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New Bunbury Power Station

Strategic Environmental Review
June 2002

Western Power

Western Power Corporation

Strategic Planning for
Future Power Generation

New Bunbury Power Station

Strategic Environmental Review
June 2002

SINCLAIR KNIGHT MERZ

Western Power

6. Existing Environment

6.1 Introduction

This section describes the receiving environment in which the New Bunbury Power Station and associated facilities would be located. This section has drawn on several references and in particular the Greater Bunbury Region Scheme (WAPC, 2000).

As described in **Section 4.1**, the site of the proposed New Bunbury Power Station is located immediately to the north of the Bunbury Port Inner Harbour and south west of The Cut near Turkey Point. The Leschenault Inlet lies 1km to the south west and the Leschenault Estuary, at its closest point, approximately 1km to the east (**Figure 4-1**).

The Leschenault Inlet takes the form of a 2km long tidal inlet with a maximum depth of 2m and an area of 27km^2. The shallow lagoon is connected to the sea by an artificial channel, known as the Koombana channel at the southern end. However, as described below the Inlet and the Estuary were once the same entity.

The Leschenault Estuary is fed by the Collie River from the east and the Preston River has been diverted into it from the south east. The estuary is connected to the sea by a man-made opening known as The Cut.

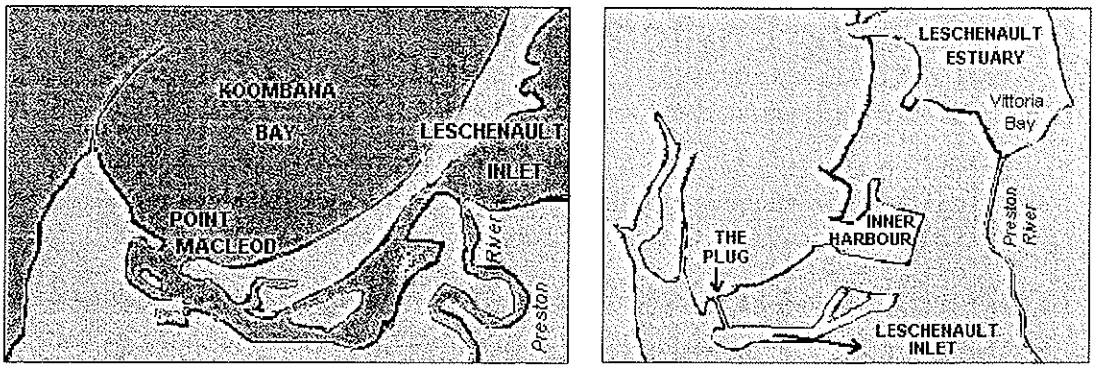
6.2 Historical Context

The land on which the New Bunbury Power Station is located has been heavily engineered over the years through both drainage and coastal works. The following section summarises the major changes that have taken place and sets in context the receiving environment in which the New Bunbury Power Station would be located.

Originally the Leschenault Inlet was an estuary into which both the Collie and Preston Rivers flowed and, at the western end of Koombana Bay, flowed back out into the sea.

In 1951, this original estuary mouth at Point MacLeod was closed and a new entrance (The Cut) was made. Development at this time resulted in the Leschenault Inlet being split into two parts now referred to as the Leschenault Inlet and the Leschenault Estuary (**Figure 6-1**).

The construction of The Cut (a short channel about 150m wide, 500m long and 2m deep through the sand dunes, opposite the mouth of Collie River) was undertaken in 1951. The Cut was made to improve the drainage of the estuary so that flooding in the Bunbury region by the Collie and Preston Rivers could be prevented. Risk of flooding was further alleviated in 1960 when the Wellington Reservoir was completed by damming 75% of the catchment area of the Collie River. The deposition of river silts in Koombana Bay was also stopped as a result of The Cut.



Leschenault Inlet in 1898 — The Plug and Inner Harbour 1976

■ **Figure 6-1 Land Use Change in the Bunbury Coastal Area**

In 1957 the old coal-fired Bunbury Power Station commenced operation near Turkey Point, when an elongated sand dune system was levelled to build the plant (refer **Section 6.4**). Land near the North Shore is composed of man-made fill, a result of dredging in the Inner Harbour during the early 1970s.

The great resources expansion of the late 1960s and 1970s led to construction of the Inner Harbour, a deep-water facility to take large ocean-going ships. To allow construction of the Inner Harbour it was first necessary to change the course of the Preston River to allow it to flow directly into Leschenault Estuary. This meant cutting off the lower part of the estuary from the main water body and changing it from an estuarine to a marine environment.

Since 1941, the effects of urbanisation and engineering works has led to significant changes in the landforms, soils and vegetation within and around the estuary. There has been a decline in the estuarine fringing forest; native vegetation has taken over sandy river deltas; a vegetated tidal lagoon has formed and between 1941 and 1989 approximately 346ha of fringing vegetation was lost through clearing, mainly in the northern and southern parts of the estuary. Salinity is also a major problem affecting the estuarine vegetation. Since flushing of the lagoon area by groundwater has been replaced by a more centralised drainage, it has caused an increase in salinity over most of the area at certain times of the year. Man-made fill also makes up some of the land in the immediate vicinity of the plant site.

Therefore the receiving environment into which the New Bunbury Power Station would be located has been substantially altered, rendering the site almost devoid of any remnant vegetation and substantially composed of made-ground. **Figure 6-2** shows as aerial view of the proposed site and highlights some of the environmental features of the immediate area.

Discussions with the Water and Rivers Commission and review of the flood inundation maps for Bunbury indicate that the site is not impacted by flooding from the Preston River.

Tide levels in Bunbury generally range between -0.1m to 1.2 m, relative to chart datum (Lord & Associates, 2000). Storm surge levels are reported to be generally in the range of 0.4m to 1.05m between 1930 and 1980 with an extreme water level of 2.48m being recorded in 1978 due to the influence of cyclone Alby (Lord & Associates, 2000).

6.8 Wetlands

Wetlands extend throughout much of the Bunbury region. The wetlands in the vicinity of the Bunbury Power Station are shown in **Figure 6-5**.

In general, extensive development on the Swan Coastal Plain has led to a large decline in the number of wetlands that now exist on the Plain. Development activities such as housing, waste disposal and agriculture have led to filling or draining of most natural wetlands. This has led to the conservation value of the remaining wetland systems of the Swan Coastal Plain being recognised.

The Environmental Protection Authority released *the Environmental Protection (Swan Coast Plain Lakes) 1992 Policy* (EPP), which defined many wetlands that contained permanent water bodies. The purpose of the EPP is to facilitate the identification and protection of wetlands within the particular policy area that are considered by the EPA to be worthy of inclusion in a wetlands register. Generally, a wetland is likely to satisfy the wetland registration criteria if it has been recognised as an internationally, nationally or regionally significant site or exhibits significant attributes or values. As shown on **Figure 6-5**, no EPP wetlands lie in close proximity to the plant site.

A more comprehensive review of the wetlands of the Swan Coastal Plain was conducted by Hill *et al.* in 1996. This defined wetlands (ephemeral as well as permanent) from Gingin to Dunsborough. The southern part of this, from Mandurah to Dunsborough, was updated in 1998, and was used to update the Water and Rivers Commission (WRC) Wetlands Geomorphic Database on the Swan Coastal Plain.

The Wetlands Geomorphic Database defines the boundaries of wetlands, classifies them according to wetland type (e.g. dampland, ephemeral wetland) and evaluates their conservation significance, assigning them a management category, based on the system established by Hill *et al.* (1996) as shown on **Figure 6-5** and described below:

Evaluation Class:	**Management Objective:**
C (Conservation)	Preserve natural attributes through reservation or statutory protection.
R (Resource Enhancement)	Preserve remaining ecological attributes through reservation or management.
M (Multiple Use)	Maintain hydrological functions and remaining natural attributes.

The WRC is expected to place a high priority on avoiding direct and indirect impacts on wetlands, particularly those of C and R categories (Bowman Bishaw Gorham, 1999).

The plant site does not directly impact on any wetlands and is approximately 1km from the Leschenault Estuary, a Conservation category wetland shown in **Figure 6-5**. The Leschenault Inlet Management Authority (LIMA) is responsible for managing the Leschenault Estuary.

Potential impacts on wetlands from the power station development and management and monitoring strategies to minimise these impacts are detailed in **Sections 7.3.3** and **8.3.1**.

6.9 Terrestrial Flora and Fauna

6.9.1 Terrestrial Flora and Vegetation

6.9.1.1 Bunbury Region

The Bunbury area is situated within the Drummond Botanical Sub-district, within the Darling Botanical District within the South West Botanical Province.

The Darling System (commonly known as System 6) regional vegetation mapping study, conducted by the Department of Conservation and Environment in 1981 covered the Bunbury area (Department of Conservation and Environment, 1981). This study recognised significant vegetation in proximity to the proposed study area as being the Leschenault Estuary (site C66), downstream parts of the Brunswick, Wellesley and Collie Rivers (site C67) and Leschenault Inlet, between the port and Bunbury City (site C68). The closest to the proposed plant site is the Leschenault Estuary (site C66), approximately 1km to the east of the site.

Recently during preparation of the 'Environmental Review of the Greater Bunbury Region Scheme' (WAPC, 2000), vegetation was assessed regionally. The vegetation was described as being closely related to the landforms. The general study area, contained within the Quindalup Complex, is described as:

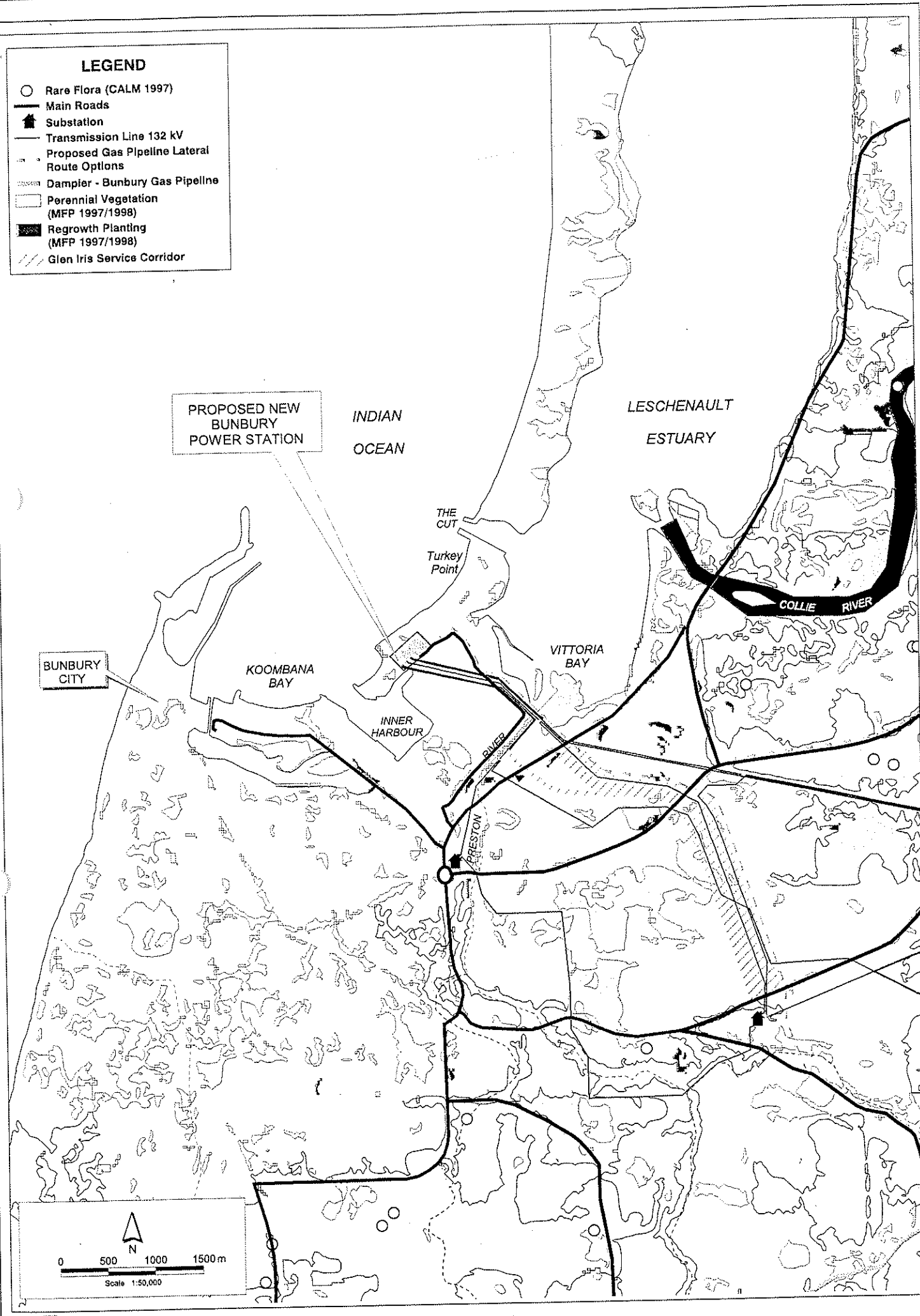
> 'Coastal dune complex consisting mainly of two alliances – the strand and fore dune alliance and the mobile and stable dune alliances. Local variations include the low closed forest of *Melaleuca lanceolata – Callistris preissei* and the closed shrub of *Acacia rostellifera*.'

The vegetation within this complex is stated as being relatively well represented with approximately 40% of the original area of this vegetation community still remaining in 1995/6 (WAPC, 2000).

As part of the '*System 6 Update*', currently being undertaken by Department of Environmental Protection (DEP), Threatened and Poorly Reserved Plant Communities and Threatened Ecological Communities are being defined. The nearest of the communities lies approximately 6km to the south of the proposed plant site (WAPC, 2000).

During preparation of the Environmental Review of the Greater Bunbury Region Scheme (WAPC, 2000), a search was made of the Department of Conservation and Land Management (CALM) rare flora database. No occurrences of declared rare flora was found within a 10km radius of the proposed plant site.

Remnant vegetation occurring around the Bunbury area is shown in **Figure 6-6**.



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NEW BUNBURY POWER STATION
REMNANT VEGETATION AND RARE FLORA

FIGURE 6-6

Project No. DE02258.100
Date Drawn: 14.08.2001
Prepared by: T.Lee

6.9.1.2 Bunbury Power Station Site

The proposed plant site is generally highly disturbed with only the coastal foredune and halophytic river complex associations surviving. Much of the coastal foredune vegetation has been rehabilitated by Western Power. Western Power has also rehabilitated an area at the far northern end of the site, on the former ash ponds yet to be opened to the public. This site has been returned to the City of Bunbury for use as a recreation reserve as shown on **Figure 6-2** but has not yet been opened to the public.

A vegetation survey of the New Bunbury Power Station site has not been undertaken for this assessment, due to the disturbed nature of the site. In 1957 the site was first developed for industry and no vegetation data is available before this point in time. As shown on **Figure 6-6** only a small amount of remnant vegetation still exists in the vicinity of the plant site, and none of this is on the proposed plant site itself. **Figure 6-2,** an aerial photograph dating from 2000 provides a more recent illustration of existing remnant vegetation near the plant site.

Based on a review of available information it is concluded that the proposed plant site is likely devoid of significant vegetation and rare flora having been previously cleared for construction of the Old Bunbury Power Station (**Figure 6-6**). Furthermore, the proposed plant site is located on an area disturbed significantly by man over the years, when major drainage and coastal engineering works were undertaken (**Section 6.2**).

Potential impacts on terrestrial flora and vegetation from the power station development and management and monitoring strategies to minimise these impacts are detailed in **Section 7.3.1**.

6.9.2 Terrestrial Fauna and Habitats

Native terrestrial fauna would once have been widespread in the Greater Bunbury region. However, as urbanisation increased with population growth, native fauna and their habitats have declined or disappeared altogether, resulting in disturbance-tolerant species being increasingly characteristic of heavily disturbed areas.

As the Old Bunbury Power Station operated between 1957 and 1999, there is not expected to be any significant fauna habitat on-site.

Fauna associated with and present in the Leschenault Inlet and Estuary is described in **Section 6.10**.

Potential impacts on terrestrial fauna and habitats from the power station development and management and monitoring strategies to minimise these impacts are detailed in **Section 7.3.2**.

6.10 Estuarine Flora and Fauna

The Leschenault Estuary is regarded as one of the top ten South West wetlands, with up to 5,000 birds present at a time (Ninox Wildlife Consulting, 1989). The estuary is 13km in length and 1.5 to 2.5km wide. Both the Collie and Preston Rivers enter the estuary in the lower 3km section where the mouths of the rivers are bordered by extensive vegetated deltas. From 1941 to 1989 approximately 350ha of fringing vegetation was lost through clearing, mainly in the northern and southern regions of

the estuary. Degradation of the remaining native vegetation is occurring due to the invasion of introduced species (Waterways Commission, 1994).

6.10.1 Estuarine Flora and Vegetation

The following section describes the main fringing vegetation communities found in the southern section of the Leschenault Estuary and the Leschenault Inlet within a 5km radius of the proposed plant site, based on information extracted from the Waterways Commission (1994). This Waterways Commission document is not a detailed vegetation survey of the Leschenault Estuary and Inlet, rather it provides descriptions of known vegetation associations and examples of their locations. However, it is still useful in considering the type of vegetation present within the estuary and inlet.

The Leschenault Estuary and Inlet support 28 plant communities, which can be divided into:

- Saltmarshes: Saltmarshes develop in areas which are saline due to tidal inundation or evaporation of saline water trapped on the marsh by a shoreline levee. Thirteen communities are found in and around the Leschenault Estuary.
- Fringing Vegetation: Is classified as emergent species, which live more or less permanently in shallow water. Three groups are found in the Leschenault Estuary.
- Fringing Estuarine Forest: Is typically composed of the small saltwater sheoak (*Casuarina obesa*) and the saltwater paperbark (*Melaleuca cuticularis*), the mohan paperbark (*M. viminea*) and the swamp paperbark (*M. rhaphiophylla*). It usually occurs where the ground level rises and salinity levels are not extreme. Five communities are found in the Leschenault Estuary.
- Freshwater Vegetation: Occurs close to the estuary in areas receiving substantial freshwater input from drains and creeks or from groundwater seepage typically occurring at the base of a ridge or sand dune. Three communities are found in the Leschenault Estuary.
- Sandy Rise Vegetation: Four communities of sandy rise vegetation occur in the Leschenault Peninsula where they are commonly found on the margins of high coastal sand dunes or low estuarine beach dunes.

Four communities of Saltmarshes are found in the vicinity of Vittoria Bay and the Preston River Delta, approximately 1.5km from the site. These include:

- Shore rush closed rushland (*Juncus kraussii*);
- Samphire closed herbland (*Sarcocornia quinqueflora*); and
- Samphire glasswort low open heath (*Halosarcia halocnemoides*).

One community of Fringing Vegetation is found in the Vittoria Bay and the Preston River Delta area, namely, the water couch and marsh club rush closed grass and sedgeland (*paspalum distichum- Bolboschoenus caldwelii*).

One community of Fringing Estuarine Forest, namely, the saltwater low open-closed forest (*Casuarina obesa*) has been identified in this area.

6.10.2 Estuarine Fauna and Habitats

The Leschenault Estuary is regarded as one of the top ten wetlands in Western Australia in terms of waterbird species richness. These significant habitats are located approximately 1.5 – 2km east and south west of the site (WAPC, 2000).

The most important area is the northern end of Leschenault Estuary, which is a breeding ground and refuge for migratory birds including greenshank. The estuary is also a significant summer refuge for waterfowl including black duck, black swan, grey teal, mountain duck, musk duck and pelican. From mid to late summer most ducks move from the western shore to the northern shore where there is some freshwater seepage rendering it an important bird refuge.

It is estimated that 62 species of waterbirds use the estuary, of which the tidal saltmarshes provide an important intertidal and freshwater feeding area (Ninox Wildlife Consulting, 1989). These tidal marshes are the only areas where breeding takes place and provide refuge for young waterbirds. A total of 18 bird species are protected through Japan – Australia Migratory Bird Agreement and China – Australia Migratory Bird Agreement and some species are not commonly found elsewhere. Little Egret, Great Egret, Grey Plover, Bar-tailed Godwit and Great Knot all use the estuary in vast numbers particularly for feeding. As a permanent wetland it provides an important drought refuge for ducks, swans and other groups of waterbirds (Ninox Wildlife Consulting, 1989). These occur in large numbers in the estuary however they are believed to be particularly abundant in the Northern Estuary (Waterways Commission, 1992).

Key waterbird habitats of the Bunbury area have been identified as fringing samphire marshes, wetlands and mudflats. These are:

- Marshes at the extreme northern end of the Leschenault Estuary;
- A freshwater soak on the western shore of the Leschenault Estuary;
- Mudflats at the Preston River mouth;
- Mangroves on Anglesea Island and Leschenault Inlet; and
- Mudflats at the Collie River mouth.

The mudflats at Preston River mouth, and mangroves on Anglesea Island and Leschenault Inlet, lie closest to the plant site, approximately 1km to the east and south west, respectively as shown on **Figure 6-5**.

For many reasons, primarily man-induced, much of the terrestrial fauna of the estuary foreshore has been lost. In 1992 it was reported that the Leschenault Peninsula still supports quite a large population of kangaroos and large populations of rabbits have established. Lizards and snakes are found amongst the fringing vegetation (Waterways Commission, 1992).

- Construction and erection of gas lateral to power station (by the gas supplier);
- Construction and erection of power transmission lines from the station (by Western Power);
- Construction and erection of liquid fuel storage facilities;
- Removal of temporary waste handling facilities;
- Construction of any landscaping;
- Establishing security, fencing and procedures;
- Establishing safety and first aid procedures;
- Establishing environmental management and emergency procedures; and
- Site clean up.

The remainder of this section identifies the potential impacts of the above mentioned activities, along with generic management and monitoring strategies.

7.3 Biophysical Environment

7.3.1 Terrestrial Flora and Vegetation

Management Objectives

- *Manage the abundance, species diversity, geographic distribution and productivity of vegetation communities; and*
- *Protect Declared Rare and Priority Flora, consistent with the provisions of the Wildlife Conservation Act 1950.*

7.3.1.1 Potential Impacts

During the construction phase, direct impacts on flora and vegetation would result from clearing for the power station site, construction laydown areas and corridors for access roads and infrastructure. The extent and significance of these impacts would largely depend on the final layout of the power station and corridor locations, and the significance of the vegetation and flora in the areas cleared.

The New Bunbury Power Station would occupy 10 – 12ha of land. The plant site was cleared during the 1950s for construction of the old Bunbury Power Station. As shown in **Figure 6-6**, very little remnant vegetation remains in the vicinity of the power station site and none of this occurs on the power station site itself. Therefore it is considered that there would be no direct impacts on significant flora or vegetation from the development at the power station site.

As discussed in **Section 5.4.3**, the transmission corridor requirements beyond the initial 240MW development are not known at this stage of the assessment and would be determined by network operational requirements at the time. Any new transmission lines would be constructed by Western Power utilising existing corridors and easements where possible. Assessments of and management strategies for any clearing for new transmission line corridors would be undertaken by Western Power in a separate approvals process and have not been considered in this assessment.

The gas pipeline lateral route to the New Bunbury Power Station has not been confirmed, however it is likely that it would follow existing easements, or defined service corridors. The options for the proposed gas lateral route are shown in **Figure 4-4** and described in **Section 4.6.3**. Given the strategic nature of this assessment, specific impacts associated with the gas lateral have not been assessed in this document. Specific impacts of and management strategies for the pipeline lateral construction and operation would be addressed in the separate environmental approvals for the construction of the gas lateral, which would be undertaken by the gas supplier.

Although there would be no direct impact on significant flora or vegetation from development at the power station site, there may be potential for indirect impacts on flora and vegetation in the areas adjacent to the plant site during the construction phase, through the following:

- Dust deposition on vegetation;
- Potential spread of dieback (*Phytophthora* species);
- Potential introduction and spread of weed species; and
- Potential leakage or spillage of environmentally hazardous materials or hydrocarbons.

7.3.1.2 Management Strategies

The Preferred Bidder would be required to implement the following strategies (or equivalent) to minimise the impacts on flora and vegetation:

- Areas used for temporary construction laydown and other areas would be selected such that vegetation removal is minimised;
- A site rehabilitation plan would be developed and where possible, disturbed areas would be rehabilitated with native species where possible;
- Dust mitigation measures would be implemented (refer to **Section 7.4.1**);
- A weed management and control plan would be implemented; and
- Materials that are potentially hazardous to vegetation would be contained and managed in accordance with strategies outlined in **Section 7.4.5**.

Management strategies to minimise impacts on any flora and vegetation from the construction of the gas pipeline lateral and power transmission lines would be addressed in separate environmental impact assessments.

7.3.1.3 Monitoring

The Preferred Bidder would be required to supervise all clearing and earthwork activities to ensure that no unnecessary clearing is undertaken.

7.3.2 Terrestrial Fauna and Habitats

Management Objectives

- *Maintain the abundance, diversity and geographic distribution of terrestrial fauna; and*
- *Protect Specially Protected (Threatened) Fauna, consistent with the provisions of the Wildlife Conservation Act 1950.*

7.3.2.1 Potential Impacts

During the construction phase, potential impacts on fauna and their habitats would be through the removal of habitat that occurs within the areas that are required for the power station site, construction laydown areas and corridors for access roads and infrastructure. As identified in **Section 6.9.2** no impacts on fauna values are predicted at the Bunbury Power Station site as the site has been previously disturbed and does not contain any significant fauna habitat.

Marine and estuarine fauna (e.g. Leschenault Estuary and Inlet) are not expected to be impacted by construction activities at the plant site as they are considered to be a sufficient distance from the site.

There may however be potential indirect impacts on fauna in habitat around the site from factors such as noise during construction, but this would be temporary. Blasting is not likely to be required, given the previous workings on the site.

7.3.2.2 Management Strategies

To minimise the impacts on fauna and their habitats from the proposed development, the Preferred Bidder would be required to, where possible, minimise disturbance of vegetation and the habitats that are provided by vegetation. This would include the use of existing corridors and easements where possible. Clearing management strategies are detailed in the management strategy section for terrestrial flora and vegetation (**Section 7.3.1.2**).

7.3.2.3 Monitoring

The Preferred Bidder would be required to supervise all clearing and earthwork activities to ensure that no unnecessary clearing of fauna habitats is undertaken.

7.3.3 Drainage and Site Hydrology

Management Objectives

- *Minimise the potential to impact the quality of local surface and groundwater; and*
- *Minimise the potential for erosion due to stormwater flow.*

7.3.3.1 Potential Impacts

Earthworks and terrain shaping would be carried out on the project site thus potentially altering existing surface water flows within and outside the site. The potential impacts associated with the proposal include the following:

- Increased erosion and sediment transport as a result of diversion of upstream surface runoff around the site;
- Soil deposition down gradient of project site; and
- Increased surface runoff volumes due to the creation of hard surfaces.

During construction there would be a requirement for normal earthmoving equipment fuel, lubricant and oil supply to be temporarily stored on-site. There is the potential that these could be accidentally released and contaminate surface water or groundwater (refer to **Section 7.4.5**).

7.3.3.2 Management Strategies

The potential impacts identified above apply equally during construction as with operation. Therefore, for clarity, the discussion of management measures below includes aspects relating to operation activities as well.

The Preferred Bidder would be required to manage drainage and hydrology impacts with reference to the Environmental Protection Authority (EPA) Draft Guidance No. 26 *Management of Surface Run-Off from Industrial and Commercial Sites* (EPA, 1999a), specifically including the following strategies or equivalent:

- A Stormwater Management Plan would be developed prior to the commencement of construction.
- Clean water would be separated from potentially contaminated stormwater. These sources would be managed in the following ways:
  - All infrastructure which could potentially leak or spill contaminated substances would be sealed and bunded and the stormwater would be diverted into a lined storage area (or sump) for water quality testing. If the stormwater is found to be clean, it would be discharged into the 'clean' surface water drainage system. If the stormwater is found to be contaminated, Best Management Practices would be used to treat the stormwater to acceptable levels prior to discharge into the environment or the stormwater would be transported off-site for treatment and disposal.
  - A clean surface water drainage system would be provided comprising open channels, pipes and sedimentation trap(s).
  - Clean surface runoff would be diverted around the construction site and discharged into sediment traps prior to release into the environment. These sediment traps would serve to minimise erosion and attenuate flows.
  - The stormwater drainage would consist of a major/minor drainage system where the minor system would consist of internal pipe drainage that would convey the 1-in-5 year storm while the major drainage system would convey the 1-in-100 year storm;
  - Sediment traps would be designed to settle out suspended particles for frequently occurring storms (e.g. the 1-in-2 year event) and would be able to withstand a 1-in-100 year event; and
  - The velocity of flows in unlined open drains would be limited to prevent scour. Limiting velocities would be achieved by a combination of sensible drain configuration and energy dissipating structures.

Also refer to management strategies for Pollution – Hydrocarbon and Hazardous Material Management (**Section 7.4.5.2**).