

Referral of proposed action

Project title	Gorgon Gas Development Revised Proposal, Western Australia
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1 Contacts

1.1 **Referring party**

Person, agent or agency who is making the referral
Chevron Australia Pty Ltd (Chevron Australia) is the operator for the Approved Gorgon Gas Development and for the Revised Proposal (on behalf of Chevron Australia Pty Ltd, Chevron (TAPL) Pty Ltd, Shell Development (Australia) Proprietary Limited and Mobil Australia Resources Company Pty Limited).

Chevron Australia is the referring party. The contact person at Chevron Australia for the Revised Proposal is:
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julia.martin@chevron.com

1.2 **Responsible party**

Person responsible for or who will carry out the proposed action.
If same as 1.1, write 'as above'
Mr Colin Beckett, (General Manager, Greater Gorgon Area) on behalf of Chevron Australia Pty Ltd, as the operator for the Approved Gorgon Gas Development and for the Revised Proposal (on behalf of Chevron Australia Pty Ltd, Chevron [TAPL] Pty Ltd, Shell Development [Australia] Proprietary Limited and Mobil Australia Resources Company Pty Limited).

1.3 **Proponent**

Person responsible for preparing assessment documentation, if approval is required. If same as 1.2, write 'as above'
As above

2 Summary of proposed action

2.1	Short description	<p>Chevron Australia was granted approval for the 10 MTPA Gorgon Gas Development by the Western Australian Minister for the Environment on 6 September 2007 (Ministerial Implementation Statement No. 748) and the Commonwealth Minister for the Environment on 3 October 2007 (EPBC Reference: 2003:1294) (“Approved Gorgon Gas Development” or “Approved Development”).</p> <p>Chevron Australia has revised the Approved Development, and now seeks approval to enable production to be expanded from 10 MTPA to 15 MTPA, as well as changes to other development components. Collectively these changes are the “Gorgon Gas Development Revised Proposal” or “Revised Proposal” and are the subject of this referral. The Revised Proposal is an alteration of the Approved Development and includes the following principal alterations to the Approved Development:</p> <ul style="list-style-type: none"> i. the installation of an additional 5 MTPA LNG train; ii. the re-configuration of the Marine Offloading Facility (MOF) to reduce the need for drilling and blasting hard rock in the nearshore area off Town Point; and iii. disturbance of additional areas for carbon dioxide (CO₂) injection to accommodate an accelerated rate of reservoir CO₂ injection. 																	
2.2	Latitude and longitude	<table border="1"> <thead> <tr> <th>Location</th> <th>Longitude</th> <th>Latitude</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>115.30438</td> <td>-20.66389</td> </tr> <tr> <td>2</td> <td>115.51604</td> <td>-20.66389</td> </tr> <tr> <td>3</td> <td>115.51604</td> <td>-20.89675</td> </tr> <tr> <td>4</td> <td>115.30438</td> <td>-20.89675</td> </tr> </tbody> </table>	Location	Longitude	Latitude	1	115.30438	-20.66389	2	115.51604	-20.66389	3	115.51604	-20.89675	4	115.30438	-20.89675		<p>Geocentric Datum of Australia 1994, Decimal Degrees Figure 1 in Appendix 1 shows the regional location of the Gorgon Gas Development.</p>
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2.3	Locality	<p>Barrow Island is located approximately 70 km off the north-west coast of Western Australia (WA) (Appendix 1, Figure 1). The Gorgon Gas Development Gas Treatment Plant will be located on the east coast of Barrow Island at Town Point, with related infrastructure located at a small number of other locations on the Island (Appendix 1, Figure 2). The Gorgon Gas Development marine facilities will be located within the Port of Barrow Island and extend offshore from Town Point (Appendix 1, Figure 3).</p>																	

2.4 **Size of the development footprint or work area (hectares)**

Approved Development Context

The Approved Gorgon Gas Development was expected to disturb 300 ha during its construction phase, with a lesser land take during the operations phase (during which phase a portion of the 300 ha would be marked for use for future expansion or alternatively rehabilitated) During the environmental impact assessment for the Approved Gorgon Gas Development, and as stated in the Environmental Impact Statement/Environmental Review and Management Programme (EIS/ERMP) (Chevron Australia 2005), the full extent of the likely impact on the available 300 ha on Barrow Island was assessed.

Revised Proposal Context

The Gorgon Gas Development Revised Proposal will involve additional long-term utilisation of 38.6 ha more than the Approved Development. (This represents an additional ~13% of the total available 300 ha which was assessed for the Approved Gorgon Gas Development.) This additional land use occurs as a result of the expanded Gas Treatment Plant, the additional CO₂ injection infrastructure and pressure relief well infrastructure. The expanded use of explosives for CO₂ seismic data acquisition will not result in additional land disturbance.

There will be some additional direct disturbance to the seabed associated with the proposed increase in length of the causeway and MOF, and the revised shape of the LNG turning basin and berthing arrangement. These increases are to be kept to the minimum required for safe operational purposes. The Revised Proposal is estimated to result in approximately 7-8 ha more permanent seabed disturbance than the Approved Gorgon Gas Development marine facilities, taking the cumulative sea-bed disturbance from approximately 233 ha to 241 ha. This represents an increase in seabed disturbance as a result of the Revised Proposal of about 3-3.5% more than the Approved Development.

2.5	Street address of the site	Barrow Island is located approximately 70 km off the north-west coast of WA, in State Territorial waters.
2.6	Lot description	Barrow Island is located approximately 70 km off the north-west coast of WA.
2.7	Local Government Area and Council contact (if known)	Shire of Ashburton Keith Pearson (CEO) Administration Centre Poinciana St, TOM PRICE WA 6751 Ph: (08) 9188 4444 Email: soa@ashburton.wa.gov.au

2.8	Project life		Construction of the Gorgon Gas Development is planned to commence in 2009 (for already approved components of the original 2x5 MTPA LNG train Gorgon Gas Development). The Revised Gas Treatment Plant and marine facilities (LNG Jetty and MOF) are also planned to commence construction in 2009 (subject to approval). The LNG trains will be constructed in sequence; with each train anticipated to be commissioned at six monthly intervals over an 18 month period. The production facilities are expected to have a life of at least 60 years.
2.9	Alternatives		No
		X	Yes, complete section 3.2
2.10	State assessment		No
		X	Yes, complete Section 3.5
2.11	Component of larger action		No
		X	Yes, complete Section 3.6

3 Detailed project description

3.1 Description of proposal

The Revised Proposal is an alteration of the Approved Development and includes the following principal alterations to the Approved Development:

- (i) the installation of an additional 5 MTPA LNG train;
- (ii) the re-configuration of the MOF to reduce the need for drilling and blasting hard rock in the nearshore area off Town Point; and
- (iii) disturbance of additional areas for CO₂ injection to accommodate an accelerated rate of reservoir CO₂ injection

The details of the Revised Proposal are indicated in table 1 Appendix 2, Figure 4 & Figure 5 and Figure 6. Figure 6 provides a close up of the revised design for the marine facilities (predominantly the Causeway/MOF and LNG Jetty). A comparison of Greenhouse Gas Emissions between the Revised Proposal and the Approved Development are contained in Table 2 (Appendix 2) for information.

3.2 Alternative locations, time frames or activities that form part of the referred action

Location

The Approved Gorgon Gas Development received Western Australian and Commonwealth environmental approval for the development of a Gas Treatment Plant near Town Point on Barrow Island. The installation and operation of the Revised Proposal third LNG train will also occur at this location. The Barrow Island location is a necessity to enable disposal of reservoir CO₂ by geosequestration, as described in the Gorgon Gas Development EIS/ERMP (Chevron Australia, 2005).

Marine Facilities

Marine geophysical and geotechnical information acquired during front-end engineering and design (FEED) phase of the Approved Gorgon Gas Development indicates that the rock substrate in the vicinity of the MOF is significantly harder and more extensive than previous data indicated, and would result in approximately 500,000 m³ of drill and blast material. Chevron Australia is concerned about the environmental and schedule impacts of such a program and has therefore revised, and now seeks approval for, a design of the MOF to reduce the level of impact. Evaluation of re-design opportunities, taking into account environmental impacts (construction and operation phases), safety, accessibility and functionality has rendered a revised design which comprises a modified orientation and longer MOF structure, and a reduced length of the dredged access channel. The proposed extension to the MOF structure into deeper water reduces the need for

significant drilling and blasting of the MOF access channel in the nearshore marine area off Town Point.

By extending the length of the MOF and causeway, the total length of the LNG Jetty will be reduced from approximately 2.7 km to 2.1 km. The orientation of the jetty will also be modified slightly to align with the revised MOF structure. The jetty re-alignment has the added benefit of now avoiding an area of coral that previously was within the Approved Development jetty footprint (refer to Figure 6 in Appendix 1).

3.3 Previously considered alternatives and the 'do nothing' case

Number and Size of LNG Trains

The addition of one 5 MTPA LNG processing train (to take total processing capacity from 10 MTPA to 15 MTPA) is necessary for the foundation Gorgon Gas Development from an economic feasibility perspective. The Approved Gorgon Gas Development EIS/ERMP was prepared in respect of 10 MTPA processing capacity. (The EIS/ERMP indicated that additional LNG trains (ie more than 2 x 5 MTPA trains) and associated infrastructure were being considered for future development, but these additional trains were not assessed or approved (Chevron Australia 2005).)

It is now proposed to increase the capacity of the Gas Treatment Plant by installing one additional 5 MTPA LNG train at foundation, increasing the number of LNG trains from two to three, to increase production capacity from 10 MTPA to 15 MTPA. Alternatives considered included increasing the capacity of the two Approved Development trains to approximately 7.5 MTPA. Uncertainty regarding this technology drove the decision to the 3x5 MTPA LNG trains Revised Proposal.

Marine Facilities

As described in Section 3.2, the alternative to changing the MOF configuration is to continue with the Approved Development design (as described in the EIS/ERMP (Chevron Australia, 2005)), which would entail an extensive drilling and blasting program over an estimated period of 15-22 months.

The 'do nothing case'

A 'defer or not develop' alternative was discussed in the Approved Development EIS/ERMP. The primary impact of not developing is lost economic benefits to nation, state and region.

3.4 Context, planning framework and state/local government requirements

Historical context

In early 2002, the Government of Western Australia determined that a strategic level evaluation of the proposed (now approved) Gorgon Gas Development was required to allow it to make an informed decision on whether to provide in-principle approval for the restricted use of Barrow Island for a Gas Treatment Plant.

This evaluation consisted of an Environmental, Social and Economic Review (ESE Review) which was submitted for Government consideration in February 2003. The Western Australian Government sought advice on environmental matters from the Western Australian Environmental Protection Authority (EPA) and social, economic and strategic aspects of the plan from the Western Australian Department of Industry and Resources. Advice was also sought from the Conservation Commission of Western Australia, with whom the Barrow Island Nature Reserve is vested.

In principle approval for the Gorgon Gas Development was granted by the Western Australian Government in August 2003. This in principle support for the proposed Gorgon Gas Development is expressed in the Gorgon Gas Processing and Infrastructure Project Agreement and its ratifying Act, the *Barrow Island Act 2003* (WA), which was promulgated on 20 November 2003.

The Gorgon Gas Development was referred for environmental impact assessment to the Commonwealth Government (under the EPBC Act) and the State Government (under the *Environmental Protection Act* (EP Act)) in November 2003. The Gorgon Gas Development was subsequently assessed through a parallel Commonwealth Environmental Impact Statement and State Environmental Review and Management Programme (EIS/ERMP) process (Chevron Australia 2005).

Environmental approval for the Gorgon Gas Development was issued by the State Minister for the Environment on 6 September 2007 (Ministerial Implementation Statement No. 748) and the Commonwealth Minister on 3 October 2007 (EPBC Reference: 2003:1294). Both approvals contain a substantial set of conditions.

The Approved Gorgon Gas Development comprises a range of offshore and onshore components to recover gas from the Gorgon gas field (located off the north-west coast of WA) and to process gas at, and ship it from, a Gas Treatment Plant on Barrow Island.

Current context

Chevron Australia is referring the Gorgon Gas Development Revised Proposal to seek approval to enhance production from the Approved Gorgon Gas Development from 10 MTPA to 15 MTPA. By developing three x 5 MPTA LNG trains the Gorgon Gas Development will generate more clean-burning natural gas sooner in a rapidly growing global energy market, and lead to greater community benefit. The other elements proposed as part of the Gorgon Gas Development Revised Proposal are summarised in Appendix 2, Table 1.

The *Barrow Island Act 2003* (Barrow Island Act) and Gorgon Gas Processing and Infrastructure Agreement (the State Agreement) document the undertakings between the Gorgon Joint Venture and the State Government resulting from the ESE Review process and the granting of in-principle access to Barrow Island. A wide range of conditions and obligations are stipulated in the State Agreement. Two key Project approvals required under the Barrow Island Act and State Agreement include the approval to inject CO₂ and approval of the Project's 16 Development Proposals.

3.5 Environmental impact assessments under Commonwealth, state or territory legislation

Environmental Impact Assessments

Approved Development Context

The Approved Gorgon Gas Development was assessed by the Commonwealth and State at the EIS and ERMP level of assessment, respectively. Chevron Australia was granted approval for the 10 MTPA Gorgon Gas Development by the Western Australian Minister for the Environment on 6 September 2007 (Ministerial Implementation Statement No. 748) and the Commonwealth Minister for the Environment on 3 October 2007 (EPBC Reference: 2003:1294) ("Approved Development"). Even though the Final EIS/ERMP (Chevron Australia, 2006) was prepared in respect of the Approved Development, much of the information in that assessment remains relevant for considering impacts from the Revised Proposal because the environmental values and impacts and associated with the Approved Development and the Revised Proposal are the same.

Revised Proposal Context

The WA EPA determined on the 12 March 2008 that the Revised Proposal will be assessed via Public Environmental Review with an 8 week public review period.

The Revised Proposal will also be subject to further assessment under Part V of the WA *Environmental Protection Act 1986*, because some the facilities which will be part of the project (regardless of whether it proceeds as the Approved Development or the Revised Proposal) will be classified as "prescribed premises" and therefore require works approvals and licences.

Stakeholder consultation

Approved Development Context

Stakeholder consultation for the Approved Gorgon Gas Development commenced early in 2002 and continued throughout the EIS/ERMP environmental assessment process. A broad range and diverse cross-section of government, industry and community representatives were involved in this process.

Revised Proposal Context

For the Gorgon Gas Development Revised Proposal, a number of preliminary discussions and meetings have been held with the State Premier, the Minister for State Development, the Minister for the Environment, the EPA, the EPA Service Unit, the Department of Environment and Conservation (DEC), the Department of Industry and Resources, the Commonwealth Department of the Environment, Water, Heritage and the Arts and the Commonwealth Department of Resources, Energy and Tourism. Chevron Australia has also held briefings with key Indigenous stakeholders and communities in the Pilbara region and will be re-establishing community reference groups in the Pilbara region during March 2008.

Chevron Australia will continue to consult with relevant stakeholders during the environmental assessment process for the Gorgon Gas Development Revised Proposal. A Stakeholder Management Plan is currently being prepared which will include engagement with environmental Non-Government Organisations (eNGOs), local communities, indigenous stakeholders, regional NGOs, industry associations and Local, State and Federal Government.

3.6 A staged development or component of a larger project

Refer to Section 3.1 and 3.4.

As noted above, the Revised Proposal is an alteration of the Approved Development. The alterations were not relevant at the time of initial referral of the Approved Development, and so approval is being sought for the Revised Proposal now.

4 Affected environment

4.1 Matters of national environmental significance

4.1 (a) World Heritage Properties

There are no World Heritage Properties in the areas affected by the Gorgon Gas Development (including the Revised Proposal).

4.1 (b) National Heritage Places

There are no National Heritage Places in the areas affected by the Gorgon Gas Development (including the Revised Proposal).

4.1 (c) Wetlands of International Significance (Ramsar)

There are no Ramsar Wetlands in the areas affected by the Gorgon Gas Development (including the Revised Proposal).

4.1 (d) Listed threatened species and ecological communities

Results of a search of the EPBC Act Protected Matters Interactive Search Tool indicated that a total of 14 threatened fauna species listed under the EPBC Act as Endangered or Vulnerable could potentially occur within the areas affected by the Revised Proposal (refer to Appendix 3, Table 3). The threatened fauna included terrestrial and marine species, some of which are also protected by the EPBC Act as 'migratory species'. Whilst the species listed in Table 3 (Appendix 3) may potentially occur in the Approved Development and Revised Proposal areas, some have not been previously recorded on Barrow Island and are therefore highly unlikely to be impacted from the Revised Proposal. No additional species have been identified during the search of EPBC Protected Matters in respect of the Revised Proposal that were not assessed for the Approved Development.

No vegetation associations which are listed under the EPBC Act or as Threatened Ecological Communities as listed by the Western Australian DEC have been recorded within areas affected by either the Approved Development or the Revised Proposal.

4.1 (e) Listed migratory species

Results of a search of the EPBC Act Protected Matters Interactive Search Tool indicated that 22 migratory fauna species listed under the EPBC Act could potentially occur in the areas affected by the Approved Development and Revised Proposal (refer to Appendix 3, Table 4). This included migratory terrestrial, wetland and marine species and migratory marine birds. Some of these species were also considered 'threatened species' under the EPBC Act. Whilst the species listed in Table 4 (Appendix 3) may potentially occur in the Revised Proposal areas, some have not been previously recorded on Barrow Island and are therefore highly unlikely to be impacted from the Revised Proposal. No additional species have been identified during the search of EPBC Protected Matters in respect of the Revised Proposal that were not assessed for the Approved Development.

4.1 (f) Nuclear actions

The Gorgon Gas Development Revised Proposal does not involve nuclear actions.

4.1 (g) Commonwealth marine areas

No part of the Gorgon Gas Development Revised Proposal is located in a Commonwealth marine area. However, the increased gas processing rate does accelerate the timing of construction of wells and manifolds in the Gorgon Field Development Plan.

4.2 Important or unique aspects of the environment, if relevant

4.2 (a) Soil and vegetation characteristics

Soils

The soils on Barrow Island and specifically within the areas affected by the Gorgon Gas Development Revised Proposal are not considered important or unique. All the issues related to the soil affected by the Revised Proposal are the same as the Approved Development, and have therefore already been considered as part of the EIS/ERMP for the Approved Gorgon Gas Development. Barrow Island is a geological extension of the Cape Range Peninsula and is composed of coastal deposits overlying tectonically folded limestone. Three broad geomorphic units have specifically been identified including limestone uplands, near coastal lowlands and coastal fringe. The surface geology at the Gas Treatment Plant site consists of limestone, floodplain deposits, dune sands and gravels (Chevron Australia 2005).

Vegetation

A number of vegetation and flora studies have been undertaken on Barrow Island since the 1960s. As part of the environmental impact assessment for the Approved Gorgon Gas Development, flora and vegetation surveys were undertaken in the areas that were (at the time) proposed for disturbance (Chevron Australia 2005). This included surveying areas in the location of the Approved Development and Revised Proposal Gas Treatment Plant (as part of a conservative wider survey area).

Eighty-three vegetation associations were mapped by Chevron Australia (2005) within the survey area based on major landforms, soil type and species composition on Barrow Island. No vegetation associations which are listed under the EPBC Act or as Threatened Ecological Communities as listed by the Western Australian DEC have been recorded in the Approved Development and Revised Proposal areas. There are some vegetation associations considered to have conservation significance due to their restricted distribution on the island. Infrastructure will be located so as to avoid vegetation considered to be of conservation significance (e.g. CO₂ injection well sites and the CO₂ pipeline) when practicable.

The flora of Barrow Island is typical of the arid Pilbara region, but has floral affinities with the Cape Range area on the mainland. No Declared Rare Flora as listed under the EPBC Act or by the DEC were found within the survey area. Three Priority species protected under the Western Australian *Wildlife Conservation Act 1950* have been collected on Barrow Island: *Helichrysum oligochaetum* (Priority One), *Mukia* sp. Barrow Island (Priority 2) and *Corchorus congener* (Priority Three). Of these species, *Corchorus congener* is anticipated to be present within areas affected by the Revised Proposal. This species is widely distributed on Barrow Island and also occurs on the Pilbara mainland. This species is also known to recover well from disturbance and is not considered under threat on Barrow Island.

4.2 (b) Water flows, including rivers, creeks and impoundments

The surface hydrology on Barrow Island is characterised by:

- Unpredictable, but sometimes very intense, rainfall resulting in significant runoff and short-term ponding;
- Consistently high rates of evaporation resulting in extremely low soil moisture content; and
- High infiltration capacities of the surface sands and limestones which is conducive to recharge of relatively deep groundwater aquifer(s).

The hydrological regime of the island is split by a water divide running north to south along a central, elevated ridge. Creeks flow along a largely east-west orientation on either side of this divide but are highly ephemeral and usually dry. Permanent surface water sources occur in freshwater seeps, though none of these are located within 5 km of the Approved Development and Revised Proposal areas. Other seeps are ephemeral and generally only appear after rain events.

4.2 (c) Outstanding natural features, including caves

Barrow Island is a karst system and caves are known to exist on the island, however there are no known caves or other significant natural land features identified that would be impacted by the Revised Proposal.

4.2 (d) Gradient

The terrain in the development area is flat to undulating and gradually slopes upward from the coastline. The average elevation in the development area on the east coast of Barrow Island is 15 m above sea level.

4.2 (e) Buildings or other infrastructure

The current oilfield operations, and associated infrastructure, are located to the south of the location of the Approved Development and Revised Proposal infrastructure. Oilfield infrastructure, such as service roads, wells and oil pipelines are located in the vicinity of the Revised Proposal Gas Treatment Plant site and feed gas pipeline route. There is an existing sub-marine oil export pipeline (associated with the current oilfield operations on Barrow Island) located approximately 6.5 km northeast of the Revised Proposal LNG tanker berths at the end of the LNG Jetty. None of these buildings or infrastructure will be affected by the Revised Proposal.

4.2 (f) Marine areas

Barrow Island is almost entirely surrounded by limestone pavement reef that extends to the subtidal zone. Broad intertidal reef platforms with scattered mud and sand flats are widespread along the east coast of Barrow Island. On the west and north coasts, the intertidal reef is much narrower and more eroded, but supports dense macroalgal turf if exposed. The upper intertidal zone is often overlain by sand veneers of varying thickness. Sandy beaches are widespread around both the east and west coasts of Barrow Island and typically form above the intertidal reef between rocky headlands.

Coral reefs and bombyria are restricted to the photic zone and vary greatly in their spatial distribution, structural complexity and ecological function in response to numerous environmental factors, including water clarity, currents and exposure to swell. Corals are abundant around Barrow Island, ranging in size from large, high profile reefs to isolated coral bombyria on turbid inshore limestone pavements. Coral communities occur on both the east and west coasts of Barrow Island, with the most significant coral reefs around Barrow Island being Biggada Reef on the west coast and Dugong Reef, Batman Reef and the Southern Lowendal Shelf Reef on the east side of the island.

4.2 (g) Kinds of fauna

There have been a number of fauna studies undertaken on Barrow Island. Specifically associated with the Approved Gorgon Gas Development, studies were conducted as part of the EIS/ERMP (Chevron Australia 2005). More recent studies associated with the Approved Development and Revised Proposal have been conducted, including (but not limited to) surveys for subterranean fauna, terrestrial invertebrates and short range endemics. There are no distinctive habitat features within the areas affected by the Revised Proposal that are likely to support unusually high population densities of any fauna species and there are no additional species affected by the Revised Proposal that were not assessed as part of the EIS/ERMP.

Terrestrial Avifauna

Fifty-one species of terrestrial avifauna were recorded on Barrow Island, however only 16 of these species are residents or regular migrants to the island. Several species of terrestrial avifauna, including migratory terrestrial or wetland species, are listed under Western Australian and/or Commonwealth legislation.

The most common landbirds on Barrow Island are the spinifexbird, white-winged fairy wren, singing honeyeater, white-breasted wood swallow and the welcome swallow. Within the Gas Treatment Plant site, the abundance of landbirds varies across different vegetated habitats. Species richness is highest in coastal *Acacia* shrublands where both the singing honeyeater and the spinifexbird are abundant. Landbirds commonly roost in the scattered emergent shrubs along the side of the roads and may occur at higher densities on roadsides than in adjacent habitats. There are no critical avifauna habitats in the proposed development areas that are of higher ecological significance than surrounding areas for any landbird species. No additional species will be affected by the Revised Proposal that was not assessed as part of the EIS/ERMP.

White-winged fairy wrens are listed as Vulnerable under the Western Australian *Wildlife Conservation Act 1950* and the Commonwealth EPBC Act. This species were found to be more abundant in areas where *Melaleuca cardiophylla* and other shrubs such as *Acacia bivenosa* form an open shrubland over tussock grassland of *Triodia* sp. They have been found however to occur and breed in a range of plant species including *Melaleuca cardiophylla*, *Acacia bivenosa*, *Acacia coriacea*, *Hakea lorea*, *Grevillia pyramidalis* and *Triodia* sp. (RPS BBG 2006). White winged fairy wrens also nested in the tall *Triodia angusta* along the roadways on Barrow Island in areas without *Melaleuca cardiophylla*.

Terrestrial Mammals

Barrow Island supports 13 species of resident terrestrial mammals (with a further two species of bat recorded as vagrants to the island), seven of which are listed under State and/or Commonwealth legislation. Mammal species include Burrowing Bettong, Barrow Island Golden Bandicoot, Black-flanked Rock Wallaby, Water Rat and the Barrow Island Chestnut Mouse. All of the terrestrial mammals of Barrow Island, except the bats and the Black-flanked Rock Wallaby, are known from the proposed development areas. All of these species are widespread on the island, with the exception of the Black-flanked Rock Wallaby and Water Rat, which are not known to be restricted to the areas impacted by the Gorgon Gas Development Revised Proposal. No additional species will be affected by the Revised Proposal that was not assessed as part of the EIS/ERMP.

Terrestrial Reptiles

The reptile and amphibian assemblage on Barrow Island is depauperate in comparison with the herpetofauna of the adjacent mainland. Species identified as having potential significance which are found within areas affected by the Approved Development and Revised Proposal include the Endemic Skink (*Ctenotus pantherinus acripes*) and the Blind Snake (*Ramphotyphlops grypus*). The Subterranean Blind Snake (*Ramphotyphlops longissimus*) has been found on Barrow Island and is listed by the DEC as a Priority 2 species. However this species is not currently known from the areas affected by the Revised Proposal. None of the other terrestrial reptile species found within Revised Proposal development areas (or on Barrow Island in general) are listed as threatened species under the Western Australian *Wildlife Conservation Act 1950* or the Commonwealth EPBC Act. No additional species will be affected by the Revised Proposal that was not assessed as part of the EIS/ERMP.

Terrestrial Invertebrates

None of the invertebrate fauna known from the Approved Development and Gorgon Gas Development Revised Proposal areas is listed as Schedule or Priority fauna under the Western Australian *Wildlife Conservation Act 1950* or listed as threatened under the Commonwealth EPBC Act. The invertebrate taxa collected from vegetation associations that also occur within the Approved Development and Revised Proposal development areas are well represented on the island, and their habitats from which they were collected are widespread on the island. Evidence from terrestrial invertebrate surveys (in addition to subterranean fauna surveys) supports the thesis that short-range endemism is expected to operate at an island-scale, rather than at a local scale within parts of the island. No additional species will be affected by the Revised Proposal that was not assessed as part of the EIS/ERMP.

Subterranean Fauna

There have been a number of subterranean fauna studies undertaken on Barrow Island over the last decade, including work carried out by the Western Australian Museum. As part of the environmental impact assessment for the Approved Development, a number of additional subterranean fauna surveys were undertaken (Chevron Australia 2005). Further surveys were continued into 2006 (total of four surveys).

Barrow Island is recognised as being of high conservation significance for subterranean fauna (stygoфаuna and troglοфаuna) communities at state, national and international levels. The subterranean fauna of the island demonstrates a high level of endemicity and species diversity, with over 20 species known from Barrow Island. Subterranean fauna records to date confirm that the habitats under both the Approved Development and Revised Proposal Gas Treatment Plant and the adjacent parts of the island support both stygoфаuna and troglοфаuna.

One species of stygoфаuna known from Barrow Island, the Blind Gudgeon (*Milyeringa veritas*), is listed under the Commonwealth EPBC Act. To date this species has not been recorded in the Approved Development and Revised Proposal development area. Other subterranean fauna species are listed as Scheduled Fauna under the *Wildlife Conservation Act 1950*; some of these

species have been recorded within the Approved Development and Revised Proposal area but are not restricted to this site. Work is ongoing by Chevron Australia to further understand the distribution of troglofauna and stygofauna found within the Approved Development and Revised Proposal Gas Treatment Plant relative to elsewhere on Barrow Island. The work is being conducted in accordance with the MIS 748 Condition No. 8. No additional species will be affected by the Revised Proposal that was not assessed as part of the EIS/ERMP.

Marine Avifauna

Barrow Island's marine avifauna comprises numerous species, including migratory shorebirds and resident shorebirds. Many of these species are protected under the international Japan-Australia Migratory Bird Agreement or China-Australia Migratory Bird Agreement treaties.

Barrow Island is both a staging site and an important non-breeding site for migratory shorebirds. The highest abundances of shorebirds on Barrow Island, over two-thirds of records for most species, are associated with the south-eastern and southern coasts of the island. The areas affected by the Revised Proposal do not contain critical shorebird habitat.

Marine Mammals

The region supports migratory, transient and resident marine mammals such as whales, dolphins and dugong. There are a number of whale species that may occasionally visit the region, though Humpback Whales are considered to be regular visitors. Humpback Whales are likely to be present off the west coast of Barrow Island during the June to October migration period. Most whales are more abundant in deeper waters and are expected to be rare visitors to the offshore waters close to the western shore of Barrow Island and are unlikely to visit the shallow, turbid inshore waters in the vicinity of the east coast facilities that are the subject of the Revised Proposal.

Bottlenose dolphins, common dolphins and striped dolphins are likely to visit the offshore Development area on the west coast of Barrow Island. Bottlenose dolphins are also likely to be regular visitors to the east coast Revised Proposal development area.

Dugong can occur from time to time throughout the shallow waters between the Pilbara offshore islands and the mainland.

No additional Marine Mammal species will be affected by the Revised Proposal that was not assessed as part of the EIS/ERMP.

Marine Reptiles

The marine reptile fauna of the area comprises sea turtles and sea snakes (including kraits). Crocodiles may make rare visits to the region, but have not been recorded in the vicinity of Barrow Island.

Six species of sea turtle are known from the Montebello/Lowendal/Barrow Island region, all of which are protected under the *Wildlife Conservation Act 1950*, the Bonn Convention and the EPBC Act. Barrow Island is a regionally important nesting area for green turtles and flatback turtles.

Storr *et al* (1986) estimate nine genera and 22 species of sea snakes and kraits occur in Western Australian waters. Sea snakes are highly mobile and are likely to occasionally visit the marine areas that are the subject of the Revised Proposal.

No additional species of Marine Reptile will be affected by the Revised Proposal that was not assessed as part of the EIS/ERMP.

Fish

The majority of fish species are widespread throughout the Indo-West Pacific region however; some species are protected by legislation as they are migratory, endangered or subject to fishing pressure. No areas of regional importance to fish have been identified within the Revised Proposal development areas. Whale Sharks and Grey Nurse Sharks are anticipated to visit the Revised Proposal development area. Great White Sharks would rarely be encountered in the Revised Proposal development area. Pipefish and seahorses are expected to be widespread through the shallower benthic habitats of the Revised Proposal development area. No additional species will be affected by the revised proposal that was not assessed as part of the EIS/ERMP.

4.2 (h) Current state of the environment

The vegetation of Barrow Island shows affinities to those in the Cape Range area, most remains in a long unburnt stage of growth, and therefore has experienced low disturbance (exceptions being along main tracks, well pads and seismic lines). Fourteen introduced flora species have been recorded on Barrow Island, mostly in or near previously disturbed sites, though only six of the weed species are known to persist on the island. No introduced species have been identified in the areas presently surveyed and that are affected by the Revised Proposal.

There are currently no known non-indigenous species of vertebrate fauna on Barrow Island, although the proposed invertebrate baseline surveys are expected to detect species such as the cosmopolitan American cockroach and daddy long legs spider. Historically however, there have been occasions when non-indigenous species were unintentionally brought to the island (e.g. black rat and house mouse). Cooperative eradication programs between the operator of the Barrow Island Joint Venture and the Western Australian Department of Conservation and Land Management (now known as the DEC) led to the eradication of these species.

There is at present little information on non-indigenous marine species off Barrow Island. Chevron Australia has developed a strategy to establish a baseline understanding of potential pest species that may have already been introduced to Barrow Island, Dampier and possibly Onslow; and a strategy to monitor for future introductions (Western Australian Museum 2004).

4.2 (i) Commonwealth Heritage Places and places on the Register of the National Estate

Barrow Island is listed on the Register of the National Estate.

4.2 (j) Known Indigenous heritage values

There are no European cultural sites of significance on Barrow Island and no Aboriginal people were reported when Europeans first visited the island in 1629. Surveys for Aboriginal cultural heritage sites have been conducted and archaeological sites and artefacts have been described and reported to the Aboriginal Sites Department of the WA Museum, in accordance with the *Aboriginal Heritage Act 1972* (WA). Twelve archaeological sites have been reported and their locations are included in the Chevron Australia Geographic Information System database. None of these known sites are close to the existing or revised development. The Revised Proposal is not expected to impact on any recorded cultural heritage sites. There are no lodged Native Title claims over Barrow Island.

4.2 (k) Other important or unique values of the environment

Barrow Island is a Class A nature reserve No. 11648, reserved under the *Land Administration Act 1997* (WA). The Reserve is vested in the Conservation Commission of Western Australia and is managed by the DEC.

The waters surrounding Barrow Island are part of the area covered by the Montebello – Barrow Island Marine Conservation Reserve. The majority of the Marine Conservation Reserve is zoned as a Marine Management Area, recognised for both commercial and conservation values. The marine areas surrounding Barrow Island are mainly used for petroleum exploration and production, and

shipping. Within the Marine Conservation Reserve, the Barrow Island Marine Park is located off the west coast of the island and the Bandicoot Bay Conservation Area is located on the south-east coast. These areas will not be affected by the Revised Proposal. The marine area off the east coast impacted by or immediately adjacent to this proposal lies within a designated port (The Port of Barrow Island).

4.2 (l) Tenure of the action area (eg freehold, leasehold)

Barrow Island is a Class A nature reserve vested in the Conservation Commission of Western Australia. The *Barrow Island Act 2003* (WA) and the Gorgon Gas Processing and Infrastructure Gorgon Gas Development Agreement (State Agreement) reserves 300 ha of undisturbed land on Barrow Island for the establishment of projects to process or use natural gas and other petroleum from the Greater Gorgon Area. Following approval of Development Proposals in accordance with the State Agreement the Western Australian Government is obligated under clause 16(1) of the State Agreement to grant any required Leases, Licenses or Easements under the *Land Administration Act 1997* (WA) to the Gorgon Joint Venturers.

The marine area off the east coast impacted by or immediately adjacent to the Revised Proposal lies within a designated port area (The Port of Barrow Island).

4.2 (m) Existing land uses

Barrow Island currently supports an oil production operation, which operates under lease L1H. Chevron Australia is the current operator of the oilfield under the provisions of this lease. The operation has been in place since the 1960s and is expected to continue for another 15 – 20 years.

The marine areas surrounding the proposed Gorgon Gas Development marine facilities are mainly used for petroleum exploration and production, and shipping. A number of Western Australian and Commonwealth commercial fisheries coincide with the Montebello/Lowendal/Barrow Island region, however these were considered during the environmental impact assessment for the Approved Gorgon Gas Development (Chevron Australia, 2005). There are no new impacts to recreation or commercial fishing activities arising from the Revised Proposal.

4.2 (n) Proposed land uses

The Gorgon Gas Development Revised Proposal will encompass the construction and operation of an additional 5 MTPA LNG train production facility and associated infrastructure on Barrow Island.

5 Nature and extent of likely impacts

5.1 Likely impacts on matters of national environmental significance (NES)

5.1 (a) Likely impact on the world heritage values of a declared World Heritage property

The Revised Proposal will not affect any World Heritage properties.

5.1 (b) Likely impact on the heritage values of a listed National Heritage place

The Revised Proposal will not affect any National heritage places.

5.1 (c) Likely impact on the ecological character of a declared Ramsar wetland

The Revised Proposal will not affect any declared Ramsar wetlands.

5.1 (d) Likely impact on the members of a listed threatened species or ecological community, or their habitat

The Revised Proposal, as outlined in this referral (and summarised in Table 1 of Appendix 2) are not anticipated to result in a cumulative significant impact on matters of National Environmental Significance in addition to, or different from, the impacts of the Approved Gorgon Gas Development.

Terrestrial fauna

Approved Development Context

The risk assessment undertaken as part of the Approved Gorgon Gas Development EIS/ERMP (Chevron Australia 2005) identified the following medium risk stressors to terrestrial fauna:

- Clearing and earthworks
- Physical interaction
- Noise and vibration (operations)
- Fire.

The main potential impacts associated with these stressors include direct displacement or loss of fauna, habitat loss or modification, and increased competition between individuals and species. The level of risk associated with these stressors is not anticipated to increase significantly as a result of the proposed changes to the terrestrial facilities of the Approved Gorgon Gas Development included in the Revised Proposal and no new risk stressors are expected.

During the environmental impact assessment for the Approved Gorgon Gas Development (Chevron Australia 2005), the full extent of the likely impact on the available 300 ha on Barrow Island was assessed. The Approved Gorgon Gas Development was expected to disturb the full 300 ha during its construction phase, with a lesser land use during the operations phase. A portion of the 300 ha was marked for use for future expansion or was to be alternatively rehabilitated.

As documented in the Approved Gorgon Gas Development EIS/ERMP (Chevron Australia, 2005), it is estimated that the area of disturbance associated with the Approved Gorgon Gas Development and future development areas on Barrow Island (as described in the *Barrow Island Act 2003*) will affect approximately 1.3% of the terrestrial fauna on the island (Chevron Australia 2005). This estimate is based on the combined footprint area of the Approved Gorgon Gas Development and future development areas corresponding to approximately 1.3% of Barrow Island. As the 1.3% already incorporates the additional disturbance requirements for the Revised Proposal subject to this Referral, the implications of this impact as assessed and described in the EIS/ERMP will remain unchanged.

The fauna surveys conducted for the EIS/ERMP (Chevron Australia 2005) did not extend to the locations of the wells and the pipeline associated with the full extent of the Revised Proposal CO₂ Injection System because detailed design is still in progress. Final selection of wells sites and the

pipeline route will be undertaken in consultation with an ecologist so that important fauna habitats are avoided wherever practicable. The requirements of the Commonwealth conditions of approval of the Approved Development require Chevron Australia to monitor (determine if a risk is evident) and develop practicable measures to reduce or offset Significant Impacts to those EPBC Act listed species identified within the Terrestrial Disturbance Footprint.

Revised Proposal Context

The Gorgon Gas Development Revised Proposal will involve additional long-term utilisation of 38.6 ha (or ~13%) of the available 300 ha over and above the long-term land use estimate for the Approved Gorgon Gas Development. The long-term land disturbance associated with the Revised Proposal may increase the potential for loss or displacement of individual fauna. This effect may be greatest for taxa with limited home ranges or limited dispersal ability.

The clearing/land disturbance required for the proposed changes to the terrestrial facilities will increase the immediate area of habitat disturbed when compared to the terrestrial facilities that comprise the Approved Gorgon Gas Development. However, fauna habitats within the area of the Gas Treatment Plant (including the additional area required as part of the Revised Proposal) are well represented outside the disturbance area. There is no indication that these habitats are of critical importance to terrestrial fauna and there are no distinctive habitat features that are likely to support unusually high population densities of any species. No additional Bettong warrens (active or inactive) will be disturbed as a result of the land disturbance required for Revised Proposal Gas Treatment Plant footprint. Incremental additions of disturbance for the associated terrestrial infrastructure are not anticipated to impact on terrestrial fauna species to a greater cumulative extent than those impacts assessed for the Approved Development.

Fire, noise and vibration risks to terrestrial fauna are not anticipated to increase significantly as a result of the Revised Proposal. Construction and operations methods are not anticipated to be modified to an extent that increases the risk of impact to terrestrial fauna due to additional accidental fire, higher noise levels or additional vibration.

The conditions attached to the Commonwealth approval for the Approved Gorgon Gas Development (EPBC Reference: 2003/1294) require Chevron Australia to monitor and manage impacts to Terrestrial Fauna in consultation with Commonwealth and State agencies. The Commonwealth Minister for the Environment must review and approve terrestrial fauna monitoring plans and any subsequently required management measures. Therefore any impacts associated with the Revised Proposal could be effectively managed under conditions of approval similar to the conditions for the Approved Development.

Subterranean fauna

Approved Development Context

The risk assessment undertaken as part of the EIS/ERMP (Chevron 2005) assessment process for the Approved Gorgon Gas Development identified the following risk stressors to subterranean fauna:

- Clearing and earthworks
- Physical presence of Gas Treatment Plant
- Wastewater disposal
- Noise and vibration
- Leaks and spills
- Potential leakage of injected CO₂.

These stressors have the potential to impact on subterranean fauna through the direct loss of habitat, the local loss of subterranean fauna, and through modification of subterranean habitats (e.g. changes to hydrology, sedimentation, contamination, etc).

Revised Proposal Context

The level of pre-management assessed risk (medium – high, Chevron Australia 2005) associated with the above stressors is not expected to increase as a result of the proposed changes to the terrestrial facilities of the Approved Gorgon Gas Development included in the Revised Proposal.

One additional stressor (the CO₂ seismic data collection program) is anticipated to impact subterranean fauna or their habitat on Barrow Island as a result of the Gorgon Gas Development Revised Proposal. The altered CO₂ seismic program, consisting of approximately 1900 shot holes is anticipated to have additional localised short-term impacts to subterranean fauna habitat and localised direct impacts to subterranean fauna individuals. Further study is underway to define the predicted impacts.

Activities associated with the Revised Proposal are likely to increase the volumes of wastewater requiring disposal. However no new waste streams are anticipated, and the additional wastewater generated will be managed in the same manner as the Approved Gorgon Gas Development (i.e. treated and then disposed via deep well injection). The well currently identified for wastewater disposal is an existing produced water disposal well on Barrow Island (utilised by the Barrow Island Oilfield Operator), therefore additional impacts to subterranean fauna from the Revised Proposal wastewater disposal are anticipated to be negligible.

The increase in clearing and earthworks associated with the reconfigured Gas Treatment Plant which is part of the Revised Proposal may impact on some additional subterranean fauna habitat. The area covered by the Revised Proposal Gas Treatment Plant represents an increase of approximately 30 ha in addition to the disturbance anticipated for the Approved Development Gas Treatment Plant site. Noise and vibration may also increase during a marginally longer construction period and during operations as a result of the Revised Proposal, however this is not anticipated to result in cumulative significant impacts when compared to the Approved Gorgon Gas Development.

Survey work is currently focussed on defining the level of consistency of subterranean fauna species present when comparing sites within the Revised Proposal Gas Treatment Plant Site and elsewhere on Barrow Island. Earthworks on the area to be cleared for the Revised Proposal Gas Treatment Plant site (for the 3rd LNG train) will cause disturbance to subterranean fauna habitat, in addition to that described in the Approved Gorgon Gas Development. The impacts to subterranean fauna as a result of proposed activities such as drilling wells for CO₂ injection, water production and disposal and seismic monitoring data acquisition are considered to be highly localised and insignificant, given the widespread karstic nature of the Barrow Island geological structure. There is potential for some additional loss of habitat and possibly direct impacts to subterranean fauna from the installation of the additional wells associated with the Revised Proposal CO₂ Injection System. However, these impacts will be localised and limited to the immediate vicinity of the wells. Therefore, construction of the additional wells is not anticipated to result in significant impacts to subterranean fauna beyond that assessed for the Approved Gorgon Gas Development.

Modelling of CO₂ injection into the Dupuy Formation indicates that the reservoir CO₂ plume remains below Barrow Island and does not extend into areas beyond the Island that are within the Commonwealth Government's jurisdiction. The anticipated geographic extent of the plume after 1000 years for the Approved Gorgon Gas Development (2x5 MTPA) and for the Revised Proposal (3x5 MTPA) are provided in Appendix 1 (Figures 7 and 8).

There are multiple barriers between the Dupuy Formation and the environment inhabited by subterranean fauna, which would likely prevent CO₂ from reaching this environment in the event of a Dupuy Formation containment failure, the risk of which could be slightly increased under the Revised Proposal by the accelerated rate of CO₂ injection into the Dupuy Formation.

The uncertainty and risk mitigation framework described for the Approved Gorgon Gas Development identified a higher than anticipated increase in reservoir pressure as a risk and proposed a potential mitigation strategy of producing water from the Dupuy Formation from outside the CO₂ plume as a means to reduce reservoir pressure. This produced Dupuy Formation water would then be disposed of into the Barrow Group Formation which has been pressure depleted on a regional scale due to the extensive oil production operations in the Barrow Sub Basin.

Modelling studies involving the higher CO₂ injection rates included in the Revised Proposal support implementation of a precautionary pressure management strategy shortly after the commencement of CO₂ injection. The implementation of pressure management mitigation is anticipated to maintain reservoir pressure well within acceptable levels such that the overall risk of containment failure of the Dupuy Formation is not anticipated to be significantly different from that assessed as part of the Approved Gorgon Gas Development.

The proposed changes to the Approved Development CO₂ seismic monitoring program included in the Revised Proposal, i.e. an increase from up to 1000 shot holes, as described in the EIS/ERMP (Chevron Australia, 2005) to approximately 1900 shot holes, are not anticipated to have a significant effect on subterranean fauna. In the absence of legislated or documented maximum shock wave levels for subterranean fauna and their habitat, Chevron Australia is in the process of completing a review of likely shock waves (PPV – peak particle velocity) from seismic sources at Barrow Island against analogous PPV levels assigned for the protection of selected receptors such as fish and fish habitat and Australian standards for structural integrity. These shock wave levels were used to estimate the zone of impact, i.e. the distance from a blast that the selected shock waves would travel through the sub-surface. Preliminary results from this review suggest that effects to subterranean fauna and their habitat from seismic survey activity are likely to be localised and may account for impacts to a small area of subterranean fauna habitat at Barrow Island. Based on specialist advice (Garth Humphreys (Biota), pers comm., February 2008), it is considered unlikely that the vibration and shock effects of the seismic activity would propagate out far enough or at sufficient velocity to have any widespread effects on the subterranean fauna or their habitat. Furthermore, as any impacts that do arise from the seismic survey will be associated with single events (and not ongoing pressure); they are also less likely to result in any sustained and long term effects (Garth Humphreys pers comm., February 2008).

Marine fauna

Approved Development Context

The risk assessment undertaken as part of the Approved Gorgon Gas Development EIS/ERMP (Chevron Australia 2005) identified the following medium to high risk stressors to marine fauna and habitat:

- Seabed disturbance
- Physical interaction
- Light
- Noise and vibration (during construction)
- Leaks or spills.

The potential impacts associated with marine stressors include loss, injury, or disturbance to marine fauna; loss or modification of habitat; and sedimentation and turbidity.

Revised Proposal Context

There will be some additional direct seabed disturbance associated with the proposed reconfiguration of the Approved Development causeway and MOF under the Revised Proposal.

The Revised Proposal causeway and MOF will result in a minor increase in the area of the seabed permanently covered by marine infrastructure, noting that some of this additional area would have been subject to disturbance from the LNG Jetty (as part of the Approved Gorgon Gas Development). The macrophytes and coral assemblages in the vicinity of the MOF are widespread and do not comprise any regionally significant coral communities. Any new area of hard substrate, such as the causeway and MOF, will also be readily colonised by macroalgae and corals. The consequences of the additional permanent coverage of seabed are not anticipated to significantly increase the level of impact (or risk) from that determined for the Approved Gorgon Gas Development. Impacts will remain localised and will not reduce benthic community or taxon viability in the local area.

The causeway and MOF may constitute a barrier to sea turtles utilising the marine habitats and beaches adjacent to Town Point for feeding, mating and nesting activities. An assessment of the predicted impacts on Flatback turtles for the Approved Gorgon Gas Development suggests this barrier provides residual risk to Flatback turtles using the beaches to nest. Lights along the causeway will be managed to minimise glow and its effects on hatchling orientation from beaches to the ocean. The most intense offshore lighting (located at the MOF) will be approximately 800 m further offshore; however, the total distance affected by offshore lighting (Causeway/MOF + LNG Jetty) will remain consistent with the distance assessed as part of the Approved Development. An increase in the length of this barrier is unlikely to increase residual risk to the Flatback turtles and hatchlings using the waters off Barrow Island. Turtle tracking studies conducted by Chevron Australia indicate that Flatback turtles can travel long distances up and down the North Western Australian Coastline during the inter-nesting and non-nesting periods of the year.

Coastal process modelling completed for the Approved Development MOF indicates that there is a negligible change to the overall sediment budget and longshore coastal sediment transport dynamics as the majority of the substrate covered by the MOF is hard rock with little or no sand coverage. The Western Australian Department of Planning and Infrastructure (DPI) reviewed the modelling and concluded that the impact of the Approved Development causeway on the adjacent beaches is likely to be modest. Additional coastal process modeling will be undertaken if deemed necessary following consultation with the DPI Assessment Officers and/or coastal process model subject matter experts (consultants that were involved in EIS/ERMP assessment and approval process) to establish any likely change in predicted impacts.

Additional geotechnical and geophysical data recently gathered for the Approved Development MOF approach channel and turning basin location indicate the presence of hard rock, which is unsuitable for a cutter suction dredge and which would require significant drilling and blasting to construct the MOF. The Revised Proposal MOF structure will significantly reduce the amount of drilling and blasting and may reduce dredging impacts required during construction.

With the extension of the Approved Development causeway and MOF into deeper water, the dredging requirements for the MOF vessel access channel may be reduced, and it is anticipated that the dredging volume may therefore also be reduced by possibly as much as 0.2 million m³, but this will not be certain until detailed design is completed. Chevron Australia commits to

ensuring that the dredging volume for the MOF access channel and berthing pockets does not exceed the Approved Development volume of 1.1 million m³.

The dredging volumes for the LNG Jetty turning basin will remain the same as the Approved Gorgon Gas Development (i.e. 6.5 million m³).

The impacts of the revised marine infrastructure construction and dredging program could be effectively managed through conditions similar to existing Approved Gorgon Gas Development environmental approval conditions mechanisms, which require the submission and approval of a coastal and marine baseline state survey plan and a coastal and marine monitoring and management plan. This management plan will allow for further assessment of the predicted impacts and the approval of practicable management measures.

Sea turtles are one of the more sensitive receptors that may be affected by physical interaction with Revised Proposal Gorgon Gas Development activities (e.g. vessel movements) and by light emissions from marine and terrestrial sources. The Revised Proposal Gas Treatment Plant may require additional lighting. Although there is an increased potential for light spill to affect fauna behaviour, implementation of management measures to be defined in the management plans required to satisfy Approved Development Condition 16 of MIS No. 748, aim to maintain this risk at acceptable levels.

The Approved Gorgon Gas Development EIS/ERMP (Chevron Australia 2005) identified that incidental impacts to marine fauna from vessel strike will be of concern during the construction phase when there are many vessels in the area. It is expected there will be an increase in construction time associated with the Revised Proposal additional LNG train, however much of this increase is focussed onshore at the Gas Treatment Plant site rather than in marine areas. Any additional impacts to marine fauna as a result of the Revised Proposal are therefore not expected to be significant and, as for the Approved Gorgon Gas Development, will remain short-term and localised. There is also the possibility that dredging time will be reduced which would reduce impacts to marine fauna from the presence of dredging equipment and associated support vessels.

The LNG and condensate tanker movements during operations under the Revised will increase proportionately to the proposed increase in Approved Development LNG and condensate production. The increase in LNG tanker movements is dependent on tanker size (which is determined by the customer). Based on a 145, 000m³ tanker, LNG and condensate tanker movements are likely to increase from 160 movements per annum to 245 movements per annum.

There will be an increase in the number of LNG and condensate offtake tankers moving to and from Barrow Island per annum under the Revised Proposal. This increase in tanker movements may have some level of additional impact to individual sea turtles on the east coast of Barrow Island; however, as for the Approved Gorgon Gas Development, the tankers will not transit the west coast of Barrow Island and will not transit within approximately 4 km of the east coast.

5.1 (e) Likely impact on the members of a listed migratory species or their habitat

The risk assessment undertaken as part of the EIS/ERMP (Chevron Australia 2005) for the Approved Gorgon Gas Development identified a number of medium to high risk stressors for terrestrial and marine fauna (refer to Section 5.1 (d)). These stressors would also apply to the various terrestrial and marine migratory species listed under the EPBC Act. There are not expected to be any new or different stressors to migratory species (as listed in Appendix 3, Table 4) as a result of the Revised Proposal.

Refer to Section 5.1 (d) for a discussion of the potential impacts of the Revised Proposal on sea turtles. This section discusses the potential impacts to other migratory species including whales, dolphins, dugong and avifauna.

The proposed changes to the Approved Development MOF and LNG Jetty included in the Revised Proposal are not anticipated to have any additional affect on whale, dolphin and dugong populations given the area of the marine facilities does not support critical habitats for these species and impacts associated with the proposed changes to the marine facilities will be highly localised. In addition, dugongs are uncommon visitors along the east coast of Barrow Island. Although dolphins are commonly observed in shallow waters adjacent to the east coast of Barrow Island, any potential reduction in the foraging grounds of this species is not expected to affect the viability of the population.

As discussed in Section 5.1 (d), it is expected there will be an increase in construction time associated with the additional LNG train included in the Revised Proposal, however much of this increase is focussed onshore at the Gas Treatment Plant site rather than in marine areas. Any additional impacts to marine fauna as a result of the Revised Proposal are therefore not expected to be significant and, as for the Approved Gorgon Gas Development, will remain short-term and localised. There is also the possibility that dredging time will be reduced which would reduce impacts to marine fauna from the presence of dredging equipment and associated support vessels.

There is not expected to be any additional impacts to migratory bird species (terrestrial, wetland and marine) as the additional area occupied by the Revised Proposal does not contain critical habitats for these species and most habitats are widespread across the island. The Revised Proposal will have no additional impact to the coastline around Town Point (compared to the Approved Gorgon Gas Development) and will therefore not affect waterbird roosts or other potential nesting habitats. The proposal will have no additional affect to the rookery for Bridled Terns or Wedge-tailed Shearwaters located on Double Island, approximately 5 km north east of Town Point.

5.1 (f) Likely impact on the environment in part of the Commonwealth marine area

The proposal will not affect the Commonwealth marine area beyond the acceleration of scheduled development components described in 4.1(g).

5.2 Likely impacts for nuclear actions, actions affecting Commonwealth land or actions taken by the Commonwealth

The Revised Proposal does not involve nuclear actions.

6 Measures to avoid or reduce impacts

The proposed changes to the Approved Gorgon Gas Development included in the Revised Proposal, as outlined in this referral and summarised in Table 1 of Appendix 2, will not result in significant impacts to matters of National Environmental Significance in addition to, or different from, those of the Approved Development. As a result Chevron Australia is confident that all changes (and the resultant impacts) could be effectively managed under Conditions predominantly identical to those already set by the Commonwealth Minister for the Environment (EPBC Reference: 2003/1294) and by the Western Australian Minister for the Environment (State Ministerial Implementation Statement No. 748) in relation to the Approved Development.

7 Conclusion on the likelihood of significant impacts

Do you THINK your proposed action is likely to have significant impacts?

- | | |
|-------------------------------------|---------------------------|
| <input checked="" type="checkbox"/> | No, complete section 7.1 |
| <input type="checkbox"/> | Yes, complete Section 7.2 |

7.1 Proposed action is NOT LIKELY to have significant impacts

Key reasons

Chevron Australia considers that the Gorgon Gas Development Revised Proposal does not constitute a 'controlled action', as defined by the EPBC Act.

An extensive environmental impact assessment was undertaken for the Approved (2x5 MTPA LNG train) Gorgon Gas Development at an Environmental Impact Statement (EIS) EPBC Act level of assessment, and the proposal was approved with comprehensive and stringent Ministerial Conditions (by both the State and Commonwealth). The Gorgon Gas Development Revised Proposal as outlined in this Referral and summarised in Table 1 of Appendix 2 will not result in significant impacts to matters of National Environmental Significance.

The Revised Proposal:

- Does not have any potential to affect:
 - World Heritage properties
 - National Heritage properties
 - Ramsar wetlands
 - Threatened ecological communities
 - Commonwealth marine areas
- Is not a nuclear action
- Does not affect Commonwealth land
- Is not being implemented by a Commonwealth Agency.

Chevron Australia is referring the Revised Proposal to seek approval for increased production from that already approved from the Gorgon gas fields by the construction of an additional 5 MTPA LNG train, along with several other associated component changes to improve international competitiveness. By developing three LNG production units the Gorgon Gas Development will generate more clean-burning natural gas sooner in a rapidly growing global energy market, and lead to greater community benefit.

Chevron Australia is also referring the Revised Proposal to seek approval for relocating the MOF into deeper water, which includes the following:

- a significant reduction in drilling and blasting activity (and associated environmental impacts) required to construct the Approved Development MOF;
- a reduction in the length of the MOF access channel and potential reduction in the associated dredging effort;
- a minor re-orientation of the adjoining jetty, which has the benefit of reducing some direct coral impact; and
- an improvement in the safe constructability and operability of the MOF and Jetty.

The potential impacts of the Revised Proposal on species of threatened and/or migratory fauna are described in detail in Section 5 of this referral. Whilst implementation of the Revised Proposal may result in some additional impacts to some species, these are not considered significantly different or additional to the impacts assessed as part of the Approved Gorgon Gas Development. In addition, Chevron Australia is committed to implementing the Revised Proposal in a manner that is consistent with the Approved Gorgon Gas Development.

The environmental assessment of the Approved Development was undertaken at an EIS level, and the proposal was approved with comprehensive and stringent Ministerial Conditions. The Ministerial Conditions (set by both the Commonwealth and the State) applying to the Approved Gorgon Gas Development are substantial, and conditions such as those will also be able to

effectively manage the impacts to Matters of National Environmental Significance associated with the Gorgon Gas Development Revised Proposal.

7.2 Proposed action is **LIKELY** to have significant impacts

Matters likely to be impacted

<input type="checkbox"/>	sections 12 and 15A (World Heritage)
<input type="checkbox"/>	sections 15B and 15C (National Heritage places)
<input type="checkbox"/>	sections 16 and 17B (Wetlands of international importance)
<input type="checkbox"/>	sections 18 and 18A (Listed threatened species and communities)
<input type="checkbox"/>	sections 20 and 20A (Listed migratory species)
<input type="checkbox"/>	sections 21 and 22A (Protection of the environment from nuclear actions)
<input type="checkbox"/>	sections 23 and 24A (Marine environment)
<input type="checkbox"/>	sections 26 and 27A (Protection of the environment from actions involving Commonwealth land)
<input type="checkbox"/>	section 28 (Protection of the environment from Commonwealth actions)

Key reasons

It is not anticipated that significant impacts are likely to occur as a result of the activities of the revised proposal.

8 Assessment approach under the EPBC Act

Level of assessment

<input type="checkbox"/>	Bilateral Agreement applies
<input type="checkbox"/>	Accredited assessment
<input type="checkbox"/>	Assessment on referral information
<input type="checkbox"/>	Preliminary information
<input type="checkbox"/>	Public Environment Report
<input type="checkbox"/>	Environmental Impact Statement
<input type="checkbox"/>	Commission of Inquiry
<input checked="" type="checkbox"/>	No comment/Not sure

Key reasons

9 Environmental history of the responsible party

		Yes	No
9.1	Does the party taking the action have a satisfactory record of responsible environmental management. <ul style="list-style-type: none"> If Yes, provide details 	X	

	Yes	No
<p>Chevron Corporation (Chevron) operates internationally, conducting business in approximately 180 countries, being involved in every aspect of the oil and natural gas industry. Chevron has established an Operational Excellence Management System which is the framework for management of safety, health and the environment.</p> <p>Chevron has received numerous recognitions for their environmental initiatives including Indonesia's 2006 Most Admired Company Award, which cited Chevron's record of implementing independent environmental audits and ensuring that revegetation is an integral part of any oil development.</p> <p>Chevron Australia has operated in an environmentally responsible manner on Barrow Island and Thevenard Island for the past 40 years.</p>		
<p>9.2 Is the party taking the action subject to any proceedings under a Commonwealth, State or Territory law for the protection of the environment or the conservation and sustainable use of natural resources?</p> <ul style="list-style-type: none"> • If Yes, provide details 		X
<p>9.3 For an action for which a person has applied for a permit under the EPBC Act, is the person making the application subject to any proceedings under a Commonwealth, State or Territory law for the protection of the environment or the conservation and sustainable use of natural resources?</p> <ul style="list-style-type: none"> • If Yes, provide details 		X

	Yes	No
<p>9.4 If the party taking the action is a corporation, will the action be taken in accordance with the corporation's environmental policy and planning framework?</p> <ul style="list-style-type: none"> If Yes, provide details of environmental policy and planning framework <p>Chevron's Operational Excellence Management System (OEMS)</p> <p>Chevron's OEMS aims to deliver industry leading performance through safe, reliable, efficient and environmentally sound operations. Chevron's Operational Excellence (OE) objectives are:</p> <ul style="list-style-type: none"> Achieve an injury-free work place Promote a healthy workplace and mitigate significant health risks Eliminate spills and environmental incidents. Identify and mitigate key environmental risks Operate incident-free with industry-leading asset reliability Maximize the efficient use of resources and assets. <p>The OEMS consists of three parts – Leadership Accountability; Management System Process; and OE Expectations. The OEMS integrates the OE objectives, plans, processes and behaviours into Chevron's business activities with the aim of protecting people and the environment. This management system fully addresses and in some respects goes beyond ISO 14001:2004 (Environmental Management Systems – Specifications with Guidance for Use) (AS/NZS 2004a).</p> <p>Chevron ASBU Vision, Values and Policies</p> <p>Chevron's commitment to sound environmental management in all aspects of operations is reflected in Chevron Policy 530 – Protecting People and the Environment (refer to Appendix 6).</p> <p>In accordance with OEMS, the Chevron Australasia Strategic Business Unit (ASBU) has implemented a vision, core values and policies in order to meet the OE objectives above. The ASBU Vision is to have a culture and work environment where people and the environment are injury and incident free.</p> <p>The ASBU Core Values are the values personnel need have to achieve the ASBU Vision. Chevron believes:</p> <ul style="list-style-type: none"> All incidents can be prevented There is always time to do the job safely All operating exposures can be safeguarded Employee involvement and HES training are essential Management is committed, visible and accountable – HES tours are a must Protecting our people, environment and assets is good business. <p>The elements comprising the Revised Proposal will be managed to comply with Chevron's OE objectives, the ASBU Core Values and Chevron Policy 530.</p>	X	

10 Information sources and attachments

10.1 References

Refer to Appendix 7.

10.2 Reliability of information

Source of the information

Information regarding the presence of Matters of National Environmental Significance was obtained through the EPBC Act Protected Matters Interactive Search Tool using the coordinates listed in Section 2.2 (accessed January 2008). This information was supplemented with results from fauna surveys commissioned by Chevron Australia.

The information provided in Section 4 in relation to general environmental features was obtained from the EIS/ERMP for the Approved Gorgon Gas Development (Chevron Australia 2005).

Sources of information and data presented in Sections 4 and 5 are referenced where appropriate and references are provided in Appendix 7.

How recent the information is

There have been a number of fauna studies undertaken on Barrow Island. Specifically associated with the Gorgon Gas Development, studies were conducted as part of the EIS/ERMP (Chevron Australia 2005). More recent studies associated with the Gorgon Gas Development have been conducted since 2005 including (but not limited to) surveys for subterranean fauna, terrestrial invertebrates and short range endemics.

How the reliability of the information was tested

All ecological studies were undertaken by suitably qualified and experienced personnel, using widely accepted survey methods.

Any uncertainties in the information

There are none that the Proponent is aware of. Records from the EPBC Act Protected Matters Interactive Search Tool have the caveats that are stated on entering the database.

10.3 Attachments

You must attach	figures, maps or aerial photographs showing the project locality (section 2)	X
	figures, maps or aerial photographs showing the location of the project in respect to any matters of national environmental significance or important features of the environments (section 4)	X
If relevant, attach	copies of any state or local government approvals and consent conditions (section 3.4) See Link: WA Ministerial Implementation Statement No. 748 (see full web address in references section of Appendices Document)	X
	copies of any completed assessments to meet state or local government approvals and outcomes of public consultations, if available (section 3.5) See Link: Gorgon Gas Development EIS/ERMP (see full web address in references section of Appendices Document)	X
	copies of any flora and fauna investigations and surveys (section 4)	
	technical reports relevant to the assessment of impacts on protected matters and that support the arguments and conclusions in the referral (section 4 and 5)	X
	report(s) on any public consultations undertaken, including with Indigenous Stakeholders (section 4)	

11 Signatures and declarations

NOTE: Providing false or misleading information is an offence punishable on conviction by imprisonment and fine (Section 489, EPBC Act).

Project title		Gorgon Gas Development Revised Proposal, Western Australia
11.1	Party who prepared the referral	I declare that the information contained in this form is, to my knowledge, true and not misleading. I request that the person named in 11.3 below (if any) be designated as the proponent for the action.
Signature		
Date		
Full name		Dr Julia Martin
11.2	Party who is responsible for action	I declare that the information contained in this form is, to my knowledge, true and not misleading.
Signature		
Date		
Full name		Colin Beckett
11.3	Proponent (complete only if different from 11.2)	I, being the person nominated in Section 1.3 of this referral form as the nominated proponent (or agent acting on behalf of), agree to be designated as the proponent for the action described above if it is decided that the action requires approval under Part 9 of the EPBC Act.
Signature		Not applicable
Date		Not applicable
Full Name		Not applicable

If the referring party is a small business (fewer than 20 employees), estimate the time, in hours and minutes, to complete this form (include your time reading the instructions, working on the questions and obtaining the information and time spent by all employees in collecting and providing this information).

Hours	Minutes
NA	NA

Appendices

- Appendix 1 Figures
- Appendix 2 Description of Proposed Changes to the Approved Gorgon Gas Development
- Appendix 3 EPBC Act Protected Matters Search Results
- Appendix 4 Western Australian State Government Ministerial Conditions of Approval Relevant to Commonwealth Matters
- Appendix 5 Chevron ASBU Policy 530
- Appendix 6 References