CONSERVATION COMMISSION OF WESTERN AUSTRALIA

BIODIVERSITY CONSERVATION VALUES ON BARROW ISLAND NATURE RESERVE AND THE GORGON GAS DEVELOPMENT

ADVICE TO GOVERNMENT FROM THE CONSERVATION COMMISSION OF WESTERN AUSTRALIA

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Barrow Island Nature Reserve is a class A reserve that has extremely high biodiversity conservation values and has been reserved from other uses to protect these values. It has been recognised for these values and particularly its unique fauna for over a century. It was one of the first permanent nature reserves in the country and was proclaimed as a "permanent reserve class A for the protection of flora and fauna" under the *Permanent Reserves Act 1899* on 18 February 1910.

Barrow Island Nature Reserve is recognised internationally as a unique biodiversity repository. The Commission's policy position is that national parks and nature reserves are not appropriate places for locating an industrial development.

The Commission recognises that the potential economic value of the proposed Gorgon gas development is high and that this may result in significant economic and social benefits for Australia. Thus as well as presenting its view based on the principle that national parks and nature reserves are not appropriate places for locating industrial developments, the Commission has taken the position that additional advice on future vesting and management of the nature reserve, and on net conservation benefits should be provided to aid Cabinet in making its decision based on detailed consideration of environmental factors in association with social and economic factors.

Barrow Island Nature Reserve has an area of about 23,000ha and is the second largest island off the Western Australian coast. It is best known for its abundant mammals; however, it also has a rich bird and reptile fauna, a unique and valuable assemblage of subterranean animals and valuable vegetation communities. Introduced stock or feral animals have not grazed its vegetation and introduced predators have not affected its animal assemblages. Barrow Island Nature Reserve is probably the largest island in Australia and one of the largest land masses in the world that has no introduced animals.

It is in this context that decisions to be made with respect to granting access to the nature reserve for the Gorgon gas development should be seen. Given the risks to the biodiversity conservation values of Barrow Island Nature Reserve, to grant even in principle approval should only be contemplated on the basis of an overwhelming case that development must occur at this location and time. The Commission believes that such a case has not been made.

The Commission is especially concerned as to the risk of introduction of exotic invasive species. Quarantine can never be 100% effective. The risk of introductions cannot be eliminated under any known management regime, and while the likelihood of an introduction occurring is difficult to quantify, it is "virtually certain" according to reviews undertaken of the present proposal. The consequences of a quarantine failure occurring will most likely be severe, even with best standards of quarantine, detection and eradication.

The approval of the Gorgon gas development on Barrow Island would commit the State to a long-term, probably expanding, use of the nature reserve for industrial development purposes. Decisions made on the in principle approval of the Gorgon gas development will impact upon the future of the Barrow Island Nature Reserve in the long-term and will lead to an inevitable series of cumulative impacts of further developments that will substantially diminish its biodiversity conservation values. The risk of the introduction of an exotic invasive species leading to one or more extinctions of local species will persist throughout the life of the developments. This possible outcome presents a credible risk. The most effective way to mitigate this risk is to direct the Gorgon gas development and other proposed industrial projects to a location other than Barrow Island Nature Reserve.

The Commission's advice is that Government should not approve the location, construction and operation of any gas processing plant on Barrow Island Nature Reserve.

The principal reasons in support of this advice are:

- The location of any industrial development within a nature reserve is inappropriate. Locating a major development in a nature reserve as important as Barrow Island is particularly inappropriate.

- The environmental impacts associated with the Gorgon gas development's footprint are not insignificant, while the risk to the island's biodiversity conservation values (its unique ecosystems, species and populations) from the introduction of exotic invasive species is unacceptably high.

- To approve the Gorgon gas development on the Barrow Island Nature Reserve would be likely to prevent a full return of the island to its nature reserve status and prevent any change in its classification for the foreseeable future.

- In principle approval would also set a precedent for other developments that in the long-term will lead to an inevitable series of cumulative impacts that will substantially diminish Barrow Island's biodiversity conservation values.

- Alternative sites, especially on the mainland, remain as options under appropriate economic conditions.

PART 2. ADVICE ON RELEVANT ISSUES SHOULD THE GOVERNMENT APPROVE THE LOCATION OF THE GORGON GAS DEVELOPMENT ON BARROW ISLAND NATURE RESERVE

Should Government decide that the Gorgon gas development (or other gas processing plants proposed in the future) could, in principle, be located on Barrow Island Nature Reserve, the Commission believes that the nature reserve should remain intact (ie, no land should be excised from the nature reserve to provide for the industrial development) and any lease to the gas plant operator should not diminish the powers provided by Parliament under the *Conservation and Land Management Act 1984* and the *Wildlife Conservation Act 1950*. The Commission should retain the vesting of the whole nature reserve as a Class A reserve, and remain empowered to exercise its

normal functions as for other reserves so vested. The Commission is opposed to any arrangement whereby the island is managed by an agency other than the Department of Conservation and Land Management.

Best practice environmental decision-making requires that development proposals that impact upon the environment should meet minimum standards for environmental management, including risk management, and offsets.

In some cases it is not possible to deliver environmental offsets. When the key issues involved are concerned with the conservation of biodiversity, net conservation benefits (NCBs) should be required. This is certainly the case with the Barrow Island Nature Reserve and the proposed Gorgon gas development.

The Commission offers the following principles for NCBs:

- The overarching principle of a net conservation benefit is that it should provide a demonstrable and substantial addition to, or improvement in, the conservation values of the State.

- Net conservation benefits should also accrue, or at least begin to accrue, from the earliest stages of a project, preferably from the time of approval (in the case of the Gorgon gas development from the time of in principle approval); and certainly from the point construction commences. They should not be deferred or contingent on future actions.

- They should be enduring, preferably in perpetuity, but at least for the duration of the project that requires them.

- Net conservation benefits are to be provided in addition to the environmental management, risk management, and offset actions required to deal with the impacts and potential impacts of a proposed development. As such, they are over and above what is required for good operational practice, however that is defined depending on the circumstances of each case.

- Generally speaking, net conservation benefits should accrue to the same or very similar values as close as possible to the site of those values that are affected by the proposed development. They should occur within the same bioregion wherever practicable.

In order to determine a scale for the NCBs required in the case of Barrow Island, a net present value approach has been used on the basis of $10 million expended in year 1 with $2 million (indexed annually) expended in years 2 to 30 as the nominal end-point of the project. This results in a net present value of around $40 million which is the approximate quantum that the Commission believes should be committed by the proponent. It is noted that this is a small proportion of the development costs and is also only a portion of the cost differential of development when Barrow Island is compared with alternative development sites. A priority list of potential NCB projects is provided.

Should in principle approval to access Barrow Island Nature Reserve be granted further work will be required to define the necessary environmental management and risk management requirements, and to finalise an appropriate NCB package.

BACKGROUND

The Conservation Commission of Western Australia (Commission) is established under the *Conservation and Land Management Act 1984*. Its functions are, *inter alia*:

- to have vested in it State forest, timber reserves, national parks, conservation parks, nature reserves, and other lands (section 19(1)(a));
- to develop policies for the preservation of the natural environment of the State (section 19(1)(c)); and
- to advise the Minister on the development of policies for the conservation and management of biodiversity and biodiversity components throughout the State (section 19(1)(d)).

ChevronTexaco proposes to construct a large gas processing plant and associated infrastructure on Barrow Island Nature Reserve utilising natural gas from the offshore Gorgon area. Details of this proposal are provided in the *Environmental, Social and Economic Review of the Gorgon Gas Development on Barrow Island*, published in February 2003 (ESE Review). The Western Australian Cabinet has requested advice from the Commission before deciding whether or not to eliminate the nature reserve as a location for possible approval of the gas processing plant.

It has been determined by the Cabinet that it would consider the possible use of Barrow Island Nature Reserve for the gas processing plant after consideration of an environmental, social and economic review of the proposal by the proponent, public and agency comments on that review, and the proponent's response to those comments, and in particular:

- a report by the now Department of Industry and Resources outlining the economic and social justification of the projects as a development of strategic State significance as well as an assessment of alternative sites;
- an environmental assessment report on the projects under the Environmental Protection Act and, if necessary, consideration pursuant to the Commonwealth Environment Protection and Biodiversity Conservation Act; and
- advice from the Conservation Commission of Western Australia, which is the vesting authority for the Nature Reserve.

Cabinet has also determined that, noting Barrow Island is a Class A Nature Reserve, in considering such a development it would expect the proposal to result in net conservation benefits.

This advice has been prepared to meet the requirements for a report from the Commission and is in two parts:

- Part 1 briefly describes the biodiversity values of the island that the Commission is charged with conserving and provides the Commission's policy on the proposed development, together with reasons supporting the policy.
- Part 2 is only relevant should the Cabinet decide to locate the gas processing plant on Barrow Island Nature Reserve. It provides the Commission's views on future vesting and management of the nature reserve, and its position on net conservation benefits. If an in principle decision is made to approve the granting

of access to the Barrow Island Nature Reserve, the Commission will provide additional comments during later environmental impact assessment of specific proposed projects.

The Commission has developed this advice following consideration of the ESE Review and other associated documents. The Commission has also received a number of briefings from the proponent, has made site visits, and has participated in a number of intra-governmental working groups considering the proposal.

The Commission has also reviewed the Environmental Protection Authority's (EPA) *Environmental Advice on the Principle of Locating a Gas Processing Complex on Barrow Island Nature Reserve*. The Commission notes and endorses the conclusions and recommendations of the EPA. In preparing its own advice the Commission has focussed on biodiversity conservation issues.

PART 1. SHOULD THE GORGON GAS DEVELOPMENT BE LOCATED ON BARROW ISLAND NATURE RESERVE?

Barrow Island Nature Reserve is a Class A reserve that has extremely high biodiversity conservation values and has been reserved from other uses to protect these values. It has been recognised for these values and particularly its unique fauna for over a century, having been set aside as a reserve for the protection of native game under the *Game Act 1892* on 4 November 1909, after being proposed for protection in 1908. It was one of the first permanent nature reserves in the country and was subsequently proclaimed as a "permanent reserve Class A for the protection of flora and fauna" under the *Permanent Reserves Act 1899* on 18 February 1910.

Barrow Island Nature Reserve is recognised internationally as a unique biodiversity repository. The Commission's policy position is that national parks and nature reserves are not appropriate places for locating an industrial development.

The Commission recognises that the potential economic value of the proposed Gorgon gas development is high and that this may result in significant economic and social benefits for Australia. Thus as well as presenting its view based on the principle that national parks and nature reserves are not appropriate places for locating industrial developments, the Commission has taken the position that additional advice on future vesting and management of the nature reserve, and on net conservation benefits should be provided to aid Cabinet in making its decision based on detailed consideration of environmental factors in association with social and economic factors.

Biodiversity conservation values of Barrow Island Nature Reserve

Barrow Island Nature Reserve is one of the oldest and most valuable biodiversity conservation reserves in the world, and its creation at a time when conservation was not a significant priority in the State shows that its conservation values were well understood nearly a century ago. Barrow Island Nature Reserve is vested in the Conservation Commission of Western Australia, and its day-to-day management is the responsibility of the Department of Conservation and Land Management. However, this responsibility is presently effectively overridden in many respects by virtue of the petroleum lease held by the Barrow Island operation joint venturers that provides for the current oilfield operation. This is a situation that the Commission believes needs to be

remedied to ensure that the responsibility and authority for the protection of the island's biodiversity conservation values are appropriately located.

Barrow Island Nature Reserve has an area of about 23,000ha and is the second largest island off the Western Australian coast. It is best known for its abundant mammals; however, it also has a rich bird and reptile fauna, a unique and valuable assemblage of subterranean animals and valuable vegetation communities. Introduced stock or feral animals have not grazed its vegetation and introduced predators have not affected its animal assemblages; the island thus provides a benchmark against which changes to mainland ecosystems can be measured following the introduction of species such as sheep, cattle, goats, rabbits, foxes, cats, rats and mice. Barrow Island Nature Reserve is probably the largest island in Australia and one of the largest land masses in the world that has no introduced animals.

It is in this context that decisions to be made with respect to granting access to the nature reserve for the Gorgon gas development should be seen. Given the risks to the biodiversity conservation values of Barrow Island Nature Reserve, to grant even in principle approval should only be contemplated on the basis of an overwhelming case that development must occur at this location and time. The Commission believes that such a case has not been made.

Some examples of Barrow Island Nature Reserve's high biodiversity conservation values are:

- Fourteen species of mammals occur on Barrow Island Nature Reserve, of which six are listed as threatened pursuant to the *Wildlife Conservation Act 1950*. Due to changes that have occurred elsewhere, Barrow Island Nature Reserve's larger mammals are now uniquely abundant and easily observed and studied. Barrow Island thus provides an indication of mammal abundance in much of mainland Western Australia before the introduction of sheep, cattle, goats, rabbits, foxes, cats, mice and rats. The Barrow Island native mammal fauna is extremely rich for an island of its size (23,000 ha); compared with the severely reduced native mammal fauna of Dirk Hartog Island (62,000 ha), which originally supported fifteen native mammal species and now retains only five species[1] as a result of the impacts of introduced sheep, goats, cats and mice.

- All but one of Barrow Island's six threatened mammals are in the critical weight range – species that are threatened with extinction by changes brought about since European settlement of Australia. Studies demonstrate that the risk of extinction of such mammals is higher in arid areas, and for species that are herbivores or omnivores and shelter on the ground's surface. About one third of all native mammals formerly inhabiting arid regions of mainland Western Australia are totally or locally extinct. Extinction risk is greatly increased in areas where introduced predators such as foxes, cats and rats have established. Since 1788, 22 species of native mammals have become extinct in Australia; more than any other country over the past 400 years. Nine additional Australian mammal species would have been lost had they not occurred on islands, including Barrow Island Nature Reserve.

[1] Species lost from Dirk Hartog Island include Mulgara, Chuditch, Dibbler, Western-barred Bandicoot, Burrowing Bettong (or Boodie), Woylie, Greater Stick-nest Rat, Shark Bay Mouse and Heath Rat

- One hundred and ten species of birds have been recorded on Barrow Island Nature Reserve, of which 32 are known to breed there. The Barrow Island Black-and-white Fairy-wren (*Malurus leucopterus edouardi)* occurs nowhere else and is listed as a threatened species. Recent genetics research at the University of Chicago has demonstrated that the Barrow Island population is genetically distinct from the mainland White-winged Fairy-wren (*Malurus leucopterus*). The protected eastern coastline, including intertidal reefs and bays, provides a major and significant habitat for migratory wading birds protected by international treaty and by Commonwealth and State law.

- Fifty-four species of reptiles have been recorded, a high number of species for an island of this size. One species, *Ramphotyphlops longissimus* (a blind snake) and one subspecies, *Ctenotus pantherinus acripes* (a lizard), occur nowhere else. The Perentie (*Varanus giganteus)*, which is abundant on the island, can grow to more than 2m in length, and is the largest predator on the island.

- Three species of marine turtle (Green Turtle [*Chelonia mydas]*, Flatback Turtle [*Natator depressus]* and Hawksbill Turtle [*Eretmochelys imbricata]*), all listed as threatened, breed on the island. In particular, the island has large and significant Green and Flatback rookeries. The Barrow Island Green Turtle rookery is the second largest in Western Australia and the Flatback rookery is one of the largest. Island rookeries are known to be subject to fewer threats than mainland ones, have a greater long-term potential for survival, and therefore make an especially significant contribution to biodiversity conservation.

- Despite only limited searching, Barrow Island Nature Reserve is known to have a very rich subterranean fauna including stygofauna and troglofauna. Consultants working for ChevronTexaco to document the subterranean fauna of the site of the proposed gas processing plant discovered new species of animals. The stygofauna (subterranean animals inhabiting underground water) is particularly species rich. Because of lack of research it is not known how many of these species are restricted to the island, but on present data many species are endemic to the island. The troglofauna (subterranean species living in the airspaces of caves and other underground cavities) comprises at least four species including a new species of scorpion of uncertain taxonomic placement. A species of blind snake, *Ramphotyphlops longissimus*, known only from Barrow Island Nature Reserve, is thought to be troglobitic and if so would be the only known troglobitic snake in the world. Twelve of the subterranean species are listed as threatened pursuant to the *Wildlife Conservation Act 1950*; further recently discovered species may also meet criteria for listing.

- About 350 species of land plants occur on the island. Botanically, Barrow Island Nature Reserve has a flora and vegetation that is atypical of the islands on the North-West Shelf. This is due to the size of the island, its geomorphic heterogeneity and variety of habitats. Barrow Island Nature Reserve has unique vegetation that is not represented on any other island off the Pilbara coast. The island's flora and vegetation are more closely related to those of the North-West Cape Peninsula and Cape Range, and less so to the adjacent Pilbara.

- Little information is available on the terrestrial invertebrate fauna of the island; however, limited data suggest that endemic species are present.

- Genetically isolated island populations of sedentary species often undergo genetic change after island separation. Small populations tend to lose genetic diversity; eg, the population of Black-footed Rock-wallabies (Petrogale lateralis) on Barrow Island Nature Reserve has extremely low levels of genetic variation. In addition, selection pressures and particularly genetic drift in isolated island populations often lead to significant genetic changes between island and mainland populations. It therefore can be expected that many of the Barrow Island Nature Reserve's animal populations differ in some way from their mainland populations. There are now many examples in both animals and plants where significant genetic differences are found between geographically isolated populations within a species. These isolated populations have been recognised as significant evolutionary units. Modern conservation theory and practice dictate that these units should be recognised as discrete entities for conservation purposes and managed independently. Barrow Island Nature Reserve is clearly of great significance with unique ecosystems, species and populations.

Risks to biodiversity conservation values associated with industrial development on Barrow Island Nature Reserve

In this section the Commission discusses the risks to biodiversity associated with the construction of a gas processing plant and associated facilities under two main headings — footprint (removal and degradation of natural areas at the site of the proposed plant and elsewhere), and quarantine issues associated with the possible introduction of exotic invasive species.

Footprint issues

The direct impacts on the island as described in the ESE Review are not inconsequential. Up to 300ha would be cleared or highly modified to allow the construction of the gas processing plant and associated infrastructure. Warrens inhabited by boodies (*Bettongia lesueur*, a threatened species) adjacent to the Town Point site would be placed at risk. There would be impacts on other areas of the island associated with the construction of pipelines, roads, power lines, a jetty and a barge landing. Increased road traffic would lead to more road kills, particularly of the larger mammals and reptiles.

The area of the island already affected by oilfield operations is already significant, and the 300ha of additional cumulative impacts should not be seen in isolation.

The Town Point site as used in the ESE Review reference case includes a drainage line. Although information on the vegetation of Barrow Island Nature Reserve is of limited quality and is insufficient to fully assess the impact of the gas plant, it is known that ecosystems low in the landscape on Barrow Island have been disproportionately and significantly affected by gravel extraction and road building[2]. These ecosystems are among the most important for many species of plants and provide the best shelter for some of the mammals.

[2] The ESE Review identifies vegetation type "D2 – Hummock Grassland of *Triodia angusta* along minor creek lines and drainage lines" as being the most impacted by existing development (21.7% disturbed).

The proposed industrial development will detrimentally impact on turtle nesting through disturbance and lighting (including gas flaring), particularly the Flatback Turtle which nests on the east coast of the island. Seabirds may also be detrimentally impacted.

Further damage to subterranean ecosystems and species can be expected. The stygofauna inhabit a narrow lens of freshwater located above salt groundwater. The Commission is not aware of any information on the effects of groundwater utilisation by ChevronTexaco (or its predecessor WAPET) over the past 40 years, nor on the effects of any pollution resulting from the operations of the existing oilfield on the stygofauna. However, it is possible that impacts have occurred due to oil pollution. The proposed development is likely to result in additional impacts on the groundwater.

Shipping access would require considerable dredging with consequent damage to marine ecosystems. The construction of pipelines from the Gorgon field and construction of a major shipping jetty and a new deep-water barge landing would further impact upon marine and terrestrial ecosystems and possibly interfere with migrating whales and other marine species. Cooling water is required for some types of gas plant and heated water discharged into adjacent seas would impact upon marine species. The production of fresh water through desalination will also require disposal of brine which could impact marine environments. Thus the impacts extend beyond the terrestrial footprint and into areas proposed as a marine conservation reserve.

It is the Commission's view that these direct impacts on the Barrow Island Nature Reserve's ecosystems and species are not consistent with the biodiversity conservation objectives inherent in the reservation of the island as a nature reserve.

Establishment of exotic invasive species on Barrow Island Nature Reserve

The key to the environmental and biodiversity conservation significance of Barrow Island is the unique and abundant fauna surviving as a result of the absence of introduced animals. The establishment of any exotic species on a nature reserve is undesirable and should be avoided. It is vital for the future of Barrow Island Nature Reserve that its unique status be retained. Worldwide, the introduction of exotic invasive species has led to catastrophic loss of native species on islands (including Dirk Hartog Island) and the great majority of known extinctions of birds and mammals in the last few hundred years has been of species restricted to islands.

The Commission believes that the location, construction and operation of a gas processing plant on Barrow Island Nature Reserve would significantly increase the risk of introduction and establishment of exotic invasive animal and plant species. The Commission has noted that quarantine procedures associated with the current oilfield are of relatively high quality, but despite this introductions of both weed plants and pest animals have still occurred. A key to the past success has been the relatively small and highly motivated workforce and the relatively low volume and frequency of imports. The large amount of construction materials needed for the Gorgon gas development[3] and the large workforce proposed to be located on the island mean that risks of introductions will increase well beyond those existing currently.

[3] As an indication of the quantum and type of materials likely to be used in the development, the North West Shelf LNG facilities required 132,000 cubic metres of concrete, 70,000 tonnes of steel, 270 km of piping and over 7,000 km of cabling – Atherton, G. and Wilkinson, R. (1990), *Beyond the flame: the story of Australia's North West Shelf Natural Gas Project*, Woodside Offshore Petroleum Pty Ltd, Perth. The ESE Review also discusses the need for the materials offloading facility to handle modules in the range of 500 to 2,000 tonnes.

Not only is there a significant increase in number of landings, shipments and personnel movements, but there will also be a new source of risk presented by the use of large pre-fabricated units providing a suite of yet unknown risk factors that can only be determined once details such as location of module construction and shipping method are known. Bringing sand and other basic raw materials from the mainland also increases the risk of introduction of weeds, diseases and invertebrate animals.

The construction of a jetty is of particular concern, as jetties allow ships and other vessels to moor on a structure connected to the island, greatly increasing the risk of pest animals moving directly from the vessel to the island. The current oilfield does not have a jetty — tankers moor some kilometres offshore and are loaded via an undersea pipeline. Risk assessment suggests low risk from LNG tankers but it should be noted that LNG is only the reference case and other forms of development that are possible may present different risk profiles (eg, GTL or fertiliser production).

The Commission has been advised that some possible introductions of invasive species would be irreversible without also doing great damage to the island's species and ecosystems, particularly the native animals, as there are no selective techniques available to eradicate particular invasive species (eg, rats, mice and ants). Treating introductions of invasive species could result in the extinction of native species, while failure to treat invasions would also result in species extinctions, as has happened on other Australian islands.

The introduction of wildlife diseases to Barrow Island Nature Reserve is of further concern, and is not dealt with adequately in the ESE Review. Knowledge about wildlife diseases in Australia is limited and methods of transmission poorly understood; however, the greater the movement of materials and people onto the island, the greater will be the risk of disease introduction. The establishment of an exotic wildlife disease on Barrow Island could be devastating, as the isolated animal populations may have much less resistance to disease than mainland animals.

The Commission concludes that, as undesirable as it is, the destruction of 300ha of Barrow Island Nature Reserve's vegetation and impacts on the animals that are dependent on it, presents a much lower relative impact to the island's biodiversity than the risk of introduction of exotic invasive species. Quarantine can never be 100% effective (as has been acknowledged in risk assessments undertaken by the proponent). The risk of introductions cannot be eliminated under any known management regime, and while the likelihood of an introduction occurring is difficult to quantify, it is "virtually certain" according to reviews undertaken of the present proposal. The consequences of a quarantine failure occurring will most likely be severe, even with best standards of quarantine, detection and eradication.

Existing oilfield on Barrow Island Nature Reserve

The argument has been put that, since there is already an oilfield development in existence on Barrow Island, notwithstanding its nature reserve status, there can also be an industrial development. The Commission does not accept this argument because:

- The oilfield was approved some decades ago, when community values were different and community understanding of the need for biodiversity conservation was much less developed than today.

- At that time, much less was known about the conservation importance of Barrow Island Nature Reserve and of the possible impacts that invasive species could have.
- Development of the oilfield could not have been carried out anywhere else but on Barrow Island because that is where the oil is — this is not the case with a gas processing plant that, as shown by the proponents, could be developed on the mainland.
- Although the quarantine procedures associated with the current oilfield are of relatively high quality, introductions of both weed plants and pest animals have still occurred, along with other impacts to the nature reserve's landscapes, flora and vegetation.

It has also been suggested that ChevronTexaco (and before it WAPET) has managed the island from a conservation viewpoint better than any State government authority or department could. This argument ignores the direct and ongoing impacts of the oilfield operation on the island's biodiversity conservation values and cannot be sustained in today's environment, when there is a well established State nature conservation agency employing professional scientists and managers and having a nearby regional office. Other islands (eg, Bernier, Dorre) have maintained their fauna while under the control of the State's nature conservation agency.

Future of the nature reserve

While legally the nature reserve has continued to exist in parallel with the oil production lease, the reality is that ChevronTexaco controls access to the island and manages it. Input by the Commission has been limited to occasional visits and irregular, limited interaction with company staff. Input by the Department of Conservation and Land Management has also been limited.

Currently, the public of Western Australia can expect that Barrow Island will be returned to its full nature reserve status once the oilfield is depleted or leases for production cease (noting the current lease expires in 2009). At that time, Government can make a decision as to whether nature reserve is the appropriate classification or whether other classifications, such as national park, would be more aligned with public expectations. Any change to the island's classification will, of course, need to provide adequately for the protection of its biodiversity conservation values. This will inevitably require the maintenance of quarantine measures.

Should the Gorgon gas development proceed, ChevronTexaco will be present on the island for a very long additional time. How long does not seem to be clear — while the company mentions 30 years as the life of the Gorgon gas development, there are adequate gas resources available to provide for a much longer period than this. The Commission notes that when the oilfield was developed in the 1960s, its stated life expectancy was 20 years. The Commission is concerned that with known gas resources, likely future discoveries, and improvements in technologies for extraction a gas processing plant on Barrow island may remain for many decades beyond the nominal 30 years identified by the proponents.

In addition to its concerns in relation to the present proposed development the Commission is concerned that this development, if approved, may be a prelude to further industrial development. The Commission has noted speculation that a Barrow

Island Nature Reserve location would allow the development of other major offshore gas fields[4].

Thus, it is the Commission's view that approval of the Gorgon gas development on Barrow Island is likely to prevent a full return of the island to its nature reserve status and prevent any change in its classification for the foreseeable future. Such a decision would commit the State to a long-term, probably expanding, use of the nature reserve for industrial development purposes. Decisions made on the in principle approval of the Gorgon gas development will impact upon the future of the Barrow Island Nature Reserve in the long-term and will lead to an inevitable series of cumulative impacts of further developments that will substantially diminish its biodiversity conservation values. The risk of the introduction of an exotic invasive species leading to one or more extinctions of local species will persist throughout the life of the developments. This possible outcome presents a credible risk. The most effective way to mitigate this risk is to direct the Gorgon gas development and other proposed industrial projects to a location other than Barrow Island Nature Reserve.

Alternative sites for the gas plant

If the Government accepts the Commission's advice not to permit the Gorgon gas development to be located on Barrow Island, it is noted that potential alternative sites include other island nature reserves. Principal among these are Thevenard Island Nature Reserve and Trimouille Island in the Montebello Islands Conservation Park.

The Commission does not favour locating an industrial development on any conservation reserve, and especially island conservation reserves, and believes that a mainland site zoned for industrial development is the best option consistent with biodiversity conservation requirements.

However, the Commission accepts that the above two alternative islands have significantly lower terrestrial biodiversity conservation values than Barrow Island and notes that other small island nature reserves off the Pilbara coast are currently the site of oil and gas production facilities (Thevenard Island, Airlie Island and Varanus Island). The Commission understands that the marine environment in the vicinity of Trimouille Island has very high biodiversity conservation values and that the Marine Parks and Reserves Authority is opposed to a development impacting on those marine values.

Should the Government consider alternative sites, the Commission's preferences are for a mainland site appropriately zoned, followed by Thevenard Island.

The Commission notes that the Gorgon gas development is comprised of two principal components; a gas refining stage and a gas manufacturing stage. While the proponent has indicated to the Commission that there are barriers to a development in which the two stages are physically separate, the Commission is of the view that this possibility should be explored as part of the consideration of alternative sites.

[4] Eg, *Exxon unveils biggest gas find*, The West Australian, 25 March 2003, quotes ExxonMobil exploration director Doug Schwebel as saying that Barrow Island was one of the development options for Jansz.

Conclusion

The Commission's advice is that Government should not approve the location, construction and operation of any gas processing plant on Barrow Island Nature Reserve.

The principal reasons in support of this advice are:

- The location of any industrial development within a nature reserve is inappropriate. Locating a major development in a nature reserve as important as Barrow Island is particularly inappropriate.
- The environmental impacts associated with the Gorgon gas development's footprint are not insignificant, while the risk to the island's biodiversity conservation values (its unique ecosystems, species and populations) from the introduction of exotic invasive species is unacceptably high.
- To approve the Gorgon gas development on the Barrow Island Nature Reserve would be likely to prevent a full return of the island to its nature reserve status and prevent any change in its classification for the foreseeable future.
- In principle approval would also set a precedent for other developments that in the long-term will lead to an inevitable series of cumulative impacts that will substantially diminish Barrow Island's biodiversity conservation values.
- Alternative sites, especially on the mainland, remain as options under appropriate economic conditions.

PART 2. ADVICE ON RELEVANT ISSUES SHOULD THE GOVERNMENT APPROVE THE LOCATION OF THE GORGON GAS DEVELOPMENT ON BARROW ISLAND NATURE RESERVE

This part of the Commission's advice is relevant only if Government decides to approve the location, construction and operation of a gas processing plant on Barrow Island Nature Reserve. The Commission believes that the principles provided for island management arrangements and net conservation benefits (NCBs) should be strictly applied to minimise the losses that will accrue from location of a facility on Barrow Island and maximise the benefits that will accrue from the provision of NCBs.

Future management arrangements

Barrow Island Nature Reserve is vested in the Conservation Commission and is subject to the *Conservation and Land Management Act 1984* and the *Wildlife Conservation Act 1950*. Should Government decide that the Gorgon gas development (or other hydrocarbon processing plants and infrastructure proposed in the future) could, in principle, be located on Barrow Island Nature Reserve, the Commission believes that the nature reserve should remain intact (ie, no land should be excised from the nature reserve to provide for the industrial development) and any lease to the gas plant operator should not diminish the powers provided by Parliament under the above Acts.

The Commission should retain the vesting of the whole nature reserve as a Class A reserve, and remain empowered to exercise its normal functions as for other reserves so vested. The Commission is opposed to any arrangement whereby the island's biodiversity is managed by an agency other than the Department of Conservation and Land Management.

It will also be necessary for there to be one accountable industrial entity to accept responsibility for all quarantine and shipping management and other management elements associated with all industrial developments on the island for all operators on the island. This requirement will ensure that uniform standards are applied and action can be taken regardless of who is perceived to be responsible for any quarantine breaches or other issues that may arise. It will also be necessary to ensure that arrangements are put in place that provide for all individual lessors remaining accountable for any breaches of lease conditions.

The *Conservation and Land Management Act 1984* does not provide for the granting of a lease that is inconsistent with the purpose of the reserve, therefore Government will need to legislate to provide a special lease or other arrangement that does not affect the status of the nature reserve. Rental for the lease should be substantial and directed at least in part towards full cost recovery for the Department of Conservation and Land Management's management activities on the island that are required as a consequence of the industrial development.

Principles for net conservation benefits

Best practice environmental decision-making requires that development proposals that impact upon the environment should meet minimum standards for environmental management, including risk management, and offsets. Ideally these minimum standards are embraced by the proponent of a development as part of their own planning and design. When this does not occur, or only partly occurs, environmental conditions can be attached to development approval under one or more statutes; for example, the *Environmental Protection Act 1986*. Where the legislative support for the imposition of environmental conditions is lacking special arrangements need to be made.

Best practice environmental decision-making distinguishes between environmental management, risk management and offsets in the following terms:

- Environmental management – 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.
- Risk management – measures similar to environmental management, but where the impacts may not eventuate. In such circumstances the combination of the likelihood of the impact occurring and its consequences (ie, the risk) should be reduced to within acceptable limits.
- Offsets – these are actions taken to compensate for an unavoidable loss of one or more environmental values. The acceptability of the environmental and risk management measures may be contingent on the delivery of appropriate offsets. An offset often involves the replacement of environmental values lost by similar values nearby, perhaps through the restoration of degraded land, or through enhancing the protection of land by adding it to the conservation estate. In some situations monetary compensation appropriately directed to equivalent outcomes is acceptable.

In some cases it is not possible to deliver adequate environmental offsets. When the key issues involved are concerned with the conservation of biodiversity, net conservation benefits should be required.

Net conservation benefits do not include the actions covered under environmental management, risk management, and offsets for impacts and potential impacts of a development. While there may be some overlap with NCBs these actions need to be put in place to manage the project regardless of any overlaps.

In the case of the Barrow Island Nature Reserve an overlap could occur if, say, a management action required the development of a new quarantine procedure or process that had spin-off benefits for how conservation values were managed more widely. The action would need to be taken to manage the development anyway and should not be regarded as an NCB. Similarly, a residual benefit may accrue if some risk management action was taken but not 'called in' in the absence of the risk eventuating. Barrow Island fauna may be established elsewhere to insure against their loss from Barrow Island Nature Reserve should an exotic invasive introduction occur. If the Gorgon gas development runs its course, is decommissioned and the site rehabilitated without a breach of quarantine occurring leading to species loss, the fauna population established elsewhere then becomes an NCB. However, at the time of approval the risk management action should not be regarded as an NCB. Its status as such is contingent on future outcomes.

The Commission offers the following principles for NCBs:

- The overarching principle of a net conservation benefit is that it should provide a demonstrable and substantial addition to, or improvement in, the conservation values of the State.
- Net conservation benefits should also accrue, or at least begin to accrue, from the earliest stages of a project, preferably from the time of approval (in the case of the Gorgon gas development from the time of in principle approval); and certainly from the point construction commences. They should not be deferred or contingent on future actions.
- They should be enduring, preferably in perpetuity, but at least for the duration of the project that requires them.
- Net conservation benefits are to be provided in addition to the environmental management, risk management, and offset actions required to deal with the impacts and potential impacts of a proposed development. As such, they are over and above what is required for good operational practice.
- Generally speaking, net conservation benefits should accrue to the same or very similar values as close as possible to the site of those values that are affected by the proposed development. They should occur within the same bioregion wherever practicable.

The rationale for this principle is that a set of conservation values in one region should not be compromised for the benefit of values outside the region. For example, a general benefit, like revegetation of cleared land, would not be appropriate where a proposal presents a specific threat to an endangered species found elsewhere. It is acknowledged that this principle could be re-examined on a case-by-case basis. There

may be a special case for a benefit to accrue to a value which is highly threatened and otherwise likely to be lost elsewhere.

ChevronTexaco has proposed in its ESE Review that a Gorgon Foundation be established to deliver NCBs. The setting up of industry-funded foundations is laudable and they can undoubtedly make a valuable contribution to environmental protection and net benefits to conservation. However, the Commission is of the view that they do not fall under the NCB heading. If the State is to risk its conservation values in nature reserves secured by Parliament on behalf of the community, then the State should gain the benefit from, and control the NCBs provided in a way directly linked to that risk.

Application of the principles of net conservation benefit if access to Barrow Island Nature Reserve is approved in principle

Table 1 provides a priority list of potential NCB projects.

Perhaps the most difficult question in regard to NCBs is 'how should the right amount be judged?' The biodiversity values of Barrow Island Nature Reserve are significant, however there is no agreed way to evaluate in monetary terms many environmental costs such as the loss of a threatened species. What benefit could be offered for the loss of a species? This makes the determination of appropriate NCBs a difficult question.

Some may argue that, if the likely conservation dis-benefits are small then the required net benefits need only be slightly bigger to over-compensate those losses. Other views may be to set the NCBs as a minimum figure, or as a percentage of a project's development cost or revenue.

In the light of the scale of the Gorgon gas development, the NCBs should be substantial. NCBs need not, and arguably should not, be simply a dollar amount. Demonstrable, substantial and enduring outcomes that can be delivered now are required. This is so even if we need to quantify in dollar terms the cost of delivering the NCBs so as to assess what it would take to deliver the identified outcomes.

In the language of the triple bottom line, a project which is required to deliver NCBs should deliver them in the same way it delivers net economic and social benefits.

The Commission has noted that ChevronTexaco in its ESE Review proposed the creation of a Gorgon Environment Foundation to fund projects chosen by the Foundation. The ESE Review contains a commitment to "provide an amount to commence the Foundation's activities after the project has been sanctioned, an amount expected to exceed $10 million". The Commission believes that this sum will not provide adequate NCBs in this instance.

The importance of the biodiversity conservation values of Barrow Island Nature Reserve and the threats to them from the proposed development have led the Commission to the belief that NCB projects would need to be similarly significant, substantial and ongoing. There is a need for a substantial icon project together with a substantial annual program over the life of the project. As a reference case for the substantial icon project the Commission has considered the creation of a national park on Dirk Hartog Island (the only island off the WA coast larger than Barrow Island). Costs for the removal of introduced fauna, destocking, revegetation, fauna reintroductions, and visitor facility

establishment have been estimated by the Department of Conservation and Land Management to amount to around $8 million to $10 million. In addition to these costs, there would be other costs depending on the actual makeup of the island reserve and any other land uses on the island.

For a substantial annual program the Commission has used as a reference case the Department of Conservation and Land Management's Western Shield fox and cat baiting program. This work delivers important benefits to biodiversity conservation and has total costs of around $2 million per annum.

In order to determine a value in present day terms a net present value approach has been used on the basis of $10 million expended in year 1 with $2 million (indexed annually) expended in years 2 to 30 as the nominal end-point of the project. This results in a net present value of around $40 million which is the approximate quantum that the Commission believes should be committed by the proponent. It is noted that this is a small proportion of the development costs and is also only a portion of the cost differential of development when Barrow Island is compared with alternative development sites.

It is stressed that these figures do not represent an attempt at an economic valuation of the biodiversity conservation values of Barrow Island Nature Reserve, which are very substantial and almost impossible to realistically measure. Rather they are intended to give an indication only of the resources required to deliver an acceptable package of NCBs that the Commission feels may be appropriate to the Barrow Island situation.

If the project was to proceed the proponent and Government are committed to allowing the use of a maximum of 300ha of Barrow Island for the reference case LNG plant and any future developments based on Gorgon gas. The actual area to be utilized by an initial LNG plant is less than this 300ha. The above calculation of NCB requirements relates only to the reference case developed and promoted by ChevronTexaco in its ESE review.

Any further developments in the proposed 300ha development zone would bring with them additional conservation risks and impacts. In the absence of certainty as to what such developments may be or exactly how they would be configured it is appropriate to consider that future NCB calculations for future Barrow Island development proposals would initially be based on a pro-rata proportion for the area of impact. The calculation of NCB costs for future developments would therefore use the relative area to be utilized compared with that used by the initial development. Thus if a GTL plant were to use 10% more area than the initial LNG plant they would be required to contribute an NCB amount 10% greater.

Should in principle approval to access Barrow Island Nature Reserve be granted, further work will be required to define the necessary environmental management and risk management requirements, and also to finalise an appropriate NCB package.

TABLE 1: PRIORITISATION OF NET CONSERVATION BENEFIT PROJECTS FOR BARROW ISLAND NATURE RESERVE

Priority	Net Conservation Benefit Project	Specific Strategies / Comments
Essential	ICON PROJECT - Increasing the State's conservation estate area/values through the purchase of lands including the funding of restoration and management of the purchased lands.	• This can include islands and mainland sites and should be the subject of the initial allocation and subject to Conservation Commission and Department of Conservation and Land Management requirements. • Funding for land acquisitions to be supplemented with funding for the restoration and management of purchased lands.
High	Species re-introductions and associated long-term management that is not directly risk management. Could form part of 'icon' restoration project(s).	• For example, re-introduction of species formerly found at Dirk Hartog Island, or other non-Pilbara region islands (following restoration of the re-introduction ecosystems).
High	Enhancing/reconstructing the conservation value of island and other reserves in the Pilbara Region, such as Montebello Islands.	• Weed eradication; eg, buffel grass and kapok • Introduced animal eradication • Threatened species recovery programs • Research programs to improve effectiveness and efficiency of conservation programs (eg, biological control research for weeds, improved baiting techniques for introduced animal control)
High	Improving knowledge of flora and fauna of Barrow Island	• Department of Conservation and Land Management and Conservation Commission to agree to research priorities • Research projects could include genetic research into endemic and/or threatened species, taxonomy of the flora, research on stygofauna
Low to Moderate	Improving the understanding by the general community of conservation values relevant to Barrow Island (eg, the importance of island ecosystems, the Pilbara etc)	• This action has merit if done properly