

01: Introduction



Proposal Title

This document is a Draft Environmental Impact Statement and Environmental Review and Management Programme (Draft EIS/ERMP) for the proposed Gorgon Development. It was prepared by the Gorgon Joint Venturers in accordance with the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and the Western Australian *Environmental Protection Act 1986* (EP Act).

The title of this proposal is 'the proposed Gorgon Development', which comprises a range of offshore and onshore infrastructure components to recover gas from the Gorgon gas field (Figure 1-1), and to process this gas at, and ship it from, a gas processing facility on Barrow Island. All construction, operation and decommissioning activities associated with this infrastructure are considered as part of the proposed Development.



1.1 Development Proponent

Chevron Australia is the operator and proponent for the proposed Gorgon Development (the key elements of which are outlined in Section 1.2.4) on behalf of the companies listed in Table 1-1. In this document, these companies are referred to together as ‘the Gorgon Joint Venturers’ (or the Joint Venturers).

The Gorgon Joint Venturers are subsidiaries of leading companies in the global oil and gas industry with proven technical and management skills for safe, efficient and environmentally responsible development.

These companies have a wealth of international and domestic experience in oil and gas processing and LNG operations covering all aspects of the Development, ranging from drilling to subsea production systems, offshore operations, gas plant operations, and product shipping. Between them, the Joint Venturers are involved in eight other LNG projects that are currently operating or under construction. About three-quarters of the world production of LNG is produced by joint ventures involving the Gorgon Joint Venturers.

The Joint Venturers also have extensive experience in injection of carbon dioxide (CO₂) into subsurface formations associated with oil recovery operations. This is another key area for the Gorgon Development as discussed in Chapter 13. The Rangely operation in the United States is one such example. Chevron Australia has also been working closely with the

Table 1-1:
Addresses of the Gorgon Development Proponent and Joint Venturers

Company
Chevron Australia Pty Ltd Level 24, QV1 Building 250 St Georges Terrace Perth, Western Australia, 6000
Texaco Australia Pty Ltd Level 24, QV1 Building 250 St Georges Terrace Perth, Western Australia, 6000
Shell Development Australia Pty Ltd Level 28, QV1 Building 250 St Georges Terrace Perth, Western Australia, 6000
Mobil Australia Resources Company Pty Ltd 12 Riverside Quay, Southbank Melbourne, Victoria, 3000

Geodisc program, and its replacement the Cooperative Centre for Greenhouse Gas Technologies (CO₂CRC), to widen the knowledge base associated with CO₂ injection.

Chevron Australia has been involved in the oilfield operation on Barrow Island for over 40 years that has produced some 300 million barrels of oil. Chevron Australia’s management of oil production activities on

Barrow Island is widely recognised as an industry benchmark for co-existence of petroleum development and the protection of conservation values (Box 1-1).

Implementation of conservation best practices underpins the success of the oilfield operations in managing quarantine and protecting the island from unauthorised visits. As a result, Barrow Island is free from introduced vertebrate pests such as rats, mice, cats, rabbits and foxes. Without Chevron Australia's environmental stewardship of the island, the same level of protection of the conservation values would have required a contribution of millions of dollars from the

Box 1-1:

Barrow Island – Oilfield and Nature Reserve

Barrow Island is the centre for Chevron Australia's oil operations in Western Australia. It has been operating as a producing oilfield since 1967. The conservation value of the island has long been recognised and a successful environmental management program has been in place for almost 40 years of the oilfield operation.

Barrow Island is a unique remnant of the natural ecology with close affinities to the Cape Range area. In 1910, Barrow Island was proclaimed as a Class A Nature Reserve. The Class A status of the island reflects its importance as a refuge for wildlife species, some of which are endemic to Barrow Island and some of which are extinct, or near extinction, on the mainland. This island provides an indication of environmental conditions on the mainland prior to impacts such as weeds, feral animals and grazing following European settlement. The Reserve is vested in the Conservation Commission of Western Australia and managed by the Department of Conservation and Land Management (CALM) for the purpose of wildlife and landscape conservation, scientific study and preservation of features of archaeological, historic and scientific interest.

Barrow Island is the largest of a group of islands located off the Pilbara coast of Western Australia, 85 km north-north-east of the town of Onslow. Barrow Island is Western Australia's second largest island; it is some 25 km long and 10 km wide. The island has an arid climate with a highly variable rainfall (the average is about 320 mm per annum).

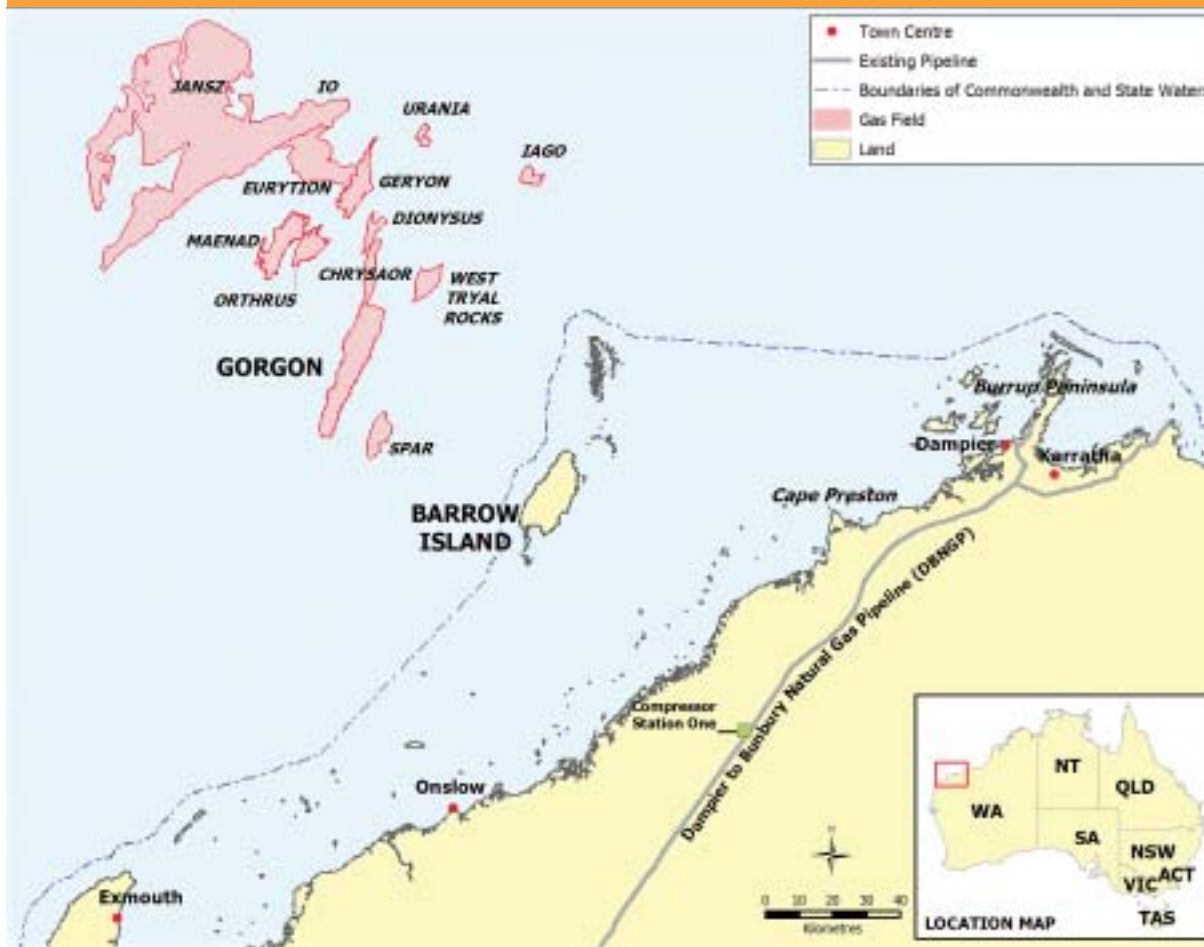
state of Western Australia. Chevron Australia's success in managing the conservation values of Barrow Island has been formally recognised by the receipt of a number of environmental awards (ChevronTexaco Australia 2003).

1.1.1 Environmental Commitment and Responsibility

Developing Gorgon gas in a sustainable manner is a major objective of the Gorgon Joint Venturers (Section 1.4). Further, the Joint Venturers are committed to conducting activities associated with the proposed Gorgon Development in an environmentally responsible manner; and aim to implement best practice environmental management as part of a program of continuous improvement. This will be achieved by addressing issues systematically, consistent with internationally accepted standards and the Chevron Operational Excellence Management System which includes the values and goals of the Chevron Health, Environment and Safety Policy (Policy 530) (Chapter 16). To fulfil its commitment to ensuring the Gorgon gas resource is successfully developed in an environmentally responsible and sustainable manner, the Joint Venturers will draw on their collective experience and the most appropriate technologies available.

During the planning and design of the Gorgon Development, a range of mitigation measures to prevent or minimise adverse environmental impacts have been taken into consideration. For example, the location for the feed gas pipeline shore crossing was moved to avoid sensitive rock wallaby habitat. Further, a range of management measures for identified adverse environmental impacts are presented throughout this Draft EIS/ERMP. In many situations, where impacts cannot be avoided, the implementation of these measures will: limit the degree or magnitude of the adverse impact; or rehabilitate any impacted sites. In addition, much of the assessment work and many of the proposed management strategies and monitoring programs have and will contribute significantly to the substantial body of scientific knowledge and understanding of the ecology of the Development Area – thus providing benefit as environmental offsets.

Figure 1-1:
The Gorgon Gas Field in Relation to North-West Australia



The Joint Venturers are proud of their environmental record and, in accordance with the requirements of Schedule 4 of the EPBC Regulations, confirm that none of the Venturers are the subject 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.

1.2 Development Overview

1.2.1 Resource under Consideration for Development

The Greater Gorgon area, situated over 130 km off the north-west coast of Western Australia, comprises the largest gas resource discovered to date in Australia (Figure 1-2). The reservoirs of untapped natural gas contain in excess of 1.1 Tera cubic metres (Tm³) (40 Trillion cubic feet (40 Tcf)) of gas which represents some 25% of Australia's known gas resources. Development of this substantial national asset would secure Australia's position as a leading gas producer and generate a new source of wealth for Western Australia and Australia.

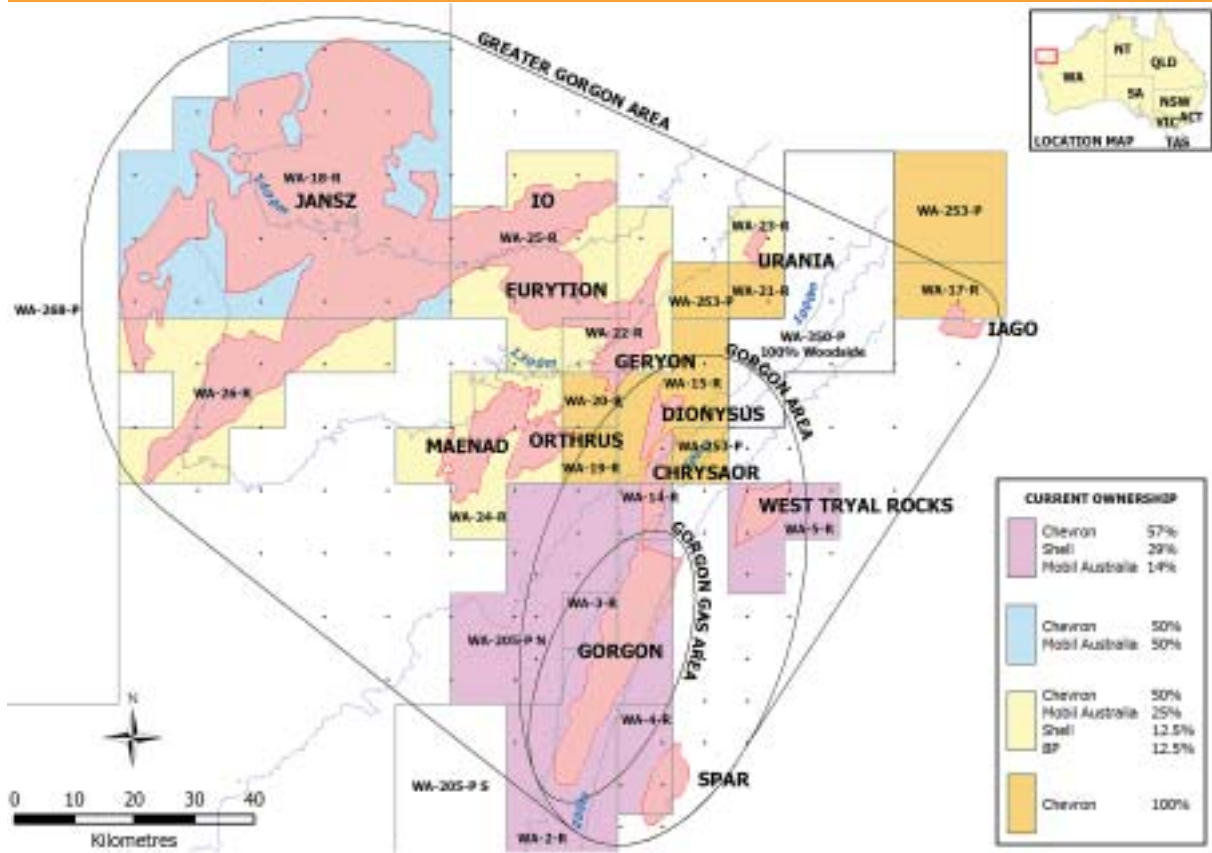
Box 1-2: Gorgon Gas Resource Base

The gas fields of the **Greater Gorgon area** contain an estimated gas resource in excess of 1.1 Tm³ (40 Tcf) and include the Gorgon area gas fields in relatively shallow water; and the Jansz field, among others, in deeper water further offshore.

The gas fields of the Gorgon area contain a technically proven and certified recoverable gas resource of 0.37 Tm³ (12.9 Tcf) and includes the Gorgon, West Tryal Rocks, Spar, Chrysaor and Dionysus fields.

The **Gorgon gas field** is the largest field in the Gorgon area, a technically proven and certified resource of 0.27 Tm³ (9.6 Tcf), and one of the largest fields ever discovered in Australia.

Figure 1-2:
The Greater Gorgon Area Gas Resource Base



NB: Ownership is subject to change pursuant to an agreement between Chevron Australia, Mobil Australia Resources Company and Shell Development Australia to align their interests on a 50/25/25 basis in certain permits. This change requires government approvals before it becomes effective.

The Gorgon Joint Venturers are considering developing the Gorgon field, which is located within the Greater Gorgon area (Figure 1-2 and Box 1-2). The Gorgon field contains approximately 0.27 Tm³ (equivalent to 9.6 Tcf) of recoverable gas. The field retention lease is held by the Gorgon Joint Venturers and lies in Commonwealth waters approximately 70 km from Barrow Island.

The Gorgon and Jansz fields will be developed first due to the economics of field development, which is driven by the following factors:

- resource size, internal structure, and reservoir properties of each field
- amount of information available on each field
- gas composition of each field, including the amount of hydrocarbon liquids (condensate) and inert gases
- distance of each field from land
- water depth of each field.

The other fields of the Greater Gorgon area will be developed subsequently once production from the Gorgon and Jansz fields decline naturally; and/or as market demands dictate.

1.2.2 Background to this Development Proposal

Delivery of gas from the Greater Gorgon area gas fields will provide significant economic and social benefits to the state and nation, but developing the fields presents some challenges. Over the past 20 years, the Joint Venturers have spent approximately \$1 billion on exploration, planning and marketing to prepare for the ultimate development of the Gorgon gas field. This preparation includes the evaluation of a number of development options and potential gas processing facility locations. In the 1990s, for example, customers were sought based on a processing facility on the Burrup Peninsula. However, the cost of transporting gas from the Gorgon gas field to this mainland site made the Development internationally uncompetitive.

Continued efforts to find a suitable location saw Barrow Island emerge as the only site that would enable the gas to be competitive in the current market.

Barrow Island is the nearest landfall to the Greater Gorgon fields with the Gorgon gas field being the closest field to the island. Establishment of a gas processing facility on Barrow Island will provide the catalyst for further development of the Greater Gorgon area fields.

Barrow Island also presents a unique opportunity to dispose of reservoir CO₂ from the Gorgon gas field into deep formations beneath the island (Chapter 13). The island is also Australia's largest operating onshore oilfield so provides the opportunity to utilise existing infrastructure (Box 1-3 and Figure 1-3). Despite the appeal of these drivers, the decision to apply for approval to base the onshore components of the proposed Development on Barrow Island was a difficult one for the Joint Venturers. The decision was made only after exhausting all other development alternatives (Chapter 3) because Barrow Island is a Class A Nature Reserve and home to a rich suite of wildlife, some of which are endemic to this island or listed as threatened on the mainland. This Draft EIS/ERMP demonstrates the Gorgon Venturers are committed to implementing the actions necessary to protect and maintain the conservation values of Barrow Island.

1.2.3 In-principle Approval for Restricted Access to Barrow Island

Before proceeding with the complex and expensive technical, commercial and environmental investigations necessary to advance the proposed Development, the Joint Venturers sought and received in-principle approval from the State Government of Western Australia for restricted access to Barrow Island.

The government's decision followed a strategic review by the Joint Venturers of the environmental, social and economic ramifications of the proposed Development on Barrow Island. This review (ESE Review), which included a wide range of public consultation, was subject to a six-week period of public comment. Responses by the Joint Venturers to those comments were also submitted to the government for consideration in the assessment of the proposed Development. Three government agencies also provided independent advice on the ESE Review in accordance with their areas of expertise and responsibility. This advice was also available for public comment for a six-week period (refer to Chapter 2 for further details on this process).

Box 1-3: Infrastructure with Sharing Potential on Barrow Island

Under the *Barrow Island Act 2003* (Chapter 2), there is a requirement for the Joint Venturers during planning to take into account and make provision, as far as practicable, for use and sharing of services, facilities and infrastructure. Sharing will minimise environmental disturbance and impacts on the conservation values of Barrow Island.

Several components of the existing infrastructure on Barrow Island, which supports the Barrow Island Joint Venture operation on the island, could be shared with the Gorgon Development. These components include the:

- barge landing (until a new Materials Offloading Facility is built)
- airport
- roads
- old airstrip for materials lay-down
- oil offloading line
- water injection well
- accommodation (initially pioneer construction workforce and possibly longer term workforce)
- power
- water
- waste management (incineration)
- communications
- emergency response infrastructure.

The Joint Venturers are also required to enter into negotiations for the sharing and supply of their services, facilities and infrastructure on Barrow Island. The negotiation terms are to be based on 'reasonable commercial terms' and will be subject to availability of spare capacity.

The proposed Development is now subject to regulatory environmental approvals as outlined in section 1.5 and described in Chapter 4.

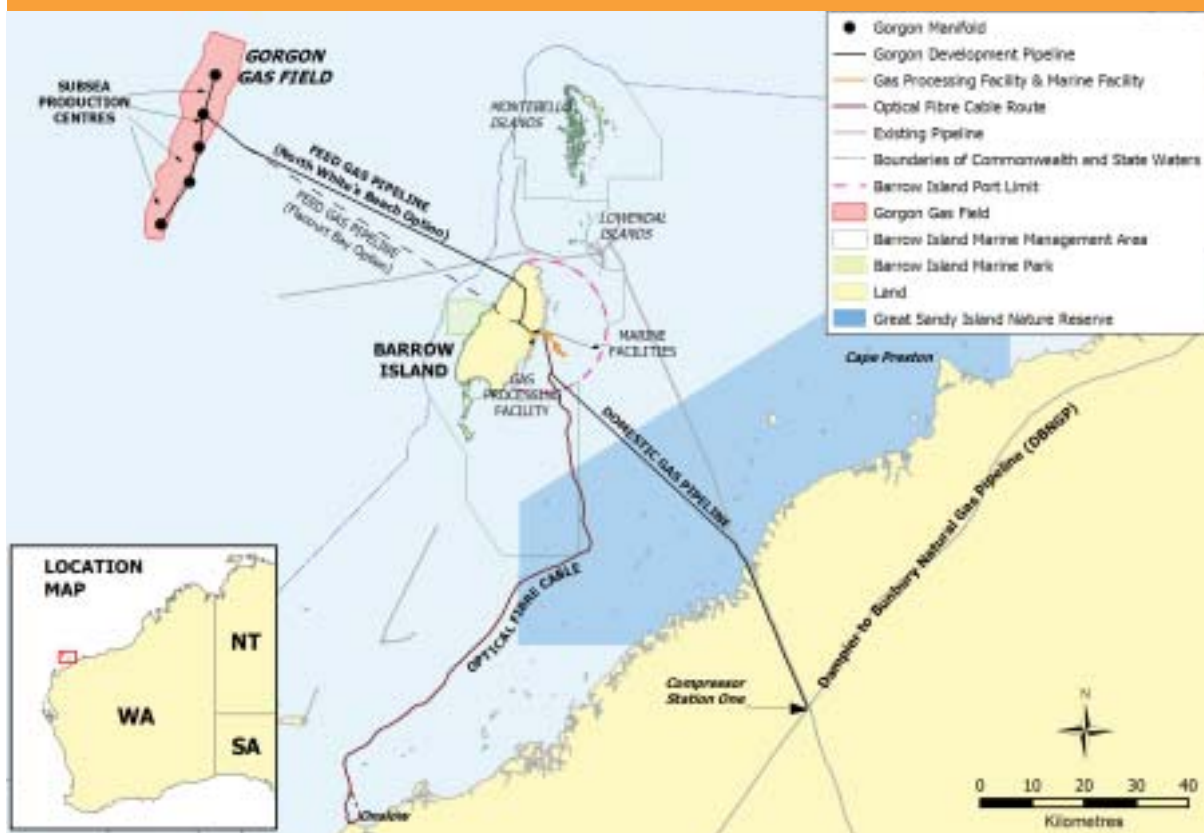
1.2.4 Scope of the Proposed Development

The Gorgon Joint Venturers propose to develop a 10 million tonne per annum (MTPA) Liquefied Natural Gas (LNG) plant and a 300 TJ/day domestic gas plant on Barrow Island, which will be supplied from both the Gorgon and Jansz fields. Approximately 2000 m³/day (12 000 bbl/day) of hydrocarbon condensate will also be produced.

Figure 1-3:
Existing Infrastructure on Barrow Island



Figure 1-4:
Development Concept



The scope of this Draft EIS/ERMP, as illustrated in Figure 1-4, covers:

- the Gorgon gas field wells and subsea installation
- a feed gas pipeline from the Gorgon gas field to the gas processing facility on Barrow Island
- an easement along the Gorgon gas field pipeline (onshore Barrow Island and traversing state waters) to accommodate additional feed gas pipelines
- a gas processing facility on Barrow Island (including two LNG trains, domestic gas and condensate facilities)
- port/marine facilities at Barrow Island
- water supply and disposal
- the construction village and associated facilities
- a proposal to dispose of reservoir CO₂ by injection into the Dupuy formation
- monitoring of CO₂ movement in the Dupuy formation
- an optical fibre cable connection to the mainland
- a domestic gas pipeline to the mainland.

For the purpose of cumulative impact assessment, this Draft EIS/ERMP addresses the impacts on, and near, Barrow Island associated with the installation of the Jansz feed gas pipeline to process gas from the Jansz field and other potential tieback opportunities associated with the Greater Gorgon area, or other nearby prospects. An easement along the Gorgon gas field pipeline corridor (onshore and traversing state waters) to accommodate the Jansz and additional feed gas pipelines is included in this environmental assessment and approval application with construction subject to conditions set for the Gorgon Development. Onshore and near shore construction of additional feed gas pipelines will be planned concurrently, where possible, to minimise the total environmental impact.

It is likely that gas from the Jansz field will supply the domestic gas processing plant. However, for the purposes of this Draft EIS/ERMP it was assumed that the gas will be supplied from the Gorgon gas field, as this provides a worse case CO₂ emissions profile.

Under the provisions of the Western Australian *Barrow Island Act 2003* (Chapter 2), no more than 300 ha of uncleared land is available for this and other future gas processing proposals on Barrow Island. This 300 ha is comprised of 150 ha that is reserved for the Gorgon Development and 50 ha that is reserved for easements for petroleum pipelines, control lines and ancillary services. The remaining 100 ha is reserved for future developments. Future phases of the Development will be subject to separate approval. However, the cumulative impacts of land clearing and habitat modification for the full 300 ha are considered in this Draft EIS/ERMP. Further details on specific components of the proposed Development are provided in Section 1.2.5.

The infrastructure and activities that are beyond the scope of this assessment and will be assessed under separate approvals processes are:

- Jansz field development and pipeline (operated by Mobil Exploration and Producing Australia (MEPA))
- subsea installations to develop additional gas fields in the Greater Gorgon area, or other nearby prospects
- feed gas pipelines from additional gas field developments in Commonwealth waters
- offshore marine seismic surveys
- shipping activities outside of the Barrow Island port facility.

The Jansz deepwater development and pipeline will be subject to a separate environmental approval process coordinated by MEPA as the operator of the Jansz field.

1.2.5 Principal Elements of the Proposed Development

Development of the Gorgon field will require a range of infrastructure to extract the gas and transport it to Barrow Island for processing and delivery to market. The principal physical components of the proposed Development are provided in Table 1-2 (details provided in Chapter 6).

The initial Development will consist of subsea infrastructure for the production and transport of gas from the Gorgon gas field to Barrow Island, and a gas processing facility at Town Point (Figure 1-4). A subsea development concept circumvents the need for an offshore platform as part of the initial development.

Liquefied Natural Gas and condensate produced at the gas processing facility will be shipped from Barrow Island to buyers. If commercially viable, gas for domestic use may be exported by a pipeline from Barrow Island to the domestic gas collection and distribution network on the mainland. Associated infrastructure will be required on the island and in the adjacent marine area. This will include administration and accommodation facilities, a materials lay-down area, a materials offloading facility, a CO₂ injection facility and a conventional loading jetty.

Table 1-2:
Key Elements of the Proposed Gorgon Development

Element	Description
Market objective	First shipment of LNG in mid-2010
Construction start (site preparation)	Late-2006
Development life	60 years
Size of recoverable resource: • Gorgon field	0.27 Tm ³ (9.6 Tcf) (technically proven and certified)
Leases: • Gorgon field	WA-2-R; WA-3-R
Typical gas composition: • Gorgon field • Jansz field*	<ul style="list-style-type: none"> • CO₂ = 14–15%; N₂ = 2-3%; Hydrocarbon = remainder • CO₂ = < 1%; N₂ = 2%; Hydrocarbon = remainder
Wells (all subsea): • location • number	<ul style="list-style-type: none"> • Gorgon gas field • 18–25
Pipeline lengths: • feed gas pipeline • Gorgon (offshore) • Gorgon (onshore, Barrow Island) • state-water easement** • domestic gas • offshore (state waters) • onshore (mainland) • CO ₂ injection	<ul style="list-style-type: none"> • ~ 70 km • ~ 14 km (~ 42 ha easement) • ~ 5.6 km • ~ 70 km • ~ 30 km (~90 ha easement) • < 5 km (< 6 ha easement)
Gas processing facility: • location • components	<ul style="list-style-type: none"> • Town Point, Barrow Island • 2 x 5 MTPA LNG trains • 300 TJ/day domestic gas plant • 2000 m³/day hydrocarbon condensate
Port facility	<ul style="list-style-type: none"> • materials offloading facility (MOF) with an 800 m causeway • LNG load-out facility with a 3.1 km jetty
Other associated facilities	<ul style="list-style-type: none"> • mainland supply base • optical fibre cable • construction village • administration and maintenance facilities • offshore spoil ground (1500 ha) • widened roads • water supply, treatment and disposal facility • power generation and supply • extended airport
Air emissions: • greenhouse gases (with CO ₂ injection) • total NO _x • total SO _x • total particulates (PM10)	<ul style="list-style-type: none"> • 4.0 million tonnes of CO₂ equivalents per annum • 4430 tonnes per annum • 0.15 tonnes per annum • 241 tonnes per annum
Dredging: • MOF channel and turning basin • shipping channel and turning basin	<ul style="list-style-type: none"> • 0.8 Mm³ over ~ 21 weeks • 7.0 Mm³ over ~ 45 weeks

Table 1-2: (continued)**Key Elements of the Proposed Gorgon Development**

Shipping:	<ul style="list-style-type: none"> • LNG export • condensate export 	<ul style="list-style-type: none"> • ~ 3 shipments per week • ~ 1 shipment per month
Element		Description
Total direct employment:	<ul style="list-style-type: none"> • construction (on Barrow Island at peak) • operations: <ul style="list-style-type: none"> • on Barrow Island • on rotation (off the island) • in Perth office 	<ul style="list-style-type: none"> • ~ 3300 people • ~ 600 people: • 150–200 • 150–200 • 200–300
Development Investment		~ \$11 billion

* Composition of Jansz gas included here as the gas processing facility will receive gas from both Gorgon and Jansz fields and as such emissions calculations and modelling have been based on the total incoming gas stream.

** Potential impacts in the easement in state waters associated with construction and operation of the Jansz (or other) feed gas pipelines are considered for cumulative impact assessment purposes.

1.2.6 Relationship to Other Proposals in the Region

The economy of Western Australia is dominated by the resources sector with more than three-quarters of Australia's identified natural gas resources. This extensive energy resource provides a significant competitive advantage to the state and will ensure continued economic growth to the region. Currently Western Australia has almost 500 resource projects in commercial production, underwriting the strong economic foundation of the state.

Within Western Australia, one of the most vital and dynamic wealth producing regions is the Pilbara, which accounts for more than 55% of the mineral and energy production at a value of more than \$15 billion per annum. This region currently produces 100% of Australia's LNG.

As shown in Table 1-3, from data published by the Western Australian Department of Industry and Resources (DoIR), the proposed Gorgon Development is one of a number of substantial oil and gas, mining and associated downstream processing developments planned for the Pilbara region.



Table 1-3:
Current Commissioned and Committed Pilbara Minerals and Energy Projects

Project	Project Value (\$ M)	Employment – Construction	Employment – Operations	Construction Commencement
Oil and Gas				
Woodside Energy: Enfield Oilfield	1 480	100	80	Production 2006
Santos: Mutineer-Exeter Oilfields	480	540	90	Production 2005
Gorgon Joint Venturers: Gorgon Development, LNG (2 trains)*	11 000	3 300*	600*	2006
North West Shelf Partners: 5th LNG Train, 2nd Trunkline**	1 600	–	–	Not yet determined
BHP Petroleum: Pilbara LNG	Under evaluation	–	–	–
Petrochemicals				
Burrup Fertilisers: Ammonia Plant	630	700	60	Production 2005
Japan DME: Dimethyl-ether Plant	1 000	1 000	150	Operational 2007
Deepak Resources: Burrup Peninsula Ammonium Nitrate	300	700	150	NA
Sasol-Chevron gas to liquids plant	2 000	2 500	200	–
Iron and Steel				
BHP Billiton Iron Ore: Rapid Growth Project 1	145	–	–	2004
Hamersley Iron: Dampier Parker Point Expansion	700	600	–	2004 (expected completion end 2005)
Hamersley Iron: Yandicoogina Mine Expansion	290	330	–	Production 2005
Hope Downs: Iron Ore Mine	1 050	500	300	–
Robe River Mining Company: West Angelas Mine Expansion	–	–	–	Completion mid-2005
Fortescue Metals Group: (Cape Preston) Mine and HBI Plant	3 000	5 000	1 050	Mid-2005
Other				
Newcrest Mining: Telfer Gold Mine Expansion	1 400	1 222	620	Full production 2005
Hamersley Iron: Power Infrastructure Enhancement	–	30-40	–	2005
Robe River Mining Company: Rail Duplication from Tunkawanna to Rosella Siding	200	–	–	Completion mid-2006
TOTAL VALUE	25 275	16 532	3 300	

Source: DoIR website: www.doir.wa.gov.au/investment

Note: Only projects that are commissioned or committed are included in this list. Projects under consideration are not included and account for a significant amount of potential investment and employment.

* Figures as per DoIR website: [www.doir.wa.gov.au/investment/mineralsandpetroleum/Status of ResourceProjectsFeb2005.pdf](http://www.doir.wa.gov.au/investment/mineralsandpetroleum/Status%20of%20ResourceProjectsFeb2005.pdf)

** Figure as per www.smh.com.au/news/Business/26/4/05

Given the amount of other resource activity planned, the regional economy is not large enough to provide all labour, goods and services required for the Gorgon Development. Whilst economic modelling (Chapter 15) shows that the proposed Development would result in little ‘crowding out’ of the investment potential for other projects, there is a risk that short-term demand (e.g. labour for construction) will cause regional price rises. Total employment in the Pilbara region ranged between 22 000 and 24 000 from 1999 to June 2003 (Department of Local Government and Regional Development 2003). At its peak, the Gorgon Development construction workforce is expected to require some 3300 people on the island which is more than 14% of the entire Pilbara workforce. This means that the regional economy will not be able to provide sufficient labour when required, so additional labour will need to be employed from other areas.

Depending on the execution schedule of the other proposed projects, construction of the Gorgon Development could smooth out manpower and demand for materials and services if it is ramping up when other

projects are ramping down. There could also be a fifth LNG train constructed for the North West Shelf Joint Venture (NWSJV) by 2008, the Sunrise project in the Timor Sea in 2009, and the remote Scott Reef on the north-west Shelf in 2012 according to Australian newspaper reports. The approach described in the State Agreement (Chapter 2) and Australian Industry Participation Policy (Chapters 8 and 14) offers a good balance between the development of local capacity and the commercial drivers for the Gorgon Development.

1.2.7 Development Timeline

The actual timing for the commencement of construction on Barrow Island is subject to government approval processes. An indicative schedule for the proposed Development is provided in Figure 1-5, which shows that the first shipment of LNG is expected in mid-2010. The production life of the proposed gas processing facility will fall within the first long-term lease period of 60 years allowed under the State Agreement annexed to the *Barrow Island Act 2003*.

Figure 1-5:
Indicative Environmental Approval and Development Schedule

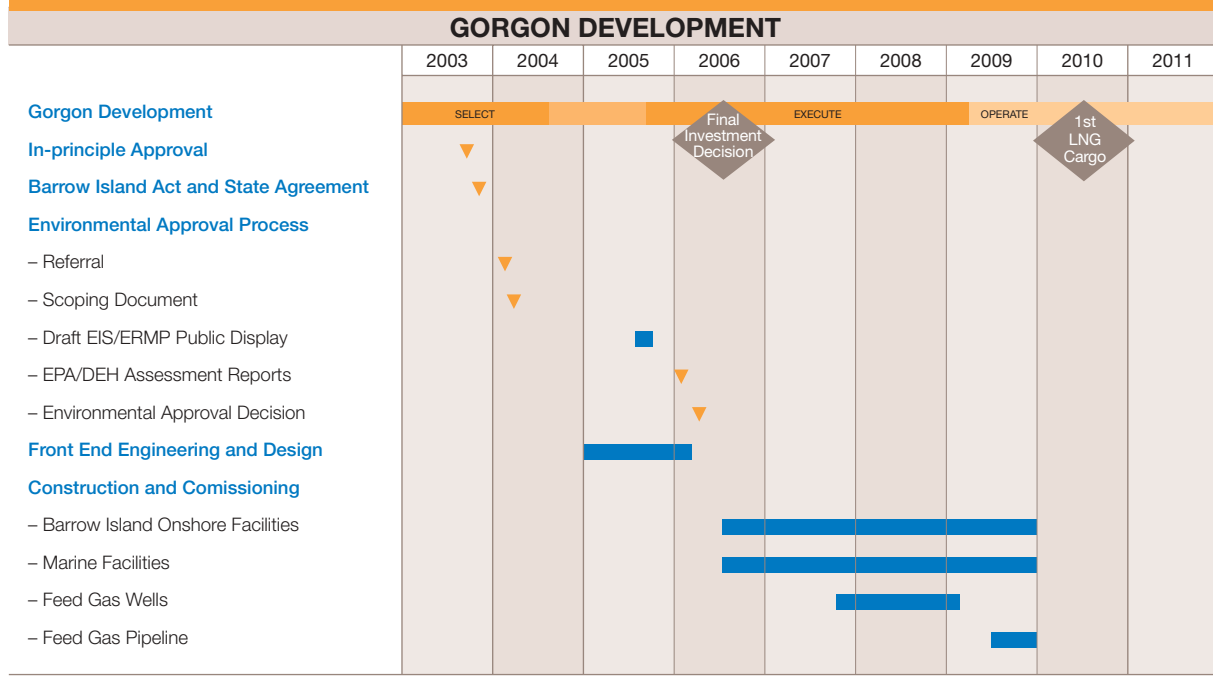
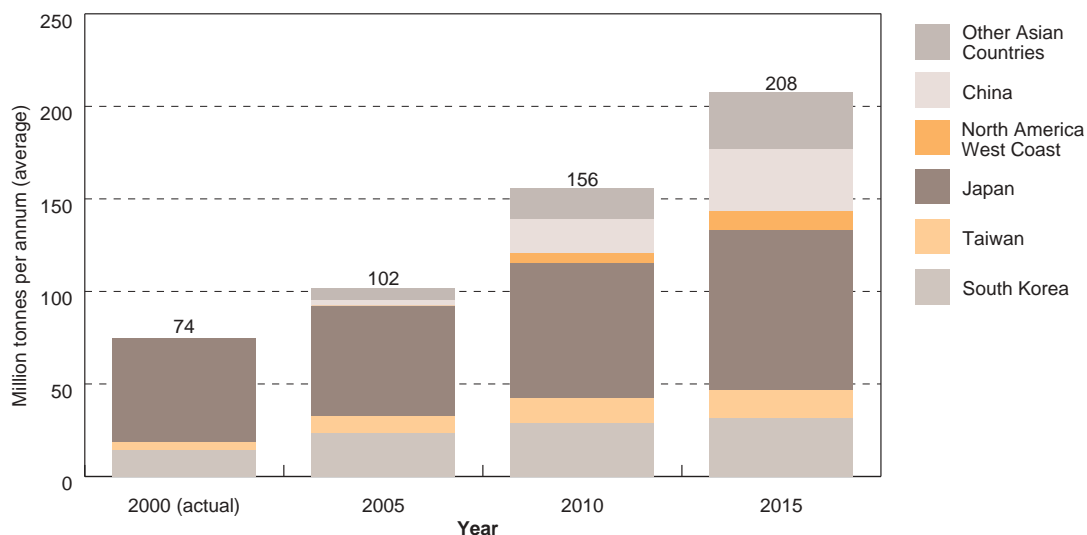


Figure 1-6:
Asia-Pacific LNG Demand Forecast



1.3 Development Rationale

The Western Australian and Commonwealth governments both identify the resource industry as a key to economic growth, so have legislation and policy objectives designed to expedite development of the nation's resources. The retention leases issued to the Joint Venturers obligate the proponents to actively seek development opportunities for these resources.

There is a growing demand for energy in the Asia-Pacific region (Figure 1-6) and the Australian domestic gas market. At the international market level, particularly in the Asia-Pacific region, the Development will supply LNG for the next generation of gas-based industries.

At the Australian market level, the proposed Development will double the size of the gas industry in Western Australia at a time when there is a projected shortfall in energy supply. Further, the development of an additional strategic gas supply hub in Western Australia will significantly improve the availability of long-term, competitive supplies of gas to the state, and help build Australia's standing as a reliable gas supplier.

1.3.1 Market Opportunities

China

The opportunity to sell Gorgon gas to China was bolstered in October 2003 by the signing of an agreement between the China National Offshore Oil

Plate 1-1:
Signing of the CNOOC Agreement



Corporation (CNOOC) and the Joint Venturers. Whilst the formal exclusivity within that agreement has expired the parties are continuing to negotiate both the (conditional) Sales and Purchase Agreements for Equity and LNG sales.

Subject to the completion of formal contracts, it is proposed that CNOOC Limited will purchase a substantial equity stake in the Gorgon Development, and Zhejiang LNG will purchase significant volumes of LNG from the Gorgon Development for use in China. CNOOC will also assist the Joint Venturers to secure markets in China for a further designated amount of LNG.

North America

Progress has also been made with marketing in North America. Shell has committed capacity from the Energia Costa Azul LNG receiving terminal in Northern Mexico to take its share of gas from the Gorgon Development. These marketing arrangements provide Shell with the capacity to divert Gorgon gas to other markets if it is commercially attractive to do so. This facility, which is currently under construction, will be the first LNG receiving terminal on the North American west coast. This secures a market for 25% of LNG production from the Gorgon Development (up to 2.5 MTPA).

Discussions continue with Chevron Global Gas for the sale of further volumes of Gorgon LNG to the North American west coast market.

Other Markets

Negotiations continue to secure a place for Gorgon LNG to major gas buyers in Japan and Korea for the window of opportunity seen in 2010.

The Gorgon Development thus has the potential to secure Australia's position as a leading gas producer and provide a large source of additional wealth to Australia and Western Australia (refer to Chapter 15; and ChevronTexaco Australia 2003).

1.3.2 Consequences of Missing the Current Development Opportunity

Federal and state legislation and policy require Australia's resources to be developed expeditiously. As holders of the retention leases, the Joint Venturers are obliged to bring the hydrocarbon resources into commercial production as soon as reasonably practicable.

Furthermore, if the Development does not proceed, the economic, social and strategic benefits described in this document will not be realised. Even a short delay to the Gorgon Development could trigger a long delay in capturing and transferring these benefits to Australia, Western Australia and the Pilbara. This is because the market opportunities currently available to the Joint Venturers could be easily won by competing countries such as Indonesia, Malaysia, Russia and Qatar. Future market opportunities may not become available for a considerable period if the current opportunity is lost.

1.4 Development Objectives

The primary objective of the Gorgon Joint Venturers is to commercialise the proven recoverable gas from the Greater Gorgon area in a sustainable manner. This includes continuing to protect the conservation values of Barrow Island, managing environmental, health and safety requirements responsibly, and implementing best practice environmental management throughout all phases of the Development.

To meet this objective, the Joint Venturers established a set of sustainability principles and assessment criteria for the proposed Development on Barrow Island during the ESE Review process (Box 1-4 and Chapter 2). These principles and criteria are based on widely accepted sustainability principles and address the key concerns, particularly those concerning environmental protection, expressed by stakeholders consulted about the proposed Development. They are also consistent with the EPBC Act principles of ecologically sustainable development and the direction of the State Government of Western Australia, including the EPA Principles of Environmental Protection (EPA 2004a). These principles will be applied to all phases of the Development, and provide a framework for the Joint Venturers to sustainably unlock the value of Greater Gorgon area.

Box 1-4:**Gorgon Development Sustainability Principles**

Clean Energy Supply	The Development will meet Western Australian, Australian and international demands for competitive, clean energy sources. It will also enhance energy competition and security of supply in Australia.
Economic Benefit Delivery	Current and future economic growth in Australia will benefit from the Development. It will foster economic growth and business development, generate government revenue, provide commercial returns to the Joint Venturers and contribute to the wealth generated by Australia's natural resource base.
Biodiversity and Ecological Integrity Protection	The Gorgon Development will not disrupt ecological structure and function, nor will it result in a loss of biological diversity on Barrow Island.
Social Equity and Community Well-being Enhancement	Communities will benefit from improved quality of life and well-being resulting from contributions of the Gorgon Development such as creation of jobs.
Future Generations Commitment	The Gorgon Development will meet the needs of the present generation and assist future generations to meet their needs.
Efficient Resource Use	International best practice and continual improvement principles will be applied to efficiently manage resources and wastes.
Precautionary Principle Application	Where there are threats of serious or irreversible damage, lack of full scientific certainty will not be used as a reason for postponing cost-effective measures to prevent environmental damage.
Community Respect and Safeguards	The Joint Venturers will respect community values, community diversity and safeguard the well-being of the public and workforce throughout the life of the Development.
Stakeholder Engagement	The Joint Venturers will seek the views of stakeholders and take their interests into account throughout development of the Gorgon gas field.
Accountability	The Joint Venturers are committed to the highest standards of governance and accountability. They will report regularly to the community on the sustainability performance of the Development.

The assessment criteria for these sustainability principles are outlined in the ESE Review (ChevronTexaco Australia 2003).

1.5 EIS/ERMP Process

The proposed Gorgon Development is subject to state and federal regulatory environmental assessment under the *Environmental Protection Act 1986* (EP Act) (WA) and the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) (Commonwealth).

A number of environmental assessment and management requirements would also apply to the Development under state and federal petroleum legislation as shown in Table 4-1 of Chapter 4.

The Commonwealth Department of the Environment and Heritage (DEH) and the Western Australian Environmental Protection Authority (EPA) determined that the Gorgon Development should be formally assessed respectively at the levels of Environmental Impact Statement (EIS) and Environmental Review and Management Programme (ERMP).

The Commonwealth and Western Australian governments have agreed to a coordinated environmental assessment process. Accordingly, they will assess a single EIS/ERMP document that satisfies the requirements of both jurisdictions. The EIS/ERMP process is designed to comprehensively identify and examine environmental impacts associated with the proposed Development. This process also provides a means to address those impacts so that the Development is based on sound environmental protection and management criteria.

The approach to the environmental impact assessment and preparation of this Draft EIS/ERMP is summarised in the following section. Further details on the impact assessment process is provided in Chapter 4.

1.5.1 Approach to the Impact Assessment

Potential impacts to physical and biological systems and socio-economic systems are assessed through this EIS/ERMP process. Whether the risks that the proposed Gorgon Development poses to these factors can be managed to an acceptable level are also investigated through this process. The factors assessed during the EIS/ERMP process are presented in Table 1-4 as per the 'Guidelines for an Environmental Impact Statement and Environmental Scoping Document for an Environmental Review and Management Programme for the Proposed Gorgon Development' (ChevronTexaco Australia 2004) which is available at www.epa.wa.gov.au. The final version of this document, which was refined following public comment became the EIS guidelines endorsed and issued by DEH in accordance with the requirements of the EPBC Act. The acceptability of environmental risks needs to be considered in the context of the Class A Nature Reserve status of Barrow Island and the environmental and conservation values that the island represents.

A risk-based approach was adopted to assess the potential environmental impacts associated with the Gorgon Development. Where practicable, this approach was also applied to potential negative social and economic impacts. However, positive/beneficial social and economic impacts should also be considered in the assessment process. Where beneficial impacts could not be assessed adequately using a risk-based approach, more traditional assessment approaches were applied. Details of the risk assessment process are presented in Chapter 9.

As part of a comprehensive environmental management program, proposed strategies to avoid, minimise, mitigate, rehabilitate or offset potential impacts are presented for each factor/stressor combination (refer to risk assessment tables in Chapters 10–15). In addition, a framework EMP, which collates environmental management strategies on an activity basis, is presented in Technical Appendix A.

Management of risks and potential impacts identified through risk assessment and stakeholder consultation processes will be further addressed in the detailed Environmental Management Plan series (EMP) as part of a comprehensive framework for environmental management of the Development. This series of EMPs will be developed and documented through a systematic and consultative process according to an agreed timetable, taking into consideration comments on this Draft EIS/ERMP and recommendations from relevant agencies.

The final stage of this process will be a series of Environmental Management Implementation Plans prepared by the engineering design and construction contractor. These will be internal project documents designed to bridge to the EMP series, provide greater site-specific details and document individual responsibilities, contact and other details (Chapter 16).



Table 1-4:
Environmental and Socio-economic Factors Assessed in the EIS/ERMP Process

Factor Type	Factor
Terrestrial Environment	Flora and Vegetation Communities
	Terrestrial Fauna
	Subterranean Fauna
	Soil and Landform
	Foreshore
	Water (Surface or Ground)
Marine Environment	Marine Fauna
	Marine Flora (mangroves, corals, seagrasses and algae and water quality)
	Benthic Habitats Intertidal Zone (including water quality)
Physical Environment	Air Quality
	Greenhouse Gas Emissions
	Ozone Depleting Substances
	Noise and Vibration
	Light
	Liquid and Solid Waste Disposal
	Hazards and Spills
Socio-economic	Local Communities
	Government Policy, Strategic Plans and Legislation
	Cultural Heritage
	Native Title
	Livelihood and Lifestyle
	Social Infrastructure
	Workforce and Public Health and Safety
	Economic Development
Community Development	

An important component of the Joint Venturers' approach to planning and assessing the proposed Development has involved a comprehensive stakeholder engagement program, as described in Chapter 5. This consultation will continue during the EIS/ERMP approval process and into the ensuing phases of construction, commissioning and operation of the proposed Development.

1.6 Key Concepts

A number of commonly used terms and concepts, used throughout this Draft EIS/ERMP, are often defined and interpreted in different ways depending on the document context and the reader. Box 1-5 provides the Joint Venturers' understanding and application of selected terms and concepts. Further definitions can be found in the Glossary.

Box 1-5:

Definitions of Key Concepts and Terms used in this Draft EIS/ERMP

Best Practice – the Joint Venturers have adopted the Western Australian EPA's definition which states that 'best practice' involves the prevention of environmental impact, or, if this is not practicable, minimising the environmental impact, and also minimising the risk of environmental impact through the incorporation of best practicable measures. No significant residual impact should accrue as a result of a proposal. The EPA defines best practicable measures as technological and environmental management procedures which are practicable, having regard to, among other things, local conditions and circumstances, including costs, and to the current state of technical knowledge, including the availability of reliable and proven technology (EPA 2003).

Biodiversity – collectively describes the variety and variability of nature which encompasses the genetic, species, and ecosystem level of organisation in living systems (ChevronTexaco 2004).

Conservation Values – are natural assets or attributes that are of conservation significance. Key conservation values of Barrow Island include:

- unique fauna species and a high level of biodiversity
- a suite of native marsupials that once occurred on the mainland but are now threatened or extinct there
- an absence of introduced fauna species
- potential as a source for controlled re-introductions to other areas
- a rich marine environment and its various components (e.g. coral reefs, intertidal flats, marine mammals and turtles)
- importance as a staging area for migratory birds
- various subterranean fauna components and their affinities to and differences from populations on the mainland (ChevronTexaco Australia 2003).

Cumulative Effects – describes progressive environmental degradation over time resulting from a range of activities in an area or region (ChevronTexaco 2004).

Environmental Management – is the sum of the day-to-day activities that are designed to mitigate a development's environmental impacts by either avoiding them or reducing them to within 'acceptable limits' (Conservation Commission of Western Australia 2003).

Mitigation Measures – are actions taken to minimise or lessen the impact of activity on the environment or surrounding communities (ChevronTexaco 2004).

These include (in order of preference):

- avoidance – completely avoiding an adverse environmental impact
- minimisation – limiting the degree or magnitude of an adverse impact
- rectification – rehabilitating an impacted site as soon as possible
- offsets – undertaking activities that counterbalance an adverse, residual environmental impact (EPA 2004b).

Net Conservation Benefits – are demonstrable and sustainable additions to, or improvements in, biodiversity conservation values of Western Australia targeting, where possible, the biodiversity conservation values affected or occurring in similar bioregions to Barrow Island (EPA 2004b); in addition and separate to environmental offsets.

Offsets – are any environmentally beneficial activities undertaken to counterbalance an environmental impact or harm, with the aim of achieving 'no net environmental loss' or 'net environmental benefit' outcome. There are two key types of 'offsets', these are 'primary' and 'secondary' offsets. The terms 'primary' and 'secondary' reflect a sequence of approach, rather than a ranking of importance. A primary environmental offset is any environmentally beneficial activity undertaken to counterbalance an adverse environmental impact or harm, with the goal of achieving 'no net loss' and preferably a 'net environmental benefit'. A secondary environmental offset is any environmentally beneficial activity undertaken to complement and enhance the primary offset activity. Secondary offset activities do not contribute to a 'no net loss' outcome, but instead adds materially to environmental knowledge, research, management, protection, etc. (EPA 2004b).

Preventative (Preventive) Measures – are actions taken in advance to keep something possible or probable from happening or existing (Safety and Quality Council 2001).

Box 1-5: (continued)

Definitions of Key Concepts and Terms used in this Draft EIS/ERMP

Risk – is defined as the chance of something happening that will have an impact on objectives. Risk is measured in terms of consequences and likelihood. Consequence refers to the outcome of an event expressed qualitatively or quantitatively, being a loss, injury, disadvantage, or gain. There may be a range of possible outcomes associated with an event. Likelihood is a qualitative description of probability or frequency (AS/NZS 4360:2004).

Risk Assessment – is the overall process of risk analysis and risk evaluation (AS/NZS 4360:2004).

Risk Management – is the culture, processes and structures that are directed towards the effective management of potential opportunities and adverse effects (AS/NZS 4360:2004).

Sustainable Development – is development that meets the needs of the present without compromising the ability of future generations to meet their own needs (WCED 1987).

1.7 Draft EIS/ERMP Purpose and Structure

This Draft EIS and ERMP (Draft EIS/ERMP) is the primary source of information for the public and regulatory decision-makers in their assessment of the potential environmental impacts of the proposed Gorgon Development.

For the reader to identify the factors that may be affected by the Development and the significance of the risks and their management at local, regional, state and national levels, this document provides:

- relevant background information on the proposed Development
- a description of the proposed Development, its emissions and the receiving environment
- a risk-based assessment of all significant environmental impacts that could occur within state and federal jurisdictions
- management measures to prevent and/or minimise significant adverse environmental impacts
- a description of residual risks
- a list of environmental management commitments.

The structure of the presentation of this information is provided in Figure 1-7. This Draft EIS/ERMP consists of a stand-alone executive summary, a main report and technical appendices, which include reports on technical studies undertaken by specialists. The structure of the main report generally follows the format set out in the 'Guidelines for an Environmental Impact Statement and Environmental Scoping Document for an Environmental Review and Management Programme for the Proposed Gorgon Development' (ChevronTexaco Australia 2004).

The first group of chapters provide the reader with background information. The proposed Development is then put in context before the potential risks and their management are presented. In the final section, the Environmental Management System is described before the conclusions reached by the Joint Venturers are provided.

A summary is provided at the beginning of each subsequent chapter to assist readers who wish to understand the whole document but intend to focus on specific sections.

Only metric units are used in this document, although industry standards such as gas quantities are also given as imperial measurements (e.g. Tcf). As such, quantities of liquids are expressed as cubic metres (m³), pipe sizes are in millimetres (mm), areas are in hectares (ha) and distances are in kilometres (km). Conversion factors are included in the Glossary to allow conversion of these units to commonly used imperial measurements.

Throughout this document a number of common oil and gas industry terms are used. To assist readers with industry terminology, a Glossary that describes relevant terms in more detail is provided. Other supplementary information such as references, acknowledgements and acronyms and abbreviations are also provided after the final chapter.

Figure 1-7:
Structure of this Draft EIS/ERMP

