



WESTERN AUSTRALIA  
MINISTER FOR THE ENVIRONMENT

Ass #	172
Bull #	616
State #	281

**STATEMENT THAT A PROPOSAL MAY BE IMPLEMENTED (PURSUANT  
TO THE PROVISIONS OF THE ENVIRONMENTAL PROTECTION ACT  
1986)**

THE SANCTUARY, PELICAN POINT, BUNBURY (172)

PELICAN POINT PTY LTD

This proposal may be implemented subject to the following conditions:

**1 Proponent Commitments**

The proponent has made a number of environmental management commitments to protect the environment.

- 1-1 In implementing the proposal, the proponent shall fulfil the commitments (which are not inconsistent with the conditions or procedures contained in this statement) made in the Public Environmental Review and subsequently, and included as Appendix 1 in Environmental Protection Authority Bulletin 616. (A copy of the commitments is attached.)

**2 Implementation**

Changes to the proposal which are not substantial may be carried out with the approval of the Minister for the Environment.

- 2-1 Subject to these conditions, the manner of detailed implementation of the proposal shall conform in substance with that set out in any designs, specifications, plans or other technical material submitted by the proponent to the Environmental Protection Authority with the proposal. Where, in the course of that detailed implementation, the proponent seeks to change those designs, specifications, plans or other technical material in any way that the Minister for the Environment determines on the advice of the Environmental Protection Authority, is not substantial, those changes may be effected.

**3 Artificial Wetlands**

The proponent may create artificial wetlands in place of the existing wetlands. These should be designed to maximize their use by waterbirds.

- 3-1 The proponent shall create artificial wetlands on Lot 100 as a substitute for some of the existing wetlands on Lot 26 and on Lot 100, according to the requirements of the Environmental Protection Authority.
- 3-2 Prior to commencement of construction the proponent shall design, and subsequently construct, the artificial wetlands to maximize their use by waterbirds, to the requirements of the Environmental Protection Authority on advice of the Leschenault Inlet Management Authority and the Department of Conservation and Land Management.

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#### **4 Mosquito Control**

The wetlands should be managed to reduce mosquito breeding.

4-1 The proponent may open part of the Lot 26 wetland to the Collie River so as to facilitate the management of mosquito breeding in the wetland.

4-2 The proponent shall manage mosquito breeding in all wetlands by:

1. distribution of information to all potential land purchasers about the mosquito problem;
2. application of adulticides only wherever feasible, but not at the waterbird feeding habitat; and
3. timing of chemical control measures to minimize conflict with bird feeding.

4-3 The proponent shall manage mosquito breeding in a way that is consistent with the Leschenault Regional Mosquito Strategy and shall meet the requirements of the Environmental Protection Authority on advice of the Leschenault Inlet Management Authority and the City of Bunbury.

#### **5 Foreshore Reserve**

The width of the Collie River reserve should average no less than 50 metres from the high water mark.

5-1 Prior to commencement of construction, the proponent shall provide a publicly-owned foreshore reserve along the Collie River which averages no less than 50 metres in width from the high water mark, to the requirements of the Minister for the Environment on advice of the Department of Planning and Urban Development and the Leschenault Inlet Management Authority.

5-2 Prior to commencement of construction, the proponent shall provide a land-based publicly-owned foreshore reserve of sufficient size to back the boardwalk over the river, to the requirements of the Minister for the Environment on advice of the Department of Planning and Urban Development and the Leschenault Inlet Management Authority.

#### **6 Management of Water Bodies**

The proponent should monitor and manage the canal, the marina and the non-navigable waterway as part of an environmental management programme, prepared in stages.

6-1 Prior to commencement of construction, the proponent shall prepare an environmental management programme for monitoring and management of the canal, the marina and the non-navigable waterway for the constructional and post-constructional stages (Part 1) to address the following:

1. water quality;
2. connection of the canal to the river;
3. dewatering;
4. protection of the foreshore; and
5. accumulation of nutrients in the sediments,

to the requirements of the Minister for the Environment on advice of the Environmental Protection Authority and the Leschenault Inlet Management Authority.

6-2 Within six months following commencement of construction, the proponent shall prepare an environmental management programme for monitoring and management of the canal, the marina and the non-navigable waterway for the post-constructional stages (Part 2) to address the following:

1. navigable depths, including the connection of the canal to the Collie River;
2. maintenance dredging if required;
3. the canal retaining walls, the foreshore walls and other structures;
4. strategies for dealing with accidental spillages;
5. management of oil and fuel, wastes from boats, rubbish and suspended solids;
6. water quality and sediment levels; and
7. contingency provisions,

to the requirements of the Environmental Protection Authority on advice of the Leschenault Inlet Management Authority, the Department of Marine and Harbours and the City of Bunbury.

- 6-3 The proponent shall implement the two parts of the environmental management programme required by conditions 6-1 and 6-2.

## **7 Waterways Manager**

A long-term Waterways Manager should be identified prior to rezoning.

- 7-1 Prior to canal zoning receiving final approval under the Bunbury Town Planning Scheme, the proponent shall determine the long-term Waterways Manager, to the requirements of the Minister for the Environment and the Minister for Planning, on advice of the City of Bunbury, the Department of Planning and Urban Development and the Department of Marine and Harbours.

## **8 Nutrients**

The proponent should manage nutrients to minimise their export from the site.

- 8-1 Prior to commencement of construction, the proponent shall prepare a plan to minimize nutrient export from the site, to the requirements of the Environmental Protection Authority on advice of the Leschenault Inlet Management Authority.
- 8-2 The proponent shall implement the plan required by condition 8-1 to the requirements of the Environmental Protection Authority
- 8-3 The proponent shall ameliorate any adverse impacts by nutrients on the environment, to the requirements of the Environmental Protection Authority on advice of the Leschenault Inlet Management Authority.

## **9 Environmental Management Programme**

The proponent should prepare a comprehensive Environmental Management Programme, which draws together the proponent's initial and subsequent commitments and the environmental conditions in this statement. This programme should be prepared for the two phases of the proposal : Constructional (Phase 1) and Post-constructional and on-going (Phase 2).

- 9-1 Prior to commencement of construction, the proponent shall prepare an Environmental Management Programme for the management, monitoring, auditing and reporting requirements of the constructional phase (Phase 1) which addresses, but is not necessarily limited to the following issues during construction:
1. remnant vegetation management;
  2. foreshore management;
  3. management of waterbird habitat ; and
  4. appropriate management commitments,

to the requirements of the Minister for the Environment on advice of the Leschenault Inlet Management Authority (for issues 1, 2, and 3), the Department of Conservation and Land Management (for issue 3) and the City of Bunbury (for issue 4).

- 9-2 The proponent shall implement the Environmental Management Programme for Phase 1 required by condition 9-1 to the requirements of the Environmental Protection Authority on advice of other relevant State and local authorities.
- 9-3 Within six months following commencement of construction, the proponent shall prepare an Environmental Management Programme for the management, monitoring, auditing and reporting requirements of the post-constructional and on-going phase (Phase 2) which addresses the environmental issues not addressed in Phase 1, and issues which should be addressed throughout the life of the project, including but not necessarily limited to the following:
1. remnant vegetation;
  2. foreshore management;
  3. monitoring and management of waterbird habitat;
  4. mosquito breeding management;
  5. nutrient management;
  6. monitoring and management of all waterbodies, including wetlands;
  7. management of groundwater drawdown effects on vegetation;
  8. contingency provisions; and
  9. appropriate management commitments.
- 9-4 The proponent shall implement the Environmental Management Programme for Phase 2 required by condition 9-3 to the requirements of the Environmental Protection Authority on advice of relevant State and local authorities.

## **10 Proponent**

The ministerial conditions apply legally to the nominated proponent.

- 10-1 No transfer of ownership, control or management of the project which would give rise to a need for the replacement of the proponent, shall take place until the Minister for the Environment has advised the proponent that approval has been given for the nomination of a replacement proponent. Any request for the exercise of that power of the Minister shall be accompanied by a copy of this statement, endorsed with an undertaking by the proposed replacement proponent to carry out the project in accordance with the conditions and procedures set out in the statement.

## **11 Time Limit on Approval**

The environmental approval for the proposal is limited.

- 11-1 If the proponent has not substantially commenced the project within five years of the date of this statement, then the approval to implement the proposal as granted in this statement shall lapse and be void. The Minister for the Environment shall determine any question as to whether the project has been substantially commenced. Any application to extend the period of five years referred to in this condition shall be made before the expiration of that period, to the Minister for the Environment, by way of a request for a change in the condition under Section 46 of the Environmental Protection Act. (On expiration of the five year period, further consideration of the proposal can only occur following a new referral to the Environmental Protection Authority.)

## **12 Compliance Auditing**

In order to ensure that environmental conditions and commitments are met, an audit system is required.

- 12-1 The proponent shall prepare periodic "Progress and Compliance Reports" to help verify the environmental performance of this project, in consultation with the Environmental Protection Authority.

## **Procedure**

The Environmental Protection Authority is responsible for verifying compliance with the conditions contained in this statement, with the exception of conditions stating that the proponent shall meet the requirements of either the Minister for the Environment or any other government agency.

If the Environmental Protection Authority, other government agency or proponent is in dispute concerning compliance with the conditions contained in this statement, that dispute will be determined by the Minister for the Environment.

~~Bob Pearce, MLA~~  
MINISTER FOR THE ENVIRONMENT

21 JUL 1993

## PROPONENT'S COMMITMENTS

The Proponent, Pelican Point Pty Ltd, undertakes to abide by all commitments made in the Public Environmental Review and in subsequent discussions with the EPA, as detailed below. The project will be operated and maintained in accordance with the guidelines established in the management programmes detailed in Section 6 of the PER. These commitments, which the Proponent accepts as being legally binding on approval of the project by the Government of Western Australia, will be incorporated into the Environmental Management Programme and any agreement entered into between the Proponent, the State and the City of Bunbury.

Commitments which have been marked with an asterisk (\*) are largely issues of a planning or engineering nature which will be addressed through local authority or other approvals and will not be subject to the EPA environmental audit programme.

### 1 CONSTRUCTION MANAGEMENT

Pelican Point Pty Ltd (the Proponent) undertakes to carry out the following works prior to or during construction of the Pelican Point project:

#### 1.1 Public Access During Construction\*

- (i) In the interests of public safety the construction site will be fenced and appropriately worded signs will be erected at access points around the project area to enforce public access restrictions, to the satisfaction of the City of Bunbury.

#### 1.2 Ethnographic and Archaeological Sites\*

- (i) The Proponent will comply with the provisions of the Western Australian *Aboriginal Heritage Act 1972-1980*, and in particular will make application under Section 18 of the Act in the event that it is proposed to disturb any identified site.

#### 1.3 Landscape Aesthetics and Landform

- (i) A comprehensive landscape master plan for the development, including the golf course and areas of public open space, will be prepared to the satisfaction of EPA on advice from LIMA and the City of Bunbury, prior to construction. Landscaped areas to be provided within the development will incorporate:
  - a review at the detailed design stage to ensure the retention of a greater proportion of remnant vegetation and in particular the retention of mature trees, fringing vegetation and areas of bushland;
  - retention of the samphire and wetland vegetation fringing that part of the wetland which is to be retained within Pt. Loc. 26;

- maintenance of samphire and other wetland vegetation on Lot 100 sufficient to support the current levels of feeding by egrets, on the advice of CALM and LIMA;
- planting of indigenous vegetation species, including a high proportion of flowering shrubs; and
- planting of fringing vegetation along the Leschenault Inlet foreshore to screen the development from the estuary.

- (ii) All housing and tourist accommodation within the site will be constructed outside the industrial buffer zone as defined by the Rigden Lines.\*

Tree belts will be planted within the buffer zone along the western boundary of Lot 100.

- (iii) Buildings will be restricted to two development levels.\*
- (iv) Power supply to the development will be underground and constructed to SECWA approved standards.\*
- (v) The provisions of the Collie River Flood Study, notably the adoption of the recommended development set-back from the Collie River and the provision of a 250 m wide relief floodway, will be incorporated to the satisfaction of WAWA.
- (vi) The relief floodway will be established as a wetland reserve to the satisfaction of the EPA.

#### **1.4 Traffic, Noise and Vibration**

- (i) Hours of operation will be subject to approvals to be granted by the City of Bunbury. All construction vehicles will be fitted with effective emission controls. Ground vibration will be monitored on site and in surrounding areas if this is identified as a problem. Liaison with the City of Bunbury throughout the construction phase will identify any public concerns arising from noise or vibration.
- (ii) All roads, roundabouts and other entry points to the Pelican Point development will be constructed to meet the safety standards and requirements of the Main Roads Department and the City of Bunbury.\*

#### **1.5 Protection of Vegetation During Clearing**

All vegetation to be retained on site, as indicated in the detailed design plan, will be clearly marked and, where appropriate, fenced off from construction activity.

## 1.6 Importation of Fill and Disposal of Spoil

- (i) Bulk earthworks will be undertaken in two phases separated by 1-3 years. Phase One will involve construction of Stage One of the project on the ILDA land.\*

Works to resolve the mosquito and odour problem on Pelican Point will also be undertaken during Phase One.

- (ii) Filling of the site will only occur to the level necessary to comply with flood level requirements and potential sea level rise, to an average level of 2.7 m AHD. In general the fill levels will be set at the minimum level required by the City of Bunbury for the various land uses proposed.\*
- (iii) Topsoil removed during construction will be stockpiled on parts of the site which will be subsequently disturbed. Excavated soil will later be used in landscaping the golf course and areas of public open space within the resort. There will be no export of spoil from the site.\*
- (iv) Stockpiled topsoil and spoil will be stabilised to the satisfaction of the City of Bunbury to prevent erosion or the generation of dust. Dust will be suppressed by watering if necessary. Exposed soil surfaces will be revegetated with appropriate grasses, e.g. cereal rye, for interim soil stabilisation. As earthworks are completed the land will be revegetated with native species or planted to lawn and trees as appropriate.

## 1.7 Excavation and Dredging

- (i) Dewatering fluids will be impounded on site to allow suspended particulates to settle out before the water is discharged to the Collie River. Turbid water will be contained within the canal and lake until the entrance is breached. Timing of discharge of dewatering fluids and breaching of the canal and lake connections to the estuary will take place when turbidity is seasonally high and flow is out to sea. Construction timing and techniques will be subject to approvals by LIMA and the City of Bunbury.
- (ii) The residential portion and the connection channel of the non-navigable waterway will be excavated to a design depth of -1.6 m AHD, to the satisfaction of EPA and LIMA. From this point invert levels will increase to mean water level at the southern portion of the wetlands lake to ensure that water does not stagnate within the waterway.
- (iii) The non-navigable waterway will be transferred to the Crown free of cost and where it forms part of a private housing and resort development, will be maintained initially by the Proponent and subsequently by a Home Owners Association, or alternatively, by the City of Bunbury under a possible differential rating scheme. Those sections of the non-navigable waterway which lie within the Collie River foreshore reserve or within the floodway, will be established and maintained by the Proponent during the agreed maintenance period, after which time the City of Bunbury will become responsible for ongoing maintenance and management.

- (iv) Excavation of the canal and non-navigable floodway lake will be undertaken under dry conditions with traditional earthmoving equipment wherever possible, to the approval of LIMA and City of Bunbury.
- (v) The canal and entrance channel will be excavated and maintained at a depth of -1.6 m AHD, with a centre line depth of -2 m AHD to allow for sedimentation, to the satisfaction of DMH and the City of Bunbury.
- (vi) The canal waterway will be transferred to the Crown free of cost and be maintained, initially by the Proponent and subsequently by a Home Owners Association, or alternatively, by the City of Bunbury under a possible differential rating scheme.

## **1.8 Wetland Reconstruction and Rehabilitation**

- (i) Artificial wetlands planned within the development (perched freshwater lakes, irrigation lakes and saltwater lakes) will be developed and maintained over the lifetime of the project in accordance with a management plan to the satisfaction of EPA, LIMA and the City of Bunbury. These water bodies will remain in private ownership and be maintained initially by the proponent and subsequently by a Home Owners Association, or alternatively, by the City of Bunbury under a possible differential rating scheme.
- (ii) Artificial wetlands and associated vegetation will be designed to replace traditional sites lost as a result of the development. The design of artificial wetlands planned for the development, which will be further detailed in the management plan, will incorporate:
  - existing native wetland vegetation;
  - a variety of water depths;
  - natural or artificial variations in water levels;
  - revegetation using indigenous plant species; and
  - islands for refuge.

## **2 OPERATIONS MANAGEMENT**

The Pelican Point project involves the management of a number of interactive aspects which have the potential to adversely impact on the environment, if not adequately managed. These include:

- mosquito breeding;
- odour;
- drainage;
- groundwater;
- nutrients;
- wetland water quality and productivity;
- canal water quality, siltation (water depth) and structural integrity; and
- landscape.

The commitments given by the Proponent in relation to each of these issues are described in the following sections.

## **2.1 Mosquito Breeding**

- (i) Sites in which mosquito breeding currently takes place will be modified to reduce or eliminate breeding, to the satisfaction of the City of Bunbury. Artificial wetlands created within the development will be designed to minimise mosquito breeding to the satisfaction of the Mosquito Control Review Committee.

## **2.2 Odour**

- (i) The existing odour problem generated by wetlands which dry in summer will be eliminated by converting the wetland to a tidally-flushed permanent wetland to the approval of LIMA and the City of Bunbury.

## **2.3 Drainage**

- (i) Stormwater from the development will be managed to the satisfaction of the City of Bunbury and LIMA. Disposal will be on site to localised soakage pits to the maximum extent possible. Excess stormwater will be discharged to the perched lakes within the development and by discharge to the residential canal or non-navigable lake. The stormwater drainage plan proposed will ensure that silt, contaminants and nutrients are trapped before discharge to the artificial waterways. The drainage system will be maintained to ensure effective trapping of contaminants.

## **2.4 Groundwater Management**

- (i) Groundwater will be pumped from the Leederville Formation, subject to the granting of a licence by WAWA prior to the commencement of abstraction, into a series of interconnected lakes which will be lined to form a water storage facility, from which the reticulated water supplies will be drawn.
- (ii) The availability of shallow groundwater to supplement that drawn from the Leederville Formation will be further investigated and reported to WAWA prior to the commencement of abstraction.

## **2.5 Nutrient Management**

Nutrient management will be implemented through a comprehensive nutrient and irrigation management plan prepared to the satisfaction of the EPA and LIMA with the objective of minimising impacts on wetlands and adjacent and downstream water quality in the Collie River and Leschenault Inlet.

To minimise nutrient migration from the site, the following management strategies are proposed:

(i) Minimise application of fertiliser by:

- use of recommended fertilizer types at a frequency and application rate determined on the advice of the Department of Agriculture (Bunbury);
- monitoring soil and foliar nutrient levels to determine appropriate rates of nutrient application;
- monitoring of nutrient levels and chlorophyll in all saline and freshwater lakes between October and January of each year to determine the trophic status;
- use of slow release fertilisers;
- soil modification to enhance retention of nutrients;
- minimising grassed areas in the golf course and landscaped open spaces;
- use of local species of grass wherever possible;
- encouraging residents to minimise fertiliser application and plant native species through the establishment of landscaped demonstration gardens and providing advice on recommended species appropriate to the area.

(ii) Minimise groundwater use by:

- reducing the golf course grassed areas to minimum required;
- irrigation of grassed areas only. Intervening areas will be allowed to dry in summer;
- adoption of appropriate water conservation measures such as seasonal modifications to irrigation programme and dawn/dusk irrigation;
- use of stormwater runoff;
- monitoring of soil moisture levels to determine appropriate irrigation requirements;
- planting of native drought-tolerant species throughout landscaped parts of the development.

## 2.6 Existing and Artificial Wetland Habitat Management

To manage urban, human, domestic and feral animal pressures on the use of wetlands by waterfowl, the following measures will be introduced:

- creation of islands;
- planting of shelter belts;
- setting paths back from the water's edge;
- development of a public education programme;
- strict control of dogs;
- formulation of a fox and feral cat reduction programme if required in consultation with the Agriculture Protection Board;
- direction of light away from water;
- provision of vegetated refuge areas;
- provision of warning signs indicating the possibility of wildlife movement within the development; and

- enforcement of speed limits within the development.

These measures will be incorporated into a wetland management plan prepared to the satisfaction of the EPA on the advice of LIMA and CALM.

## 2.7 Foreshore Management

A foreshore management plan for the Collie River and Leschenault Inlet foreshores adjacent to the development will be finalised following negotiation between the Proponent, the local authority and LIMA incorporating the following elements.

- (i) Land, identified on the land transfer plan (Fig. 15), will be transferred to the Crown free of cost.\*
- (ii) Fringing shoreline trees will be retained wherever possible and additional plantings at an increased density will be made at the conclusion of the site preparation phase of construction. Those parts of the Collie River foreshore which still support a fringing rush vegetation will be protected wherever possible. Minor variations to the Collie River foreshore reserve boundary will be made to maintain mature trees, on advice from LIMA.
- (iii) The Proponent will re-construct the Collie River public boat ramp, and car and boat trailer parking will be provided.\*
- (iv) The tennis courts, currently shown as being partly located within the Collie River floodway, will be relocated outside of the Collie River foreshore reserve;
- (v) A kiosk and associated parking area will be constructed on freehold land adjacent to the boat ramp facility to provide convenience items to the boating public and foreshore users.\*
- (v) A dual-use pathway is proposed around the Collie River and Vittoria Bay foreshores, as well as through the development to facilitate access between the two foreshores. Three public toilet blocks are proposed in locations along the foreshore and at the boat launching ramp.
- (vi) A public thoroughfare around the foreshore of the hotel and accommodation units will be maintained by way of an easement on title in favour of Bunbury City Council and LIMA. This easement will provide continuous pedestrian access and limited vehicular access for maintenance purposes in perpetuity.
- (vii) Areas of the foreshore which are currently degraded will be grassed to provide for greater public use.
- (viii) Parking areas will be provided in all defined areas of public open space within the development which lie adjacent to the foreshore reserve.\*
- (ix) To minimise the pressures of adjacent development and human disturbance on the foreshore regions, the following management strategies are proposed:

- the dual use pathways will be set back from the water's edge;
- a public education programme will be established and implemented in order to stress the significance of waterbirds utilising the area; and
- signs will be erected to direct the strict control of dogs.

## 2.8 Canal and Navigable Waterway Management

A management plan designed to address the operational aspects of the waterways will be prepared to the satisfaction of the City of Bunbury, EPA, DMH and LIMA, and will incorporate the following commitments:

### Physical requirements

The physical elements of the canal and artificial waterway system are generally discussed in the construction programme. The following relate however to the on-going management of the project:

- (i) Easements to the satisfaction of LIMA and the City of Bunbury will be located at least every 300 m along the canal banks to facilitate access for canal maintenance.\*
- (ii) The Collie River shoreline will be stabilised adjacent to the public boat launching ramp and at the entrance of the canal and non-navigable lake to the satisfaction of LIMA and the City of Bunbury.
- (iii) Navigation aids to the approval of DMH will be provided within the canal and adjacent estuary. Following their construction responsibility for navigation aids will be handed over to that authority.\*

### Water quality

It is proposed to maintain water quality within the canal (within the limits imposed by the waters of the Collie River and Leschenault Inlet) to meet the criteria set down in Schedules 1, 2, 5, 7, 8 and 16 of Bulletin No. 103 (DCE, 1981). To achieve these aims the following commitments are made:

- (iv) Discharge from boat holding tanks will be strictly prohibited.
- (v) Long-term accommodation on vessels will not be permitted within the development's waterways.
- (vi) The development site will be fully deep sewered to the satisfaction of WAWA.
- (vii) The refuelling facility will include appropriate drains to trap pollutants before runoff discharges into the canal.
- (viii) A ban on the use of TBTO-based antifouling paint coatings on vessels less than 25 m in length will come into effect in July 1991, but will take up to five years to

become fully effective. In the interim boats with TBTO coatings will not be permitted to moor within the canal waterway or marina.

- (ix) In the event that water quality declines to the point where ameliorative action is required, forced circulation and aeration will be achieved through use of a boat and compressor. If coliform counts exceed permissible limits, appropriate advisory signs will be erected around the canal shore, and water contact will be restricted as necessary.

### **Fishing pressure**

- (x) The Proponent will co-operate with the Fisheries Department in developing a public education programme aimed at managing exploitation of the fish resource. It is proposed to provide informative signage within the marina, including information about minimum catchable fish sizes and bag limits.

### **Contingency plans**

- (xi) Contingency plans to ensure the navigability of the canal entrance, water quality maintenance, the prevention of accidental overflow from the sewerage system and repair of storm and flood damage will be documented in an Emergency Procedures Manual to the satisfaction of DMH, LIMA and the City of Bunbury.

## **3 MONITORING PROGRAMMES**

### **3.1 Nutrient and Groundwater Monitoring Programme**

- (i) Nutrient monitoring will include recording the levels of nutrient used within the site on the golf course and public areas and the monitoring of nutrient levels within the soil and plant tissues in order to determine application rates, based on application at the minimum rates necessary to maintain the health of the target species.
- (ii) Monitoring of groundwater resources will include:
  - observation of the migration of the seawater interface over time, so that action can be taken to protect the aquifer within the Leederville Formation from seawater intrusion if necessary;
  - water levels and quality (including nutrients) on a monthly basis; and
  - groundwater abstraction rates on a monthly basis.
- (iii) Monitoring results will be reported annually and reviewed following five years of operation.

### **3.2 Wetland Monitoring Programme**

Monitoring of the wetlands within the project site will incorporate the following:

- (i) Nutrient, dissolved oxygen and salinity levels within the lakes.
- (ii) Re-establishment of wetland vegetation around the margins of the lakes.
- (iii) Use of the wetlands by birds and other vertebrate animals.
- (iv) Productivity of the lakes measured in terms of invertebrate and amphibian population levels.

### **3.3 Canal and Artificial Waterway Monitoring Programme**

A canal and artificial waterway monitoring programme will be detailed to the satisfaction of the City of Bunbury and LIMA, incorporating the following commitments:

- (i) A survey of canal earthworks will be conducted prior to the cessation of dewatering. Subsequently, an annual hydrographic survey will be undertaken and compared with the "as constructed" survey to establish whether sedimentation is occurring and thus the necessity for, and frequency of, dredging. Navigable water depth will be maintained by dredging as required. Plans for both maintenance dredging and the disposal of dredged material will be submitted to LIMA for approval prior to dredging.
- (ii) The condition of wall structures within the canal and lake will be monitored on an annual basis for five years, commencing within one month of practical completion, and the results reported to the City of Bunbury. A monitoring programme will be developed to confirm that the design and construction of the walls and scour protection material is satisfactory.
- (iii) The artificial waterways will be inspected daily by the Waterways Manager and any corrective action, required to maintain water quality and aesthetics to the high standard required by the Proponent and Government agencies, will be implemented immediately.
- (iv) The condition of shoreline stabilisation structures will be monitored on an annual basis for five years by the Proponent and the results reported to the City of Bunbury and LIMA.
- (v) Water quality monitoring of physical, chemical and aesthetic parameters will be conducted at selected sites both within the canal and lake and within the Collie River commencing on completion of the construction phase. Monitoring will be conducted on a quarterly basis for the first five years of operation and be reported on annually to the City of Bunbury, LIMA and the EPA. Monitoring after the initial five years will be dependent upon a review of the initial monitoring results.

Parameters to be monitored and the frequency of monitoring will be as follows:

- Bacteria levels within the canal will be monitored five times over a 30 day period in January and February each year.
- Nutrients (i.e. total phosphorus, orthophosphate, total nitrogen and inorganic nitrogen) will be monitored within the artificial wetlands on a quarterly basis.
- Sediments within the canal will be monitored as follows:
  - (a) biannually in the canal for nutrients, including apatite and non-apatite phosphorus; and
  - (b) when the canal is initially opened, and subsequently in years three and five for a range of metals and derivatives. These are copper, zinc, cadmium, tin, lead and chromium. Sediments will be sampled at the water quality monitoring sites identified in Figure 23 of the PER and at a control site within the Collie River.