relevant heritage stakeholders as appropriate such as the Heritage Council of Western Australia and the Shire of Ashburton	3	5	L	Reasonable level Uncertainties: Extent and significance of existing European Heritage artefacts	Complete a European Heritage Study to identify and assess potential impacts of the Project on European Heritage such as the Old Onslow Heritage Site	EPA Guidance Statement No. 33 Guidance from Heritage Council WA	Note that this risk could occur during other components of the construction process, such as excavation and infill of material, but has not been repeated as the proposed studies will be relevant to all construction activities
8A	Construction earthworks Includes: <ul style="list-style-type: none"> Excavation (Open trenches) Infill Building of flood/surge protection bunds Borrow Pit 	<ul style="list-style-type: none"> LNG plant Onshore pipelines Roads Accommodation camp 	Soils and landform	Physical changes in natural drainage patterns in Hooley Creek and Ashburton River Delta leading to modified sediment dynamics Disturbance of acid sulphate soils	Runoff controls to be in place during construction Develop and implement construction management procedures for clearing and	2	4	M	Low level Uncertainties: Presence and spatial extent of ASS Natural drainage patterns and surface water flows	Complete site assessment of ASS and opportunistic sampling as part of groundwater/subterranean fauna bore installation A detailed sampling program will be completed if required Complete a surface water	DEC guidelines for the management of acid sulphate soils EPA draft Guidance Statement No 26	Ranking based on potential physical changes to Hooley Creek and Ashburton River Delta ASS is not considered to be a significant risk to the terrestrial environment Health issues associated with mosquitoes and the design of any stormwater ponds will be

Reference column (Matters of National Environmental Significance)	Aspect (Stressor/Project Activity)	Project Component	Environmental Factor (Receptor)	Potential Impacts	Standard Controls	Likelihood	Consequence	Risk High Medium Low Very Low	Confidence Level	Proposed Studies	Primary Guidance Material (not intended to be inclusive)	Comments/Assumptions
				leading to acidification and contamination of soils, surface and marine water Potential secondary impacts to flora and vegetation associated with changes to surface drainage	topsoil handling Provide design measures and guidance to avoid disturbing ASS, and management measures for the control of acid sulphate soils, should the baseline investigations indicate their presence Plant drainage will be designed to maintain stormwater runoff volumes and peak flows to pre disturbance levels and control sediment runoff Drainage will be designed to reduce ponds and potential mosquito habitat					assessment, including baseline surface water hydrology, baseline flood study and development of a conceptual surface water control system Develop hydrodynamic model for the Hooley Creek Catchment (baseline and infrastructure) Determine flood water levels using model and evaluate potential impacts of the Project on flood levels and the environment		investigated and controls will be incorporated into the design.
8B MNES		<ul style="list-style-type: none"> LNG Plant Onshore pipelines Accommodation camp 	Terrestrial (mobile) fauna Native fauna	Entrapment of fauna in pipeline trenches (only temporarily open) and other excavations leading to loss of significant numbers of individuals, or loss of species	Implement management measures during construction such as fauna escape methods and routine trench inspections and in-filling of trenches as soon as practicable	4	4	L	High level Certainties: Management strategies will identify, process and design measures to reduce impact	Complete fauna baseline Level 2 surveys to identify terrestrial habitats and associated ecological communities including terrestrial vertebrate fauna and feral animals	EPA Draft Guidance Statement No 56	Ranking is based on risk of fauna falling into the trenches Risk assessment assumes that effective management measures are in place.
8C		<ul style="list-style-type: none"> LNG Plant 	Terrestrial short range endemic (SRE) fauna Claypan invertebrates	Infilling of claypan habitat leading to loss of SRE species	Clearing will be minimised as much as possible	3	3	M	Low level Uncertainties: Degree of connectivity of claypans and invertebrate endemism Presence of SREs within the disturbance footprint of the Project	Complete fauna baseline Level 2 surveys to identify terrestrial habitats and associated ecological communities including short range endemics and claypan invertebrates	EPA Draft Guidance Statement No 56	DEC's Pilbara Bioregion Survey indicates that claypans may be a potentially significant habitat for invertebrate endemism High connectivity between claypans is likely due to seasonal flooding

Reference column (Matters of National Environmental Significance)	Aspect (Stressor/Project Activity)	Project Component	Environmental Factor (Receptor)	Potential Impacts	Standard Controls	Likelihood	Consequence	Risk High Medium Low Very Low	Confidence Level	Proposed Studies	Primary Guidance Material (not intended to be inclusive)	Comments/Assumptions
8D		<ul style="list-style-type: none"> LNG Plant Accommodation camp 	Subterranean fauna	Loss of troglofauna habitat from earthworks leading to loss of species		3	3	M	Low level Uncertainties: Presence of subterranean fauna	Complete subterranean fauna investigations at targeted bore locations based on likely habitats and suitable geological formations	EPA Draft Guidance Statement No 54	For this risk assessment a conservative approach has been applied and assumes a worst case that rare subterranean fauna may be present
9A MNES	Dust emissions Construction, including staged construction Particulate	<ul style="list-style-type: none"> LNG plant Onshore pipelines Roads Accommodation camp 	Flora and fauna Smothering of flora leading to a reduction in photosynthesis Potential for physical impact on fauna	Temporary reduction in air quality due to nuisance dust No burning of cleared material	Dust monitoring and management plans will be in place Cleared areas will be reduced as much as practicable	3	4	L	Low level Uncertainties: Proposed stockpile location Lack of details on proposed haulage routes Particle size of spoil and cleared areas Moisture content of spoil and cleared areas Presence of priority fauna species or EPBC listed species	Dust monitors will be in place prior to construction to establish background concentrations	EPA Guidance for the Assessment of Environmental Factors No.18	Ranking is based on impacts on amenity Likelihood is based on the fact that dust may occur during the dry season but not during the wet During the dry season dust damping measures will be implemented on environmental and health and safety grounds The cleared area may exceed 2000 sqm therefore burning will not be permitted as per Guidance No. 18
9B		<ul style="list-style-type: none"> LNG plant Onshore pipelines Roads Accommodation camp 	Public amenity / local values and uses Campers and other recreational users	Temporary reduction in air quality due to nuisance dust	Consultation with stakeholders / local community to identify and document key stakeholder and community values/uses associated with the project area and surrounding areas Construction Environmental Management Plan (CEMP)	3	5	L	Reasonable level Uncertainties: Precise location of recreation sites to be identified	Ongoing consultation with stakeholders / local community to identify and document key stakeholder and community values and uses associated with the Project area and surrounding areas	EPA Draft Guidance Statement No. 33	Will be managed in accordance with outcome of consultation activities regarding current uses and values
9C		<ul style="list-style-type: none"> LNG plant Onshore pipelines Roads Accommodation 	Other users	Loss of production value (related to health and food issues/perception)	Dust monitoring and management plans will be in place Cleared areas will be reduced	5	6	VL	Low level Uncertainties: Proposed stockpile location Lack of details on proposed haulage	Desktop toxicological assessment and dispersion modelling Dust monitors will be in place prior to construction to establish background concentrations	EPA Draft Guidance Statement No. 33 EPA Draft Guidance Statement No. 18	Will be managed in accordance with outcomes from consultation on current uses and values Ranking is based on impacts to amenity Likelihood is based on the fact

Reference column (Matters of National Environmental Significance)	Aspect (Stressor/Project Activity)	Project Component	Environmental Factor (Receptor)	Potential Impacts	Standard Controls	Likelihood	Consequence	Risk High Medium Low Very Low	Confidence Level	Proposed Studies	Primary Guidance Material (not intended to be inclusive)	Comments/Assumptions
		camp			as much as practicable No burning of cleared material				routes Particle size of spoil and cleared areas Moisture content of spoil and cleared areas			that dust may occur during the dry season but not during the wet During the dry season dust damping measures will be implemented on environmental and health and safety grounds The cleared area may exceed 2000 sqm therefore burning will not be permitted as per Guidance No. 18
10A	Fire (During construction or operation)	<ul style="list-style-type: none"> LNG plant Onshore pipelines Roads Accommodation camp 	Flora and vegetation	Loss of flora and vegetation community Alteration to vegetation community composition Loss of seed reserves	Implement procedures to reduce fire risk Occupational safety controls Clearance of vegetation creating a firebreak	3	6	VL	Reasonable level Uncertainties: Detailed construction schedule and methods still to be determined	Safety studies to assess potential fire pathways No specific environmental related studies proposed		Environment is subject to natural fires Risk assessment based on the likelihood of impacts of fire (caused by the Project) on flora and vegetation There will be management measures on site to contain fires
10B MNES		<ul style="list-style-type: none"> LNG plant Onshore pipelines Roads Accommodation camp 	Terrestrial fauna (Mobile and SRE)	Loss of habitat Fauna injury or death	Implement procedures to reduce fire risk, including firebreaks, emergency-response exhaust requirements on vegetation clearing machinery, constraints on naked flames, and Occupational safety controls Clearance of vegetation creating a firebreak	3	6	VL	Reasonable level Uncertainties: Detailed construction schedule and methods still to be determined Presence of priority fauna species or EPBC listed species	Safety studies to assess potential fire pathways No specific environmental studies proposed		Environment is subject to natural fires Risk assessment based on the likelihood of impacts of fire (caused by the Project) on flora and vegetation There will be management measures on site to contain fires
11A	Air Emissions	<ul style="list-style-type: none"> LNG plant and processing equipment Accommodation camp Vessel movements Vehicle movements Offshore facilities 	Ambient Air Quality (Environmental and socio-economic receptors)	Reduction in air quality leading to impacts on flora (secondary air pollution) and social impacts This includes potential impacts on nearby businesses	Technological controls will be included in the design This may include low NOx burners and/or re-using gas as fuel Venting will be reduced	1	5	M	High level Uncertainties: Final LNG Plant layout yet to be determined although typical emissions from an LNG plant are known An Air Quality screening assessment (Ausplume Version 6.0) indicates that	An Air Quality screening assessment (Ausplume Version 6.0) has been undertaken Detailed atmospheric modelling to be performed for normal and upset operating conditions Diffusion tube survey will be undertaken for key pollutants to obtain background data	EPA Guidance Statement No 3, 15, 18, 34 and 47	Ranking considered potential community concerns, and further detailed modelling will be undertaken

Reference column (Matters of National Environmental Significance)	Aspect (Stressor/Project Activity)	Project Component	Environmental Factor (Receptor)	Potential Impacts	Standard Controls	Likelihood	Consequence	Risk High Medium Low Very Low	Confidence Level	Proposed Studies	Primary Guidance Material (not intended to be inclusive)	Comments/Assumptions
									ground level concentrations are unlikely to exceed environmental limits (NEPM) during normal operations Meteorological modelling undertaken using CSIROs TAPM model			
11B		<ul style="list-style-type: none"> LNG plant and processing equipment Accommodation camp Vessel movements Vehicle movements Offshore facilities 	Flora and vegetation	Physiological effects on mangal communities from deposition and absorption of airborne contaminants Venting will be avoided where practicable	Technological controls will be included in the design This may include low NOx burners and reusing gas as fuel	4	5	VL	High level Uncertainties: The following were considered to be variables that will be addressed in a detailed modelling assessment Process upset conditions LNG Plant final layout VOC component	An Air Quality screening assessment (Ausplume Version 6.0) has been undertaken Detailed atmospheric modelling to be performed for normal and upset operating conditions given the ranking above Diffusion tube survey will be undertaken for key pollutants to obtain background data	EPA Guidance Statement No 3, 15, 18, 34 and 47	Risk assessment based on mangroves being the most sensitive receptor to ground level ozone (secondary pollutant) 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 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
11C		<ul style="list-style-type: none"> LNG plant and processing equipment Accommodation camp Vessel movements Vehicle movements Offshore facilities Flaring 	Air Quality (Upset conditions)	Localised reduction in air quality Potential impacts on industries and recreational locations Potential impact on birds	Technological controls will be included in the design	3	4	L	High level Uncertainties: LNG plant design has not yet been confirmed	An Air Quality screening assessment (Ausplume Version 6.0) has been undertaken Detailed atmospheric modelling to be performed for normal and upset operating conditions given the ranking above Diffusion tube survey will be undertaken for key pollutants to obtain background data Review of flaring and flare design to minimise environmental impacts	EPA Guidance Statement No 3, 15, 18, 34 and 47	Design will include management of systems during upset conditions. Hydrocarbon venting and flaring will not occur during normal operations. During upset conditions flaring and venting may be required. This will be reduced wherever possible. The releases will also be of a relatively short duration to allow the processes to be safely shut-in.
11D		<ul style="list-style-type: none"> LNG plant and processing equipment Accommodation camp Vessel movements Vehicle movements Offshore facilities 	Atmosphere (Greenhouse Gases)	Increase in greenhouse gas emissions Contribution to climate change Crowding out of alternative projects via Emissions Trading Scheme (ETS)	Greenhouse abatement through plant efficiency and emission controls	2	4	M	Low level Uncertainties: Greenhouse gas emissions have not yet been calculated for the design	An assessment of opportunities for reducing greenhouse emissions will be undertaken, taking into account market forces introduced by carbon permitting	White Paper – Carbon Pollution Reduction Scheme, Australia's Low Pollution Future COAG principles for the review and streamlining of their existing climate change mitigation measures. 29 Nov 2008	Wheatstone will be benchmarked against equivalent projects to determine its potential contribution of GHG emissions to the Australian total. This benchmarking will also ensure that Wheatstone is comparable or has lower emissions than other similar projects. Detailed studies will be undertaken as part of the risk

Reference column (Matters of National Environmental Significance)	Aspect (Stressor/Project Activity)	Project Component	Environmental Factor (Receptor)	Potential Impacts	Standard Controls	Likelihood	Consequence	Risk High Medium Low Very Low	Confidence Level	Proposed Studies	Primary Guidance Material (not intended to be inclusive)	Comments/Assumptions
											EPA Guidance Statement No.12	assessment process. This will include a cost benefit analysis of various technologies.
12A	Visual impact • Presence of plant • Emissions of light	<ul style="list-style-type: none"> LNG plant accommodation camp Marine offloading facilities Offshore platforms Flaring and lighting 	Public Amenity (Onslow) Visual amenity during operations	Alteration of visual amenity	Light reduction will include a number of controls to reduce the amount of permanent lighting while maintaining safe operations	1	5	M	Low level Uncertainties: Plant layout – specifically whether elevated flares will be incorporated into the design	Complete a Visual and Light Impact Assessment, including view shed models, photomontages and low light levels Values/Use/Issues Assessment	EPA Draft Guidance Statement No. 33 (Part B)	The presence of infrastructure is almost certain to impact visual amenity Public perceptions were considered as part of this risk assessment The plant's 12 km distance from Onslow was considered but a more detailed review will be undertaken to establish where the plant will be visible from
12B MNES		<ul style="list-style-type: none"> LNG plant Accommodation camp Marine offloading facilities Offshore platforms (Commonwealth waters) Flaring and lighting Vessel movements 	Protected marine fauna Initial surveys indicate local beaches are not important turtle nesting habitats	Disturbance to nesting turtles and hatchlings	Light reduction will include a number of controls to reduce the amount of permanent lighting while maintaining safe operations	3	3	M	Reasonable level Uncertainties: Significance of the nearshore waters for nesting turtles	Undertake field investigations to identify and map key turtle habitat and species including abundance and seasonal variations		A preliminary study has shown that the plant site is of low significance for nesting
13A	Vehicular activity	<ul style="list-style-type: none"> LNG plant Onshore pipelines Roads Accommodation camp 	Flora and vegetation Weed spread	Introduction of pest species into Cane River CP resulting in a loss of biodiversity Spread of pest species from existing infested areas to outside of project area resulting in a loss of biodiversity Increased vehicular activity from, workforce and increased population in Onslow	Traffic management plans will be developed for construction and operation Quarantine and hygiene measures will be developed and applied to manage the spread of weeds	3	5	L	Reasonable level Uncertainties: Final locations of roads and pipelines Surveys completed to date have indicated existing weeds at site and also in the Cane River CP	Vegetation surveys record existing levels of disturbance at Project sites including weed species present		Main concern is the spread of existing weeds beyond the site and ranking is based on this Surveys at the site have found mesquite present The risk assessment assumes that effective quarantine and hygiene measures will be applied to manage the spread of weeds
13B MNES		<ul style="list-style-type: none"> LNG plant Onshore pipelines Roads Accommodation camp 	Terrestrial fauna (Mobile and SRE)	Injury or fatalities (road kill) leading to loss of significant numbers of individuals Increased vehicular activity	Traffic management plans will be developed for construction and operation, including speed restrictions	3	5	L	Reasonable level Uncertainties: Number and frequency of vehicle movements Presence of priority fauna species or			Main concern is traffic onsite and travel to and from site Traffic will also be increased on existing roads Public perception was considered as part of assessment

Reference column (Matters of National Environmental Significance)	Aspect (Stressor/Project Activity)	Project Component	Environmental Factor (Receptor)	Potential Impacts	Standard Controls	Likelihood	Consequence	Risk High Medium Low Very Low	Confidence Level	Proposed Studies	Primary Guidance Material (not intended to be inclusive)	Comments/Assumptions
				from, workforce and increased population in Onslow					EPBC listed species			
13C		Roads	Onslow Community (Road safety)	Impact on other public road users as a result of accidents and road injuries/fatalities	Construction traffic management plan	5	1	M	Reasonable level Uncertainties: Traffic data exists for existing road network but project-induced traffic is uncertain	Complete a Traffic Study to identify existing traffic movements, including road and air, the potential increase in traffic associated with the Project and potential management measures to reduce impacts of increased traffic	DPI Transport Assessment Guidelines	Public perception was considered as part of assessment
14A MNES	Acoustic emissions during operations and construction	<ul style="list-style-type: none"> LNG plant Onshore pipelines Roads Accommodation camp 	Terrestrial mobile fauna	Behavioural effects to sensitive terrestrial fauna	Engineering noise controls on plant equipment	3	5	L	Low level Uncertainties: Nearest noise sensitive receptors not mapped Noise impact from construction and operations at sensitive receptors is not known Presence of priority fauna species or EPBC listed species	Baseline noise monitoring to be undertaken Noise modelling assessment to be performed for construction and operations noise Assessment of fauna which may be sensitive to noise and unable to leave noise impacted areas	EPA Draft Guidance Statement No. 8	Project will comply with WA noise regulations to reduce the potential impact of noise beyond the site boundary
14B		<ul style="list-style-type: none"> LNG plant Onshore pipelines Roads Accommodation camp 	Amenity (For local community and campers)	Nuisance and detrimental impact on amenity	Engineering noise controls on plant equipment Schedule noisy construction and planned maintenance during daytime where possible	2	5	L	Reasonable level Uncertainties: Locations of most sensitive receptors	Baseline noise monitoring to be undertaken Noise modelling assessment to be performed for construction and operations noise	EPA Draft Guidance Statement No. 8	Project will comply with WA noise regulations to reduce the potential impact of noise beyond the site boundary Regulatory and public perceptions considered as part of risk assessment
14C MNES		<ul style="list-style-type: none"> Marine offloading facilities Drilling operations Vessels 	Protected marine fauna Most sensitive species considered to be foraging turtles, migratory whales and dugong Available data indicate the Project area is not a critical habitat for protected marine fauna	Altered distribution of fauna due to avoidance of area during noisy construction activities (piling, dredging, drilling) Behavioural effects to protected marine fauna	Engineering noise controls on construction equipment	4	4	L	Reasonable level Uncertainties: Presence or absence of critical habitats for protected marine fauna Importance of the nearshore waters as migratory pathway or foraging area	Marine fauna survey to determine presence, distribution and seasonal variation Acoustic impact assessment		Likelihood of noise and vibration impacting marine fauna Nearshore environment considered to be the most sensitive habitat Regulatory and public perceptions considered as part of risk assessment

Reference column (Matters of National Environmental Significance)	Aspect (Stressor/Project Activity)	Project Component	Environmental Factor (Receptor)	Potential Impacts	Standard Controls	Likelihood	Consequence	Risk High Medium Low Very Low	Confidence Level	Proposed Studies	Primary Guidance Material (not intended to be inclusive)	Comments/Assumptions
15A	Groundwater abstraction Fresh water supply to the plant and accommodation	Water supply facilities for plant and accommodation camp	Flora and vegetation	Loss of groundwater dependent vegetation	Design criteria and monitoring of groundwater levels during operation	3	3	M	Low level Uncertainties: Groundwater and surface water hydrology Water supply option not defined – potential for groundwater supply or desalination plant or both Groundwater supply options Groundwater dependent vegetation	Characterise baseline groundwater hydrology and quality If the option of groundwater abstraction is selected, develop a regional conceptual ground water model for the water supply borefield Complete wet season flora baseline surveys (Level 2 surveys) to identify presence of significant flora species, vegetation communities, introduced species, threatened ecological communities	EPA Draft Guidance Statement No. 26	This risk assessment assumes groundwater abstraction at the site At this stage the source of the groundwater is unknown Risk assessment assumes a worst-case abstraction of groundwater from shallower sources
15B		Water supply facilities for plant and accommodation camp	Surface water	Alterations to surface water flow regimes and levels	Surface water (waste) discharge designs that reduce potential impacts	3	3	M	Low level Uncertainties: Groundwater and surface water hydrology. Water supply option not defined – potential for groundwater supply or desalination plant or both Groundwater supply options	Characterise baseline groundwater hydrology and quality If the option of groundwater abstraction is selected, develop a regional conceptual ground water model for the water supply borefield Intertidal and nearshore habitat baseline surveys	EPA Draft Guidance Statement No. 26 ANZECC/ARMCANZ 2000. Australian and New Zealand Guidelines for Fresh and Marine Water Quality	Risk assessment assumes groundwater abstraction at the site At this stage the groundwater source is unknown Assessment assumes worst - case potential impacts on river pools and critical habitats, and on invertebrates if present
15C		Water supply facilities for plant and accommodation camp	Subterranean fauna Limestone outcrops are located within the potential footprint of the project Water quality (salinity) is unknown and groundwater may be too saline to support stygofauna	Loss of habitat leading to loss of species	Design criteria and monitoring of groundwater levels during operation	3	3	M	Low level Uncertainties: Groundwater salinity Uncertainty about presence of rare species	Characterise baseline groundwater hydrology and quality and determine presence of subterranean fauna If the option of groundwater abstraction is selected, develop a regional conceptual ground water model for the water supply borefield	EPA Draft Guidance Statement No. 26 ANZECC/ARMCANZ 2000. Australian and New Zealand Guidelines for Fresh and Marine Water Quality Dangerous goods codes, DoW requirements on bunds	The assessment also assumes groundwater abstraction
16A	Spills and leaks • Large incident such as storage tank failure or leakage to groundwater	<ul style="list-style-type: none"> LNG plant Onshore pipelines Roads Accommodation camp 	Groundwater and surface water quality	Loss of beneficial use of groundwater resource	Chemical use, storage and handling procedures Vessel and secondary containment design criteria Clean-up response plans	3	3	M	Low level Uncertainties: Groundwater hydrology Chemical types and storage locations to be determined	Characterise baseline groundwater hydrology and quality If the option of groundwater abstraction is selected, develop a regional conceptual ground water model for the water supply borefield Key receptor baseline mapping	EPA Draft Guidance Statement No. 26 ANZECC/ARMCANZ 2000. Australian and New Zealand Guidelines for Fresh and Marine Water Quality	This assumes beneficial uses as well as an ecological value associated with the groundwater resources

Reference column (Matters of National Environmental Significance)	Aspect (Stressor/Project Activity)	Project Component	Environmental Factor (Receptor)	Potential Impacts	Standard Controls	Likelihood	Consequence	Risk High Medium Low Very Low	Confidence Level	Proposed Studies	Primary Guidance Material (not intended to be inclusive)	Comments/Assumptions
16B		<ul style="list-style-type: none"> LNG plant Onshore pipelines Roads Accommodation camp 	<p>Subterranean fauna</p> <p>Limestone outcrops are located within the potential footprint of the project</p> <p>Water quality (salinity) is unknown and groundwater may be too saline to support stygofauna</p>	Loss of subterranean fauna	<p>Chemical use, storage and handling procedures</p> <p>Vessel and secondary containment design criteria</p> <p>Clean-up response plans</p>	3	3	M	<p>Low level</p> <p>Uncertainties: Groundwater salinity</p> <p>Uncertainty about presence of rare species</p>	Characterise baseline groundwater hydrology and quality and determine presence of subterranean fauna.	EPA Draft Guidance Statement No. 26	For this risk assessment a conservative approach has been applied and assumes a worst case that rare subterranean fauna may be present
16C		<ul style="list-style-type: none"> LNG plant Onshore pipelines Roads Accommodation camp 	<p>Flora and fauna</p>	Loss of habitat or species	<p>Chemical use, storage and handling procedures</p> <p>Vessel and secondary containment design criteria</p> <p>Clean-up response plans</p>	3	4	L	<p>Reasonable level</p> <p>Uncertainties: Chemical types and storage locations to be determined</p>	Complete Level 2 flora baseline surveys to identify presence of significant flora species, vegetation communities, and introduced species within local and regional context (No threatened ecological communities are present)		Risk assessment assumes that effective storage and management measures will be in place.

APPENDIX 2: RELEVANT ACTS, POLICIES, GUIDELINES

State Legislation

Part V of the EP Act (1986) requires that Works Approvals and Environmental Licences are required for prescribed activities under the *Environmental Protection Regulations 1987*. No such approvals have yet been sought for the Project. The Project will be prescribed as Category 34 – Oil or Gas Refining.

The other key State legislation that is likely to apply to the Project, includes, but is not limited to:

- ◆ Aboriginal Heritage Act 1972
- ◆ Conservation and Land Management Act 1984
- ◆ Environmental Protection Act 1986
- ◆ Heritage of Western Australia Act 1990
- ◆ Land Administration Act 1997
- ◆ Local Government Act 1995
- ◆ Wildlife Conservation Act 1950
- ◆ Planning and Development Act 2005
- ◆ Petroleum Act 1967
- ◆ Rights in Water and Irrigation Act 1914
- ◆ Soil and Land Conservation Act 1945
- ◆ Petroleum (Submerged Lands) Act 1982

Commonwealth Legislation

In addition to the EPBC Act and Sea Dumping Act, there are other Commonwealth Acts and Regulations that apply to this proposal. The key Commonwealth legislation that applies to the Project includes, but is not limited to:

- ◆ Environment Protection and Biodiversity Conservation Act 1999
- ◆ Aboriginal and Torres Strait Islander Heritage Protection Act 1984
- ◆ Native Title Act 1993
- ◆ Australian Heritage Council Act 2003
- ◆ Offshore Petroleum and Greenhouse Gas Disposal Act 2006
- ◆ Protection of the Sea (Prevention of Pollution from Ships) Act 1983

Applicable Policies and Guidelines

A number of international treaties and conventions, Commonwealth and State policies, EPA position statements, EPA guidance statements, environmental guidelines and Codes of Practice are applicable to the Revised Proposal, including:

International

- ◆ Convention on Biological Diversity 1992 (ratified by Australia in 1993)
- ◆ United Nations Framework Convention on Climate Change and Kyoto Protocol

Commonwealth

- ◆ National Strategy for Ecologically Sustainable Development 1992
- ◆ Intergovernmental Agreement on the Environment 1992
- ◆ National Greenhouse Strategy 1998
- ◆ National Strategy for Conservation of Australia's Biological Diversity 1996

State

- ◆ Western Australia State Sustainability Strategy 2003
- ◆ Western Australia Greenhouse Strategy 2004
- ◆ 1987 State Conservation Strategy
- ◆ EPA Guidance Statement No. 12 – Guidance Statement for Minimising Greenhouse Gases
- ◆ EPA Guidance Statement No. 15 – Guidance Statement for Emissions of Oxides of Nitrogen from Gas Turbines
- ◆ EPA Guidance Statement No. 29 – Benthic Primary Producer Habitat Protection
- ◆ EPA Guidance Statement No. 33 – Environmental Guidance for Planning and Development - Part D Social Surrounds
- ◆ EPA Guidance Statement No. 41 – Assessment of Aboriginal heritage
- ◆ EPA Guidance Statement No. 51 – Terrestrial flora and vegetation surveys for Environmental Impact Assessment in Western Australia
- ◆ EPA Guidance Statement No. 54 – Consideration of subterranean fauna in groundwater and caves during environmental impact assessment in Western Australia
- ◆ EPA Guidance Statement No. 56 – Terrestrial fauna surveys for Environmental Impact Assessment in Western Australia
- ◆ EPA Position Statement No 7 – Principles of Environmental Protection
- ◆ EPA Position Statement No 2 – Environmental Protection of Native Vegetation in Western Australia
- ◆ EPA Position Statement No 3 – Terrestrial Biological Surveys as an Element of Biodiversity Protection
- ◆ DEC Pilbara Coastal Water Quality Consultation Outcomes: Environmental Values and Environmental Quality Objectives
- ◆ DEC State Water Quality Management Strategy No 6, Implementation Framework for Western Australia for the Australian and New Zealand Guidelines for Fresh and Marine Water Quality and Water Quality Monitoring and Reporting (Guidelines Nos 4 & 7: National Water Quality Management Strategy) .
 - State Planning Policy No 4.1 State Industrial Buffer Policy (WAPC 1997).
 - Coastal Protection Policy for Western Australia (DPI 2006)
 - Coastal Zone Management Policy for Western Australia (Draft) (WAPC 2001)

APPENDIX 3: EPBC PROTECTED MATTERS SEARCH

Table A3.1: EPBC Act Threatened and Migratory listed species that may occur within the potential areas of Project and supporting infrastructure*

Scientific Name	Common Name	EPBC Conservation Status	EPBC Migratory Listing
Birds			
<i>Apus pacificus</i>	Fork-tailed swift	Listed (over fly)	Migratory marine
<i>Ardea alba</i>	Great egret, white egret	Listed (over fly)	Migratory wetland/marine
<i>Ardea ibis</i>	Cattle egret	Listed (over fly)	Migratory wetland/marine
<i>Charadrius veredus</i>	Oriental plover, oriental dotterel	Listed (over fly)	Migratory wetland
<i>Glareola maldivarium</i>	Oriental pratincole	Listed (over fly)	Migratory wetland
<i>Haliaeetus leucogaster</i>	White-bellied sea eagle	Listed	Migratory terrestrial
<i>Hirundo rustica</i>	Barn swallow	Listed (over fly)	Migratory terrestrial
<i>Macronectes giganteus</i>	Southern giant petrel	Endangered	Migratory marine
<i>Merops ornatus</i>	Rainbow bee-eater	Listed (over fly)	Migratory terrestrial
<i>Numenius minutus</i>	Little curlew, little whimbrel	Listed (over fly)	Migratory wetland
<i>Puffinus pacificus</i>	Wedge-tailed shearwater	Listed	Migratory marine
<i>Sterna anaethetus</i>	Bridled tern	Listed	Migratory marine
<i>Sterna caspia</i>	Caspian tern	Listed	Migratory marine
Terrestrial Mammals			
<i>Dasyercus cristicauda</i>	Mulgara	Vulnerable	N/A
<i>Dasyurus hallucatus</i>	Northern quoll	Endangered	N/A
<i>Rhinonicteris aurantius (Pilbara form)</i>	Pilbara leaf-nosed bat	Vulnerable	N/A
Marine Mammals			
<i>Balaenoptera bonaerensis</i>	Antarctic minke whale	Cetacean	Migratory
<i>Balaenoptera edeni</i>	Bryde's whale	Cetacean	Migratory
<i>Balaenoptera musculus</i>	Blue whale	Endangered	Migratory
<i>Dugong dugon</i>	Dugong	Listed	Migratory
<i>Eubalaena australis</i>	Southern right whale	Endangered	Migratory
<i>Megaptera novaeangliae</i>	Humpback whale	Vulnerable	Migratory
<i>Orcinus orca</i>	Killer whale	Cetacean	Migratory
<i>Physeter macrocephalus</i>	Sperm whale	Cetacean	Migratory
<i>Sousa chinensis</i>	Indo-Pacific humpback dolphin	Cetacean	Migratory
<i>Tursiops aduncus</i>	Spotted bottlenose dolphin	Cetacean	Migratory
Terrestrial Reptiles			
<i>Liasis olivaceus barroni</i>	Olive Python (Pilbara subspecies)	Vulnerable	N/A
Marine Reptiles			
<i>Caretta caretta</i>	Loggerhead turtle	Endangered	Migratory
<i>Chelonia mydas</i>	Green turtle	Vulnerable	Migratory
<i>Dermochelys coriacea</i>	Leatherback turtle	Vulnerable	Migratory
<i>Eretmochelys imbricata</i>	Hawksbill turtle	Vulnerable	Migratory
<i>Natator depressus</i>	Flatback turtle	Vulnerable	Migratory
Fishes			
<i>Rhincodon typus</i>	Whaleshark	Vulnerable	Migratory

APPENDIX 4: STAKEHOLDER CONSULTATION

A4.1 Stakeholder Identification

The following stakeholders have been identified for the Project to date:

- ◆ State Government Departments
 - Pilbara Development Commission
 - Department of Commerce
 - Department of Environment and Conservation (including EPA Service Unit)
 - Department of Lands
 - Department for Mines and Petroleum
 - Department for Planning and Infrastructure
 - Department of Premier and Cabinet
 - Department of State Development
 - Department of Water
 - Department of Fisheries
 - Department of Health
 - Department of Indigenous Affairs (DIA)
 - Department of Education & Training
 - Environmental Protection Authority of WA
 - Heritage Council of WA
 - Fire and Emergency Services / Onslow State Emergency Services
 - Water Corporation
- ◆ Commonwealth Government Departments
 - Department of the Environment, Water, Heritage and the Arts
 - Department of Resources, Energy and Tourism
 - Department of Families, Housing, Community Services and Indigenous Affairs
 - Department of Foreign Affairs and Trade
 - Department of Prime Minister and Cabinet
- ◆ State and Commonwealth Ministers
- ◆ Native Title Holders
 - Thalanyji
- ◆ Native Title Claimants
 - Yaburara-Mardudhunera
 - Kuruma Marthudunera
 - Wong-Goo—Tt-Oo
- ◆ Other Indigenous Communities
 - Bindi Bindi
 - Jundaru Aboriginal Corporation (Peedamulla Station)
- ◆ eNGOs
 - WA Conservation Council
 - Greenpeace
 - Worldwide Fund for Wildlife
 - Cape Conservation Group
 - Greens WA
- ◆ Local Shires – Ashburton and Roebourne
- ◆ Community
 - Onslow -Chevron Onslow Community Reference Group
 - Karratha - Chevron Karratha Community Reference Group
 - Onslow Employment Project

- Old Onslow Committee
- Onslow Tourism & Progress Association
- Onslow Streetscape Committee
- Volunteer Marine Rescue Group Inc
- ◆ Regional bodies
 - Pilbara Industry Community Council
 - Pilbara Area Consultative Committee
 - Pilbara Division of General Practice
 - Royal Flying Doctors Service
- ◆ Local industry
 - Onslow Salt
 - BHP Billiton Petroleum
 - Ashburton Fisheries, KR Fisheries, Ausfish
 - Mindaroo Station (Murion Cattle Company)
 - Urala Station (BHP lease)
 - Northern Transport
- ◆ Tourism operators
 - Recreation eg Scubaroo Dive, Blue Horizon Fishing & Diving Charters, Whale Shark & Dive, Warrior Princess Charters, Mackerel Islands, Fly Fish Charters, Norwest Airwork
 - Accommodation providers: eg Beadon Bay Village, Sun Chalets, Ocean View, Club Thevenard, Beadon Bay Hotel, Ku'arlu Retreat, Onslow Mackerel, Nicki's restuarant
- ◆ Peak bodies
 - Chamber of Minerals and Energy of WA (CME)
 - Chamber of Commerce and Industry of WA (CCIWA)
 - Australian Petroleum Producers and Explorers Association (APPEA)
 - WA Fishing Industry Council
 - Pearl Producers Association

Table A5.1 provides a summary of the stakeholder consultation completed to date.

Table A5.1: Summary of Stakeholder Consultation Completed to Date

Purpose	Stakeholder	Category	Date	Meeting Location
Inform about Wheatstone Project decision	State Premier, State and Commonwealth Ministers, Departmental Heads.	State and Commonwealth Government	January to April 2008	Canberra and Perth
Convert Gorgon Reference Group into a Chevron Reference Group	Gorgon Reference Group members	Community	Feb 12, 08	Onslow
Project briefing	Onslow Community Reference Group (CRG)	Community	Mar 19, 08	Onslow
	Onslow Salt	Local Business	Apr 16, 08	Onslow
	Ashburton Shire Council meeting	Local Govt	Apr 15, 08	Onslow
Brief key stakeholders on site screening study outcomes	Chevron Community Reference Group	Community	Jul 8, 08	Onslow
	Thalanyji representatives	Native Title Claimants		
	Shire of Ashburton	Local Govt	Jul 15, 08	Paraburdoo
	Vince Catania	State Govt	Jul 16, 08	Onslow
	Shire of Roebourne	Local Govt	Jul 17, 08	Karratha
Project, site screening briefing	Beadon Creek Harbour Marine Advisory Committee	Local business/State Govt	July 29, 08	Onslow
Project Briefing	EPA SU, DEWHA, EPA Board	State and Commonwealth Government	Aug 20, 08 Sept 18, 08 Oct 30, 08	Perth and Canberra
Brief key stakeholders re environmental referral	Karratha CRG, Onslow CRG, Shires, key eNGOs	Community/local govt	Sep 8-12	By phone

Brief Cape Preston NT claimants on site screening study outcomes	Yaburara / Mardudhunera Wonn-Goo-Tt-Oo Pilbara Native Title Service (for Kuruma Marthudunera)	Native Title Claimants	Sept 9-0	Roebourne/ Karratha
Detailed site screening study and environmental referral briefing	Karratha CRG members	Community/local govt	Oct 7, 08	Karratha
Project update	Belinda Robinson, Exec Director, APPEA	Peak bodies	Oct 14-16, 08	Perth, Karratha and Canberra
	State and Commonwealth Ministers, Departmental Heads	State and Commonwealth Government		
Project Schedule & Timing	EPA Service Unit	State Government	Nov 6	Perth
Project overview and site comments	Onslow and districts public	Community	Nov 18	Onslow
Project overview and site comments	Karratha and districts public	Community	Nov 19	Karratha
Pilbara Perspectives – Project and site screening overview and site ranking workshop	Select Karratha and Onslow stakeholders (representing education, health, Ashburton and Roebourne Shires, Karratha and Onslow communities, local industries and , Pilbara Project Commission)	Community	Nov 26	Onslow
Project overview and site selection process comments	Select Govt stakeholders (DEC, Fisheries Dept, EPA, DoIR, DPI. Note: Conservation Council of WA failed to respond to numerous invitations and WWF declined to attend.)	State Govt	Dec 3	Perth
Consultation on sites	Thalanyji	Native Title Holders	Dec 5	Onslow
Discussions on fishing industry operations around Onslow and potential impacts	Dept of Fisheries (Research Branch) WA Fishing Industry Council WA Pearling Industry Association Ashburton Fisheries	State Govt Peak Body Peak Body Local Industry	Dec 10	Perth
Discussion on proposed terrestrial ecological surveys	DEC	State Government	Dec 12	Perth

Inform key stakeholders about site selection decision	Onslow Community Reference Group members	Community	Dec 18-19	Onslow
Joint meeting with Gorgon Project	World Wildlife Fund, Conservation Council of Western Australia	ENGOS (Environmental Non-Government Organizations)	Jan 30	Perth
Overview of environmental, social and health impact assessment of Wheatstone Project and risk-based scoping	WA Department of Health	State Government	Feb 9	Perth
Risk-based Scoping Workshop – Intro to process and Chevron’s application	Government stakeholders (EPA Service Unit, DEC, Health, Fisheries, DIA)	State Government	Feb 17	Perth
Project overview and risk-based scoping	Department of the Environment, Water, Heritage and the Arts	Commonwealth Government	Feb 26	Canberra
Risk-based Scoping Workshop 2 – draft risk ranking tables	Government stakeholders (EPA SU, DEC, Health, DSD, Water)	State Government	March 4	Perth
Overview of emission impacts, air quality modelling, and monitoring	Dept of Environment and Conservation Air Quality Management	State Government	March 11	Perth
Discussion of groundwater and water source investigations	Dept of Water	State Government	March 12	Perth
Risk-based Scoping Workshop 3 – draft Scoping Document	Government stakeholders (EPASU, DEC, Health, DSD)	State Government	March 16	Perth

APPENDIX 5: DEWHA GUIDELINES FOR PREPARATION OF EIS/ERMP



Australian Government

Department of the Environment, Water, Heritage and the Arts

**GUIDELINES FOR THE CONTENT OF A DRAFT
ENVIRONMENTAL REVIEW AND MANAGEMENT
PROGRAMME/ENVIRONMENT IMPACT STATEMENT**

Construction and Operation of LNG and Domestic Gas Plant and Onshore
and Offshore facilities, State and Commonwealth Waters, Pilbara Coast,
WA

Environment Protection and Biodiversity Conservation Act 1999
(Reference: 2008/4469)

PREAMBLE

Chevron Pty Ltd (Chevron) proposes to develop the Wheatstone gas field within the Carnarvon Basin, approximately 200km north of Onslow and 100km from Barrow Island. The project encompasses upstream and downstream facilities. The facilities are expected to operate for a period of 30 years or more.

The key components of the offshore upstream facilities will include:

- Drilling of wells in Permit WA_253-P (ranging from 8 to 12 wells) and Permit 17-R (ranging from 4 to 6 wells)
- Installation and operation of a subsea gathering system
- Installation and operation of gas processing and wellhead platforms;
- Offshore compression equipment (required during the later stages of field life)
- Installation and operation of two export pipelines.

The key components of the onshore LNG plant downstream facilities will include:

- Processing of reservoir fluid to separate the hydrogen gas, hydrocarbon liquid, and water streams
- Pre-treatment of the gas stream to remove acid gases (such as carbon dioxide), water and other contaminants
- LNG trains to liquefy the gas to produce liquefied natural gas
- A Nitrogen Reinjection Unit for removal of nitrogen from the raw liquefied natural gas product
- LNG storage and loading facilities
- Domestic gas plant
- Water management
- Condensate stabilization and storage
- LNG and condensate tanks and facilities including loading lines either over a jetty or by subsea lines to an offshore loading facility
- Port facilities including; jetties, material offloading facilities (either as an inland harbor or part of the offshore harbour)
- Navigational channel and turning basin
- Supporting infrastructure including: airport or upgrade of existing airports, access roads, supply base, construction camp, drainage and waste water treatment, solid waste management facilities, temporary lay-down areas for construction, accommodation blocks for operations personnel, utilities such as power and water supply, storage facilities, use of rock for site preparation and pipeline stabilisation.

The proposal was referred under the *Environment Protection and Biodiversity Conservation Act 1999* (the EPBC Act) to the Minister for the Environment, Heritage and the Arts on 23 September 2008. A delegate for the Minister determined on 22 October 2008 that approval is required under the EPBC Act, and that it will be assessed by Environmental Impact Statement (EIS).

The proposed action has the potential to have a significant impact on the following matters of national environmental significance (NES) that are protected under Part 3 of the EPBC Act.

- Listed threatened species and communities (sections 18 & 18A)
- Listed migratory species (sections 20 & 20A)
- Commonwealth marine areas (section 23 & 24A)

Information about the action and its relevant impacts, as outlined below, is to be provided in the EIS. This information should be sufficient to allow the Minister to make an informed decision on whether or not to approve, under Part 9 of the EPBC Act, the taking of the action for the purposes of each controlling provision.

GENERAL ADVICE ON GUIDELINES

1 GENERAL CONTENT

The EIS should be a stand-alone document that primarily focuses on the matters listed above. It should contain sufficient information to avoid the need to search out previous or supplementary reports.

The EIS should enable interested stakeholders and the Minister for the Environment, Heritage and the Arts to understand the environmental consequences of the proposed development. Information provided in the EIS should be objective, clear, and succinct and, where appropriate, be supported by maps, plans, diagrams or other descriptive detail. The body of the EIS is to be written in a clear and concise style that is easily understood by the general reader. Technical jargon should be avoided wherever possible. Cross-referencing should be used to avoid unnecessary duplication of text.

Detailed technical information, studies or investigations necessary to support the main text should be included as appendices to the EIS. It is recommended that any additional supporting documentation and studies, reports or literature not normally available to the public from which information has been extracted be made available at appropriate locations during the period of public display of the EIS. The proponent should make the EIS available on the Internet.

If it is necessary to make use of material that is considered to be of a confidential nature, the Proponent should consult with Department of the Environment, Water, Heritage and the Arts on the preferred presentation of that material, before submission to the Minister for approval for publication.

The level of analysis and detail in the EIS should reflect the level of significance of the expected impacts on the environment. Any and all unknown variables or assumptions made in the assessment must be clearly stated and discussed. The extent to which the limitations, if any, of available information may influence the conclusions of the environmental assessment should be discussed.

The proponent should ensure that the EIS addresses the matters stated in Schedule 4 of the EPBC Regulations *Matters to be addressed by draft Environmental Impact Statement at Attachment 1*.

2 FORMAT AND STYLE

The EIS should comprise three elements, namely:

- the executive summary;
- the main text of the document, and
- appendices containing detailed technical information and other information that can be made publicly available.

The guidelines have been set out in a manner that may be adopted as the format for the EIS. This format need not be followed where the required information can be more effectively presented in an alternative way. However, each of the elements must be addressed to meet the requirements of the EPBC Act and Regulations.

The EIS should be written so that any conclusions reached can be independently assessed. To this end all sources must be appropriately referenced using the Harvard standard. The reference list should include the address of any Internet "web" pages used as data sources.

The main text of the EIS should include a list of abbreviations, a glossary of terms and appendices containing:

- a copy of these guidelines;
- a list of persons and agencies consulted during the EIS;
- contact details for the Proponent; and
- the names of, and work done by the persons involved in preparing the EIS .

Maps, diagrams and other illustrative material should be included in the EIS . The EIS should be produced on A4 size paper capable of being photocopied, with maps and diagrams on A4 or A3 size and in colour where possible.

The proponent should consider the format and style of the document appropriate for publication on the Internet. The capacity of the website to store data and display the material may have some bearing on how the document is constructed.

Information about species listed under the EPBC Act should be provided in electronic format to DEWHA. The provision of this information will help facilitate decision making under the EPBC Act and assist in the protection and recovery of species and communities.

SPECIFIC CONTENT

1 GENERAL INFORMATION

This should provide the background and context of the action including:

- (a) the title of the action;
- (b) the full name and postal address of the designated Proponent;
- (c) a clear outline of the objective of the action;
- (d) legislative background for the proposal, including the NES matters protected under Part 3 of the EPBC Act and any other requirements and approvals needed under the EPBC Act;
- (d) the location of the action;
- (e) the background to the development of the action;
- (f) how the action relates to any other actions (of which the proponent should reasonably be aware) that have been, or are being, taken or that have been approved in the region affected by the action;
- (g) the current status of the action; and
- (h) the consequences of not proceeding with the action.

2 DESCRIPTION OF THE ACTION

All construction components of the action, should be described in detail. This should include the precise location of all works to be undertaken, structures to be built or elements of the action that may have impacts on matters of national environmental significance.

The above information must include details on how the works are to be undertaken (including stages of development and their timing) and design parameters for those aspects of the structures or elements of the action that may have relevant impacts.

3 FEASIBLE ALTERNATIVES

Any feasible alternatives to the action to the extent reasonably practicable, including:

- (a) if relevant, the alternative of taking no action;
- (b) a comparative description of the impacts of each alternative on the NES matter protected by Part 3 of the EPBC Act; and
- (c) sufficient detail to make clear why any alternative is preferred to another.

Short, medium and long-term advantages and disadvantages of the options should be discussed.

4 DESCRIPTION OF THE ENVIRONMENT

A description of the environment of the proposal site and the surrounding areas that may be affected by the action must be provided.

- (a) Listed threatened and migratory species (including marine species) that are likely to be present in the vicinity of the proposal should be identified and the following information provided.
 - Baseline data on listed threatened and migratory species that may be present in the vicinity of the proposal including regional status, population size and distribution within the project site and adjacent habitat that may be impacted by the project.
 - Details of the scope, timing (survey season/s) and methodology for studies or surveys undertaken to provide information and baseline data on the listed threatened and migratory species and their habitat in and surrounding the site. These details must be determined in consultation with recognised experts for the listed threatened and migratory species.
 - Baseline data and details as mentioned above regarding any additional listed threatened and migratory species which may be impacted by the proposal and which were listed after the making of these draft EIS Guidelines.

- (b) Develop and undertake a Sampling and Analysis Plan (SAP) to determine suitability and characteristics of dredge spoil.
 - Ensure the SAP and the SAP Report are developed in accordance with the National Assessment Guidelines for Dredging (NAGD 2009).
- (c) Develop and undertake additional offshore disposal site selections for dredge material in accordance with the National Assessment Guidelines for Dredging (NAGD 2009).
- (d) A description of the Commonwealth Marine environment that is likely to be impacted by the proposal, including but not restricted to:
 - significant regional habitat for listed threatened and migratory marine species.

5 RELEVANT IMPACTS

- (a) The EIS must include a description of all the potential relevant impacts of the action on the ecology, hydrology and geomorphology of the project area as it relates to the NES matters protected under Part 3 of the EPBC Act, including but not restricted to:
 - a detailed assessment, developed in consultation with appropriate recognised experts, of the nature and extent of the likely short-term, long-term and consequential relevant impacts on all relevant NES matters.
 - the Commonwealth marine environment such as:
 - i. the potential direct, indirect and consequential impacts on regional habitat and the Commonwealth marine environment;
 - ii. impacts on other users of the area;
 - iii. the potential impacts on important amenities, navigation, culturally and historically significant sites, threatened or migratory species or sensitive habitats;
 - iv. potential impact on listed marine species;
 - v. the potential risk of pest species becoming established in the Commonwealth marine area;
 - vi. changes in air and water quality.
 - a statement whether any relevant impacts are likely to be unknown, unpredictable or irreversible;
 - analysis of the significance of the relevant impacts; and
 - any technical data and other information used or needed to make a detailed assessment of the relevant impacts.

6 PROPOSED SAFEGUARDS AND MITIGATION MEASURES

The EIS must provide information on mitigation measures, with a particular focus on matters protected under Part 3 of the EPBC Act. Specific and detailed measures must be provided and substantiated, based on best available practices and must include the following elements.

- (a) A consolidated list of mitigation measures proposed to be undertaken to prevent, minimise or compensate for the relevant impacts of the action, including:
 - a description of proposed safeguards and mitigation measures to deal with relevant impacts of the action including mitigation measures proposed to be taken by State governments, local governments or the proponent;
 - assessment of the expected or predicted effectiveness of the mitigation measures;
 - any statutory or policy basis for the mitigation measures; and
 - the cost of the mitigation measures.
- (b) A detailed Environmental Management Plan (EMP) that sets out the framework for management, mitigation and monitoring of relevant impacts of the action, including any provisions for independent environmental auditing.

The EMP needs to address the construction phase. It must state the environmental objectives, performance criteria, monitoring, reporting, corrective action, responsibility and timing for each environmental issue.

The EMP should also describe contingencies for events that may impact on the proposal.

- (c) The name of the agency/s responsible for endorsing or approving each mitigation measure or monitoring program.

7 OTHER APPROVALS AND CONDITIONS

Information given on any other requirements for approval or conditions that apply, or that the Proponent reasonably believes are likely to apply, to the proposed action must include:

- (a) details of any local or State Government planning scheme, or plan or policy under any local or State Government planning system that deals with the proposed action, including:
 - what environmental assessment of the proposed action has been, or is being, carried out under the scheme, plan or policy; and
 - how the scheme provides for the prevention, minimisation and management of any relevant impacts;
- (b) a description of any approval that has been obtained from a State, Territory or Commonwealth agency or authority (other than an approval under the Act), including any conditions that apply to the action;
- (c) a statement identifying any additional approval that is required; and
- (d) a description of the monitoring, enforcement and review procedures that apply, or are proposed to apply, to the action.

8 CONSULTATION

Any consultation about the action, including:

- (a) any consultation that has already taken place;
- (b) proposed consultation about relevant impacts of the action;
- (c) if there has been consultation about the proposed action, any documented response to, or result of, the consultation; and
- (d) identification of affected parties, including a statement mentioning any communities that may be affected and describing their views.

9 INFORMATION SOURCES PROVIDED IN THE EIS

For information given in a draft Environmental Impact Statement, the draft must state:

- (a) the source of the information;
- (b) how recent the information is;
- (c) how the reliability of the information was tested; and
- (e) what uncertainties (if any) are in the information.

10 ENVIRONMENTAL RECORD OF PERSON(S) PROPOSING TO TAKE THE ACTION

Details of any proceedings under a Commonwealth, State or Territory law for the protection of the environment or the conservation and sustainable use of natural resources against:

- (a) the person proposing to take the action; and
- (b) for an action for which a person has applied for a permit, the person making the application.

If the person proposing to take the action is a corporation, also include details of the corporation's environmental policy and planning framework.

11 CONCLUSION

An overall conclusion as to the environmental acceptability of the proposal should be provided, including discussion on compliance with principles of ESD and the objects and requirements of the EPBC Act. Reasons justifying undertaking the proposal in the manner proposed should also be outlined.

Measures proposed or required by way of offset for any unavoidable impacts on NES matters, and the relative degree of compensation, should be highlighted.

ATTACHMENT 1

MATTERS THAT MUST BE ADDRESSED IN A ERMP AND EIS (SCHEDULE 4 OF THE EPBC ACT REGULATIONS 2000)

1 General information

1.01 The background of the action including:

- (a) the title of the action;
- (b) the full name and postal address of the designated Proponent;
- (c) a clear outline of the objective of the action;
- (d) the location of the action;
- (e) the background to the development of the action;
- (f) how the action relates to any other actions (of which the Proponent should reasonably be aware) that have been, or are being, taken or that have been approved in the region affected by the action;
- (g) the current status of the action; and
- (h) the consequences of not proceeding with the action.

2 Description

2.01 A description of the action, including:

- (a) all the components of the action;
- (b) the precise location of any works to be undertaken, structures to be built or elements of the action that may have relevant impacts;
- (c) how the works are to be undertaken and design parameters for those aspects of the structures or elements of the action that may have relevant impacts;
- (d) relevant impacts of the action;
- (e) proposed safeguards and mitigation measures to deal with relevant impacts of the action;
- (f) any other requirements for approval or conditions that apply, or that the Proponent reasonably believes are likely to apply, to the proposed action;
- (g) to the extent reasonably practicable, any feasible alternatives to the action, including:
 - (i) if relevant, the alternative of taking no action;
 - (ii) a comparative description of the impacts of each alternative on the matters protected by the controlling provisions for the action; and
 - (iii) sufficient detail to make clear why any alternative is preferred to another;
- (h) any consultation about the action, including:
 - (i) any consultation that has already taken place;
 - (ii) proposed consultation about relevant impacts of the action; and
 - (iii) if there has been consultation about the proposed action — any documented response to, or result of, the consultation; and
- (i) identification of affected parties, including a statement mentioning any communities that may be affected and describing their views.

3 Relevant impacts

3.01 Information given under paragraph 2.01(d) must include

- (a) a description of the relevant impacts of the action;
- (b) a detailed assessment of the nature and extent of the likely short term and long term relevant impacts;
- (c) a statement whether any relevant impacts are likely to be unknown, unpredictable or irreversible;
- (d) analysis of the significance of the relevant impacts; and
- (e) any technical data and other information used or needed to make a detailed assessment of the relevant impacts.

4 Proposed safeguards and mitigation measures

4.01 Information given under paragraph 2.01(e) must include:

- (a) a description, and an assessment of the expected or predicted effectiveness of, the mitigation measures;
- (b) any statutory or policy basis for the mitigation measures;
- (c) the cost of the mitigation measures;
- (d) an outline of an environmental management plan that sets out the framework for continuing management, mitigation and monitoring programs for the relevant impacts of the action, including any provisions for independent environmental auditing;
- (e) the name of the agency responsible for endorsing or approving each mitigation measure or monitoring program; and
- (f) a consolidated list of mitigation measures proposed to be undertaken to prevent, minimise or compensate for the relevant impacts of the action, including mitigation measures proposed to be taken by State governments, local governments or the Proponent.

5 Other Approvals and Conditions

5.01 Information given under paragraph 2.01(f) must include:

- (a) details of any local or State government planning scheme, or plan or policy under any local or State government planning system that deals with the proposed action, including:
 - (i) what environmental assessment of the proposed action has been, or is being carried out under the scheme, plan or policy; and
 - (ii) how the scheme provides for the prevention, minimisation and management of any relevant impacts;
- (b) a description of any approval that has been obtained from a State, Territory or Commonwealth agency or authority (other than an approval under the Act), including any conditions that apply to the action;
- (c) a statement identifying any additional approval that is required; and
- (d) a description of the monitoring, enforcement and review procedures that apply, or are proposed to apply, to the action.

6 Environmental record of person proposing to take the action

6.01 Details of any proceedings under a Commonwealth, State or Territory law for the protection of the environment or the conservation and sustainable use of natural resources against:

- (a) the person proposing to take the action; and

(b) for an action for which a person has applied for a permit, the person making the application.

6.02 If the person proposing to take the action is a corporation — details of the corporation's environmental policy and planning framework.

7 Information sources

7.01 For information given the ERMP/EIS must state:

- (a) the source of the information; and
- (b) how recent the information is; and
- (c) how the reliability of the information was tested; and
- (d) what uncertainties (if any) are in the information.