Eglinton Beach resort

Ocean Dunes Pty Ltd

Report and recommendations of the
Environmental Protection Authority

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Summary and recommendations

Eglinton Beach Resort is a proposal by Ocean Dunes Pty Ltd to develop a recreational resort complex incorporating an 18 hole dune links type golf course of international competition standard, marina and beach resort, and residential estate on a 245 ha coastal site located at Eglinton, some 45 km north of the Perth Central Business District.

The development site is characterised by the Quindalup Dune System in the western and coastal portions and the Spearwood Dune System in the easterly portion. A portion of the coastal dunes on the project site has both conservation and recreation value as identified in System Six Recommendation M2.

In recognition of the System Six Recommendation M2, the golf course has been mainly routed through natural low-lying depressions to allow construction with minimum alteration to the dune landform. The golf course also incorporates a clubhouse complex and approximately 400 residential units will be scattered around the course.

The marina has the primary function of providing an area suitable for the development of the resort facilities in close proximity to the ocean whilst minimising the amount of development that takes place in the coastal dunes. Safe harbouring of the boats is a secondary function of the marina. The marina precinct will incorporate a public boat ramp and launching basin, a protected bay and swimming beach in the centre, approximately 200 boat moorings, ferry docking facilities, public car park for 500 cars and public car/trailer park for 80 cars and trailers, a Fisherman's wharf/retail complex, a theme park, and approximately 300 residential units on 7 ha of land around the perimeter of the harbour and on terraces behind. The resort proposes a hotel complex which will incorporate both private and public facilities including hotel units, bars and restaurants, function rooms, coffee shop, pools, tennis courts and service shops. The hotel will be built on a reclaimed promontory at the southern end of the marina precinct.

A Public Environmental Review was prepared by the proponent under guidelines issued by the Environmental Protection Authority and subsequently released for an eight week public review period which ended on 6 November 1990.

The Authority has limited its assessment of the proposal to the golf course/residential precinct, the resort, and the marina and its residential precinct. The areas marked "Future Urban" which abut the proposed extension of Marmion Avenue have mostly planning issues associated with them which will be dealt with through the planning system

A number of environmental issues were identified by the Environmental Protection Authority from its own assessment and as a result of submissions. The details of the proposal have been modified during the assessment, though the components remain the same, that is, golf course, marina, resort, and residential estate.

Subject to compliance with the recommendations listed below, together with the commitments provided by the proponent, the Authority considers that the environmental issues associated with the project are manageable, and therefore recommends accordingly.

Recommendation 1

The Environmental Protection Authority has concluded that the proposed Eglinton Beach Resort, as modified during the process of interaction between the proponent, the Environmental Protection Authority, the public and the government agencies that were consulted is environmentally acceptable.

In reaching this conclusion, the Environmental Protection Authority identified the main environmental factors requiring detailed consideration as:

- **loss of public foreshore areas;**
- **maintenance of public access to the foreshore and through the System Six Recommendation M2 area;**
- **modification of coastal dunes to create the golf course and associated development;**

- **vegetation and habitat loss;**
- **groundwater quality and quantity;**
- **golf course management to minimise ongoing impacts to the coastal dunes, groundwater quality and marina water quality;**
- **marine impacts resulting from the marina development; and**
- **maintenance of marina water quality.**

The Environmental Protection Authority considers that these environmental factors have been addressed adequately by either environmental management commitments given by the proponent or by the Environmental Protection Authority's recommendations in this report.

Accordingly, the Environmental Protection Authority recommends that the project could proceed subject to the Environmental Protection Authority's recommendations in this report and the proponent's commitments to environmental management (Appendix 1).

Whilst the Authority considers that the biophysical impacts of this development are manageable, the Authority believes that given that there are already four marinas on the coast between Sorrento and Two Rocks and others are being contemplated, a regional assessment of the requirement for further marina developments should be undertaken.

Recommendation 2

The Environmental Protection Authority recommends that the Department of Planning and Urban Development in conjunction with the Department of Marine and Harbours, review the need for, and the consequences of marina developments along the metropolitan coast from a planning perspective, and publish the results.

In the Public Environmental Review document released for public review, the proponent proposed to have much of the currently publicly owned foreshore reserve (approximately 7.5 ha) and the land created by construction of the marina transferred from the Crown into the proponent's private ownership. By way of exchange, the proponent proposed to transfer two privately owned areas comprising 12 ha into public ownership. In correspondence received by the Authority following closure of submissions, the proponent indicated that the proposal had now been modified to allow for a mixture of public and private ownership of foreshore land. The proposed land exchange remains unaltered.

The Authority believes in the principle of public ownership of foreshore areas and of ensuring full though managed public access to the foreshore in perpetuity. The Authority has provided this same advice on previous assessments of proposals such as Mindarie Keys (1985), Port Kennedy Regional Recreation Centre (1989) and Port Geographe (1989). While the proposal advocates continued and even improved public access to the foreshore, the Authority does not find it acceptable that the proponent wishes to have some sections of the foreshore area in private ownership. Although the Authority accepts that development of the foreshore may be acceptable, it believes that coastal foreshore open space should remain, and it should be in public ownership. Private ownership is considered to present a potential constraint on full public access.

Recommendation 3

The Environmental Protection Authority recommends that an adequate foreshore reserve be created to the satisfaction of the Minister for the Environment and the Minister for Planning, in consultation with the City of Wanneroo, the Department of Planning and Urban Development, and the Environmental Protection Authority. A commitment for the foreshore reserve to be delineated and transferred to the Crown at no cost should form part of the proposed legal agreement between the proponent, the City of Wanneroo and the Minister for Planning.

The creation of a foreshore reserve as required by the above recommendation ensures that the foreshore remains in public ownership and that access is guaranteed. However, in addition to this, some account must be taken for the fact that the proponent will be developing what is currently publicly owned land in part, as well as land which has been identified as being of regional importance by the System Six study. Compensatory recreation and conservation areas will be required in return.

Recommendation 4

The Environmental Protection Authority recommends that as much of the development site is affected by System Six Recommendation M2, and as the proponent will be developing both this area and the Crown foreshore land, a land exchange to the Crown of equivalent environmental value to those areas of the current foreshore reserve and nearshore environment lost to the development, should be provided in compensation. The location of this land exchange should be determined to the satisfaction of the Minister for the Environment on advice from the Environmental Protection Authority. Transfer of ownership of this land to the Crown at no cost, should be undertaken prior to commencement of development.

The clarification of, and securing of public access to the majority of the site is important given that this is coastal foreshore land and that much of the development is affected by System Six Recommendation M2. This access should not be limited to the foreshore land but should include that area of the golf course and surrounds which is affected by System Six Recommendation M2.

Recommendation 5

The Environmental Protection Authority recommends that the proponent provide surveyed plans confirming the location and extent of all public access areas throughout the development site. These public access areas are to be secured prior to subdivision approval being granted in a manner acceptable to the Minister for the Environment. The plans are to be prepared in consultation with the Environmental Protection Authority, and the Department of Planning and Urban Development.

The Quindalup dune system of the site has been identified by System Six recommendation M2 as being of regional conservation and recreation value. The Authority considers that the proposed development is generally within the intent of the System Six Recommendation, however, it is of considerable importance that the impact of development on the dune system be minimised. The design of the golf course and residential component has in the main part followed the principle of minimising impact on the dune system, however, the construction of the 17th and 18th golf holes in the locations proposed would result in unacceptable environmental impact upon the foredunes and therefore their construction as proposed would not be acceptable.

A comprehensive environmental management programme (refer Recommendation 9) will be required for the development to ensure that the System Six area retains its value and that all terrestrial and marine biophysical impacts associated with the development proposal are minimised and managed. Ocean Dunes Pty Ltd has, in the Public Environmental Review, provided commitments to prepare and implement a series of management plans for protection of the environmental values of the site.

Recommendation 6

The Environmental Protection Authority recommends that the proponent develop the golf course and surrounds such that the dune system and its vegetation is protected to the satisfaction of the Minister for Environment, on the advice of the Environmental Protection Authority.

As stated previously, the coastal dunal system of this area is of importance. The maintenance of this system, once construction is finalised, must be provided for. Management of the coastal environment should encompass all aspects of the site including the golf course and residential estate and the foreshore with due regard to coastal processes which impact upon the site and which can be affected by the proposed marina.

Recommendation 7

The Environmental Protection Authority recommends that as part of the overall environmental management programme referred to in Recommendation 9, the proponent prepare and be responsible for implementing a coastal management plan, including maintenance of the dune system, both on the foreshore and throughout the golf course/residential precinct, prior to completion of construction to the satisfaction of the Environmental Protection Authority, on advice from the Department of Planning and Urban Development and the City of Wanneroo.

The construction of the re-designed marina component of the Eglinton Beach Resort proposal will result in the modification of an overall area of 17ha rather than 23ha of near shore environment. Of the original 23ha, 14ha of seagrass/algal habitat would have been affected. The 6ha reduction in size as a result of the new design now means that the area of seagrass/algal habitat affected is reduced from 14ha to 8ha. Some of the 8 ha of seagrass/algal habitat will be lost due to construction impacts associated with the reclaimed land and breakwaters, and the remainder which is not directly lost may be modified as a result of being enclosed within the marina. In addition, the new marina design has the navigable waterway totally over natural sea bed, thus eliminating the need for dredging of coastal rock and sediment, and ensuring that the location of the natural freshwater/saltwater interface will be largely unaffected.

The Environmental Protection Authority considers that the modification and/or direct loss of 17ha of nearshore environment is not an impediment to the proposal proceeding, as the affected marine habitat with its associated flora and fauna assemblages are not unique on a regional scale, and therefore the dimension of the losses are acceptable on biological grounds on a regional scale.

In terms of coastal processes, modelling undertaken as part of the Public Environmental Review has indicated that there is sediment being fed into the development area from both the north and south in relatively small quantities. This finding, in association with the proponent's commitment to monitor sand movement and to manage sediment bypassing as required, indicates that the potential environmental impact on coastal processes is minimal and manageable.

There is potential for water quality problems to emerge in the marina without proper management. The Authority considers that in order to prevent such problems from occurring, it is necessary to prepare a environmental monitoring and management proposal for the marina.

Recommendation 8

The Environmental Protection Authority recommends that as part of the overall environmental management programme referred to in Recommendation 9, details of water quality monitoring and management be developed by the proponent in consultation with the Department of Marine and Harbours to the satisfaction of the Environmental Protection Authority, prior to completion of construction of the marina. This should include:

- **monitoring of physical, biological and chemical parameters within and outside the marina to ensure that the Environmental Protection Authority's water quality criteria are met for Beneficial Use No. 1, for the purposes of direct contact recreation, and Beneficial Use No. 16 for the purpose of navigation and shipping (Department of Conservation and Environment, 1981);**
- **management strategies developed for implementation in the event of criteria not being met, particularly in the case of accidental spillages; and**
- **monitoring and management of oil and fuel, wastes from boats, anti-fouling paints, rubbish, suspended solids and nutrients.**

An overview of management provisions for the development should be provided in an environmental management programme.

Recommendation 9

The Environmental Protection Authority recommends that the proponent prepare a comprehensive environmental management programme, to the satisfaction of the Environmental Protection Authority drawing together previous recommendations and other management requirements. This programme should include the following elements:

- **dune management during construction as contained in Recommendation 6;**
- **fauna management provisions;**
- **coastal management proposal as contained in recommendation 7, with particular reference to maintenance of the dune systems of the site;**
- **management of sediment bypassing; and**
- **marina water quality and monitoring proposal, as contained in recommendation 8.**
- **management commitments by the proponent as contained in Appendix 1.**

1. Introduction

The proposal to develop a recreational resort complex on the coast at Eglinton was referred to the Environmental Protection Authority for assessment in March 1989. The Authority required that a Public Environmental Review of the proposal be undertaken and guidelines to assist the proponent in the preparation of the relevant documentation were issued in May 1989. Following the submission of a revised concept plan, the Authority revised and issued new guidelines in March 1990. The level of assessment remained the same. The Public Environmental Review was released for an eight week public submission period ending on 6 November 1990.

As a result of issues highlighted during the Authority's assessment of the proposal, submissions received, and feasibility studies carried out by the proponent, the design concept has once again been revised from that presented in the Public Environmental Review document. The Environmental Protection Authority's assessment is based on the design concept as presented by the proponent in correspondence of 15 January 1991 and described in section 2 of this report and illustrated in Figure 2.

2. Description of proposal

Eglinton Beach Resort is proposed by Ocean Dunes Pty Ltd (the proponent), for a 245ha coastal site located 45 kilometres north of the Perth Central Business District (Figure 1). The proposal is for a recreational resort complex incorporating an 18 hole dune links type golf course of international competition standard, marina and beach resort, and a residential component. Figure 2 illustrates the proposal design.

The golf course has been mainly routed through natural low-lying depressions to allow construction with minimum alteration to the dune landform, however, the 17th and 18th holes will require substantial alteration of the foredune. Perched lakes are proposed to provide irrigation storage and to contribute to golf strategy and landscape. A two storey club house complex is proposed to provide a wide range of facilities. It will be connected to the resort hotel complex by a covered board walk. It is also proposed to develop 387 residential units, both attached and detached dwellings, scattered around the golf course.

The proposed marina has the primary function of creating and providing an area of protected land suitable for the development of resort facilities in close proximity to the ocean whilst minimising the amount of development that takes place in the coastal dunes. Safe harbouring of boats is an important though secondary function of the marina. The marina precinct will incorporate a public boat ramp and launching basin, a protected bay and swimming beach in the centre, approximately 200 boat moorings, ferry docking facilities, public car park for 500 cars and public car/trailer park for 80 cars and trailers, a Fisherman's wharf/retail complex, a theme park, and approximately 300 residential units on 7ha of land around the perimeter of the harbour and on terraces behind.

The resort proposes a hotel complex which will incorporate both private and public facilities. These include a reception area, hotel units, bars and restaurants overlooking the swimming bay within the marina and the coastline, function rooms, coffee shop, pools, tennis courts and service shops.

Most of the development site is privately owned, however, there is a Crown owned foreshore reserve along the coastal boundary of the development site. The proponent proposes to seek alienation of certain sections of the foreshore area into private ownership, these sections being, the Hotel Development Precinct, the Marina Residential Development Precinct, and the Public Use Precinct. The proponent proposes that the Public Beach, Breakwaters and hinterland, Northern Groyne and Boat Ramp, and Public Car Parks remain or be placed in public ownership. In return for being permitted to transfer those sections of current public foreshore outlined above into private ownership, the proponent proposes to provide an area of greater than equivalent size as a land swap. The proponent has labelled this area as "Conservation Area".

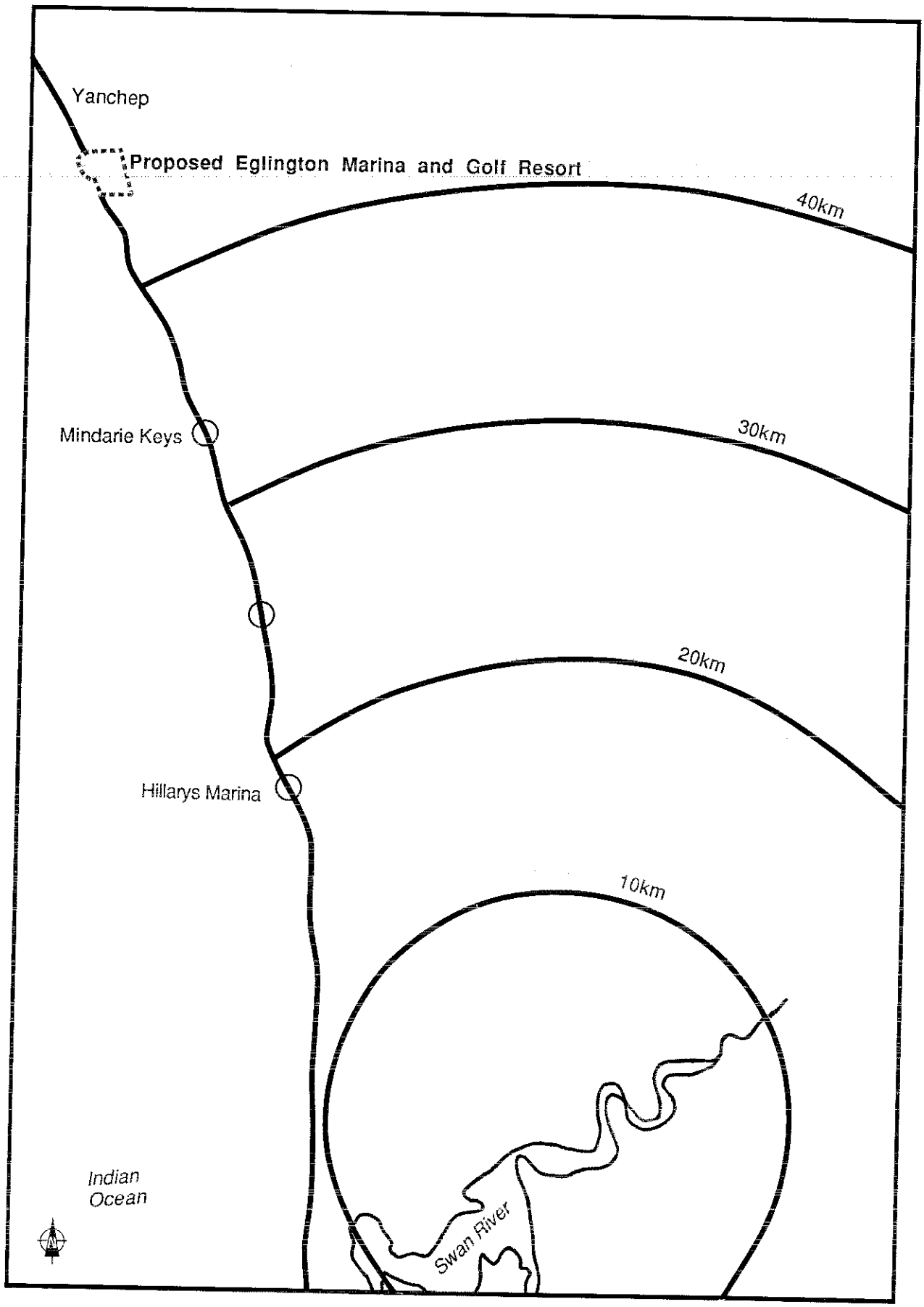

Figure 1: Location map

3. Existing environment

3.1 Terrestrial environment

The site chosen for development is characterised by the Spearwood Dune System in the easterly portion of the site and Quindalup Dune Systems in the western and coastal portion of the site. The Spearwood Dune System is a Pleistocene unit comprised of ridges of limestone with intervening swales and the Quindalup Dune System is a Holocene unit comprised of dunes and beaches forming along the modern coast and which overlies the Spearwood Dune System (LeProvost Environmental Consultants,1990).

The topography of the terrestrial environment of the project site is composed of:

- a gently sloping sandy beach backed by a linear shore-parallel strip of low cliffed foredunes (generally less than 10m above AHD);
- parabolic dunes extending from the foredunes inland for up to 3km. These are a series of fretted u-shaped ridges up to 40m above AHD. The ridges slope steeply down into elongated depressions; and
- a gently undulating limestone plain system which extends to the eastern boundary of the site area. In some cases this is overlain by degraded ridges of younger parabolic dunes (LeProvost Environmental Consultants, 1990).

There are five distinct vegetation assemblages within the project site with coastal *Melaleuca* low heath as the major assemblage. No rare or endangered plants or animals were found on the site during investigations undertaken for the Public Environmental Review.

A large, very hot fire burnt out the entire development site in late January 1991 thus severely affecting the flora and fauna of the area. The fire could change the long term vegetation composition in the area which in turn could impact upon the landform stability of the site.

3.2 Marine environment

The bathymetry of the marine environment in the region of the project site is characterised by:

- a sloping sea floor immediately west of the shoreline which forms a basin to 9 m depth before steeply rising to meet a limestone reef 1.4km offshore. There is a shallow sandy bank 2-4m in depth between the Alkimos Reef and the shoreline. This bank separates basins to the north and south;
- a linear depression (10-15m deep) between the inner-most reef and a more perforated middle ridge further offshore;
- a shallowing to depths of 3-4m around Hugill Reef before dropping into a deeper (20-25m) inter-ridge depression further to the west; and
- a rise in the sea floor to an outer reef with depths of 10-12m before sloping westwards towards the continental shelf. (LeProvost Environmental Consultants, 1990).

The main marine habitats in the project area are: subtidal sandy sea floor; subtidal limestone pavements; subtidal reefs; intertidal reefs and platforms; sandy beaches and beach rock.

The coastal ecosystem around the proposed harbour is presently in a semi-pristine condition and undisturbed apart from commercial and recreational fishing activities.

The banks of offshore reefs and seagrass meadows at the project site significantly attenuate the offshore wave climate resulting in a considerably milder sediment transport regime than might be expected on an open coast.

4. Review of public submissions

Comments were sought on the proposal from the public, community groups, conservation groups and local and State Government authorities. The Public Environmental Review document prepared for the proposal was available for an eight week public submission period which closed on 6 November 1990. The public submissions raised numerous issues, the principal topics of which relate to:

- Need for the development. There are already four other marinas along that stretch of coast including Hillarys. Ocean Reef, Mindarie Keys and Two Rocks Marina. There are two other golf courses nearby and a total of five golf courses in the municipality;
- Discomfort with the concept of having a private developer own and manage what is currently a public resource;
- Dispute as to whether the proposal deals satisfactorily with the intent of System Six recommendation M2;
- The land exchange proposed to compensate for the loss of public foreshore was not considered to be equitable;
- Concern that the public could end up being restricted from accessing the foreshore and other areas of the site which are currently publicly owned;
- Queries about responsibility for continued maintenance of the marina should its commercial viability fail;
- Concern over direct impacts on the marine environment as well as impacts on professional and recreational fishing;
- Concern over impacts on terrestrial flora and fauna of the site and the general Quindalup Dunes habitat;
- Perceived lack of adequate availability of water resource for the proposal or inequitable distribution of the resource;
- Construction impacts in terms of noise and dust;
- Difficulties appropriately siting the on-site sewage treatment facilities; and
- Perceived lack of contingency plans should monitoring show that the groundwater, dunes, or marine environment are being adversely affected by the development.

A detailed list of issues raised in submissions and the proponent's response to these issues is incorporated in Appendix 2 of this assessment report.

Following closure of public submissions and as a result of issues highlighted during the Authority's assessment of the proposal, submissions received, and feasibility studies carried out by the proponent, the design concept was altered. These alterations include:

- improvement of public access provisions;
- a lesser area requested for transfer from public to private ownership;
- a golf course re-design which includes a slight shifting of the 18th hole, and a reduction in grassed fairway areas and therefore a 20% reduction in water requirements; and
- marina re-design, resulting in a reduction in size and improved public access.

5. Environmental impacts

5.1 General

Following consideration of the Public Environmental Review, changes submitted since the release of the documentation, submissions from the public and government agencies and the proponent's response to them, the Environmental Protection Authority has determined that the proponent has addressed the relevant issues associated with the proposed resort development satisfactorily and that the consequent impacts can be managed. This environmental management can be achieved by a combination of the proponent's original and supplementary commitments and the Authority's recommendations.

Recommendation 1

The Environmental Protection Authority has concluded that the proposed Eglinton Beach Resort, as modified during the process of interaction between the proponent, the Environmental Protection Authority, the public and the government agencies that were consulted is environmentally acceptable.

In reaching this conclusion, the Environmental Protection Authority identified the main environmental factors requiring detailed consideration as:

- **loss of public foreshore areas;**
- **maintenance of public access to the foreshore and through the System Six Recommendation M2 area;**
- **modification of coastal dunes to create the golf course and associated development;**
- **vegetation and habitat loss;**
- **groundwater quality and quantity;**
- **golf course management to minimise ongoing impacts to the coastal dunes, groundwater quality and marina water quality;**
- **marine impacts resulting from the marina development; and**
- **maintenance of marina water quality.**

The Environmental Protection Authority notes that these environmental factors have been addressed adequately by either environmental management commitments given by the proponent or by the Environmental Protection Authority's recommendations in this report.

Accordingly, the Environmental Protection Authority recommends that the project could proceed subject to the Environmental Protection Authority's recommendations in this report and the proponent's commitments to environmental management (Appendix 1).

The Authority's experience is that it is common for details of a proposal to alter through the detailed design and construction phase. In many cases alterations are not environmentally significant or have a positive effect on the environmental performance of the project. The Authority believes that such non-substantial changes, and especially those which improve environmental performance and protection, should be provided for.

The Authority believes that any approval for the proposal based on this assessment should be limited to five years. Accordingly, if the proposal has not been substantially commenced within five years of the date of this report, then such approval should lapse. After that time, further consideration of the proposal should occur only following a new referral to the Authority.

Whilst the Authority considers that the biophysical impacts of this development are manageable, the Authority believes that given that there are already four marinas on the coast between Sorrento and Two Rocks, and others are being contemplated, a regional assessment of the requirement for further marina developments should be undertaken.

Recommendation 2

The Environmental Protection Authority recommends that the Department of Planning and Urban Development in conjunction with the Department of Marine and Harbours, review the need for, and the consequences of marina developments along the metropolitan coast from a planning perspective, and publish the results.

5.2 Land ownership and loss of public foreshore areas

The development site is privately owned apart from the Crown foreshore reserve. In the Public Environmental Review documentation released for public submission, the proponent proposed to transfer much of the existing foreshore reserve into private ownership. In correspondence received by the Authority following closure of submissions, the proponent indicated that the proposal had now been modified to allow for a mixture of public and private ownership of the foreshore land. Specifically, the proponent proposes that the public beach, breakwaters and hinterland, northern groyne and boat

ramp, and public car parks remain or be placed in public ownership, and that the Hotel Development Precinct, the Marina Residential Development Precinct, and the Public Use Precinct be placed in private ownership.

The Authority believes in the principle of public ownership of foreshore areas and of ensuring full though managed public access to the foreshore in perpetuity. The Authority has provided this same advice on previous assessments of proposals such as Mindarie Keys (1985), Port Kennedy Regional Recreation Centre (1989) and Port Geographe (1989). While the proposal advocates continued and even improved public access to the foreshore, the Authority does not find it acceptable that the proponent wishes to have some sections of the foreshore area in private ownership. Although the Authority accepts that some development of the foreshore may be acceptable, it believes that coastal foreshore open space should remain, and it should be in public ownership. Private ownership is considered to present a potential constraint on full public access.

Recommendation 3

The Environmental Protection Authority recommends that an adequate foreshore reserve be created to the satisfaction of the Minister for the Environment and the Minister for Planning, in consultation with the City of Wanneroo, the Department of Planning and Urban Development, and the Environmental Protection Authority. A commitment for the foreshore reserve to be delineated and transferred to the Crown at no cost should form part of the proposed legal agreement between the proponent, the City of Wanneroo and the Minister for Planning.

5.3 Land exchange

In return for being permitted to develop and transfer some of the current Crown owned foreshore reserve into private ownership, the proponent proposes to provide an area of greater than equivalent size as a land swap. The proponent has labelled this area as "Conservation Area" (Figure 2).

The Authority has stated in previous assessments (EPA, 1985, 1989) that Crown foreshore reserves and any created Crown land should remain in public ownership. In this instance, this principle can be best dealt with by ensuring that a new publicly owned foreshore reserve is created which takes into account existing and created land, and by obtaining an adequate exchange for any Crown land (existing or created) which is alienated by the development proposal.

The Environmental Protection Authority believes that the land swap should be of equal environmental value and that the area delineated by the proponent in the development design at this point in time is not necessarily the most suitable exchange. The land exchange should also take into account the area of land created during construction of the marina.

Recommendation 4

The Environmental Protection Authority recommends that as much of the development site is affected by System Six Recommendation M2, and as the proponent will be developing both this area and the Crown foreshore land, a land exchange to the Crown of equivalent environmental value to those areas of the current foreshore reserve and nearshore environment lost to the development, should be provided in compensation. The location of this land exchange should be determined to the satisfaction of the Minister for the Environment on advice from the Environmental Protection Authority. Transfer of ownership of this land to the Crown at no cost, should be undertaken prior to commencement of development.

5.4 Public access

As the development site has an existing publicly owned foreshore reserve as its coastal boundary, and as much of the site has System Six status, the Environmental Protection Authority regards the definition and securing of public access to the majority of the site as an issue of importance. Access is required to and along the foreshore with managed entry through the dunes at both the northern and southern ends of the site, and managed access is required through that part of the golf course which comes within the bounds of System Six Recommendation M2.

Recommendation 5

The Environmental Protection Authority recommends that the proponent provide surveyed plans confirming the location and extent of all public access areas throughout the development site. These public access areas are to be secured prior to subdivision approval being granted in a manner acceptable to the Minister for the Environment. The plans are to be prepared in consultation with the Environmental Protection Authority, the Department of Planning and Urban Development, and the City of Wanneroo.

5.5 Conservation value

A large portion of the coastal dunes on the project site are included in System 6 Recommendation M2. The actual recommendation states that areas, such as this one, which have been identified through planning procedures as open space of regional significance should, where appropriate, be designated as Regional Parks and that the National Parks and Nature Conservation Authority should be given the responsibility for coordinating the planning and management of the area (Environmental Protection Authority, 1983). Recommendation M2 affects the coastal strip between Two Rocks and Burns Beach.

The preamble to this recommendation discusses the fact that:

"the area constitutes open space of regional significance because of its high conservation value and its popularity for recreation. Not all the land under the various tenures in the area has conservation and recreation as primary management objective: to enhance these values the area's management structure requires co-ordination. Important management considerations include: preventing erosion; providing adequate car parks, boat ramps, life saving stations and fenced access ways to the ocean; restricting recreation activities to those which are compatible with conservation of flora and fauna; and recognising the area's mineral potential." (Department of Conservation and Environment, 1983).

Implementation of the System Six Recommendation M2 does not mean that the area of the development site affected by the recommendation must be set aside in a reserve. Sympathetic development of the site can enhance its conservation and recreation values as discussed in the preceding paragraph.

The Environmental Protection Authority believes that the proponent has designed the proposed Eglinton Beach Resort within the context of the System Six recommendation. The proposal provides recreational opportunities with managed public access throughout, and the resort design minimises direct impact on the dune system by routing the golf course through the dune swales for the most part, with the exception of the 17th and 18th golf holes which would have an unacceptable environmental impact upon the foredune. The construction of these holes in the locations proposed would not be environmentally acceptable. Grassed areas of the golf course are kept to a minimum so that minimum alteration to the site vegetation and associated fauna is achieved. The siting of residential units within the golf course also follows the principle of minimum impact upon the dune system. The marina precinct will provide many recreational opportunities for the public in a managed sense.

Access to the portion of the site subject to the System Six recommendation M2 will be guaranteed through the proponent's commitments and the Environmental Protection Authority's recommendations in this assessment report.

The conservation value of the area may have been compromised by the very hot fire which burnt through the development site in late January, 1991. The severity of the impact of this fire on the flora and fauna of the area will need to be assessed in terms of its ability to regenerate without excessive invasion by weed species. Great care will need to be taken so that the dunal land form of the area which has been made more fragile by the destruction of its covering vegetation, is not subject to undue erosion exacerbated by human activity.

The Authority wishes to ensure that the impact of the development on the dunal system of the development site is kept to a minimum, both during the construction and the operational stages of the development proposal.

Recommendation 6

The Environmental Protection Authority recommends that the proponent develop the golf course and surrounds such that the dune system and its vegetation is protected to the satisfaction of the Minister for Environment, on the advice of the Environmental Protection Authority.

Recommendation 7

The Environmental Protection Authority recommends that as part of the overall environmental management programme referred to in Recommendation 9, the proponent prepare and be responsible for implementing a coastal management plan, including maintenance of the dune system, both on the foreshore and throughout the golf course/residential precinct, prior to completion of construction to the satisfaction of the Environmental Protection Authority on advice from the Department of Planning and Urban Development and the City of Wanneroo.

5.6 Golf course, residential component and resort

The main environmental impacts associated with the golf course, residential area and resort are impact on the physical land form, which has been dealt with by preceding discussion, groundwater impacts, and impacts on the nearshore marine environment, particularly the marina.

Ocean Dunes Pty Ltd have provided commitments to maintain dune vegetation throughout the golf course area, to monitor groundwater levels, usage and quality, to limit nutrient applications throughout the site and to exercise strict control over herbicide, fungicide and pesticide applications.

5.6.1 Groundwater

The development site is located within the Perth Groundwater Area and the Perth Coastal Underground Water Pollution Control Area. The Water Authority of Western Australia is responsible for assessing and issuing licences for water abstraction in this area and is also responsible for ensuring that activities which may pollute the groundwater system are not permitted or are regulated.

Many submissions received by the Authority on the proposal were concerned that the quantity of groundwater to be used for this development is excessive. The Water Authority of Western Australia in their submission to the Environmental Protection Authority indicated that the abstraction of groundwater for domestic supply and to service the golf course is not likely to have an excessive effect on the groundwater resource in the area.

The proponent has in correspondence received following closure of submissions on the Public Environmental Review of the Eglinton Beach Resort proposal, indicated that significant changes have been made to the golf course and associated landscaping in order to minimise water usage. The area of fairway grasses has been reduced and the area of less frequently and non-watered 'rough' grasses has been increased. The water licence application submitted to the Water Authority by the proponent reflects the 20% reduction in projected irrigation water requirement.

Potential effects on groundwater quality will also be strictly controlled through requirements for monitoring and management through both the Water Authority licensing process and the Environmental Protection Authority's recommendations.

5.6.2 Nearshore marine environment

There is the potential for nutrients and chemicals from the land based components of the development to leach into the ocean thus damaging the nearshore environment. The Authority has examined the development proposal within the context of this possible impact and has found that this potential impact can be largely prevented with appropriate management as provided for in the proponent's commitments and the Authority's recommendations in this report.

5.7 Marina

The marina as presented in the Public Environmental Review released for public comment has subsequently been re-designed.

The re-designed marina (Figure 3) is significantly smaller than the original marina and consequently has a lesser immediate impact on the nearshore environment. The development originally proposed comprised a long main breakwater which overlapped a short northern breakwater to provide sheltered water for two small marinas, boat landing, boat launching facilities, a centrally located private residential island and public beaches. In the revised design, the long breakwater is replaced with three separate coastal components. The three components are: (i) a boating marina for about 200 boats, a public launching ramp and boat landing at the northern end; (ii) a protected bay and swimming beach in the centre; and (iii) a reclaimed promontory for the hotel at the southern end. The private island section in the centre of the superseded design does not form part of the new design.

The environmental impacts associated with the marina component of the Eglinton Beach Resort development proposal can be separated into land impacts and marine impacts.

5.7.1 Land impacts

The land impacts associated with the marina proposal include alteration of the foredunes, potential alteration of coastal processes and potential impact upon the natural freshwater/saltwater interface.

The re-design of the marina means that the location of the natural freshwater/saltwater interface will now be largely unaffected.

Modelling undertaken as part of the Public Environmental Review has indicated that there is sediment being fed into the development area from both the north and south in relatively small quantities. The proponent has provided a commitment to monitor any sand movement and to manage sediment bypassing as required.

The Authority accepts that development of the marina precinct will involve considerable modification to the foredunes in this area. The stability of these dunes during and following construction will have to be carefully managed as required by the Authority's recommendations 6 and 7.

5.7.2 Marine impacts

The marine impacts associated with development of the marina include loss of seagrass/algal habitat, possible decline and changes to fish populations, and loss of public recreational foreshore fishery areas.

The original marina design would have resulted in the modification of approximately 23ha of nearshore environment. The re-designed marina will now result in the modification of an overall area of 17ha of near shore environment. Of the original 23ha, 14ha of seagrass/algal habitat would have been affected. The 6ha reduction in size as a result of the new design now means that the area of seagrass/algal habitat affected is reduced from 14ha to 8ha. Some of the 8 ha of seagrass/algal habitat will be lost due to construction impacts associated with the reclaimed land and breakwaters, and the remainder which is not directly lost may be modified as a result of being enclosed within the marina.

In addition to the reduction in loss of seagrass/algal habitat, the new marina design has the navigable waterway totally over natural seabed, thus eliminating the need for dredging of coastal rock and sediment and minimising direct impact upon the sea bed.

Changes to fish populations are not likely to occur as a result of direct impact of the marina development. They are more likely to occur as a result of increased access opportunities provided by the development. This increase in recreational fishing pressure is something which is inevitable and is a matter for the Department of Fisheries to resolve in a regional context through educational programmes and the setting and policing of catch limits.

The Authority considers that the modification and/or direct loss of 17ha of nearshore environment is not an impediment to the proposal proceeding, as the affected marine habitat with its associated flora and fauna assemblages is not unique on a regional scale, and therefore the dimension of the losses is acceptable on biological grounds on a regional scale.

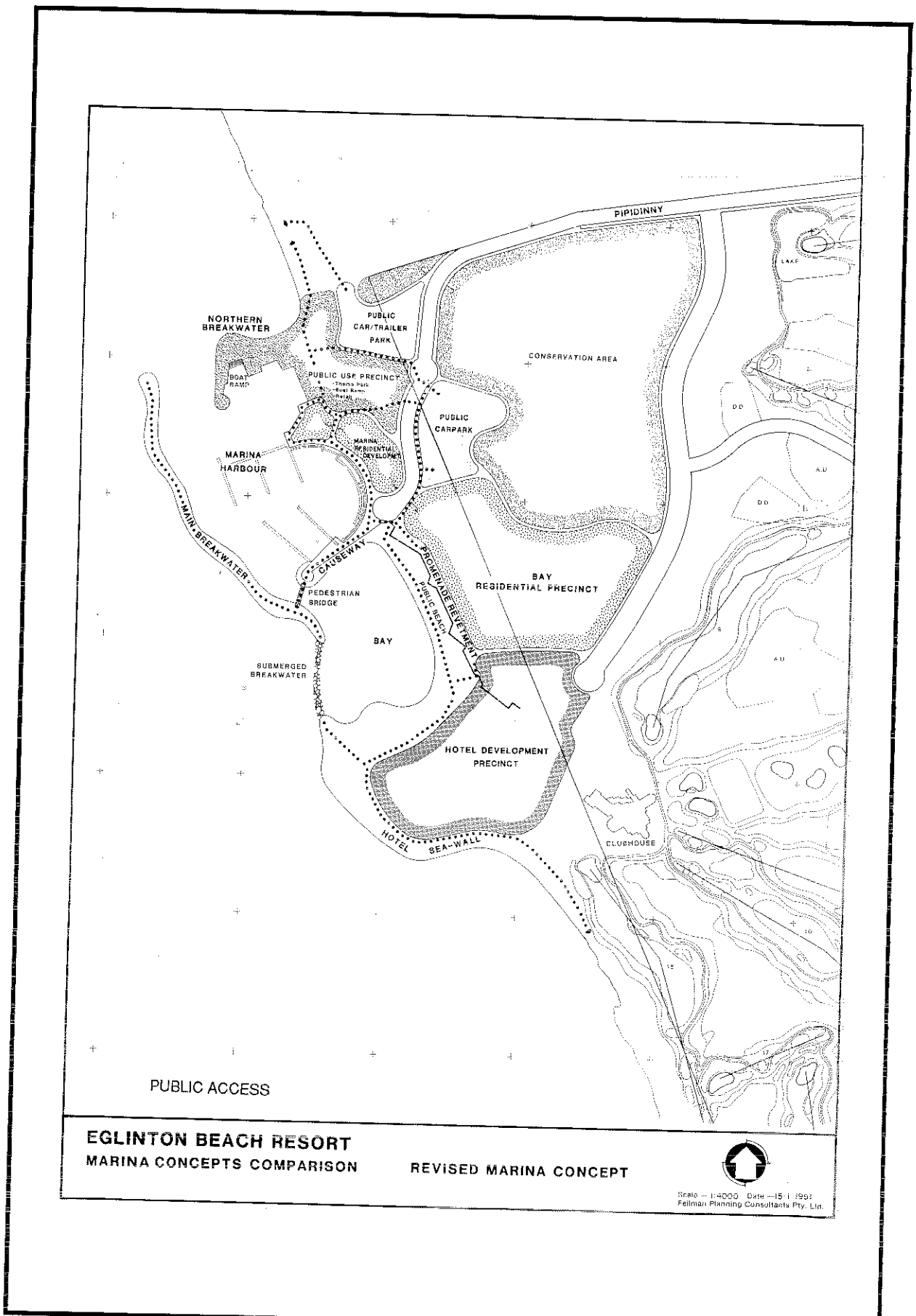

Figure 3: Marina design — original and revised versions

There is the potential for water quality problems to emerge in the marina without proper management. The Authority believes that in order to prevent such problems from occurring, it is necessary to prepare details of water quality monitoring and management as part of an overall environmental management programme.

Recommendation 8

The Environmental Protection Authority recommends that as part of the overall environmental management programme referred to in Recommendation 9, details of water quality monitoring and management be developed by the proponent in consultation with the Department of Marine and Harbours to the satisfaction of the Environmental Protection Authority, prior to completion of construction of the marina. This should include:

- **monitoring of physical, biological and chemical parameters within and outside the marina to ensure that the Environmental Protection Authority's water quality criteria are met for Beneficial Use No. 1, for the purposes of direct contact recreation, and Beneficial Use No. 16 for the purpose of navigation and shipping (Department of Conservation and Environment, 1981);**
- **management strategies developed for implementation in the event of criteria not being met, particularly in the case of accidental spillages; and**
- **monitoring and management of oil and fuel, wastes from boats, anti-fouling paints, rubbish, suspended solids and nutrients.**

5.8 Greenhouse

The proponent has adopted the approach of designing all breakwaters, marina walls, buildings and structure in the Eglinton Beach Resort to allow for a sea level rise of approximately 30 cm.

5.9 Construction

The main construction impacts will result from noise and dust emanating from the development site and material transport associated with it. The proponent has committed to confining construction activity to daylight hours and that the route taken by construction machinery and rock trucks to access the site will be by the only available access, that is Wanneroo and Pipidinny Roads, at times agreed with the Wanneroo City Council. Water trucks will be on site throughout the earth works programme to damp down all exposed sand surfaces until temporary irrigation is installed or the surface is physically stabilised.

5.10 Wastewater treatment

It is proposed to connect the resort to the Water Authority's planned Alkimos Waste Water Treatment Plant. If the Alkimos Plant is not available at the time the resort is opened, it is proposed to locate a temporary package treatment plant on site and effluent will be disposed of via spray irrigation. In the event that a package treatment plant is installed, it will be licensed by the Environmental Protection Authority and the proponent will have to comply with all conditions set as part of the licence.

5.11 Management

Ocean Dunes Pty Ltd has made various commitments to monitor and manage the environmental impacts of the proposal (Appendix 1). The Authority considers that the proponent's commitments, and the Authority's recommendations based on its assessment of the proposal, should be drawn into one comprehensive environmental monitoring and management programme for all components of the development.

In addition, the Authority considers that it should be consulted in regard to the legal agreement which is being prepared between Ocean Dunes Pty Ltd, the City of Wanneroo and the Minister for Planning, to define responsibilities for the management of the golf resort and public facilities.

Recommendation 9

The Environmental Protection Authority recommends that the proponent prepare a comprehensive environmental management programme, to the satisfaction of the Environmental Protection Authority drawing together previous recommendations and other management requirements. This programme should include the following elements:

- **dune management during construction as contained in Recommendation 6;**
- **fauna management provisions;**
- **coastal management proposal as contained in recommendation 7, with particular reference to maintenance of the dune systems of the site;**
- **management of sediment bypassing; and**
- **marina water quality and monitoring proposal, as contained in recommendation 8.**
- **management commitments by the proponent as contained in Appendix 1.**

6. Conclusion

The Environmental Protection Authority considers that all environmental impacts associated with the Eglinton Beach Resort Proposal as identified in this assessment report are manageable subject to the recommendations made in this assessment report and the commitments provided by the proponent.

7. References

Department of Conservation and Land Management (1981), Water Quality Criteria for Marine and Estuarine Water of Western Australia. Report of the Working Group established by the Environmental Protection Authority (Bulletin 103).

Department of Conservation and Environment (1983), Conservation Reserves for Western Australia as recommended by the Environmental Protection Authority, The Darling System - System 6 (Report No 13).

Environmental Protection Authority (1985), Mindarie Keys, Report and Recommendations of the Environmental Protection Authority (Bulletin 200).

Environmental Protection Authority (1989), Port Kennedy Regional Recreation Centre, Report and Recommendations of the Environmental Protection Authority (Bulletin 398)

Environmental Protection Authority (1989), Port Geographe, Report and Recommendations of the Environmental Protection Authority (Bulletin 386).

LeProvost Environmental Consultants (1990), Eglinton Beach Resort Public Environmental Review.

Appendix 1

Proponent's commitments

7 COMMITMENTS

The proponent undertakes to abide by all of the commitments made in this PER and in all cases will fulfil those commitments to the satisfaction of the appropriate statutory authority(s). Specifically this refers to the undertaking by the proponent of all construction and management and monitoring tasks as identified in Sections 4 and 6 of this report, and summarised below, over the lifetime of the project. This will include responsibility for the management, maintenance and monitoring of the resort and marina, the foreshores and all open space within the development. Where changes to the proposal have been made subsequent to the submission of the PER commitments have been amended accordingly.

7.1 LEGAL AGREEMENT

Legal agreements will be entered into between the Proponent and the City of Wanneroo, and between the Proponent and the State. Said agreements will define the commitments made by each of the signatories to this project and specifically detail the Proponent's commitment to the ongoing maintenance and management of the project.

7.2 PROJECT COMPLETION

The proponent will be responsible for the completion of the golf course and clubhouse, hotel, marina complex and all associated servicing and all public facilities including foreshore areas and pocket beaches, boat ramp and carparking facilities.

7.3 GENERAL CONSTRUCTION MANAGEMENT

- The resort will be constructed so as to minimise disturbance to the coastal dunes and dune landforms wherever possible.
- Safety - The development site will be fenced and appropriate signs posted to protect the public during the construction phase.
- Noise - Vehicle movements will be restricted to times approved by the City of Wanneroo.
- Dust - Water trucks will be on site throughout the earth works programme to damp down all exposed sand surfaces until temporary irrigation is installed or the surface is physically stabilised.

- *Phytophthora* - All sand and other materials used on site will be obtained from *Phytophthora*-free areas or will be fumigated before being brought on site. This requirement will also apply to plant and machinery.

- All earthworks resulting from road construction will be stabilised to conform with acceptable erosion control guidelines.

7.4 GOLF COURSE

- Natural vegetation will be retained, and where necessary rehabilitated, throughout the golf course area.

- Cleared vegetation will be used as brush covering to protect exposed surfaces or chipped and used as mulch and seed source in areas being revegetated.

- A turf management plan will be designed to achieve suitable turf coverage to meet stress, appearance and low nutrient and water usage requirements.

- Fertiliser application will be minimised as identified in the proposed Nutrient Input Management Plan.

- Soil nutrient levels will be monitored to determine appropriate fertiliser application rates.

- Groundwater bores will be established to monitor leaching of nutrients from the golf course.

- Volumes of water abstracted from irrigation bores will be recorded, as will rates and distribution of irrigated water throughout the resort complex. Levels in the storage lakes will also be monitored.

- An annual sample from each production bore will be collected and analysed to monitor water quality.

- Pesticide use will be limited to turfed areas of the golf course.

- The use of fungicides will be limited to putting greens, if required.

- Herbicide use will be limited to turfed areas using approved chemicals.

7.5 MARINA

- The main breakwater will be constructed to a level designed to prevent overtopping and the entrance configuration will be designed to minimise wave penetration. The submerged breakwater will be designed to attenuate storm wave action.

- An allowance for a 30 cm rise in sea level due to the Greenhouse Effect has been made in the design and siting of all buildings and structures.

- The harbour will be over natural sea-bed with a minimum water depth of approximately 2.5 m below AHD.

- Harbour walling will be constructed to standards approved by the Department of Marine and Harbours (DMH).

- All marina and berthing structures will be designed and licensed in accordance with the requirements of the DMH.

- Navigation aids will be provided in accordance with the requirements of the DMH.

- Jetty structures, designed to accommodate up to 220 boats, will be designed and licensed in accordance with the requirements of DMH.

- The proponent will monitor and maintain the structural integrity of the breakwaters, groynes, internal walls and jetties.

- Water depth in the harbour and entrance will be maintained at the designed navigable depth.

- Sediment bypassing operations will be undertaken as required.

- Water quality within the marina harbour and bay will be monitored and in the event of a decline in water quality to unacceptable levels, the proponent's Harbour Manager will take whatever steps are necessary to alleviate the problem.

- Marina harbour sediments will be monitored for a range of heavy metals associated with boating activities.

- Seagrass and algal wrack will be removed from the marina waters and breakwaters by the marina manager in the event that it is in sufficient quantity to cause odour problems.

- The proponent will co-operate with the Fisheries Department in education programmes designed to assist in the management of the marine fishery.

7.6 FORESHORE AND DUNE MANAGEMENT

- The beaches to the south of the hotel promontory will be stabilised by the construction of a groyne field in the event that on-going investigations of coastal dynamics show that they are required. If required, sand buffer zones in the form of small vegetated foredunes will be constructed at the base of the primary dune south of the hotel promontory to provide protection against severe storms.

- All foreshores adjacent to the proponent's land will be maintained by the proponent.

- Sediment accumulation or loss will be monitored and managed as required by sediment bypassing.

- Stability of the coastline affecting the marina, coastal dunes, golf course and beach areas will be monitored.

- The beach and foredune will be restored in the event of damage due to severe storms, where damage has been exacerbated by the presence of marine structures or where such damage puts at risk resort facilities.

- Existing degraded parts of the dune system will be rehabilitated.

- Access to the dune system will be managed to prevent damage to the vegetation and erosion of the dunes.

7.7 RESORT

- Public facilities provided within the resort will include:

    - boat launching ramps;
    - car and trailer parking;
    - beach access;
    - board-walk around the marina; and
    - public recreation areas.

- The management of the areas of Public Open Space provided in the marina and resort complex will be the responsibility of the proponent.

7.8 SERVICING

- All services within the resort will be underground.
- All roads servicing the development will be constructed by the proponent. Major access roads will be constructed to designated City of Wanneroo standards.
- The water levels in all water supply bores and in Pipidinny Swamp will be monitored on a regular basis.
- A local water supply for domestic requirements will be developed to WAWA-approved standards.
- Stormwater from the majority of the development (including roads) will be discharged to ground via silt and oil traps wherever possible to enhance recharge of the aquifer.
- Where necessary stormwater from the lower levels of the development, i.e. roads and carparking areas of the hotel, marina harbour and condominium sites will be discharged to the marina harbour or the ocean via an outfall in the marina breakwater.
- In the event that WAWA's proposed wastewater treatment plant at Alkimos is not immediately available a temporary on-site sewage treatment plant to service the resort will be constructed by the proponent and will be operated and maintained to WAWA standards.
- Should a temporary on-site sewage treatment plant be required, the effluent will be treated to Health Department's requirements for disposal, and disposed of by low pressure irrigation.
- Groundwater use and quality will be monitored by a series of monitoring bores.
- Annual reviews of borefield performance will be undertaken to the satisfaction of the Water Authority of Western Australia.

7.9 LAND TRANSFER

- That part of the proponent's land within System 6 M3 (Pipidinny Swamp) will be transferred to the Crown as part of the proposed land exchange.

Appendix 2

Proponent's response to issues raised by submissions

EGLINTON BEACH RESORT

SUMMARY OF SUBMISSIONS AND RESPONSES BY THE PROPONENT

This section of the report presents the submissions received on the Eglinton Beach Resort PER, as summarised by the EPA, and the responses to those submissions prepared by the Proponent. For each point the submission summary is printed in italic type immediately below the relevant subject heading. The Proponent's response to the submission follows in normal type.

1 NEED FOR THE DEVELOPMENT

1.1 Long Term Sustainability

In the current economic climate, it is doubted if another resort/marina on our coast is appropriate, especially as the Australian public have witnessed many corporate collapses recently, particularly involving tourist developments. Is it worth sacrificing and risking our fragile coastal environment for the fickle and unreliable tourist industry?

The tourism industry is acknowledged by the Federal Government as a major growth industry with the potential to both redress Australia's adverse Balance of Payments situation and provide increased employment opportunities for Australians. Furthermore the present economic climate is ideal for the construction in that:

(i) the construction resources required are readily available at competitive prices, and

(ii) development will create substantial opportunities at a time when such opportunities are declining locally.

Finally, the project is designed for the long term and the Proponent, who is currently developing other international standard golf resorts in the Asian region, is unlikely to be affected by a short term recession in Australia.

1.2 Need for Marina

There is concern that there is to be another marina in an area which has hitherto been open to public access and has been left more or less in its natural state. Is such an interference on such a scale with the natural environment necessary at this particular stage particularly when it is obvious that there is a glut of marina space for boats if one looks at the situation starting at Sorrento and moving along the coast.

The tourism industry in general, and this development in particular, relies to a large extent on the maintenance of natural environments and landscape aesthetics. Far from risking the coastal environment, which is presently unmanaged and for the most part accessible only by 4wd and motor cycle enthusiasts, and is thus of limited public accessibility, the proposed project will safeguard the coastal environment and increase managed public access to it.

It also needs to be appreciated that long-term planning for the North West Corridor (refer DPUD Urban Expansion Policy) identifies this site as being suitable for urban development. Given the growth options available for Perth, it is unrealistic to expect this land to remain in its present state in perpetuity. Managed public use of, and access to, the land is inevitable.

1.3 Marina Utilisation

The need for yet another marina north of Perth is questioned. It seems that the pleasure boat fraternity are already well catered for by existing marinas between Hillarys and Two Rocks. It is noted that the existing marinas appear to be considerably under utilised and that the proponents have not quoted occupancy rates for these other marinas as justification for building of the Eglinton Marina. It is doubted whether there is sufficient demand in the short to medium term to justify additional marina facilities.

It is important to realise that the Eglinton marina has not been designed to cater for the broad boating fraternity of Metropolitan Perth. Nor has it been designed as a stand alone commercial venture.

The purpose of the marina is primarily project orientated, with major benefits being the provision of:

- access to ocean waters for resort guests;
- sheltered boat launching facilities for residents and members of the public;
- mooring of boats of residents of the estate and visitors;
- coastal protection for nearshore golf, resort and residential facilities; and
- safe, sheltered swimming beaches.

Hence assessing its commercial viability, or justification, based on experience at existing marinas is not pertinent. Nonetheless it is worth noting that Hillarys marina is developing at a rate faster than predicted (Marine and Harbours, pers. comm.) and the occupancy rate of Mindarie has risen rapidly over the past 12 months. Demand predictions indicate that all of the presently planned marina pens in the metropolitan area will be fully utilised.

1.4 Tourism Sustainability

Mindarie Keys to a certain extent is more or less deserted at this particular stage and also many people who commenced training for tourist activities have in fact been found to be redundant. We do not want the same situation to occur in the Eglinton Beach Resort. We do not want the area to be subject to further people pressure only to find that it is unnecessary in the long run.

The form and function of Mindarie Keys cannot be compared at a detailed level with the form and function of the Eglinton Project. At present, Mindarie draws the bulk of its clientele, with respect to the hotel and marina boat pens, from the metropolitan region generally. Given its relative isolation at this stage from this population resource it is fair to conclude that presently it is not operating at its full potential. In contrast, Eglinton, because of its much larger tourist accommodation base, will draw its patronage from a resource comprising tourists and visitors from within the state, interstate and overseas, in addition to a gradually increasing local population. Growth projections for the metropolitan region ensure that the land resource will be optimally utilised and therefore not "wasted".

1.5 Long-term Maintenance Responsibility

Who will be responsible for continued maintenance of the marina should its commercial viability fail?

Should, for unforseen reasons, ownership of the marina be transferred, then subsequent owners would still be bound by the terms and conditions of the Legal Agreement and the City of Wanneroo District Town Planning Scheme. These documents contain provisions which are designed to ensure the ongoing maintenance and management of the resort area, both onshore and offshore, to the specification and satisfaction of the various public authorities.

1.6 Advantages of the Project

The proposal is unnecessary, exploitive of water resources, environmentally unsound and socially destructive countering any benefit that may be generated.

Given Department of Planning and Urban Development plans for urbanisation of the North West Corridor it is an inescapable fact that this coastline will eventually come under intense population pressure. As such the coastal land will need management to protect its conservation and recreation values. The present proposal is put forward as an innovative plan to not only safeguard the conservation value of a large part of the land, but also to improve its recreational value and accessibility to the public and provide the necessary management at no cost to the community.

All water resources being utilised are being done so in accordance with the standards established by the relevant public authorities and with all necessary approvals and licences being issued. The PER demonstrates that this project is environmentally sound and manageable.

There is no justification for stating that the project is "socially destructive", as the land use being proposed is totally compatible with the surrounding land uses proposed by the Department of DPUD in its forward planning for this corridor. From a social equity point of view, a range of housing types are proposed and will, as with other land sales, be sold on the open market, and not to target socio-economic groups. The tourist/recreation facilities will be available for use by all members of the public and in time form an important leisure resource within the urban corridor.

1.7 Impact on Long-term Regional Planning

There is concern that approval of the proposal could diminish the scope of the future Department of Planning and Urban Development report on planning in the North West Corridor, and that it could reduce the opportunity to achieve integrated planning in the corridor.

The relationship of the Eglinton project to the forward planning for the North West Corridor being undertaken by the DPUD is presently being assessed by that Department as a part of its deliberations related to the Metropolitan Region Scheme and Local Authority Town Planning Scheme amendments. Discussions with DPUD on this point indicate that the proposal is compatible with long-term plans for the region.

2 SOCIAL EQUITY

2.1 Land Exchange

The proposed land exchange is no more than a cosmetic attempt at gaining ownership of a valuable natural resource, at very little expense to the Proponent. Conservation and recreation values will be affected. Contrary to the impression promulgated by the proponents the public will have only restricted access to many of the facilities proposed. Only 25% of the natural vegetation will remain. The land exchange proposal should not be considered but rejected as a cynical attempt at grabbing prime coastal real estate.

It needs to be understood that the land which is the subject of this proposal is presently owned by the Proponent, with the exception of the narrow, 80 to 100 m wide, foreshore reserve. The uses to which his land may be put by the Proponent are governed by the zoning under the operative Town Planning Schemes (Metropolitan Region Scheme and City of Wanneroo Town Planning Scheme), both of which are subject to public input in the event of any proposed amendment.

It is an undisputed fact that to develop a project such as the Eglinton Beach Resort, an area of coastal land including some existing beach area, will need to be incorporated into the development. The value of Perth's coastal areas as a major recreational resource is not disputed, and it is this fact which enables a development such as Eglinton to become viable. In return for the opportunity to develop on this prime coastal land, the Proponent is prepared to offer in return:

- transfer to the Crown of a large conservation area;
- provision of public access to the facilities within the project area, particularly those on the foreshore;
- preservation and management of significant areas of natural dune within the Project Area; and
- agreement to apply the necessary easement rights to ensure freedom of pedestrian movement to all beaches, throughout the Marina Precinct and to other parts of the development as specified in the management plans to be approved by the relevant authorities.

Conservation and recreation values will be affected, however change along this stretch of coastline is, given the community's endorsement of the DPUD forward planning, inevitable. This project ensures these values are recognised and, where possible, enhanced to a degree that is far and above what would occur under a normal urban development scenario.

The figure of 25% of natural vegetation retention is incorrect. The area of natural vegetation which will be retained within the 245 ha project site is approximately 45% or 110 ha.

2.2 Need for Additional Golf Courses

It is stated in the PER that a review by the City of Wanneroo identified a need for a further 14 golf courses within the municipality. Cr. Water advised, when clarification was sought, that this would be when the City reached its climax population of 800,000. The current population is 180,000. It is doubtful that the proposed golf course will cater for many local people. Two golf courses are in close proximity and a total of five are located within the municipality.

The golf course, designed by internationally acclaimed architect Perry Dye, is a major part of the overall concept. It is not designed as a traditional public golf course which relies solely for its patronage on surrounding population levels. This is a tourist resort and the course, in addition to providing the opportunity for public use, is the major tourist facility within the project, and designed to attract both national and international visitors.

2.3 New Recreational Opportunities

An examination of the supposed benefits of the proposal fails to illustrate a single new recreational opportunity for local residents. Recreation opportunities will in fact decrease and facilities proposed will only be duplicates of that which is already available in the area.

The recreational opportunities provided will occur through the provision of improved facilities including improved public access, parking areas and beach access. The only recreational opportunities afforded the local population by this stretch of coastline at present are swimming, beach fishing and off-road vehicle recreation. Safe swimming is however restricted by the presence of the shoreline rock platform and deep water close to shore.

At present, legal access to the coastline is limited to Pipidinny Road which, over the last 500 m, is a dirt track which deviates onto private property. Hence the opportunity for members of the public to use the beach is limited. Off-road vehicle recreation is not desirable in the dune environment and is therefore not an activity to be encouraged.

The Eglinton Beach Resort will provide for a multitude of very accessible recreation opportunities whilst protecting the coastal environment from indiscriminate and harmful usage.

The recreational opportunities include:

- Golf
- Swimming, at both protected and unprotected beaches
- Fishing from beaches, groynes and breakwaters and from boats
- Passive recreation around the marina precinct
- Sightseeing
- "Sunday driving" around a unique environment

- Mini-golf course (Theme Park)
- Fishermans wharf style shopping complex
- Boating
  - Boat launching facilities
  - Boat mooring facilities
  - Trailer parking facilities
- Formal recreation (dining, entertainment, dancing etc.)

Recreational opportunities will therefore increase.

2.4 Public Scrutiny of the Proposal

The Proponents and the City of Wanneroo have been loathe to allow reasonable public scrutiny of the proposal.

The Eglinton Beach Resort PER was advertised and distributed according to the guidelines issued by the EPA. During the public submission period advertisements were placed prominently in the West Australian and the Wanneroo Times and complimentary copies of the PER were provided to the West Australian and Sunday Times for review. Forty three copies of the report were provided to the EPA for display and review, and distribution to other government agencies, 11 copies were provided to libraries (State Reference Library, 5 copies, Sorrento/Duncraig Library, 3 copies and Yanchep/Two Rocks Library, 3 copies), 2 copies were provided to the Environment Centre and 3 copies were provided to the City of Wanneroo for review purposes. A further 29 copies were sold to members of the general public during the public submission period at the subsidised cost of $20:00 per copy (text plus appendices).

The opportunity for formal public comment relative to the proposal has or will occur at a number of stages. The PER has completed its statutory advertising period as required by the authorities. The MRS amendment has yet to be approved by DPUD however it too will be advertised for an appropriate length of time.

The Local Authority Town Planning Scheme Amendment will be considered by DPUD following approval of the MRS rezoning, and will also be advertised for a specified period. During all of the review periods the public has, and will have, the opportunity to comment.

3 PRIVATE VS PUBLIC OWNERSHIP AND MANAGEMENT OF THE FORESHORE

3.1 Private Ownership of Coastal Land

It is of concern that coastal land of recognised conservation significance would, in the event of the proposal proceeding, be in private ownership, management and control.

With the exception of the small foreshore reserve area all of the land affected by this proposal is presently privately owned. The question of private ownership of areas of recognised recreation and conservation significance has been addressed by the EPA in the System Six Report. The EPA considered that continued private ownership of such areas was acceptable, subject to appropriate usage and management.

Assessment of the nature and intensity of the proposed usage is the role of the EPA in reporting on the PER prepared by the developer, while on-going management will be required under the terms of the proposed legal agreement and be defined in management programmes which will require the approval of the City of Wanneroo, the EPA and other authorities as appropriate.

3.2 Coastal Reserve Management

The fact that the narrow coastal reserve adjacent to the development will be managed by the developer is of concern: How accountable will they be to the public? What control will the public/government have over management arrangements?

The existing foreshore reserve will be managed by the Proponent under the terms of a management programme to be approved by the City of Wanneroo and the EPA, following advice from other relevant authorities. The programme will contain a detailed management plan for the reserve, identifying such things as public access and the location and nature of all public and private facilities. Management actions to be undertaken by the Proponent will be specified, and reporting schedules detailed. The management plan will also be subject to periodic review by the authorities to ensure its continued relevance and satisfactory operation.

In terms of accountability and public authority input into this management process, Eglinton Resort Development is expected to be more accountable for its actions within the natural environment than currently is any other private land holder along the coast north of Perth, due to the stringent Town Planning Scheme provisions proposed and more importantly the legal agreement. Both of these land use/management control mechanisms are under the control of public/government and will ensure the landowner acts in a manner which meets community expectations.

3.3 Retention of Conservation Values

The significance, and need to protect representative areas of the Quindalup dune system was recognised in the System Six Report. The opportunity here exists to protect an area of conservation significance which is in good condition. It is true to say that the proposal may protect some dune areas, but how secure will this be and will the area's conservation values be retained?

The Proponent has acknowledged the conservation value of the coastal dunes from the outset.

Preservation of the natural dunal landscape and aesthetics is a prime design requirement of the resort being created.

The proposal presents the opportunity to not only preserve representative tracts of the dunal environment but also to manage them in perpetuity at no cost to the community. Both protection and management of this system will be secured via the legal agreement and the management programmes defined therein and the provisions of the Town Planning Scheme amendment. The legal agreement and the various management programmes will be subject to review by the EPA and other relevant decision making authorities prior to their approval and implementation. There will also be on-going review of the management programmes to ensure that all conditions are complied with and the aims of the management plans are being fulfilled.

3.4 Foredune Conservation Value

The conservation value of the foredunes in the proposed resort area has been identified as being worthy of retention as a reserve. The foredunes will receive most degradation and modification, due to building and establishment of the 17th and 18th golf holes, thereby completely undermining and negating the reason for conservation.

With the exception of the 18th hole, the frontal dune will not be disturbed by the construction of the golf course, with all works being confined to the back of the dune and further inland.

The 17th hole will be constructed behind the frontal dune and will terminate in an existing blowout. The 18th hole does incorporate part of the existing frontal dune, however its location is constrained by the presence of the beach on one side and a much larger dune, which is to be conserved, on the inland side.

The detailed development plan of the 16th, 17th and 18th holes included in the draft Foreshore Management Plan demonstrates how the existing topography will be modified to accommodate the holes. The development plan demonstrates that a minimum amount of site works for the golf course will be undertaken in the foreshore area, to ensure the foredune and its surrounds are maintained in their natural state. The construction of the breakwater, where it meets the coast adjacent

to the 18th green, and the southern groyne field, if required, will further assist in stabilising the dunes.

Strict construction controls will be implemented at all times when working within this environment. All primary dune areas affected by the construction of the golf course holes will be stabilised and revegetated.

There are also a number of areas where the frontal dune has been blown through following damage to the dune vegetation. These breaches will be plugged with sand, and the surface stabilised and revegetated.

3.5 On-going Commitment to Management

In the PER the Proponent undertakes to maintain the environmental quality and character of the site over the entire lifetime of the project and it is stated that "the project has an indefinable life span". This does not sufficiently answer the question of who will have the responsibility to fulfil the proponent's undertakings should the project be sold or indeed becomes unprofitable and cannot be sold, or the proponent goes out of business.

In the event that the project should be sold or otherwise disposed of by the Proponent, all commitments to on-going management will transfer to the new owner as specified in the legal agreement.

4 PUBLIC ACCESS

4.1 Recreational Facilities

The proponents have attempted to persuade that the proposed resort will provide additional recreational opportunities. The resort is promoted as a world class facility but it appears that many areas of the resort will be restricted to the general public due to either financial or membership barriers. The only public facilities noted as being fully available to the public are; boat launching ramps, car and trailer parking, beach access, board walk around marina and public recreation areas. Public access, priorities and restrictions need to be clearly defined.

Public access to the resort will be encouraged and there will be no restrictions to access around the foreshore area of the marina development. In addition, revisions to the development plan made since the release of the PER will in fact increase and improve public access to, and recreational use of, the coast, in a manner which is presently not possible. In terms of coastal access the following features of the concept should be noted:

- Provision of an extensive range of public facilities in the northern part of the development including:

  - the upgrading of Pipidinny Road to improve beach access;
  - public car and boat trailer parking;
  - public boat launching ramp;
  - constructed access paths to the beach;
  - toilet facilities;
  - fishermans wharf style shopping complex; and
  - public recreation facilities and theme park.

- Provision of a breakwater protected, sheltered public swimming beach in the centre of the resort area.

- Provision of a comprehensive system of public pedestrian access routes ensuring unrestricted access:

  - along the waterfront;
  - from the marina to the beaches south of the hotel; and
  - along the length of the breakwater and around the hotel promontory.

To ensure pedestrian systems remain public and unrestricted the developer is prepared to place easements over all of the routes depicted in favour of any nominated authority. In this way the developer is responsible for maintenance and the public will be guaranteed access.

All facilities including the resort hotel and golf course/clubhouse will be available for public use, however in those instances where a financial return is essential to the operation of a particular facility, appropriate fees will be charged. This cannot be considered unreasonable given the scope, purpose and financial commitment on behalf of the developer to the project.

At a future date it is proposed to construct a second golf course within the balance of the Proponent's land, to the east of Marmion Avenue. Public golfing facilities will be provided at the inland course. After an initial period during which public access will be permitted, it is proposed that the coastal course will be reserved for members and resort patrons.

Public access, priorities and restrictions will be clearly defined in the legal agreement.

4.2 Access Restrictions and Pressure on Fragile Areas

Will the resort result in the public being restricted in any way and will it result in too much pressure being placed on an area which to say the least is fragile.

Some access restrictions on the public, and future resort patrons, will occur as a consequence of the development. This will occur as most of the existing four wheel drive tracks will be closed and rehabilitated, and be replaced by formalised beach access roads, parking areas and pathways providing safe, managed access for a much broader spectrum of users than presently exists. In order to protect the dune landforms and vegetation access to the dune system, other than in designated areas and on defined pathways, will not be permitted. The overall strategy to be adopted is thus similar to that applied at beaches such as Triggs, Whitfords or Mullaloo.

The rehabilitation of degraded areas and management of access to the dune system, combined with an effective on-going management presence, will effectively reduce pressure on the dune system.

5 BIOPHYSICAL IMPACTS

The minimal attention given to the biota affected by the proposal is indicative of the lack of concern that the developers have for it.

The lack of data and research evidence presented in the PER document suggest the proponents have not fully considered and do not understand the environmental impacts of their proposal.

These are essentially unanswerable statements of personal conjecture based on a subjective assessment of the information presented in the PER. The level of investigation undertaken for this project is considered to be adequate given the degree of impact which is associated with this development, the widespread distribution of the habitats and the current condition of the habitats present on this site.

5.1 Marine Impacts

5.1.1 Impact on Fisheries

The loss of seagrass is likely to have impacts on fisheries, including the crayfishing industry. The increased recreational activity and accessibility to the fishery will exacerbate the pressure on the marine ecosystem.

It has been acknowledged that construction of the marina will cause an unquantifiable, although regionally small, impact on existing fisheries, including the crayfishing industry. This is a recognised cost of the development. Redesign of the marine facilities undertaken since the release of the PER has however resulted in an approximate 40% reduction in the area of seagrass habitat which will be lost due to the construction of this project.

The on-going effects on fisheries resulting from the increased accessibility to the area afforded by the marina, is an issue which can not be resolved at the developer level. Fisheries resource management and the allocation of the resource between the commercial and recreational sectors is the responsibility of the Minister for Fisheries, acting on the advice of the Fisheries Department.

5.1.2 Oil Spills, Anti-foulant Paints (TBT)

Oil spills, antifoulant paints (TBT) from boats are likely to have a disastrous impact on the marine environment.

Fuel or oil spills within the marina will be managed according to the provisions of an Oil Spill Contingency Plan to be prepared in consultation with and approved by the Department of Marine and Harbours (and the EPA).

The marina is to be a recreational facility without any boat maintenance or servicing facilities (other than refuelling and sullage pumpout facilities) and consequently the potential for fuel or oil spills will be minimised.

The use of TBT based anti-fouling paints on recreational vessels within semi-enclosed water bodies is considered to be unacceptable and the EPA has already made recommendations concerning their use in Western Australian waters. Regulations to ban their future use on boats less than 25 m in length and on pilings and other structures within enclosed and semi-enclosed water bodies, such as marinas, will be effective before this marina becomes operational.

5.1.3 Nutrient Input

Turf fertiliser run off and sewage outfalls are likely to stress the marine environment as they have elsewhere in Australia, especially on the East coast, even if the sewage is treated.

The developer is cognisant of the problems that have occurred elsewhere in Australia as a result of the discharge to the marine environment of runoff from fertilised turf areas and of sewage via outfalls. Eglinton Resort will be managed to ensure that nutrients (principally nitrogen and phosphorus) derived from these sources do not damage the marine environment.

The soils underlying the site are highly permeable and surface runoff on the undeveloped site is negligible as evidenced by the lack of any defined water courses. Turfed areas will be designed to ensure that following development, any runoff generated locally infiltrates the ground at selected locations and does not discharge to the ocean.

Fertiliser application and irrigation rates will be controlled by properly trained maintenance staff to ensure that the quantities applied are only sufficient to stimulate plant growth and that downward leaching of nutrients into the unsaturated zone is minimised. In addition to regular testing of the nutrient levels in the soil and grasses, soil moisture and conductivity sensors will be installed within and below the root zone and will be regularly monitored. The data from this source will be used to assist the maintenance staff in determining appropriate fertiliser application rates. Any residual nutrients will be greatly attenuated by adsorption in the unsaturated zone and by dispersion associated with groundwater flow in the saturated zone. Consequently, any adverse effects on the groundwater system and hence the marine environment are expected to be minimal.

Discharge of sewage effluent by means of an ocean outfall will not occur. The developer's preferred option is to connect the resort's reticulated sewerage system to the Water Authority's proposed Alkimos Waste Water Treatment Plant (WWTP).

Recent advice from the Water Authority is that the first stage of this facility will be operational in December 1992, in time for the opening of the Eglinton Resort.

However, in the event that the Water Authority's proposed Alkimos WWTP is not available at the time of resort construction, a package treatment plant would be installed on site. This plant would operate until the resort sewerage system could be connected to the Water Authority's treatment plant.

The treatment plant proposed for the resort, if required, is different to the plant constructed at Mindarie which has oxidation ponds only. The Eglinton plant would be similar to the plant constructed at the Vines Resort in the Swan Valley, which is an intermittent activated sludge plant. This plant produces a high quality effluent and little or no odour when operated correctly.

Treated effluent from an on-site plant would be discharged to ground via a low pressure irrigation system. It is estimated that up to 85% of the nutrients in the treated effluent would be removed by vegetation which would be planted in the irrigation areas and harvested periodically for disposal. Any residual nutrients will be greatly attenuated by the processes described previously.

The location design, and operation of an on-site treatment plant would be subject to licencing by the EPA and the plant would therefore be completed in accordance with EPA and Water Authority requirements.

The regular review of monitoring data collected from 16 specially constructed groundwater monitoring bores located adjacent to and downgradient of the golf course and the sewage treatment plant and disposal area will provide further protection of the marine environment.

5.1.4 Shoreline Stability

The report contradicts itself where on Page 29 it is stated "the shoreline at the project site has been relatively stable having been subject to very little erosion or accretion over the past 45 years", but on Page 75 describes "this section of the coast which historically has been subject to slight erosion".

Overall the shoreline at the project site has been relatively stable. Analysis of historical shoreline movement plans, prepared by the Department of Marine and Harbours, indicated that the southern section of the site has been subject to minor erosion, the centre has accreted slightly and again minor erosion has occurred near the northern boundary.

Based on the shoreline movement plans and the mathematical modelling it is apparent that the amount of erosion/accretion is small. Longshore sand transport will vary from year to year in response to different climatic patterns, however over a long period of time sand would appear to be fed into the site from both north and south.

5.1.5 Sediment Transport

The estimate of the volume of sand expected to be transported into the groyne field is at best extremely vague (500% variation) and apparently based on scant quantitative data.

The estimate of longshore sediment transport has been based on a comprehensive study of the coastal processes between Quinns and Yanchep, including:

- analysis of aerial photographs;
- review of charts and hydrographic surveys;
- field inspections;
- analysis of historical shoreline movement plans; and
- extensive mathematical modelling of waves and sediment transport.

That study has concluded that due to varying climatic patterns the direction of net sediment transport may vary from year to year but that there is a long term trend.

The range of sediment transport rates quoted in the coastal report, 2,000 to 10,000 m^3/year, reflects likely variations in conditions as well as an allowance for inaccuracies in the prediction methods.

5.1.6 Additional Destruction of Shallow Marine Habitat

The recognised "major impact of the Eglinton Beach Resort development will be the alteration of 23 ha of nearshore marine habitat" (p. xvii), "which includes 14 ha of seagrass and algal pavement habitat" (p. 14) completely fails to take into account the additional destruction of the shallow marine environment caused by the groyne system which is expected to trap longshore sand drift "and build up the beaches in this area" (p. 75).

The area of shallow marine habitat which was identified in the PER as being converted to sandy beach habitat due to the sediment trapping by the groyne system was estimated at less than 5 ha [Volume I Section 5.4.1.1 (ii)]. The habitat affected, shallow sub-tidal sand, is of low productivity, the sand surface supporting no attached flora or fauna and only a sparse burrowing fauna of molluscs, gastropods and polychaete worms.

In the PER it has been assumed that the area of seagrass that will be lost as a result of the development will include all of that within the marina area, even though not all of this area will be affected by dredging or land reclamation. This allowance was however considered to be appropriate based on an evaluation of the effects on seagrass at other marinas. Given the projected rates of sediment movement in the vicinity of the proposed Eglinton marina and the commitments made by the Proponent to manage sediment bypass and groundwater quality, there is no reason to assume that "the total effect of the marina and associated development on the seagrass habitat in the area could be considerably more than

that stated in the PER". The impacts on marine habitats are therefore considered to have been accurately identified.

Breakwaters, particularly those constructed of limestone, are colonised, over a period of years, by a similar diversity of organisms to those found on natural limestone reefs. However, as the limestone reef assemblage is somewhat different to that of the seagrass and algal pavement habitat which it will replace, a direct comparison of habitat value can not be drawn. Limestone breakwaters do however constitute a useful marine habitat, the value of which can not be considered 'negligible'.

As a result of revised proposals for the hotel/marina area, the area of sandy seafloor and seagrass/algal habitat which will be either reclaimed or partially enclosed by breakwaters has been reduced by approximately 25%. The area which will be excluded from the area affected by marine development is at present seagrass/algal habitat. In addition, realignment of the 18th hole has reduced the need to widen the beach area south of the breakwater and consequently less of the shallow sandy seafloor habitat will also be lost.

5.1.7 Quantification of Sediment Transport

Until an extensive monitoring programme has been installed to quantify sand movement along the coast over a number of years any estimate of the area of impact is completely invalid.

Monitoring is not the only acceptable method of quantifying the movement of coastal sediments. The techniques which have been used in the PER follow accepted engineering practice and are the same techniques which have been used elsewhere along the Western Australian coastline in similar studies. The coastal process study has clearly shown that the amount of longshore sediment movement is small.

5.1.8 Sediment Monitoring

The Proponent's suggestion of altering the coastline first and then monitoring the impact is totally inappropriate.

The commitment to monitor the impact subsequent to construction is standard practice, and is the same as that currently undertaken at existing harbours.

5.1.9 Sediment Bypass

The Proponent also commits itself to mechanically bypassing sediment "as necessary to ensure beach stability" (p. xix). Until the Proponent can establish rates of accumulation or depletion the level of commitment is totally unknown.

The rates of longshore sediment transport and expected shoreline accumulation or depletion have been carefully studied and shown to be small and not a significant factor in the economic viability of the project.

5.1.10 Loss of Shallow Marine Habitat

The loss of nearshore habitat could be substantially reduced if the marina plans were modified so that the hotel complex and resort centre were constructed inland. The breakwater could then be built purely as a breakwater.

In designing the project a balance has been sought between the reclamation of shallow marine habitat and the conservation of the adjacent dune system. The alternative of constructing the hotel complex and resort centre inland was reviewed early in the design process (Volume I Section 2.4) and rejected because of the extent of landform modification which would have been required within the dune system.

The redesign of offshore facilities undertaken since lodgement of the PER has allowed the area of offshore marine habitat affected by the proposal, and in particular the area of reclamation, to be significantly reduced.

5.1.11 Cumulative Marina Impact

Although the PER has considered the likely effects of the marina upon the nearshore marine environment, these effects should not be regarded in isolation since there is already an impact in this region from the four marinas between Hillarys and Two Rocks and further impacts will arise if the deepwater port proposal goes ahead.

There are four marinas at present between north Fremantle and Two Rocks, a coastline length of 55 km. A fifth marina at Eglinton would result in there being a marina on average every 11 km along the coast. This is in fact the approximate distance between Eglinton and Two Rocks and between Eglinton and Mindarie, the nearest marinas to the north and south, respectively. If it is assumed that a marina on average utilises 1 km of coastline then the percentage of the northern metropolitan coastline affected by marina development amounts to approximately 10%. Given that marina developments are principle foci of recreational activity along the coastline, and are able to sustain this level of usage, this percentage is not considered excessive.

It should also be noted that the physical presence of marinas has little adverse impact on regional marine ecosystems. At a local level, they replace exposed open water reef, sandy bottom or limestone pavement habitats with a breakwater protected, sheltered embayment habitat which is itself able to provide nursery habitat for fish, crabs and crayfish. Additionally, when managed according to accepted management plans, detectable changes in water quality have been confined to the marina area, and there has been no adverse regional water quality impact.

5.1.12 Management of Impacts on Offshore Reefs

There is scant mention of the adverse impacts on the offshore reefs and how these will be managed.

As discussed under Section 5.1.15 it is considered that the marina will have no direct impact on the offshore reef system. The possible impacts on the reef are therefore related to indirect impacts such as nutrient enrichment, oil spills, and increased fishing pressure.

By virtue of the management programmes proposed for the control of nutrients from both the golf course/landscaped areas and the temporary sewage treatment plant, if constructed, and the dilution factors achieved both in the groundwater and in nearshore marine waters it is concluded that there would not be a detectable increase in nutrients in the vicinity of the reefs.

Notwithstanding the above comment should nutrients be detected in unsatisfactory levels in the groundwater it is possible by selective extraction to re-use the nutrient enriched groundwater for irrigation and thereby prevent any undesirable increase in nutrients reaching the sea.

Oil spills will be managed according to an approved oil spill contingency plan which will detail the actions to be taken in the event of an oil spill within the marina precinct.

Management of the effect of increased fishing pressure on the reef system is beyond the authority of the Proponent. However, the Proponent is prepared to assist the relevant authorities in management of the reef system as it is an important component of the tourist attraction of the area.

5.1.13 Faunal Survey of Offshore Reefs

The Proponents have either not provided or not done faunal surveys of the offshore reefs as required of them.

The PER guidelines do not specify that a survey of the offshore reefs be carried out as part of the environmental investigations for this project. Rather, the

guidelines state that "special attention should be given to the near 'pristine' conditions of the offshore reefs".

Having reviewed the impacts of the proposal in terms of both construction impacts, and long term impacts on currents in the vicinity of the reefs, it was considered that the potential for direct impact on the reefs was negligible and that detailed surveys of the reef, beyond the habitat description surveys carried out, were not warranted. The Proponent acknowledges that the reefs are in good condition and represent a near pristine environment, that they support an (unquantified) abalone resource, and are a fish and crayfish habitat and provide shelter to the inshore waters where the seagrass and algal assemblages are found.

It is not expected that these attributes will change as a result of the physical alterations to the marine environment brought about by this development.

5.1.14 Reef Monitoring

It is suggested that if the development is approved, the reefs should be monitored to detect any changes to the reef communities.

The suggestion is noted.

5.1.15 Abalone Settling Problems

There may be problems with the settlement of juvenile Abalone on the reefs.

The proposed marina breakwaters will be located quite near to shore and well removed from any of the major reef systems. The harbour is not expected to have any impacts on waves or currents except in the immediate vicinity of the breakwater.

Consequently the presence of the breakwater is not expected to have any impact on the settlement of abalone spat on the offshore reefs.

5.1.16 Maintenance of Marina Water Quality

Although water quality within the marina has been adequately addressed in technical terms the stated commitment to take "whatever action is necessary" to rectify any deterioration in water quality is somewhat general.

The studies conducted have indicated that good water exchange should be maintained at all times within the harbour with resultant high water quality. It is therefore difficult to be precise about the nature of any action which may be required to rectify problems, as none can be foreseen. Possible remedial works could vary from improved access for rubbish removal to, in extreme circumstances, pumping.

The redesign of offshore facilities undertaken since submission of the PER has resulted in a layout which lends itself to improved water quality.

5.2 Fishing

5.2.1 Increased Accessibility

The area will no longer be a fishing spot for dedicated fishermen. Such spots are not in abundance within reach of Perth. In addition, ease of access to day visitors, residents, hotel guests and boat owners using the marina will result in considerable pressure upon the local fish species, including abalone and rock lobsters in the offshore reefs.

The development will provide greater access to beach and small boat fishermen making the area available to more of the general public other than those with access to four-wheel drive vehicles or larger boats. This action, which will benefit the general public will however increase pressure on fish stocks as previously described and increase the need for effective management of the resource. As described previously this is an inevitable result of increasing population pressure within the region and is a matter for the Minister for Fisheries to resolve through the setting of appropriate catch levels.

5.2.2 Allocation of the Fish Resource and Compensation

The effect of the development on existing recreational and professional fishing, particularly rock lobster fishing in the area will be manifest by an alteration in the balance of the current share of the catch between commercial and recreational rock lobster fishers in favour of the recreational sectors. This effect is difficult to quantify although it may be possible to make estimates. Reduction of rock lobster available to commercial fishermen through this effect will result in commercial fishing pressure intensifying in areas to the north and south of the vicinity of the marina. It may be appropriate for the Proponents to address this impact by making a financial contribution to the Fisheries Research and Development Trust Account that would allow an appropriate number of commercial rock lobster pots to be purchased and withdrawn from use. This mechanism would allow the impact of recreational fishing on rock lobster stocks (and therefore less stock being available to commercial fishers) to be lessened.

It is acknowledged that the increased access to the area provided by the marina will result in a redistribution of the fish catch toward the recreational sector. Part of this increased pressure will come from within the development, i.e. residents and guests, but a significant proportion will come from persons resident outside of the resort who will take advantage of the improved public access and boat launching facilities provided as part of the public equity in the project. The use of the resource thus needs to be considered as part of an overall regional fishery resource management issue rather than as specific to this development.

In this instance the Proponent will not financially benefit from the increase in recreational fishing in this area, as the cost of providing the associated public launching ramps and car and trailer parking areas is expected to significantly outweigh the benefits to the Proponent obtained from the rental of commercial facilities directly or indirectly supporting this use. Consequently the Proponent does not consider that there is either a legal or moral basis to a claim for the payment of compensation by the Proponent to the professional fishing industry in respect to a possible decline in fish stocks due to the increase in recreational fishing.

It needs to be remembered that the fisheries resource is administered by the State Government on behalf of all of the people of Western Australia and that while the professional fishing licence confers a right to catch and sell fish according to the regulations applicable to that licence, it does not guarantee that either a specific quantity or proportion of the fish stock will be available to the professional fisherman.

5.2.3 Contribution to Management

The proponent has made a commitment to co-operate with the Fisheries Department in education programmes designed to assist in the management of the marine fishery. It is suggested that as it is an acknowledged impact of the marina to increase recreation fishing pressure and consequently cause a decline in fish stocks, it may be a more appropriate commitment by the proponent to address this impact by a financial contribution to the Fisheries Research and Development Trust Account which would allow the Fisheries Department to address the management needs of the area.

While it is acknowledged that the marina will facilitate access to the ocean and thereby the exploitation of the marine resource it is in fact members of the general public rather than the marina operators who will benefit from this increased access and directly generate the increased pressure on the available fish stocks. Consequently this issue should be addressed at the State level rather than at the development level and be seen in the wider context of fishery resource management, sustainable fish stocks and the distribution of the available resource between recreational and professional fishermen. It is not considered appropriate that the developer should be penalised for the provision of public facilities.

5.2.4 Nutrient Input, Seagrass Loss and Fishery Decline

The modification of marine habitat for the marina has been suggested as being insignificant on a local perspective but taking a broad overview of this diminishing habitat in the Cockburn Sound, a more cautious approach should be adopted. The effect of increased nutrient deposition from this site and the proposed Alkimos treatment plant could result in further losses of seagrass meadows of Amphibolis antarctica thus causing a decline in fish populations.

Comparison of the impacts of this project to the situation in Cockburn Sound is misleading as Cockburn Sound combined very large inputs of nutrient with poor water exchange to lead to a highly eutrophied system which resulted in the collapse of the seagrass ecosystem. At Eglinton the potential nutrient load is very low and the water exchange much less restricted. With respect to sewage loadings it should be noted that the treatment plant proposed for this project is only a temporary facility which will eventually be replaced by the Alkimos Treatment Plant. The outfall from the Alkimos plant will be designed to comply with EPA discharge guidelines and licence conditions to ensure that the regional marine ecosystem is not adversely impacted.

5.2.5 Pollution of the Marine Environment

The development has a potential for groundwater pollution due to the use of fertilisers, herbicides, pesticides, fungicides and the effluent discharge. The increase of nutrient, in particular phosphorus, is of concern due to the deleterious effect that it has on reef structure. There is a potential risk to the nearby Pipidinny Reef if phosphorus levels are higher than predicted. The marine biota could also be affected if nutrient leaching of an increased magnitude occurs.

Eglinton Resort will be managed to ensure that nutrients and other potential contaminants introduced to the ground do not damage the marine environment. A comprehensive Nutrient Management Plan, which is subject to scrutiny and approval by the EPA, has been developed and will be implemented as construction proceeds. Relevant extracts from the plan are summarised below.

The storage and usage of chemicals at Eglinton Resort will be carefully controlled and detailed records will be kept of the types and quantities used.

In order to minimise downward leaching through the soil profile, the topsoil will be amended through the addition of organic matter. This will increase the number of ion-exchange sites which will assist in the control of leaching by chemical binding.

Leaching of nutrients into the unsaturated zone will be controlled by applying fertilisers at rates which are just sufficient to promote satisfactory plant growth and by repeated cycling of the irrigation system at quite low precipitation rates to retain surface dampness without heavy, deep watering. Soil moisture and conductivity sensors will be installed within and below the root zone. Monitoring will be carried out regularly and the data will be used by the maintenance staff in determining appropriate water application rates. The soil sensors will be supported by a comprehensive programme of regular soil sampling. During winter when heavy rains occur, fertiliser requirements for growth are small. Consequently, there will be very little source material from which nutrients could leach.

Slow release nitrogenous fertilisers (methylene ureas and/or IBDU, sulphur coated urea) will be used to minimise the potential for leaching of nitrogen into the unsaturated zone. Sintered potassium silicate may also be employed to control leaching.

Soil phosphate levels will not be raised above 30 ppm during establishment and will be maintained at between 10 and 15 ppm thereafter. Because of the abundance of lime in the unsaturated zone, any residual phosphate reaching depths below the root zone is likely to be converted to calcium phosphate or calcium orthophosphate which are insoluble.

Insecticides which are registered for use are now almost totally confined to the organo-phosphate group, although a few carbamates and pyrethrins are still registered for turf. However, all of these chemicals share a common characteristic. Even though they are acutely toxic in small quantities, they are 99% absorbed in the thatch layer of turf within minutes of application and less than 1% actually penetrates the soil (data from large experimental programme at the Wooster Ohio Agricultural Centre, conducted by Dr Harry Niemczyk). In the soil, microflora very quickly develop a preferential appetite for the carbon skeleton of these molecules and use them as an energy source, breaking them down in a matter of days. Should a spill of such a chemical occur in a drainway, normal hydrolysis (activity of water) will de-activate the chemical quickly, and by designing a lime trap pit, any danger can be completely removed as alkaline hydrolysis occurs in a matter of minutes.

Fungicides are applied only to greens, so the quantities used are very small. They are used very sparingly because they are expensive. All of the fungicides used on turf are also registered for use on food crops. A fungicide commonly used for Dollar Spot control is also used by the mushroom industry to promote growth.

Herbicides fall into two main groups, those applied to foliage and absorbed by plants directly and those applied to the soil and absorbed from the soil. Generally, herbicides applied to soil have a long soil life and to achieve this, have to have very low water solubility and hence low mobility (data from experimental programmes conducted by Dr Harry Niemczyk). Herbicides applied to foliage are commonly used at low application rates on couch grasses and in general are biologically specific to green plants.

Any residual chemicals in the soil profile will be greatly attenuated by dispersion associated with groundwater flow in the saturated zone. Consequently any adverse effects on the groundwater system and hence the marine environment are expected to be minimal.

The regular review of monitoring data collected from groundwater monitoring bores adjacent to and downgradient of potential sources of contamination and from drainage sumps within the golf course provides a further safeguard in the protection of the marine environment.

5.2.6 Existing and Future Fishery

With regard to fishing in the proposed area the PER is contradictory. Again an indication of a paucity of research by the developers. The current use of the area has not been determined and the development will exclude the present users of the beach from fishing there. Also, a lowering of income for the professional offshore fishermen can be anticipated due to the increased pressures on the area, loss of habitat and extra boats in the immediate vicinity.

Professional use of the area by crayfishermen and abalone divers has been acknowledged in the PER (Volume I, Section 3.5.2.4). The value of the fishery in the small area directly affected by marina construction, and in the wider area offshore from the marina, can not be accurately estimated as the areas concerned are considerably less than the statistical blocks used by the professional fishing industry in gathering fisheries statistics. As these blocks contain smaller sub-areas of widely varying fishery value it is not possible to determine the value of a given sub-area by simply allocating an average unit area value.

The area is also known to be regularly used by recreational beach fishermen and some boat fishermen operating from Two Rocks, Yanchep, Mindarie and Hillarys. However this level of usage is low in comparison to that of the beaches and waters closer to Perth.

Beach fishermen will have access to all beach areas as well as to the marina breakwaters following construction of the proposed marina. Improved access to the beach will also be provided, although four-wheel drive access through private property to the beaches at the southern end of the property will no longer be permitted. Experience at other marinas, e.g. Hillarys, Ocean Reef and Mindarie, has shown that recreational fishermen are quick to take advantage to the greater access to deep water provided by rock groynes.

The PER identifies that further pressure on the fish resource will occur as a consequence of the increased population associated with regional development policies. This is a wider community issue which can not be directed by the developer.

5.2.7 Loss of Income to Professional Fishermen

Should local professional fishermen lose income to accommodate overseas visitors golf pursuits.

As described above the loss of income to professional fishermen is indeterminate. However some loss to the crayfishing industry as a result of loss of habitat and the impact of increased recreational fishing pressure could be anticipated.

As a result of recent modifications to the design of the marina harbour and offshore facilities, however, the loss of seagrass habitat will be reduced by approximately 7 ha, or 50% of that indicated in the PER, thus considerably

reducing the level of impact of this project. The remaining loss of habitat will be compensated to some extent by the provision of limestone breakwater habitat which provides alternate shelter for juvenile crayfish.

The reduced scale of construction in the marine environment also further reduces the possibility that the project could impact on the abalone populations of the offshore reefs.

The revenue that will flow to the State due to this development is expected to significantly outweigh any losses from fishing, as a result of the loss of productive habitat associated with the construction of this project.

5.3 Terrestrial Impacts

5.3.1 General Issues - Habitats

5.3.1.1 Urban Expansion

The project is likely to promote continued urban expansion, continued unsustainable growth of the metropolitan area and increased habitat loss and adverse environmental impact on the coastal plain.

The project is considered to be compatible with planning for the future development of the North West Corridor. To suggest that this project will promote such expansion rather than occurring as a result of existing and projected demand is unrealistic.

5.3.1.2 Resolution of Coastal, System 6 and Vegetation Issues

A comprehensive approach should be developed for the resolution of issues relating to coastal protection, to System 6 areas, and to vegetation protection.

The EPA recommended that a comprehensive approach to the resolution of System 6 and conservation related issues be developed in their recommendations for System 6 (EPA, 1983 Part I). While this is essentially an issue for Government the Land Development industry generally would be supportive of such an approach in order to resolve the present uncertainties and delays which occur repeatedly in the environmental assessment process.

5.3.1.3 Reservation of Representative Habitats

With regard to the required clearance of 110 ha, a value judgement has been made "this habitat has a wide distribution along the coast elsewhere". Most of W.A.'s coastline is under attack from development, mining, pollution, etc. It is also stated

that representative habitats will be reserved. Who will ensure that this is properly carried out.

The statement that "most of WA's coastline is under attack from development, mining, pollution, etc." is emotive and exaggerated. While it is true that the coastline adjacent to population centres is under pressure from both development and recreation, the majority of Western Australia's coastline remains relatively untouched. The comments made in the PER in regard to the distribution of dune habitat are based on a review of the available geomorphological and biological data and on the extensive personal experience of the authors.

The protection of dune landforms and natural vegetation on the development site will be achieved either by transferring the land to the Crown, in the case of the proposed conservation reserves, or will be undertaken by the Proponent as specified in the management plans to be approved by the relevant authorities under the legal agreement which will govern the development and on-going management of this project.

The EPA through approval conditions and subsequent audit provisions will be responsible for ensuring that appropriate reservations of habitat are made according to the commitments given by the Proponent.

5.3.1.4 Buffer Zones

There needs to be adequate buffer zones around M2 and M3, and the reserves also need to be managed accordingly to ensure that they do not become degraded by adverse impacts such as weed invasion, litter and rubbish dumping, and more feral animals, especially cats and rabbits.

With respect to recommendation M2, apart from a small part of the narrow foreshore reserve, the land is privately owned by the Proponent and should be considered in this light when discussing future land use options. The System 6 recommendations for Regional Parks recognise that privately owned land will continue to form part of these parks and consequently that these areas would not necessarily be acquired by the Crown as conservation reserves (EPA 1983, Part I Section 5.3). In discussing such areas the EPA considered that rather than acquiring such land that much of it should remain in private ownership while subject to planning or development constraints. Owners under such a scheme would "retain their land and the right to use and develop it, while receiving specialist advice on its management". This project, in which more than 50% of the total land area is utilised for conservation, landscape protection and recreational purposes, has been designed with this philosophical objective.

With respect to recommendation M3, the area of the Proponent's land which is included in the recommendation and which is proposed to be returned to the Crown as part of the proposed land exchange programme, does in fact constitute a buffer area to the wetland. As the boundary to this land area is an existing road (Pipidinny Road), the allocation of further buffer zones would not be warranted.

5.3.1.5 Impact on Pipidinny Wetlands

Increased pressures on the Pipidinny wetlands are likely to run off of turf fertilisers, weed invasion, and feral animals as a result of urban development.

The Pipidinny wetlands are located some 2 km upstream and to the east of the proposed development site. Consequently it is considered highly unlikely that there will be any input of nutrients from the development to the Pipidinny wetlands via runoff or groundwater flow.

As the wetlands are presently located within an area which has been cleared and used for agricultural purposes and is incorporated within a number of small holding properties they are already subject to a level of weed and feral animal pressure which is unlikely to be increased by the proposed development.

5.3.1.6 Distribution of Quindalup Geomorphic Units and Habitats

At a very basic level it is correct to state that "the geomorphic units, soils, habitats and vegetation assemblages.....are part of a regionally widespread coastal unit." The Quindalup dune system, however, displays a wide array of geomorphic units and habitats (the vegetation assemblages have not been studied in enough detail to make any assertions as to their complexity). This fact has important implications with regard to their conservation value. Information regarding this should have been given within the Regional Setting - Terrestrial Environment section, moreover by not including this type of information the reader is led to believe that the whole Quindalup dune system is a more or less homogeneous system.

The partial quote from the PER deletes the locational reference, 'Drummond Subdistrict (Beard, 1979)', which places this statement in its correct context. Beard divides the Drummond Subdistrict into 9 Systems and it is the Guilderton System, which comprises the vegetation of the Recent calcareous sands of the Quindalup Dune System from Fremantle northwards to Green Head, and, to a lesser extent, the Spearwood System from Yanchep southwards, in which the development site is located that comprise the regional units which have been used in the PER assessment. In placing the project site into its regional perspective from both geomorphological and biological viewpoints care has been taken to locate the site into accepted regional scales which are defined in the text and the authors of which, e.g. Beard, McArthur & Bettenay, Semeniuk, are clearly referenced. All of the regional references in the text in fact refer to much smaller areas than that of the "whole of the Quindalup Dune System".

5.3.1.7 Access to the Dune System

Impacts which could result from the siting of residential enclaves within an area designated for preservation and which are not discussed include the stress which would result to dune habitat by extra foot traffic. No criteria is specified for the exclusion or limiting of residents walking into the protected dune areas. Nor is

there any mention of restriction which would apply to residents on the introduction of pet animals, obviously this could have disastrous effects both on the flora and fauna within the "protected" zone.

The same restrictions that would apply to members of the general public would also apply to residents and patrons of the resort with respect to access to the dune system, i.e. access would be limited to defined access points only, in order to protect the dune vegetation and to prevent erosion.

While desirable that domestic animals should be controlled, there is at present no mechanism available to the developer to effectively manage pets on privately owned lots. The developer will however closely co-operate with the City of Wanneroo to ensure that the management of domestic animals complies with the requirements of that Local Authority's by-laws.

5.3.1.8 Halting of Geomorphological Processes

The justification that this proposal would result in less landform structural damage than a normal single residential subdivision does not alter the fact that this development will destroy the ongoing land formation of the site. It is therefore misleading to suggest that this proposal would "protect the whole of the younger phase blow-out formation". That is analogous to suggesting that the shooting of rare species of animals, stuffing them and placing them in museum cases is conservation.

The geomorphic processes operating on the site are presently small in scale and at present within the dune system are largely being driven by non-natural causes such as sediment instability and erosion caused by offroad vehicles. Apart from the removal of these influences the present rate of geomorphic change is likely to be little affected by the proposed development. However, it is true to say that major blowout activity, such as that which generated the present dune landforms could not be tolerated within the development, or elsewhere on the metropolitan coastline for that matter, and to that degree the landforms of the site would be "frozen".

5.3.1.9 Regional Impacts

To suggest that clearing 110 ha of fairly pristine dune ecosystem will only have a "moderate strictly local impact" is nonsensical. The statement that there will be a "negligible regional impact" is arguable as in the PER it is stated that there are insufficient areas of Quindalup dunes reserved for conservation and that urban pressure on these ecosystems is mounting, so the destruction of a fairly large area of Quindalup dunes contained within the System Six Area M2 will obviously have quite an appreciable regional impact.

The proposed development site is not a "fairly pristine dune ecosystem" as suggested in the submission. It is in fact a system which has been much influenced by human activity over all of this century. The scars created in recent times are but

the highly visible reminders of this influence. Much more important are the influences of grazing and frequent fire, and their associated impacts, which have reshaped the coastal vegetation along much of the coastline of south-western Australia. These less obvious impacts may be recognised by the presence of large numbers of exotic plants (typically pasture species) and animal species (rabbits and foxes) and by plant diversity modified by grazing, which typically reduces the number of soft-leaved herbaceous species, and over frequent burning, which alters the structure of the vegetation and also leads to reduced diversity through impact on reproduction.

Notwithstanding the above comments, the dune landforms and vegetation are representative of much of the coastal dune systems as they now appear, and have recognised conservation and recreation value.

By virtue of this proposal natural vegetation will be retained over 111 ha of the development site and the landform significantly protected over the whole site. If the alternate of protecting only the System 6 area could be achieved, and at present there is no satisfactory mechanism in place through which this can be done, a similar area of vegetation, but much reduced representation of landform would be conserved.

As a consequence, the impact of this development is assessed as being of local rather than regional significance as it is considered that the vegetation and landforms of the site can be managed to retain their contribution to the regional pattern of the Quindalup Dune System.

5.3.1.10 Quindalup Landforms

While the report correctly identifies the need to conserve complete examples of Quindalup landforms, it is erroneous to suggest that removal of the natural vegetation and replacement with a golf course is conservation. This may be preservation of an existing landform feature, but it is certainly not conservation of the dynamic process of "land-form". Whilst the current physical characteristics may both be substantially altered, the habitat, as part of the temporal succession of land formation would be destroyed.

The golf course has been quite deliberately excluded from all discussion of conservation values in the PER. As a links course, however, it is a recreational use traditionally located within a coastal setting and one which therefore could be considered an "appropriate use of coastal land" and as such be encompassed by the EPA recommendations for area M2.

It is agreed that approval of this usage would result, at least as far as major land form change is concerned, in a 'freezing' of landforms in much their present state.

As discussed in Section 5.3.1.8 above, this is considered to be inevitable as, even if development were constrained to the inland parts of the site, it would not be

feasible to have blowouts of the scale which formed the present landscape occurring over the land.

5.3.1.11 Balance of Habitat Loss vs Development

It is claimed that the development will have some "major beneficial effects" and that these will be adequate to balance the "main adverse impact" of the project, i.e. habitat loss. Amongst these "major beneficial effects" is listed "the coastal dune land form and representative areas of natural vegetation will be conserved", this has not been demonstrated by the PER.

The area of the Proponent's land which is located within System Six recommendation M2 is approximately 110 ha. The area which the Proponent has proposed to retain as dune conservation area within the 245 ha of his Stage I development amounts to approximately 111 ha. Of this area 51 ha is located within the System Six area (see PER Volume I, Fig. 2) while the other 60 ha will be distributed over the remainder of the site in order to protect a number of other significant landforms (major ridges) and vegetation types (*Xanthorrhoea* grasslands) located to the east of the System 6 line. The 111 ha amounts to approximately 44% of the total landholding within the Stage I area.

Although the complexity of the landforms makes this difficult to illustrate at small scale, Figure 20 of the PER does illustrate the relationship between landforms and development, and does show that the major dune ridges and landforms will be protected throughout the development area.

During the assessment period further detail on vegetation distribution, topography and the location of development at larger scale has been made available to assist the EPA in assessing this project.

5.3.2 Fauna

5.3.2.1 Fauna Assessment

The area under consideration for development supports a diverse fauna but the cursory appraisal initiated as part of the PER is a spurious assessment of fauna present and the effects of development on it.

Comments such as "cursory appraisal of a diverse fauna" and "spurious assessment" are personal opinions at odds with the results and objectives of the field and literature survey. In total 16 personnel days were spent assessing what is a relatively small area which, because of existing knowledge on this type of habitat, did not warrant long-term, seasonal sampling. The level of investigation undertaken is considered appropriate to that required for the PER and for the formulation of recommendations for future management.

5.3.2.2 Impact on Fauna

Whilst the wildlife consultants consider the proposed development will have a moderate and strictly local impact, this notion is challenged due to the rapidly diminishing wildlife habitats in the near metropolitan area. Development as proposed will result in major habitat modification and degradation. This will result in some species becoming locally extinct and others becoming pest species. If the fauna is going to be realistically considered then it must be catered for regionally instead of the piecemeal approach based on land tenure. Development will have the effect of creating an island, resulting in a reduction of food resources, breeding and habitat areas for resident fauna. An east-west corridor linking the coast with Yanchep National Park needs to be considered.

The Proponents stand by their comments that the impact of the proposed development on terrestrial fauna will be moderate and strictly local and have not understated the diminution of fauna habitat in the near Metropolitan Area (see Appendix 6 summary and pages 5 and 6). The list of recorded and expected species given in the report represents a best possible (and probably optimistic) scenario for a relatively small area of privately owned land already subjected to a high level of disturbance through pastoral activity, uncontrolled vehicle access and wildfire.

The last five lines of the submission on this point dealing with issues of land tenure and linking of reserved areas are philosophical conservation issues which need to be addressed by legislators rather than development proponents. This is an argument with which the consultants concur.

The possibility of an east-west corridor linking the national park to the coast in the vicinity of Alkimos may ultimately be developed through government-owned land to the north of the proposed development.

5.3.2.3 *Vermicella calonotus*, the Black-striped Snake

There is particular concern for the rare black striped snake, Vermicella calonotus, *which has been sighted in the area. The management is probably best carried out by properly qualified people such as CALM officers.*

The distribution and probable abundance of the Black-striped Snake is realistically described in the PER, as evidenced by its removal from the rare species list on 16 November 1990. It occurs in a number of already reserved areas and while it will be locally affected by the development (see Appendix 6 summary and pages 4, 6 and 7), the species as a whole will not be threatened. Management of a cryptic burrowing species such as this is not an active process which can be carried out by "properly qualified people such as CALM officers" as suggested. It is more a case of passive management through reservation of adequate areas of its habitat, a process which has and is occurring.

5.3.2.4 *Macropus irma*, the Black-gloved, or Western Brush Wallaby

Black-gloved wallabies (Macropus irma) *have been sighted in the area and its numbers in the metropolitan area are declining due to habitat clearance and if trends continue, this species will require special attention.*

The information presented in the PER is considered an accurate assessment of the status of the Black-gloved Wallaby in the near metropolitan area.

Within this region it is acknowledged that this wallaby and many other species are being affected by suburban expansion, however, this is a conservation issue which needs to be addressed at the regional land use planning level rather than at the individual development level. In the context of this development the Proponent regards the presence of the native fauna, and particularly the larger macropods, as one of the attractive attributes of this site and will be endeavouring to maintain viable populations of these species within the area of the proposed development.

5.3.2.5 *Tarsipes rostratus*, the Honey-possum

A species common in the adversely affected Dryandra sessilis *vegetation suite is the Honey-possum,* Tarsipes rostratus. *It is likely to be affected by habitat modification proposed due to its very specific habitat requirements.*

The Honey-possum will be locally affected by the development, although most of its preferred habitat in the project area, the *Acacia truncata/Dryandra sessilis* heath assemblage, lies outside of the proposed development area. Realistically, however, Honey-possums occur in large numbers and are protected in at least 11 large National Parks in the coastal and sub-coastal south-west and were recorded in eight of the southern forest areas sampled by the Forests Department in 1985. There is no evidence to suggest that the Honey-possum is decreasing rapidly throughout its range, despite a decline near populated areas. In fact, these animals may be one of the less threatened of Western Australia's small marsupials since they breed in all seasons, are found from Kalbarri in the north-west to Eyre in the south-east, through the wheatbelt, in heaths in the forest block and on the Swan Coastal Plain.

The widespread distribution of this and other vertebrates must be taken into consideration when linking proposed developments with conservation of the species as a whole.

5.3.2.6 *Rattus fuscipes*, the Western Bush Rat, and *Rattus rattus*, the Black Rat

The Western Bush Rat, Rattus fuscipes, *is known to be present in several locations within the development area. The black rat,* Rattus rattus, *is also present.*

- *Rattus fuscipes*, the Western Bush Rat

  It is acknowledged that the Western Bush Rat may well be present in the proposed development area. It is known to occur in the nearby Yanchep National Park, is probably present in Neerabup National Park and is one of the most common native mammals of reserved and non-reserved lands in south-coastal Western Australia.

- *Rattus rattus*, the Black Rat

  The introduced Black Rat occurs throughout most of southern coastal Western Australia and it is acknowledged that it is likely to be present in the proposed development area.

5.3.2.7 Wildlife Management

Wildlife management issues have been poorly addressed in the proponent's submission and the appraisal of vertebrate fauna currently present is more hypothesis than field investigation.

In terms of future wildlife management the aim of the vertebrate faunal study was to assess the potential impact of the proposed development on vertebrate fauna populations and to provide management strategies, with the intent that the identified strategies would be incorporated into on-going management planning for the resort. The objective of the vertebrate fauna appraisal undertaken for the PER is described in the first study objective (Appendix 6, Page 1), where it is explained that the report was not meant to be a long-term field investigation, but rather, a detailed exploration of aspects covered by the EPA guidelines for the project.

Several factors that appear to have been overlooked when considering the wildlife are:

- **Fire**

A fuel reduction fire regime will be required to reduce fuel in the areas of natural vegetation. This will have the potential to impact heavily on flora and fauna as desirable mosaic burn patterns will be difficult to achieve due to the interspersed housing and golf course. Escape routes for animals will be lessened due to the development. Colonising animals that generally restock areas after burns will also be impeded by the development. The season and frequency of prescribed fires will be critical and consideration should be given to containing wildfires that may occur.

The submission on this point is in error on a number of points. Firstly, much of the low heath and foredune vegetation does not accumulate significant amounts of leaf litter and thus fuel reduction burning will be required very rarely, if at all, over most of the proposed development site. The major habitat in which more frequent

fuel reduction may be required is the Acacia shrubland. Provision for undertaking fuel reduction programmes will be incorporated within the proposed dune and foreshore management programme. Secondly, the presence of the golf course will not only provide temporary refuge for most species of fauna in the event of fire but will, in association with the internal road and buggy path network, also act as a series of internal fire breaks, effectively compartmentalising the area and making controlled burning and the control of wildfire far more practicable than it is at present.

- **Grey Kangaroo Population Pressure**

The population of Western Grey Kangaroo, Macropus fuliginosus, will increase rapidly due to the improved herbage from the irrigated golf greens. A conflict situation will arise with fouled and damaged greens and unmanageable numbers of kangaroos.

This statement is correct, if somewhat over-dramatised. The Western Grey Kangaroo population anticipated following development is not expected to be different from that which occurs on a number of other Perth golf courses. As a development orientated toward international tourism the presence of kangaroos is regarded as a positive feature of the development. In the event that population numbers become unmanageable, advice would be sought from CALM as to the most acceptable method of maintaining a balanced population. CALM has no management policy on this aspect.

- **Domestic Pets**

With housing being considered in the natural golf course areas will domestic pets be allowed? If so, cats in particular will impact on fauna not only in the immediate area but in the southern sections of Yanchep National Park, Pipidinny and Beonaddy Swamps.

It is considered unlikely that the presence of household pets in the residential areas of the Eglinton resort will affect the population levels of feral animals in the Yanchep National Park or in Pipidinny or Beonaddy swamps, although it is acknowledged that increased pet numbers could exacerbate the impact on the native fauna of the project area caused by introduced animals. However, under the existing by-laws and regulations pertaining to the keeping of domestic animals and existing social customs which favour the keeping of introduced pet animals it is unlikely that any ban on the keeping of pets by the residents of this development could be applied or enforced. The keeping of domestic pets, and particularly cats which are recognised as having a major impact on native fauna, is a social and conservation issue affecting Australian fauna as a whole and one which needs to be approached on this basis, rather than at the project development level.

5.3.2.8 Birds of Prey

Concern is held for the bird of prey species known to frequent the area. As these birds are tertiary consumers, herbicides, fungicides and pesticides will ultimately find their way into the food chain which will have a major effect on this section of avifauna. Pre-emergent herbicides and fungicides to be used have not been identified. Control measures for such things as rabbits could result in secondary poisoning to many species of avifauna present.

The question of the impact of pesticides, herbicides and fungicides on birds of prey and other carnivores will be addressed as part of the overall golf course management programme.

It should be noted that because of its location and possible groundwater effects, all such chemicals used on the site must be approved for use by the Water Authority and in this regard a detailed discussion on the types of chemicals which may be used and their impacts is presented in Section 5.2.5.

5.3.3 Flora

5.3.3.1 Vegetation Assessment

The PER does not provide a detailed specialist assessment of the vegetation and flora of the properties involved.

The flora of the proposed development site was progressively assessed over the course of the twelve month design period in conjunction with the overall design of the development, such that the siting of development components takes into consideration the location of significant elements of the landform and vegetation.

The complexity of the site's topography and vegetation distribution patterns, and the dispersed nature of the proposed development makes the presentation of such information difficult at small scale. To overcome this problem, detailed overlay mapping at a larger scale has been prepared for the EPA to assist them during the assessment process.

5.3.3.2 Vegetation Mapping

It appears that only broadscale mapping of vegetation suites from aerial photos has been attempted and little attention has been given to the actual flora present.

The vegetation of the site, as shown on Figure 13 of the PER contains only a few major vegetation assemblages, however, there is a great complexity of species groupings at the small scale due to the chaotic distribution of landforms, influence of past land-use practices and recent recolonisation of disturbed areas. This combination of influences, together with other natural factors such as salt and wind

impact, and soil moisture level variability, has given rise to a multitude of variations in the basic assemblages. These variations, which frequently occupy areas as small as a few tens of square metres, contain the same species which are present in the main assemblage and become recognisable entities only because of the particular mixture of species which are present.

Typically these small sub-units have concentrations of one or two species which give rise to distinct colour or visual differentiation. Examples are the monospecific stands of *Olearia axillaris*, conspicuous because of its grey foliage, which are frequently found along the margins of tracks and other disturbed areas, and *Lepidosperma gladiatum*, with its dark-green strap-like leaves, which, because of its tendency to proliferate in sheltered hollows, creates an impression of a "wetland" environment. Such areas have not been mapped as distinct assemblages in the context of this project. Larger scale vegetation mapping of the project area has, however, been undertaken and this information has been provided to the EPA to assist in their assessment.

Given the area involved and the complexity of the landforms, mapping from aerial photography supported by ground truthing, generally carried out on foot, is the only practical way of locating the boundaries of the principal vegetation assemblages.

5.3.3.3 Flora Conservation

The attention given to the resort area flora has been minimal, is the explanation for this simply that only 25% of the natural vegetation will remain after development and 40% of a poorly represented species (Acacia rostellifera) *will be destroyed. No survey for rare or priority listed plants was initiated. The suite of* A. rostellifera *is acknowledged as being important and thus should be retained.*

Contrary to the statement made in the submission a great deal of attention has been given to the related aspects of landform and flora conservation within the proposed development area. Reference to the areas quoted in Figure 2 of the PER show that in all 44% of the area will be maintained as natural vegetation. The figure of 25% in the text was quoted in error from a previous development concept. The retained area will contain representative areas of all of the vegetation assemblages, and include examples of the various sub-units identified.

The species *Acacia rostellifera* is not "poorly represented" as claimed. This reference is taken out of context from Section 4.2.1 of Appendix 6 of the PER which relates to the reservation status of "*Acacia rostellifera* dominated primary dune country". Within the overall area of the proposed development some 111 ha of dune vegetation is proposed to be set aside and maintained as natural dune vegetation. This is equivalent to the area identified in the System 6 recommendation and represents a major reservation of private land for conservation and landscape protection purposes.

Acacia rostellifera is in fact one of the most common and widely distributed species found along the metropolitan coastline and is also one of the most common species present in the coastal portion of the Eglinton site. In addition to the *Acacia rostellifera* shrubland (shown on Figure 13), where the Acacia forms dense monospecific stands or is present with only a few other species, *A. rostellifera* is also widely distributed throughout the heath and shrubland assemblages. It is typically found as a co-dominant species of the denser shrubland pockets found in sheltered hollows and depressions, but occurs at lower density on more exposed sites.

The major habitat value of the *A. rostellifera* assemblage lies in its height and density which combine to provide a sheltered habitat for a range of dune animals (see PER Vol. II Appendix 6). Floristically, however, this assemblage is depauperate, comprising either monospecific stands or combining with the shrub species *Spyridium globulosum* and *Olearia axillaris* and the climbers *Hardenbergia comptoniana* and *Clematis microphylla*. A sparse groundcover of moss or grasses may also be present.

The endangered flora list as presented in the CALM publication, Western Australia's Endangered Flora (Hopper, S.D., van Leeuwen, S., Brown, A.P. and Patrick, S.J., 1990) was reviewed during the course of the study. None of the species either listed as endangered or under consideration for declaration are recorded as being found in the study area or in the habitats which are present within the study area.

5.3.3.4 Landform and Vegetation Reservation

No species list is presented, nor indeed a complete species appraisal of each vegetation assemblage. The very generalised discussion of dominant species is not sufficient for the reader to assess the ecological significance of the data submitted. The occurrence of these particular habitats and vegetation assemblages in nearby reserves should also have been assessed and stated. Semeniuk et al (1989) found no examples of the perched dunes or accretionary cusps typical of this area conserved in reserves (as at January 1987). This is of great concern considering that this development will mean the destruction of a significant part of a proposed reserve (System Six recommendation M2) which includes these landforms.

The addition of a plant species list would add little to the discussion on flora because of the lack of similar such data for other comparable areas of the coastline and thus the ability to use such information in discussing the ecological significance of this area at a regional scale. Reserves in which these assemblages occur within the Metropolitan Area include the Trigg Open Space, Whitfords and Burns - Quinns coastal reserve in addition to parts of the narrower foreshore reserve which extends along the length of the metropolitan coastline.

The shoreline of the development area contains no accretionary cusps, the nearest being located onshore from Alkimos Reef some 3 km to the south. The perched dunes, which give the land its distinctive form, are the typical parabolic or blowout

dunes of the Quindalup dune system. Reference to the report of McArthur and Bartle (1980) shows that these features are widely distributed along the coast between Trigg and Lancelin, which corresponds to Sector 3 of Semeniuk *et. al.* (1989).

Within the northern metropolitan area accretionary cusps are located in reserves at Whitfords and between Burns Beach and Quinns, while perched dunes occur in larger reserves at Trigg and in the proposed open space wedges at Alkimos and to the north of Two Rocks. They also occur in the possible open space wedge to the north of the Eglinton site.

5.3.3.5 Distribution of Vegetation Assemblages

The assertion is made that the vegetation assemblages of the site are widely distributed along the south-west coast, yet no data is presented to substantiate this claim. Therefore, before the destruction of these habitats is sanctioned a detailed regional study of their occurrence and conservation status should be performed.

The information presented in the PER on the regional distribution of coastal dune vegetation is drawn from a number of sources, notably Beard (1982), Semeniuk *et. al.* (1989) and Smith (1973). Analysis of this information, together with a review of the distribution of Quindalup landforms found on this site (McArthur and Bartle, 1980) adequately demonstrates both the widespread distribution of landforms and vegetation within this system. The detailed mapping of the vegetation assemblages of the Quindalup and parts of the Spearwood Dune System that would be needed to satisfy this submission request are considered to be beyond the scope of the level of investigation of a PER.

5.3.3.6 Control of Turf Grasses

It is claimed that "this design is in sympathy with the natural environment and provides an interesting and quality golf course". Whilst this development may well provide an interesting and quality golf course it is hard to see how the introduction of large turfed areas into a dunal environment can be seen as sympathetic. Aside from the initial destruction of the environment due to construction, introduced turf species have the ability to quickly and disastrously degrade natural vegetation assemblages. It is disturbing that there is no mention of design criteria aimed at reducing this impact.

The control of turf grasses will be achieved initially through the selection of appropriate turf types and subsequently through the watering and fertilizer regimes applied. The "rough" grasses which will surround the couch fairway grasses will be non-running fescue grasses. These marginal areas will receive progressively less water and fertiliser toward the grass perimeter and at the outer edges where they meet the natural vegetation, will receive no additional water or fertiliser. These harsher conditions are less suitable to the growth of the more invasive fairway grasses and the roughs will thus act as a buffer to prevent their spread. This

procedure is outlined in the draft Foreshore and Landscape Management Plan (Volume II Appendix 8).

5.3.3.7 Species Hybridisation

Discussion on controlling the impact of residential development incorporated with natural dune areas ignores several design criteria which should have been addressed. For example, no criteria have been laid down for directing which plant species may be introduced into the residents gardens. This deserves serious consideration for a number of reasons; the danger of garden plants escaping into adjacent dune areas and colonising them, and the effect of increased nutrients on groundwater quality and the ocean. There is also danger that some native plant species, such as Grevilleas, commonly seen in suburban gardens readily hybridise with local plants of the same species (or even Genus) resulting in the creation of a hybrid species. Plant hybrids invariably show the ability to out-grow parent species, and resulting hybrids in this case could lead to the eventual disappearance of the local variant. Part of the conservation value in areas such as that included within System Six area M2 lies in their ability to preserve a large gene pool for plant species which although not rare or endangered show considerable variety in growth habits or floral characteristics within their species range. A good local example of a species which could come under pressure in this way is Grevillea thelemanniana.

The submission makes a valid point although somewhat overstated. In essence the possibility of plant hybridisation occurring as a result of cross-breeding with cultivars of native plant species used in landscaping will not be significantly greater at this site than at others where there is an interface between urban development and native vegetation. As a large part of the landscaping of this site will be under the direct control of the developer there will be more opportunity to control the source of plant material introduced than there would be at sites where there is a greater number of private land owners.

5.3.3.8 Maintenance of Conservation Value

The assertion that "the proposed layout of the golf course and associated development provides for the retention of each of the major plant assemblages" and that this could be represented as "conservation of representative tracts of each assemblage", is highly debatable. Even supposing that representative vegetation complexes have been correctly identified, it is highly unlikely that the conservation value of these pockets of natural dune land contained within turfed areas and with associated housing units and tourist complex, could be maintained.

There is no evidence to suggest that natural vegetation within areas of the size proposed within this development can not be managed to retain their conservation value.

5.3.3.9 Value of Retained Vegetation

Concluding that 111 ha or approximately 25% of existing natural habitat will be retained is misleading. This may represent the correct total land area left after the construction of the golf course, residential development and resort complex, but some of this 111 ha is contained in narrow ribbons of vegetation as a buffer zone between housing complexes and the golf course. Such areas really cannot, in any sense, be included as part of a conservation zone, the only purpose such areas can serve is to conserve some small part of the aesthetic value of the land.

The 111 ha in fact represents approximately 44% of the 245 ha development site. While it is correct to say that some of this area will be included in narrower interconnecting corridors of natural vegetation, the majority will be retained within larger blocks, mostly of greater width than that which has existed in foreshore reserves adjacent to urbanised areas of Perth, frequently with little management, for a number of decades. These narrower areas have an important part to play in providing corridors for fauna movement, landscape and landform maintenance and, subject to proper management, the conservation of flora.

5.3.3.10 Vegetation Monitoring

It is difficult to imagine how the proponent proposes to monitor parameters such as vegetation density and species diversity when there is no provision of base data in the PER with which to compare any subsequent data acquired through monitoring work.

In order that the maximum value can be obtained from monitoring data, vegetation transects would be established after final survey of the site and prior to construction. This will ensure that monitoring is directed to the areas likely to come under most pressure as a result of the development.

5.3.3.11 Vegetation Restoration

There is no mention of what steps can or should be taken to restore vegetation density and species diversity should adverse changes be noted nor what parameters constitute adverse effects warranting remedial action.

The principal steps to restore vegetation in the event of adverse effects being detected are first to detect the cause of the decline and secondly to determine the most appropriate remediation procedure. As the most likely problems will be associated with disturbance to the soil surface the steps are as follows:

- isolation of the area by fencing,
- re-establishment of the surface contours,
- protection of the soil surface by brushing or other appropriate means,
- planting of seed or nursery stock of the pre-existing vegetation.

5.3.3.12 Weed Invasion

An undertaking is given to monitor weed invasion but does not give any of the parameters which might be used to determine when weed invasion should be seen to constitute a problem nor gives any information as to how such a problem would be addressed.

As a result of past land use practice and the spread of naturalised exotic plant species there are already a large number of weed species to be found within the dune vegetation of the site. While it would not be considered practical to eradicate these species at present without considerable adverse impact on the existing vegetation, the need to prevent the introduction of new species and to maintain the balance between existing species is recognised.

Previous comment has been made on the techniques to be used in the control of golf course turf grasses (see Section 5.3.3.6). Landscaping within developed areas of the resort will be based on the use of native species, primarily derived from among those growing on-site. The spread of any species from landscaped sites will be monitored during routine maintenance. The landscaping of private residential properties may result in more exotic species being used on the site and therefore it will also be necessary to regularly inspect the margins of these areas in order to detect the spread of any introduced exotic from these areas.

6 WATER RESOURCES

6.1 Water Resource Requirement

What is the position in respect of water for this particular resort. Is it going to result in less water being available for rural pursuits? Residents in the area have had their water allowance cut down by the Water Authority because of the difficulties now being experienced in the area in respect of the availability of groundwater.

The Water Authority has commented that the abstraction of groundwater for the resort "is not likely to have an excessive effect on the groundwater resource in the area". Because of the location of the project site on the coast, where the permeability of the aquifer is high and the groundwater resource is large and undeveloped, the effect of groundwater abstraction for the resort on the amount of groundwater available for use by other landowners in the area is minimal.

It is relevant to note that the project site lies within the Perth Groundwater Area, for which the eastern boundary is Wanneroo Road. Residents reported to have had their groundwater allowance reduced by the Water Authority probably live within the Wanneroo Groundwater Area to the east of Wanneroo Road where much more development of the groundwater resource has occurred, reducing the portion available for further development. The allocation of groundwater resources by the Water Authority is managed in such a way that the total volume of water permitted to be used within the Perth Groundwater Area will not cause any reduction in the quantity licenced to be used in the Wanneroo Groundwater Area.

The groundwater extraction allowance for the Eglinton project will be made by the Water Authority with due regard to the requirements of Perth Groundwater Area groundwater users upstream of the proposed development, i.e. between the eastern boundary of the development and Wanneroo Road.

6.2 Needs of Other Users

The amount of water required to establish and maintain this resort is considerable and if future developments of a second golf course and more residential units are permitted there will be little of the water resources left to service alternative requirements in the area. There is justifiable concern that conservation values and local residents water needs will be disadvantaged by the proposed development.

The water demand for the resort is not considered to be out of proportion in relation to the residential accommodation and other facilities being provided. (Note comments made in previous response). Licencing by the Water Authority will take into consideration the effects on conservation values (drawdown of the watertable) and the needs of other users in the Perth Groundwater Area.

Revisions to the grassing plan and system of turf management proposed for the golf course and landscaped areas since the PER was written have made possible a reduction of approximately 20% in the estimated annual water requirement for permanent irrigation purposes. This reduction in volume is reflected in the groundwater allocation requested in the licence application which has recently been submitted to the Water Authority.

6.3 Estimated Groundwater Requirement

The PER estimates that a total of 85.28 ha of land will be irrigated. It also estimated 1447 services for domestic supply. The WAWA allowance for turf is 16,000 kL/annum and for domestic use is 650 kL/annum. That is:

85.28 x 16,000 = 1,364,480 kL/annum

1447 x 650 = 940,550 kL/annum

Extrapolations of the water usage from the data supplied, that is PER Appendix 5, and WAWA allowances the requirement would be 2,305,030 kL/annum. The estimates quoted in the PER report on groundwater usage were domestic 950,000 kL/annum and irrigation 1,464,000 kL/annum. This is an overall requirement of 2,414,000 kL/annum.

There is a discrepancy of 108,970 kL/annum.

A provisional estimate of the water requirement for permanent irrigation at the resort was given in the PER. Since there appears to have been some misunderstanding concerning the way in which the water usage figures were calculated, further details are provided below.

The total area to be irrigated was estimated to be 87.28 ha and not 85.28 ha.

The quantities of water required for irrigation purposes were calculated using climatic data to provide projected application rates for the area to be irrigated, which includes landscaped garden areas in addition to turf. A bulk water volume per hectare of turf was not used. As far as we are able to determine after discussions with Water Authority officers, the Water Authority has not defined a specific water allowance for turf and consequently we are unsure of the source of the figure of 16,000 kL/annum.

A figure of 657 kL/annum per service for domestic supply was used in the PER (not 650 kL/annum) and this was obtained from a Water Authority report on the North West Coastal Groundwater Schemes as indicated in Appendix 5 of Volume II of the PER. For the 1447 services quoted the water requirement is 950,679 kL/annum and consequently there is no discrepancy in the figure quoted in the PER.

Since the PER was written, significant changes have been made in the grassing plan and system of turf management proposed for the golf course and the area of proposed landscaping, in order to minimise water usage. As a consequence, the estimated water requirements for permanent irrigation have been reduced by approximately 20%.

The revised annual water requirement has been calculated on the basis of a detailed analysis of the application rates required to maintain the different grasses and other types of vegetation planned for the resort. The grasses and other types of vegetation selected for the resort were chosen after careful consideration of their suitability in terms of water conservation.

The Water Licence application which has recently been submitted to the Water Authority for their approval incorporates these revised figures.

6.4 Percentage of Throughflow Utilised

Using the data from Appendix 5 there is an estimated 7,665,000 kL/annum throughflow from the aquifer but the development will use 31.49% of this throughflow.

In the PER, throughflow beneath the site is estimated to be 7,665,000 kL/annum and the provisional water use estimates do indeed equate to 31.5% of throughflow. This proportion of throughflow is not regarded as excessive as developments in other areas have been granted licences for higher percentages of the throughflow beneath their properties. It is worth noting that as the Eglinton Resort occupies an ocean front location there is no potential for downstream use of the groundwater resource and that at present the entire annual throughflow discharges to the ocean.

6.5 Domestic Water Requirement

The PER report estimated 1447 services for domestic water supply but the shortfall of 610 cannot be accounted for, even if an allowance is made for other service utilities. This seems to indicate that the domestic allowance has been exaggerated as the hotel rooms would not always have a full occupancy nor use the 650 kL/annum allowance.

The domestic water requirement for the development has not been exaggerated. Rather, it takes into consideration the projected domestic water requirements of the total area of the project site, including the expanded hotel and Future Urban areas shown on Figure 2 of the PER, which is essential in planning for long term development and peak demand. Normal planning procedures have been used in equating 1 service to 2 hotel rooms, because, even though the hotel rooms may not always have full occupancy or use the full allowance, peak demand must be catered for in the design of the water supply system. Consequently, the reference to a shortfall of 610 in the estimate of 1447 services is not understood since Table 2 of Appendix 5 fully accounts for the total number of services.

It is noted also that the domestic water supply and irrigation water supply systems will be totally separate and that the unused component of the domestic water supply allowance (if any) will not be available for irrigation purposes.

6.6 Evaporative Losses From Artificial Lakes

It is appreciated that the use of perched lakes around the development will provide an aesthetic effect but at a considerable cost of water, lost through evaporation, i.e. 19,891 kL/annum.

The estimated annual evaporation losses from the lakes equate to less than 1% of the total water requirement and are less than the groundwater discharge to the ocean during one day. The lakes form a functional component of the irrigation system as indicated in Appendix 5 of the PER. The number and distribution of the lakes proposed takes into consideration the area required to be irrigated and the complex topography of the site.

6.7 Groundwater Drawdown Estimates

Whilst modelling has shown, in theory, that the water resource required is available there must be some doubt until monitoring of the drawdown effect can be assessed. There are too many conservation values at risk to take chances with "guesstimates". The drawdown effect was based only on 24 hours continuous pumping and the time of the year was not stated. Both factors contribute to the drawdown effect and in the short time of testing, meaningful results could not have been obtained.

There will obviously be "some doubt" about the effects of abstraction until the borefield is constructed and the drawdowns associated with pumping are measured. However, for the purposes of the PER and licencing applications it is necessary to make an assessment of the probable effects of pumping before the borefield is constructed. The modelling undertaken provides an adequate basis for this assessment and is not a "guesstimate". The aquifer underlying the site has a very high permeability and measured drawdowns reached values very close to equilibrium after only a few hours of continuous pumping. Therefore, the 24 hour test is considered to be of more than adequate length to obtain meaningful results.

6.8 Remedial Action

There is no mention of remedial action if monitoring indicates a lowering of the water table.

There is no mention of remedial action because permanent lowering of the water table is most unlikely to occur. During the summer irrigation season, pumping will cause water levels in the vicinity of the borefield (within 200 to 500 m radius) to

be drawn down. However, water levels will recover during the winter non-pumping period in response to rainfall recharge.

Assessment and modelling of the aquifer indicates that the proposed development of the groundwater resource can be sustained without significantly affecting the groundwater flow system in the area.

The proposed abstraction is subject to licencing by the Water Authority. All groundwater licences normally include a condition which requires a reduction in the pumping rate if monitoring shows that the water table is being lowered.

6.9 Enhanced Recharge

The enhanced recharge mentioned, if it does occur will be beyond the bore field and flow to the sea, so is not an attribute of the development.

The effects of enhanced recharge will extend into the immediate vicinity (west side) of the borefield and will have some influence on the aquifer in this area. Enhanced recharge further to the west will make an important positive contribution to the management of the seawater interface.

6.10 Rationing Due to Drought

As the aquifer is recharged by annual rainfall, years of drought will mean less available water. Will rationing be considered in those years?

The Water Authority controls groundwater abstractions through the licencing system and would decide whether rationing would be considered in a drought situation. Examination of the last 50 years rainfall record for Perth does not show any period when a reduction in groundwater abstraction would be required.

6.11 Groundwater Contamination by Fertilisers

The groundwater is susceptible to contamination from turf fertilisers.

Although there is a potential for nutrients derived from fertilisers to enter the unsaturated zone of the superficial aquifer, a comprehensive nutrient management plan has been developed to ensure that there will be no significant adverse effects on the groundwater system (refer to previous responses, Sections 5.1.3 and 5.2.5).

6.12 Groundwater Monitoring

Monitoring of groundwater, sewage and fertiliser run off must be carried out by suitably qualified people and must be adequately accountable.

Monitoring will be carried out by an independent groundwater consultant and the results will be reviewed by the EPA and Water Authority on a regular basis.

6.13 Interference with the Groundwater Regime

The project will interfere with the groundwater regime of the area.

Detailed management plans have been drawn up to protect the groundwater system during construction and operation of the resort. An extensive network of monitoring bores will be constructed and regular reviews of the data collected will be performed by an independent consultant and by the regulatory authorities to ensure that the groundwater system is protected.

6.14 Impact of the Marina on the Saltwater Interface

The proponent has not adequately addressed the impact of the marina on the saltwater interface in the aquifer. Excavations of the aquifer material near the coast have the potential to cause a major change to aquifer flow in the area. Further work is needed to investigate the impacts and produce a monitoring and management strategy.

Since the PER was written, the design of the marina has been completely revised. The new design involves construction of the marina offshore by placement of fill and no excavation extending inland from the present coastline is proposed. Consequently, no landward migration of the saltwater interface will occur and the impact of construction on the groundwater system is likely to be minimal.

6.15 Figure 6 of Volume I

Figure 6 of Volume I of the PER is incorrect as it shows the proposal to be outside the Underground Water Pollution Control Area. In addition the plan is inaccurate as it refers to Groundwater Priority Areas and the boundaries shown are not correct.

Figure 6 of the PER is an exact reproduction of the North-West Corridor Structure Plan, as prepared by the Metropolitan Region Planning Authority (now Department of Planning and Urban Development) in 1977. The terminology, Groundwater Pollution Control Area, and the areas shown on the figure were correct as at that time.

Figure 6 is referred to in Section 3.1 of the report in relation to its historical planning context, and not in relation to Groundwater Priority Areas.

Although not shown in figure-form the proposed development site is clearly identified as being located within a groundwater protection area in Sections 3.5.2.5, 3.7.1 and 4.4.1 of the PER text.

7 GREENHOUSE

No mention is made of greenhouse implications.

The possibility of sea-level rise associated with the Greenhouse effect was discussed in Section 4.5.1.3 of Volume I of the PER. Appropriate allowance will be made in the design of all breakwaters, marina walls, buildings and structures in the Eglinton Beach Resort for possible rises in sea-level associated with the Greenhouse effect.

8 CONSTRUCTION IMPACTS

8.1 Human Impact

To construct the marina the PER identifies 24,000 return truck trips down Pipidinny Road over a 6 - 9 month period, i.e. 88 - 130 per day. This combined with all of the other construction vehicles will generate considerable noise, dust traffic hazards, congestion and depreciation of the access road. To suggest that this will be of low impact to local residents is beyond comprehension. Prevailing winds are from the south-west and they will carry noise and dust to the residents to the east of this development.

The impact of truck movements on the residents of the eight small holdings located on or adjacent to Pipidinny Road during the marina construction period has been acknowledged in the PER (Section 5.4.4.3). This impact can not be avoided as there are no alternate routes to the site. However to mitigate this impact as far as possible it is proposed to widen and upgrade the existing Pipidinny Road from Wanneroo Road to Beonaddy Road to a 7.4 m wide fully sealed road, and to upgrade Pipidinny Road west of Beonaddy Road to a sealed 7.0 m wide pavement, to City of Wanneroo standards and approval prior to commencing any truck movements. This action will assist in minimising traffic hazards and congestion resulting from the increased volume of traffic on Pipidinny Road.

Pipidinny Road will also be kept clean by periodic sweeping and washing as required by the City of Wanneroo to minimise the generation of a dust nuisance.

As a result of the proposed revision to the harbour layout there will be a reduction in the volume of breakwater material (core and armour) that will need to be imported from off-site. This will mean fewer truck trips and reduced construction impact. Where economically feasible it is also hoped to source some of the lower grade breakwater material from on-site and this will also assist in reducing the impact on adjacent residents and local roads.

Should any road damage be caused during the construction period the roads will be fully reconstructed to City of Wanneroo requirements.

Noise and dust from the construction site will be mitigated by the following factors:

- Distance from the construction area. Construction activity, other than the construction of access roads, will take place a minimum of 2 km from Beonaddy Road.

- Intervening topography. There are at least two, and generally three, high ridges located between the construction areas and Beonaddy Road which will greatly assist in mitigating noise impacts.

- Location of development. The residents of Pipidinny Road are located almost due east of the major construction areas, i.e. the marina and condominium sites. Under the prevailing south-westerly winds, any dust generated by the development will therefore tend to be driven to the north-east over unoccupied land, rather than over the homes of existing residents.

- Limited areas to be cleared. Construction work will be undertaken progressively with stabilisation following immediately upon completion of earthworks. As a result of this programme the total area on which earthworks are being carried out will not exceed 4 ha at any time.

- Dust suppression measures. On areas in which earthworks are being undertaken, dust suppression measures will be undertaken to the requirements of the City of Wanneroo in accordance with the EPA Guidelines for Assessment and Control of Dust and Wind-borne Material for Land Development Sites.

8.2 Construction Timing

Traffic in the area will be greatly increased not only during the construction period but by staff, service vehicles and visitors until alternative access roads are constructed. The timing of construction for this alternative access has not been stated.

Pipidinny Road west of Beonaddy Road will be upgraded to a sealed 7.0 m wide pavement to City of Wanneroo standard and approval prior to commencing any truck movements.

Both Eglinton and Marmion Avenues will be constructed before the resort is opened.

9 SEWERAGE

9.1 Location of Treatment Plant

Some concern is felt over the close proximity of the temporary on-site sewage treatment plant to both the ocean and the nearby wetlands due to possible nutrient contamination of groundwater. As there is some doubt as to when access to the future Water Authority treatment plant at Alkimos will become available, any adverse effects could be felt over a considerable period of time.

Advice to the Proponent by the Water Authority since the release of the PER is that the first stage wastewater treatment and disposal facility at the Alkimos WWTP will be operational by December 1992, and prior to the opening of the resort. In the event of the Water Authority's proposed Alkimos Sewage Treatment Plant not being available in time, it is planned to install a temporary on-site package treatment plant.

The temporary sewage treatment plant, if required, is proposed to be located some 2 km to the west of the nearest wetlands (Pipidinny wetlands) and with the groundwater flow to the west, the likelihood of any contamination of the wetlands is remote.

Monitoring bores located downstream, i.e. to the west, of the temporary treatment plant would be used to detect any possible nutrient contamination of the groundwater and thereby allow remedial action to be taken before the contaminated water reached the ocean. The most likely remedial action to be implemented in the event of nutrient contamination being detected would be extraction of the nutrient contaminated groundwater and by its re-use for irrigation purposes, taking advantage of nutrient uptake by the irrigated turf to lower the nutrient concentration to satisfactory levels.

9.2 Sewage Buffer Zone

The sewage treatment plant is proposed to be located within "an appropriate buffer zone to ensure it will not have any impact on nearby residents", no doubt this will mean within an area set aside for 'conservation' of dune habitats resulting in further alienation of the site's conservation values whilst providing only dubious protection for residents from odour.

Should a temporary sewage treatment plant be required on site it would not be located within an area set aside for the conservation of dune habitats. Rather, it would be located within one of the areas set aside for future development, on which development is not proposed for a number of years.

The type of treatment plant proposed for the resort, in the event that the Water Authority's proposed Alkimos Treatment Plant is not available, is different to that constructed at Mindarie which has oxidation ponds only. The proposed Eglinton

plant will be an intermittent activated sludge plant, similar to that constructed at the Vines Resort in the Swan Valley, which produces a high quality effluent and little or no odour when operated correctly (i.e. see comments on Vines effluent monitoring, PER Volume II, Appendix 5).

Only treated effluent will be disposed of on-site by spray or trickle irrigation at least 500 m west (down gradient) of any proposed domestic water supply bores or 800 m north of the proposed domestic supply bores in an area of future residential development, with a 500 m buffer zone around the works.

10 MANAGEMENT AND MONITORING

10.1 Groundwater Contamination Contingency

Management programmes aimed to minimise nutrient export from the site are provided in some detail, however, it is nowhere stated what steps will be taken to address adverse effects, such as nutrient contamination of the groundwater, should they occur.

In the event that contamination of the groundwater from any source is detected during monitoring it will be reported to the relevant authorities and the appropriate remedial action initiated. The appropriate treatment would depend on the nature and extent of contamination. However, the most likely treatment would be extraction of the contaminated water by bores, and either re-cycling of the water in through the irrigation system in the event of nutrient contamination, or decontamination and re-use of the water in the case of a non-degradable contaminant.

10.2 Monitoring and Management Programmes

It is considered that the guidelines for the PER as set down by the EPA, are not met by the report in reference to monitoring and management programmes and exact specification of commitments.

The management and monitoring programmes outlined in the PER indicate the scope of work to be carried out to ensure the satisfactory operation of the project through the construction and operational phases. The detailing of these programmes will be carried out to the satisfaction of the EPA and other relevant authorities following assessment of the PER. Basically, as indicated in the PER, in this project the Proponent will continue to be responsible for monitoring and management throughout the lifetime of the project, in accordance with management plans approved by the relevant authorities to whom the Proponent will report at specified intervals.

City of Wanneroo

When replying please quote:

OUR REF: 740-61 (E21148)
DATE: 14 December 1990
YOUR REF:
ENQUIRIES: Mr P J Neilson Town Planning

ADMINISTRATION CENTRE,
BOAS AVENUE,
JOONDALUP,
WESTERN AUSTRALIA.
TELEPHONE: (09) 405 0333
FACSIMILE: (09) 300 1383

The Chairman
Environmental Protection Authority
BP House
1 Mount Street
PERTH WA 6000

Dear Sir

PUBLIC ENVIRONMENTAL REVIEW EGLINTON BEACH RESORT

Further to my letter of the 30 November, please find attached Council's submission for the Public Environmental Review, Eglinton Beach Resort Proposal

Council's considerations are further to the initial officer level comments which were sent to you on 9 November 1990. Council has endorsed those officers comments and made some further contributions.

One such Council concern is that the developer, Eglinton Resort Development Pty Ltd, undertakes a structural examination of "Gibbs House", Pipidinny Road, Eglinton to determine whether earthmoving works associated with the Eglinton Resort development will have a detrimental effect on this historic building.

Another matter of most importance is the maintenance of continuous public access along the coast and the Marina's water edge. This includes a safe and convenient pedestrian accessway from the beach to the north, through the Marina, to the beach to the south and visa versa. It should be made clear at this early stage that these areas should be set aside for this purpose.

If you have any queries, please contact Phil Thompson of the City's Town Planning Department.

Yours faithfully

R F COFFEY
Town Clerk

pjn:jc
act1152

42693 INFO

Att

COMMENTS ON THE PUBLIC ENVIRONMENTAL REVIEW

Each matter is addressed in order as they appear in the Public Environmental Review.

Volume 1

Comments on,

SUMMARY

CL pp viii - xxi

p viii, Golf Course

"open to resort patrons....." is this the same as being open to the public?

p xvi - xviii Management Programme and Commitments

All ongoing environmental management and monitoring programmes should be forwarded to the City for consideration.

Coastal Stability, p xvi

Surveys which detect sediment volumes and beach profiles adjacent to the Marina should continue until the coast has reached a state of equilibrium. This may be longer or shorter than the 5 years specified.

Dune Stability and Vegetation, p xvii

The City should receive 6 monthly reports for any monitoring, repairing, rehabilitation and maintenance by resort staff for any land vested in the City.

Ch 1, INTRODUCTION, PP 1-9

PP 1-2, 1.2, Responsible Authorities and Required Approvals

p 2, (iv) The amendment which has been initiated by Council in fact proposes to rezone land to Marina Development zone, and Special Zone (Restricted Use) Golf Course, Clubhouse, Residential Equestrian Centre Ancillary Uses Approved by Council.

p 2, (v) Development Approval will also be required from the City.

p 5-6, 1.5, Relevant Statutory Requirements and Responsible Authorities

p 6, (vii) The City would be responsible for POS outside of the Marina and Golf resort areas.

Ch 2, ALTERNATIVES CONSIDERED AND JUSTIFICATION OF PREFERRED OPTION, PP 10-16

P 10, 2.1, Present Zoning and Use, 3rd parag.

Under the Town Planning Scheme No 1, the uses mentioned are "AA" (ie "A use that is not permitted unless approval is granted by the Council"). The exception to this is a motel, which is a use which is not permitted.

pp 10-13, 2.2, Possible Development Alternatives

p 12, 2.2.2.2 Urban Subdivision

The difficulties foreseen with future urban subdivision seem exaggerated.

Ch 3, EXISTING ENVIRONMENT, PP 17-51

P 18-31 Physical Environment

It is believed that the subject area was used as a Field and Firing Range in the past. As such there is the possibility that live firing occurred in this vicinity. Some unexploded ordnance (UXO) may remain in the sand dunes.

The State Emergency Service is currently carrying out research to determine the extent of this potential problem. Please contact Mr Ken Hutchinson of the State Emergency Service for more information in this regard.

p 21, 3.3.1.4. Drainage

The provision for a future main drainage system for the areas to the east of the development, particularly the wetlands, should be further investigated in the planning stages.

Ch 4, pp 52-70 DESCRIPTION OF PROJECT

pp 53-58, 4.3 Proposed Land Use and Tenure

P57 4.3.2. Public Access and Facilities

The public should have a safe and convenient through-access across and throughout the Marina. This should include public accessways allowing unhindered access from the beaches to the north of the Marina to those south of the Marina and vice versa. This will require clearly delineated pedestrian accessways through the Marina and resort as well as easements in gross for this purpose at the water's edge within the Marina. Such public accessways should be clearly shown on the Marina development plan and design.

p58, 4.3.3. Land Exchange

The detailed evaluation of the proposed land exchange will be made in the drawing up of the Project Agreement.

p 58-62, 4.4 Services

p 58-59 4.4.1. Water Supply and Treatment

The project should be required to incorporate water conservation measures. The 1.5M m^3/year proposed for irrigation is about 6 times the amount this City will be using for the proposed Carramar Park Golf Course. A point which may be relevant here is that the NW Corridor Concept Plan soon to be released by the Department of Planning and Urban Development (DPUD) is likely to show the rural land to the east (upstream) of this land (to the east of Wanneroo Road) as an intensive agriculture area. This would have significant groundwater requirements as well.

p 60-61, 4.4.3 Stormwater Disposal

Where discharge of the stormwater is proposed direct to the ocean, satisfactory retention and retardation basins should be incorporated near the proposed outlet.

pp 61-62, 4.4.5. Roads

The major access roads to the development including Marmion Avenue and Eglinton Avenue, should be programmed and constructed prior to the commencement of the resort operations.

pp 62-70, 4.5 Construction Methods and Schedule

p 63, 4.5.1.3. Sea Level Rise (Greenhouse Effect) and (7.4, p113)

The drainage design for the outlet discharge into the ocean is required to take into account projected rises in the sea level and include freeboard provision accordingly.

The Greenhouse Co-ordination Council should also consider the allowance of a 30 cm sea level rise for the design and siting of buildings.

4.5.2.2. Marina Construction

While the harbour excavation does not indicate the use of drilling and blasting techniques, contingency for this construction activity and impacts may need to be addressed.

Ch 6 ENVIRONMENTAL MANAGEMENT pp 95-111

pp 95-99, 6.3 Construction Management

pp 96-99, 6.3.2. Management of Construction Impacts

p96, 6.3.2.1. Public Safety

As part of the proposal to restrict public access to the project area, alternative access to the adjoining foreshore may warrant delineation and construction.

p96, 6.3.2.2. Construction Traffic and Noise

The approval of routes for the construction traffic should also include the access to the quarry sites. In addition, Pipidinny Road from east of Wanneroo Road should be upgraded to Council's standards prior to the commencement of the construction activities.

The Developer Eglinton Resort Development Pty Ltd should undertake a structural examination of the Gibbs House, Pipadinny Road, Eglinton to determine whether earthmoving works associated with the Eglinton Resort development will have a detrimental effect on this historic building.

p96, 6.3.2.3. Dust Suppression

The dust suppression requirements should accord with the EPA 'Pollution Control Guidelines for Land Development Sites'.

pp 96-97, 6.3.2.5. Landform Modification

The earthworks for the landform modification should be certified that satisfactory compaction has been achieved.

pp 104-105, 6.5 Marina Management Plan

p104, 6.5.1. Breakwater and Structural Maintenance p108/ 6.8.2. Marina Structures

The monitoring of the breakwater structure should also include provision for any maintenance of the associated access roads at the proponents cost.

p105, 6.5.6. Drainage into Marina/p106 6.6.2. Drainage

The proposed breakwater drainage discharge outlet pipe should be constructed so that the impact of waves and tidal movements does not create a major maintenance problem.

pp 110/112, 6.9 Administration Details

p110, 6.9.1.3. Reporting Authorities

As mentioned previously, the City should also receive copies of these reports.

VOLUME 2

APPENDIX 3 COASTAL ENGINEERING STUDY

More justification and detail is required for the construction of the groynes. To what extent will the groynes add to coastal stability? Will the presence of groynes create a safer and more aesthetically pleasing atmosphere for swimming than already exists, even with the marina construction?

There is a need for a study looking at

- the subject area's current suitability for beach use

- the subject area's suitability given the construction of the marina without the groyne field

- the subject area's suitability given the construction of the marina and groynes as proposed

APPENDIX 8 DRAFT FORESHORE AND LANDSCAPE MANAGEMENT PLAN

At this point it is premature to consider and draft Foreshore Management Plan for the proposal. The management plan should be viewed in conjunction with detailed planning for the Marina Precinct, golf course, residential development as well as any other aspects of the proposal which affect the foreshore.

The draft plan should show a detailed design map. This map should show the locations of dual use pathways, beach accessways fencing, beach facilities, residential areas close to the beach etc.

Matters such as fire control, signage, construction materials for abolution blocks, waste receptacles, vehicle access and parking are all aspects which should be clearly specified.

Clearly defined boundaries, current and intended land ownership (including areas of land exchange) should be specified. Any sites subject to possible lease requirements should also be specified.

Importantly, specifics relating to implementation, its timing, monitoring and responsibilities should be clearly defined.

APPENDIX 9 EGLINTON GOLF RESORT PROJECT, LEGAL AGREEMENT

The draft Project Agreement in the Appendix is different in a few matters to the latest draft which the City and Feilman Planning Consultants have confirmed as being the latest draft.

EGLINTON BEACH RESORT

CITY OF WANNEROO

RESPONSE TO SUBMISSION

PER SUMMARY

p.viii, Golf Course

During the first two or three years of operation the facilities of the golf club and clubhouse will be available for public patronage, sharing with members, residents and resort guests. After this period any member of the public who is a patron of the resort or is a guest of a club member will be able to play the course.

A second golf course catering for the public and residents is planned for the future.

p.xvi, Coastal Stability

Monitoring of sediment volumes in the vicinity of the harbour is expected to be a long term requirement. It would continue throughout the life of the development unless it becomes apparent that a state of equilibrium has been achieved.

PER TEXT

Chapter 1

p.2, 1.2(iv) Rezoning

The amendments to the rezoning initiated by Council are noted.

p.2, 1.2(v) Development Approval

The requirement for development approval to be granted by the City of Wanneroo is acknowledged.

p.6, 1.5(vii) Relevant Statutory Requirements and Responsible Authorities

The responsibility of the City of Wanneroo for areas of POS outside of the Marina and Golf Resort areas is acknowledged.

Chapter 2

p.10, 2.1 Present Zoning and Use

It is acknowledged that the specified uses are permitted at Council's discretion.

p.12, 2.2.2.2 Urban Subdivision

The comment is noted.

Chapter 3

p.18 - 3.1 Physical Environment

The State Emergency Service (Mr Ken Hutchinson) has been contacted and extensive liaison undertaken to resolve the unexploded ordinance issue. Appropriate action will be taken.

Latest information suggests that the area may have been a straffing and rifle range only with no large ordinance. A rifle range could however have incorporated live firing of mortars.

p.21, 3.3.1.4 Drainage

Provision is being made in conjunction with the Water Authority to provide a corridor in Pipidinny Road reserve to allow for future construction of an arterial drainage discharge pipeline by the Water Authority. The discharge pipeline will be incorporated in the northern breakwater design and construction.

Chapter 4

p.57, 4.3.2 Public Access and Facilities

The public accessways identified by the City of Wanneroo will be provided with appropriate easements to guarantee public access through the marina area and from the beaches to the north of the marina to those to the south of the marina.

As part of the marina re-design which has been undertaken subsequent to the release of the PER public access to the marina has been improved and movement through the marina area simplified.

p.58, 4.3.3 Land Exchange

This has been noted by the Proponent.

p.58, 4.4.1 Water Supply and Treatment

The project will incorporate water conservation measures. The installation of a system receiving data collected from soil moisture and conductivity sensors and an on-site meteorological station is planned. This type of system enables the water requirements for growth to be determined accurately on a daily basis and therefore it allows usage to be minimised.

Since the PER was written, significant changes have been made to the design of the golf course and the landscaped areas in order to minimise water usage. As a result the estimated water requirements for permanent irrigation has been reduced by approximately 20%, and this is reflected in the water licence application which has been recently submitted to the Water Authority.

The revised annual water requirement has been calculated on the basis of a detailed analysis of the application rates required to maintain the different grasses and other types of vegetation planned for the resort. The grasses and other types of vegetation selected for the resort were chosen after careful consideration of their suitability in terms of water conservation.

The development proposed in the PER is a resort which includes a number of leisure facilities in addition to the golf course. Comparison of the irrigation water requirements presented in the PER for the resort with the water requirements for the proposed Carramar Park Golf Course is therefore not considered to be valid.

The project site lies within the Perth Groundwater Area. Rural land east of Wanneroo Road, which may be zoned for intensive agriculture, lies within the Wanneroo Groundwater Area where much more development of the groundwater resource has occurred reducing the portion available for further development.

p.60 - 61, 4.4.5 Stormwater Disposal

Stormwater disposal discharge to the ocean will be designed and constructed in accordance with guidelines laid down by the EPA and City Engineer (City of Wanneroo).

p.61 - 62, 4.4.5 Roads

Marmion Avenue, Eglinton Avenue and Pipidinny Road will be constructed to City Engineer's approval prior to the opening of the resort.

p.62 - 70, 4.5 Construction Levels in Relation to Greenhouse Effect

This is being taken into account.

p.64 - 5, 4.5.2.2 Dredging, Landfill and Beach Nourishment

Geotechnical investigations undertaken since the completion of the PER have indicated the presence of some hard rock in the beach area. The revised marina precinct layout has been designed to avoid the need for excavation in such material by reclaiming out to a suitable depth for boat access.

It may be necessary for some limited blasting connected with mooring pile installation to be carried out. If this is required it would be undertaken only after close consultation with the City of Wanneroo, the Department of Marine and Harbours and the EPA, and would be closely controlled. Its impact would be negligible.

Chapter 6

p.95 - 99, 6.3 Construction Management

The comments made in relation to public safety, construction traffic and noise, dust suppression and landform modification are all being taken into account and complied with.

p.96, 6.3.2.2 Construction Traffic and Noise

The requested structural engineer's survey of the historic building, 'Gibbs House', is currently in progress. Council will be advised of the of the results of this investigation and of any remedial action required to ensure that the building is not damaged by earthworks associated with the Eglinton Resort development.

p.104, 6.5.1 Marina Management, and p.108, 6.8.2 Marina Monitoring

Breakwater monitoring and maintenance would include associated access roads.

p.105, 6.5.6 and p.106 6.6.2 Drainage

Drainage outlet pipes contained within the breakwaters and groynes would be designed taking into account wave and tidal action.

p.110, 6.9.1.3 Reporting Authorities

The City of Wanneroo will receive copies of all monitoring reports as specified in the Project Agreement.

APPENDIX 3 - COASTAL ENGINEERING STUDY

There is some minor long-term erosion of the vegetation line at the southern end of the site. The construction of the groyne field in this area, although not essential, would help to reduce long-term maintenance of the dune system.

The shoreline has beach rock exposed for much of its length, especially during winter. The groynes would trap some sand and improve the beach for swimming in some areas.

The new harbour layout also incorporates a swimming beach protected from severe wave attack by an offshore submerged breakwater.

The harbour breakwater constructed to protect the marina would have a similar impact in trapping sand, but the effect would only be localised.

APPENDIX 8 - FORESHORE AND LANDSCAPE MANAGEMENT PLAN

Detailed design for the coastal zone will be undertaken once initial approvals are granted and final design criteria for the resort have been established.

Council requirements will be undertaken at the appropriate time.

APPENDIX 9 - LEGAL AGREEMENT

The version of the draft legal agreement included in the PER was current at the time of printing but has since been, and will continue to be, progressively updated as the assessment and approval process continues and the requirements of the regulatory authorities become more clearly defined.

Your R 75/89

Our Ref: NS/5/286/89

Enquiries: Mr N Siragusa

DEPARTMENT OF
MARINE & HARBOURS
WESTERN AUSTRALIA

1 ESSEX ST., FREMANTLE
P.O. BOX 402 FREMANTLE, W.A. 6160
TELEPHONE (09) 335 0888
TLX: 94784 FAX: 335 0850

The Chairman
Environmental Protection Authority
1 Mount Street
PERTH WA 6000

Att: Ms J Boyer

PROPOSED EGLINTON BEACH RESORT

The Public Environmental Review for the above project has been reviewed and comments are offered in respect of matters relating to this Department.

In particular comments are offered on the following:

* Marina and Marina Structures
* Coastal Processes
* Water Quality within the Marina
* Wave Climate and Storm Surge
* Coastal Management
* Navigation
* Management Commitments
* Land Transfer/Seabed Leases/Reclaimed Land
* Project Agreement

15/89 JBO

MARINA AND MARINA STRUCTURES

The proponent states in the PER that the development is essentially a golf course resort and that the incorporation of a Marina is principally to allow location of the Resort in "close proximity to the ocean whilst minimising the amount of development that takes place in the coastal dunes. It is also stated that "the safe harbouring of boats is an important but secondary function of the Marina".

Whilst this argument is accepted the Marina nevertheless provides for up to 220 boat moorings. No data is presented to support the need for the moorings or the impact on existing facilities such as the Two Rocks Marina, Mindarie Keys and Hillarys Marina.

Provision of a public boat launching facility is supported and the concept plan as presented is acceptable in this regard.

42020 INFO

The lighthouse/restaurant is located on a rock pile. The rock pile is intended to act as a wave attenuation structure and as such is unsuited as a foundation for the proposed lighthouse/restaurant unless the building is supported on a piled foundation. No details or comment are provided in this regard.

All other comments and commitments made in relation to the Marina and Marina structures are acceptable to this Department.

COASTAL PROCESSES

The coastal processes have been generally adequately addressed in the PER and the conclusion drawn and commitments made are acceptable to this Department.

It is noted that the proponent commits to manage the beaches and any associated replenishment or bypassing in perpetuity.

WATER QUALITY WITHIN THE MARINA

Although this item has been adequately addressed in technical terms the stated commitment to take "whatever action is necessary" to rectify any deterioration in water quality is somewhat general.

WAVE CLIMATE AND STORM SURGE

This has been adequately addressed in the PER.

COASTAL MANAGEMENT

Management of the beaches, public access, seagrass wrack and sand bypassing etc has been adequately addressed and commitments made are acceptable to this Department.

NAVIGATION

As stated in the PER design of the approaches and navigation aids will be undertaken by the proponent to the satisfaction of this Department. Future maintenance and any necessary upgrading of the navigation aids will remain the responsibility of the proponent or his assignee and will be undertaken to the satisfaction of this Department as and when considered necessary by the Superintendent Navigation and Pilotage, Department of Marine and Harbours.

MANAGEMENT COMMITMENTS

The commitments as listed in the PER in relation to issues of interest to this Department are generally satisfactory.

As stated above it is noted that the proponent commits to manage in perpetuity all aspects of the Marina, marina structures and adjacent beaches.

LAND TRANSFER/SEABED LEASES/RECLAIMED LAND

Adequate provision has been made for land transfer in respect to foreshore reserve alienated by the proposed development.

However, the proponent has not adequately addressed the issue of the consideration to be paid relating to the seabed alienated by reclamation. The reclaimed areas will ultimately be developed and portions possibly leased or sold. Although this area of land has been reclaimed it must be recognised that the original seabed is in fact Crown land.

Similarly the water area within the marina, whether existing or that created by excavation, is Crown land and as such will be the subject of a Seabed Lease.

PROJECT AGREEMENT

As stated in the PER it will be necessary for the proponent to enter into an agreement with the State and the Local Government Authority (Wanneroo) in respect of ongoing management commitments, land transfers and seabed leases.

Permission is given to the Authority to reproduce this submission, provide a copy of this submission to the proponent and to refer to this submission in the Authority's assessment report. The contact officer in relation to this submission is Mr Nello Siragusa.

J M JENKIN
EXECUTIVE DIRECTOR

19 November 1990
(c14kns.st)

EGLINTON BEACH RESORT

DEPARTMENT OF MARINE AND HARBOURS

RESPONSE TO SUBMISSIONS

1 MARINE AND MARINA STRUCTURES

The marina is considered an integral and essential part of the proposed project as it will provide moorings for the leisure accommodation component of the resort as well as for the golf course, residential and future urban development further to the east.

A proportion of berthing space will also be provided for visiting craft.

It is intended that installation of boat pens will be staged to cater for demand which will emanate essentially from within the development.

Initial development to the west of Marmion Avenue could see the gradual influx of 1500 people expanding to more than 5000 people eventually spread across the Proponent's total land holding.

Whilst expressions of interest from boat owners outside of the immediate development area would not be dismissed, the marina is not proposed to be constructed to attract trade from other established marinas to the north or south.

The Proponent is aware of the marginal economic viability of marina operation in isolation, however, he considers that the provision of such facilities for users and residents of the development is fundamental to the success of the project.

The location of the proposed harbour, between Two Rocks and Mindarie Keys, is believed to be sympathetic to the Department of Marine and Harbours' ambition to improve and increase the number of facilities for boat owners along the Western Australian coastline, which has a sparsity of natural safe anchorages.

The lighthouse/restaurant structure is not part of the revised harbour layout, although such a structure would have required the support of a properly designed piled foundation.

2 WATER QUALITY WITHIN THE MARINA

The study indicated that good water exchange should be maintained within the harbour at all times with resultant high water quality. It is therefore difficult to be precise about the nature of any action which may be required to rectify problems,

as none can be foreseen. Possible remedial works could vary from improved access for rubbish removal to, in extreme circumstances, pumping.

3 NAVIGATION

The Proponent recognises his financial commitment to the establishment of all onshore navigation beacons and leads to the satisfaction of the Department of Marine and Harbours. Reserves for navigation aids on the Proponent's land would be made available as would provision of services to them as applicable, e.g. SECWA power and road access.

Since safety at sea is very dependent on correct functioning of navigational aids, the Department of Marine and Harbours has historically taken over the responsibility for their operation and maintenance. The Department's reference to "future maintenance" and "upgrading of the navigation aids" becoming the responsibility of the Proponent would therefore require further discussion between the parties as a separate issue, not necessarily related to the environmental report under consideration.

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Your Ref
Our Ref
Enquiries
Tele Direct

75/89
E 9679
MR G GORHAM
300 7170

PERTH NORTH REGION
8 Davidson Tce,
Joondalup, Western Australia 6027
Postal Address: Private Mailbag No. 2
Wanneroo, Western Australia 6065
Telephone: (09) 300 7111
Facsimile: (09) 300 7112

Director
Environmental Protection Authority

PROPOSED EGLINGTON BEACH RESORT

I refer to your recent request for Water Authority comments on the Public Environmental Review relating to the above proposal.

Various branches within the Authority have considered the proposal and comment as follows :

GENERAL

The proposal is located within the Perth Coastal Underground Water Pollution Control Area - a Priority 3 Source Area. Although this is noted in the GRC Report in the Technical Appendices - Volume 2, it is not mentioned in the main body of the report - Volume 1. Figure 6 to volume 1 is incorrect and shows the proposal to be outside of any UWPCA. In addition the plan is inaccurate as it refers to Groundwater Priority Areas and the boundaries shown are not correct. As this is a reproduction of DPUD's North-West Corridor Structure Plan it is recommended that action is taken to ensure DPUD plans are correct.

DRAINAGE

An assessment of the Water Authority's drainage requirements has determined that an arterial drainage route along the northern boundary of the site may be required.

Provision for a drainage route in accordance with the enclosed plan should be made.

GROUNDWATER ABSTRACTION AND PROTECTION

- The project is in the Perth Groundwater Area where a licence is required to draw groundwater, it is also located in the Perth Coastal Underground Water Pollution Control Area where activities which may pollute the groundwater system are not permitted or are regulated.

41940

- The abstraction of groundwater for domestic supply and to service the golf course is not likely to have an excessive effect on the groundwater resource in the area. The domestic supply production wells must be constructed and pump-tested to Water Authority specifications, so they may be handed over to the Water Authority when the North-West corridor Groundwater Scheme extends to that area. The conditions under which the Water Authority would operate the scheme at that time need to be negotiated.

- The proponent has not adequately addressed the impact of the Marina on the saltwater interface in the aquifer. Excavations of the aquifer material near the coast have the potential to cause a major change to aquifer flow in the area. Further work is needed to investigate this. The proponent should be required to fully investigate the impacts and produce a monitoring and management strategy, which would then be reviewed by the Water Authority before allowing excavation to proceed. This work is particularly important because of the large groundwater abstraction by the development upstream of the Marina. Changes in groundwater quality due to the excavation could affect the production wells.

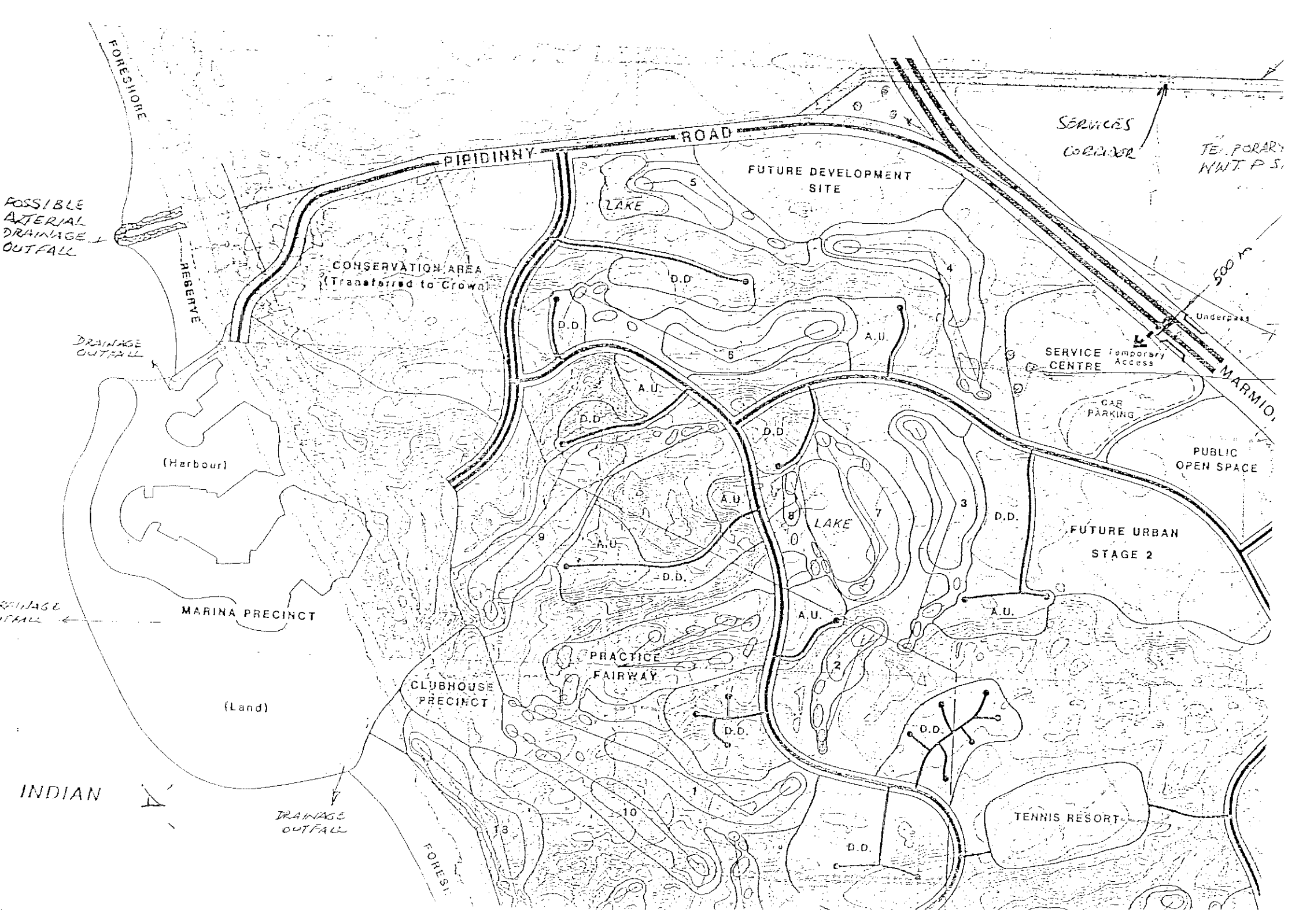
- Proposals to dispose of sewerage effluent at an on-site treatment plan is not acceptable. The risk of effluent being drawn into the production wells is too high with the ponds located at this site. A modified proposal may be acceptable if the sewerage effluent soakage ponds were placed within 500m from the coast. At this distance from the production wells drawdown should have dissipated sufficiently so that leachate from the ponds will not be drawn towards the production wells and will flow out to sea.

- Nutrient input and turf management plans will require Water Authority approval. The use of herbicides, fungicides and pesticides will also be subject to Water Authority approval.

- Temporary fuel storage for construction plant will need to be contained within impervious membranes to the approval of the Water Authority.

- Fuel storage either above or below ground is to be constructed to the approval of the Water Authority.

G R GORHAM
MANAGER DESIGN SERVICES
PERTH NORTH REGION
November 12, 1990 (ST5)


FORESHORE
PIPIDINNY ROAD
SERVICES CORRIDOR
FUTURE DEVELOPMENT SITE
LAKE
POSSIBLE ARTERIAL DRAINAGE OUTFALL
RESERVE
CONSERVATION AREA (Transferred to Crown)
D.D.
A.U.
DRAINAGE OUTFALL
Underpass
SERVICE CENTRE
Temporary Access
CAR PARKING
PUBLIC OPEN SPACE
(Harbour)
LAKE
FUTURE URBAN STAGE 2
MARINA PRECINCT
PRACTICE FAIRWAY
CLUBHOUSE PRECINCT
(Land)
TENNIS RESORT
INDIAN
DRAINAGE OUTFALL
FORESH

EGLINTON BEACH RESORT

WATER AUTHORITY OF WESTERN AUSTRALIA

RESPONSE TO SUBMISSION

1 GENERAL

The location of the development site within the Perth Groundwater Area and the Perth Coastal Underground Water Pollution Control Area was noted in Appendix 5 and reference to the statutory requirements associated with these areas was made on page 6 of the main text.

Figure 6 of the PER is a reproduction of the North West Corridor Structure Plan, as prepared by the Metropolitan Region Planning Authority (now Department of Planning and Urban Development) in 1977. The terminology, Groundwater Pollution Control Area, and the areas shown on the figure were correct as at that time.

Reference to Figure 6 is made in Section 3.1 of the report in relation to its historical planning context, and not in relation to Groundwater Priority Areas.

Although not shown in figure-form the proposed development site is clearly identified as being located within a groundwater protection area in Sections 3.5.2.5, 3.7.1 and 4.4.1 of the PER text.

2 DRAINAGE

Provision is being made to provide a corridor in the Pipidinny road reserve to allow for future construction of an arterial drainage discharge pipeline by the Water Authority of Western Australia.

3 GROUNDWATER ABSTRACTION AND PROTECTION

3.1 Groundwater Licensing

The Proponent acknowledges that the project site is in the Perth Groundwater Area where a licence is required to draw groundwater. The Proponent also acknowledges that the site is in the Perth Coastal Underground Water Pollution Control Area where activities which may pollute the groundwater system are not permitted or are regulated.

3.2 Groundwater Scheme Operation

The Proponent undertakes to construct and test domestic water supply bores to Water Authority specifications. The Proponent intends to continue negotiations with the Water Authority in order to obtain agreement on the conditions under which the Water Authority would operate the domestic water supply to the resort.

3.3 Saltwater Interface

Since the PER was written, the design of the marina has been completely revised. The new design involves construction of the marina offshore by placement of fill and no excavation extending inland from the present coastline is proposed. Consequently, no landward migration of the seawater interface will occur and the impact of construction on the groundwater system is likely to be minimal.

3.4 Disposal of Sewage Effluent

The Proponent's preferred option is to connect the resort's reticulated sewerage system to the Water Authority's proposed Alkimos Treatment Plant. The Proponent would appreciate the assistance of the State Government in obtaining permission for the sewer main to be constructed on private land situated between the Eglinton project area and the Alkimos site.

In the event that the Water Authority's proposed Alkimos Sewage Treatment Plant is not available at the time of resort construction, a package treatment plant would be installed on-site with a 500 m buffer zone around the works. This plant would operate until the resort sewerage system could be connected to the Water Authority's treatment plant.

The treatment plant planned for the resort is different to the plant constructed at Mindarie, which has oxidation ponds only. The Eglinton plant would be similar to the plant constructed at the Vines Resort in the Swan Valley which is an intermittent activated sludge plant. This plant produces a high quality effluent and little or no odour when operated correctly.

Treated effluent from an on-site plant would be discharged to ground via a low pressure irrigation system. The effluent disposal area would be at least 500 m west (down gradient) of any proposed domestic water supply bores or 800 m north of the proposed domestic water supply bores.

3.5 Nutrient Management Plans

The Proponent acknowledges that Nutrient and Turf Management Plans and the use of herbicides, fungicides and pesticides will require Water Authority approval.

3.6 Fuel Storage (construction plant)

The Proponent undertakes to construct temporary fuel storage facilities within impervious membranes to the approval of the Water Authority

3.7 Fuel Storage (permanent)

The Proponent undertakes to construct fuel storage facilities, whether above or below ground, to the satisfaction of the Water Authority.