

**Strategic Planning for Future Power Generation
Pinjar Power Station Expansion
Kwinana/East Rockingham Power Station
Kemerton Power Station
New Bunbury Power Station
Collie Power Station Expansion**

Western Power Corporation

**Report and recommendations
of the Environmental Protection Authority
under section 16(e) of the Environmental Protection Act**

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Summary and recommendations

Western Power Corporation has requested early advice on any constraints which may be “fatal flaws”, from an environmental impact perspective, which may apply to the installation of power generation facilities at sites at Pinjar, Kwinana, Kemerton, Bunbury and Collie. The proponent’s intent is to have an array of sites on which power providers could propose new power stations. It is not proposed that all sites would be used in the near future and any proposal for a specific site would be subject to more detailed assessment under s38 of the *Environmental Protection Act 1986*. This report provides the Environmental Protection Authority’s (EPA’s) advice and recommendations to the Minister for the Environment and Heritage on the environmental factors relevant to the proposal.

Section 16(e) of the *Environmental Protection Act 1986* enables the EPA to advise the Minister for the Environment and Heritage on the environmental protection aspects of any proposal or scheme, and on the evaluation of information relating thereto.

Relevant environmental factors

The EPA has provided strategic, early advice on proposed array of potential power station sites. The following factors have been considered at a high level with a view to detecting any “fatal flaws” at each site. More detailed analysis of these factors (and possibly others) would need to be undertaken at the time of any s38 assessment.

The EPA decided that the following environmental factors relevant to the proposal required detailed evaluation in the s16(e) report:

- a) Vegetation;
- b) Specially Protected (Threatened) Fauna;
- c) EPP lakes and other specially protected wetlands;
- d) Rivers and ephemeral streams;
- e) Greenhouse gas emissions;
- f) Gaseous and particulate emissions;
- g) Noise;
- h) Marine ecosystems;
- i) Groundwater;
- j) Risk and hazards; and
- k) Heritage issues.

There was a number of other factors which were relevant to the proposal, but the EPA is of the view that the information set out in Appendix 3 provides sufficient evaluation of those.

Conclusion

The discussion of environmental factors responds to Western Power Corporation's request for early advice on any environmental constraints which may apply to the installation of power generation facilities at sites at Pinjar, Kwinana, Kemerton, Bunbury and Collie.

There are no specific proposals for construction of power generation facilities but the SER documents provide details of likely types of facility which future proponents might install. More specific details of power generation facilities at specific sites will be provided by proponents and will undergo section 38 assessment.

In assessing the sites the EPA has reached the conclusion that a power generating facility of the type proposed could be managed at all of them such that it is unlikely that the EPA's objectives would be compromised. The following issues are highlighted:

- Greenhouse gases – the EPA has previously (EPA, 1990) advised that its preference in relation to electricity demand is, in declining order of rank:
 - conservation and efficiency improvements;
 - renewable energy sources such as wind and solar energy;
 - gas, including combined cycle, turbines;
 - new technology coal plants;
 - old technology coal plants; and
 - petroleum fuel plants.

The EPA is aware that the demand for electricity in Western Australia will continue to grow. The rate of this growth can be reduced somewhat through demand management but there will be a continuing need for additional electricity generating facilities.

Ideally, additional demand should be satisfied through electricity generating facilities which minimise the production of greenhouse gases, assuming that other environmental requirements are not unreasonably compromised. The EPA will support the achievement of this aim by public and private enterprises.

Renewables will be an important means of achieving this. The EPA, however, recognises that in assessing electricity generating proposals supply agencies will need to be able to give consideration to the size of the supply required, technical issues (eg the need for rapid response to peak demands) and strategic requirements (eg. maintaining a balance of sources and types of fuel).

If power stations are proposed which do not result in the least greenhouse gas intensity, the EPA expects that mitigation actions would be investigated during the s38 process and adopted as appropriate.

- NO_x control – the EPA expects the best practice of low-NO_x burners to be installed in all gas turbines. A significant reduction in NO_x emissions from liquid fuel could be achieved by NO_x control measures such as water injection. However, if NO_x suppression for liquid fuel requires water injection, the environmental impacts of producing the requisite quantity of demineralised water need to be considered against the benefits of NO_x suppression for a fuel that is expected to be used for only 100 hours per year.
- Pinjar – the protection of the groundwater at Pinjar has always been a priority for Western Power and the same high priority is expected to be enforced for additional gas fired plant at this location.

Every effort should be made to minimise the clearing of bush and, if bush is cleared, consideration should be given to its replacement with an equivalent or better piece of bushland that can be secured for conservation and management adjacent to the Pinjar Bush Forever site or by rehabilitation projects elsewhere.

- Kwinana/East Rockingham – the preferred gas fired proposal would re-use effluent from the Cape Peron outfall which would result in a desirable net reduction of over 10ML/year in effluent discharge. Seawater cooling is also an option but would be subject to a separate referral process should the proponent wish to pursue that option.
- Kemerton – the initial plant layout for a gas fired plant appeared to impact on adjacent wetlands. The layout has been revised to avoid direct impact but management strategies will need to be detailed in the s.38 assessment to address potential indirect impacts from drainage, pipe leaks etc.

Final design of a wastewater pipeline route will need to be addressed in the s.38 assessment of a specific proposal and will need to ensure minimum disturbance to vegetation.

- Bunbury – although the site is within 2km of the Preston River delta and southern tidal flats, a new gas fired electricity generating facility would likely be less intrusive than the previous coal-fired power station with which the waterbirds co-existed for many years.

The local community needs to be closely consulted in relation to the visual impact of a new power station as part of the s.38 assessment if this site is preferred by a proponent.

- Collie – Western Power should liaise with DEP over the next year to ensure confidence in the modelling methodology for the s.38 assessment.

A coal-fired power station of about 300MW would be expected to emit about 1 gram of dioxins and furans per year. An assessment of the significance of this emission and control measures, if necessary, will need to be addressed by any future proponent in the s.38 assessment.

Any s.38 submission by a future proponent needs to clearly explain the intended water management strategy and its interaction with the 1999 Collie Basin Water Resource Management Strategy formulated by the Collie Water Advisory Group.

Discussion of combustion technologies and the selection of the most appropriate technology would be expected to be a significant part of the s.38 assessment of a specific proposal.

Overall, the EPA advises future proponents that, in putting forward proposals for power generating facilities, they should take into account:

- the issues raised in Western Power's SER documents;
- the public submissions and Western Power's response to them; and
- this report.

Recommendations

The EPA submits the following recommendations to the Minister for the Environment and Heritage:

1. That the Minister notes that this report provides early advice on any environmental constraints which may apply to the installation of power generation facilities at sites at Pinjar, Kwinana, Kemerton, Bunbury and Collie;
2. That the Minister considers the report on the relevant strategic environmental factors as set out in Section 3;
3. That the Minister notes that future specific proposals for power generation facilities at specific sites will need to undergo section 38 assessment.
4. That the Minister notes that the EPA has concluded that at all of the sites, a power generating facility of the type proposed could be managed such that it is unlikely that the EPA's strategic environmental objectives would be compromised.

Contents

	Page
Summary and recommendations.....	i
1. Introduction and background.....	1
2. The proposal.....	2
2.1 Existing site development.....	3
3. Relevant environmental factors.....	9
3.1 Vegetation.....	9
3.2 Specially Protected (Threatened) Fauna.....	15
3.3 EPP lakes and other specially protected wetlands.....	19
3.4 Rivers and ephemeral streams.....	22
3.5 Greenhouse gas emissions.....	25
3.6 Gaseous and particulate emissions.....	29
3.7 Noise.....	38
3.8 Marine ecosystems.....	42
3.9 Groundwater.....	45
3.10 Risk and hazards.....	50
3.11 Heritage issues.....	54
4. Conditions and Commitments.....	58
4.1 Proponent's commitments.....	58
5. Conclusions.....	62
6. Recommendations.....	64

Figures

- 1a Location of Pinjar power generation facility
- 1b Location of Kwinana/East Rockingham power generation facility
- 1c Location of Kemerton power generation facility
- 1d Location of Bunbury power generation facility
- 1e Location of Collie power generation facility

Appendices

1. List of submitters
2. References
3. Identification of relevant environmental factors
4. Summary of submissions and Proponent's response to submissions

1. Introduction and background

Western Power Corporation has requested early advice from the Environmental Protection Authority (EPA) on any constraints, from an environmental impact perspective, which may apply to the installation of power generation facilities at sites at Pinjar, Kwinana, Kemerton, Bunbury and Collie.

As there are no specific proposals for construction of power generation facilities the identification of potential sites did not constitute a “proposal”. It therefore could not be subject to environmental impact assessment under Section 38 of the *Environmental Protection Act 1986* with the associated imposition of Conditions by the Minister for the Environment and Heritage.

The EPA has assessed the proposed sites and provides advice on the concept to the Minister for the Environment and Heritage under Section 16(e) of the *Environmental Protection Act 1986*. The advice is provided to guide potential proponents of power generation facilities through identification of ‘fatal flaws’ and the type and extent of further work that will be required for environmental approval in order to address environmental issues of concern to the EPA.

The Western Power Corporation prepared Strategic Environmental Review (SER) documents for each of the sites which were made available for a four week public review period commencing on 17 June 2002 and closing on 15 July 2002.

In compiling this report, the EPA has considered the relevant environmental factors associated with the proposal, issues raised in public submissions during the public review period, specialist advice from the Department of Environmental Protection (DEP) and other government agencies, the proponent’s response to submissions and the EPA’s own research and expertise.

Further details of the proposal are presented in Section 2 of this report while Section 3 discusses environmental factors relevant to the proposal. Commitments requiring management measures to be implemented by future proponent(s) of power generation facilities are commented on in Section 4. Section 5 outlines the EPA’s conclusions on the strategic assessment. The EPA’s Recommendations regarding the proposal are included in Section 6.

A list of people and organisations that made submissions is included in Appendix 1 and references are listed in Appendix 2. A summary of identification of relevant environmental factors is included in Appendix 3. Appendix 4 is presented as an attachment and contains a summary of submissions and the proponent’s response to submissions and is included as a matter of information only – it does not form part of the EPA’s report and recommendations.

The EPA has considered issues raised in public submissions and the response from the Western Power Corporation to those issues when identifying relevant environmental factors.

2. The proposal

Western Power Corporation (WPC) is presently the principal generator, transmitter, distributor and retailer of electricity in Western Australia. To satisfy existing customer demands for electrical power and to maintain the safety and reliability of the electricity system over the next decade, WPC believe an increase in total generating capacity of 700 – 900MW will be required over this period. Current planning studies and asset management strategies have given rise to the following plant replacement/retirement and power procurement programmes:

Power Procurement

- about 240MW of peaking capacity as early as 2004/05 and no later than the summer of 2005/06; and
- about 300MW of base load capacity to be in service by 2007/08.

Plant Replacement/Retirement:

- installation of Cockburn 1 at Kwinana – 240MW in 2003/04;
- retirement of Kwinana Stage B – 240MW in mid 2005;
- installation of Cockburn 2 – 240MW in 2005/06;
- retirement of Muja Stage A/B – 240MW in mid 2006; and
- retirement of Kwinana Stage A – 240MW in 2007/08.

The *Electricity Corporation Act 1994* requires WPC to procure any substantial new generation capacity through a non-discriminatory and open procurement process involving private suppliers.

To accelerate the process and ensure the availability of suitable sites for the procurement process, WPC is seeking strategic environmental consideration under Section 16(e) of the *Environmental Protection Act 1986* for a number of potential power station sites. A Strategic Environmental Review (SER)(WPC, 2002) outlined a site selection study conducted between Geraldton and Bunbury which identified a number of potentially suitable sites.

The initial power generation requirement is for 240MW of peaking plant to meet short duration, high power demands followed by about 300MW of base load plant to meet the increase in continuous power demand.

For the purpose of this assessment, the following ultimate power station configurations have been assumed:

Pinjar – open cycle gas turbine plant of 240MW capacity;

Kwinana/East Rockingham – open cycle gas turbine plant of up to 360MW capacity and combined cycle gas turbine plant of up to 1,080MW capacity;

Kemerton – open cycle gas turbine plant of up to 360MW capacity and combined cycle gas turbine plant of up to 1,080MW capacity; and

Bunbury – open cycle gas turbine plant of up to 360MW capacity;

Collie – coal fired steam turbine plant of approximately 300MW capacity.

This assessment does not address issues related to extensions of power lines or natural gas pipelines associated with development of power generation facilities. Most of the sites are close to existing power transmission lines but where additional power lines are necessary they will be subject to discrete section 38 referrals. Similarly, environmental aspects of extensions to natural gas pipelines will be subject to discrete section 38 referrals or will be addressed as part of section 38 assessment of power generation facilities.

The locations of the proposed sites are shown in Figures 1a, 1b, 1c, 1d and 1e.

2.1 Existing site development

Pinjar

The site (Figure 1a) is set aside for power generation facilities and currently contains nine open cycle gas turbine generators with a combined capacity of 575MW.

Kwinana/East Rockingham

The SER concentrated on the preferred site at Mason Rd (Figure 1b) but three other fallback sites have also been assessed. All sites are clear of any development but the preferred site in Mason Rd has been previously used for disposal, storage and processing of hydrocarbon and other wastes.

Kemerton

The SER concentrated on the preferred site in the north-east of the Kemerton Industrial Park (Figure 1c) with a fallback site further to the south. Both sites are clear of any development.

Bunbury

The site (Figure 1d) previously supported a coal-burning power station which was decommissioned in 1999. The main power station buildings have been demolished but some of the ancillary buildings are still standing.

Collie

The site (Figure 1e) is set aside for power generation facilities and currently contains a coal-burning steam turbine base load generator with a capacity of about 300MW.

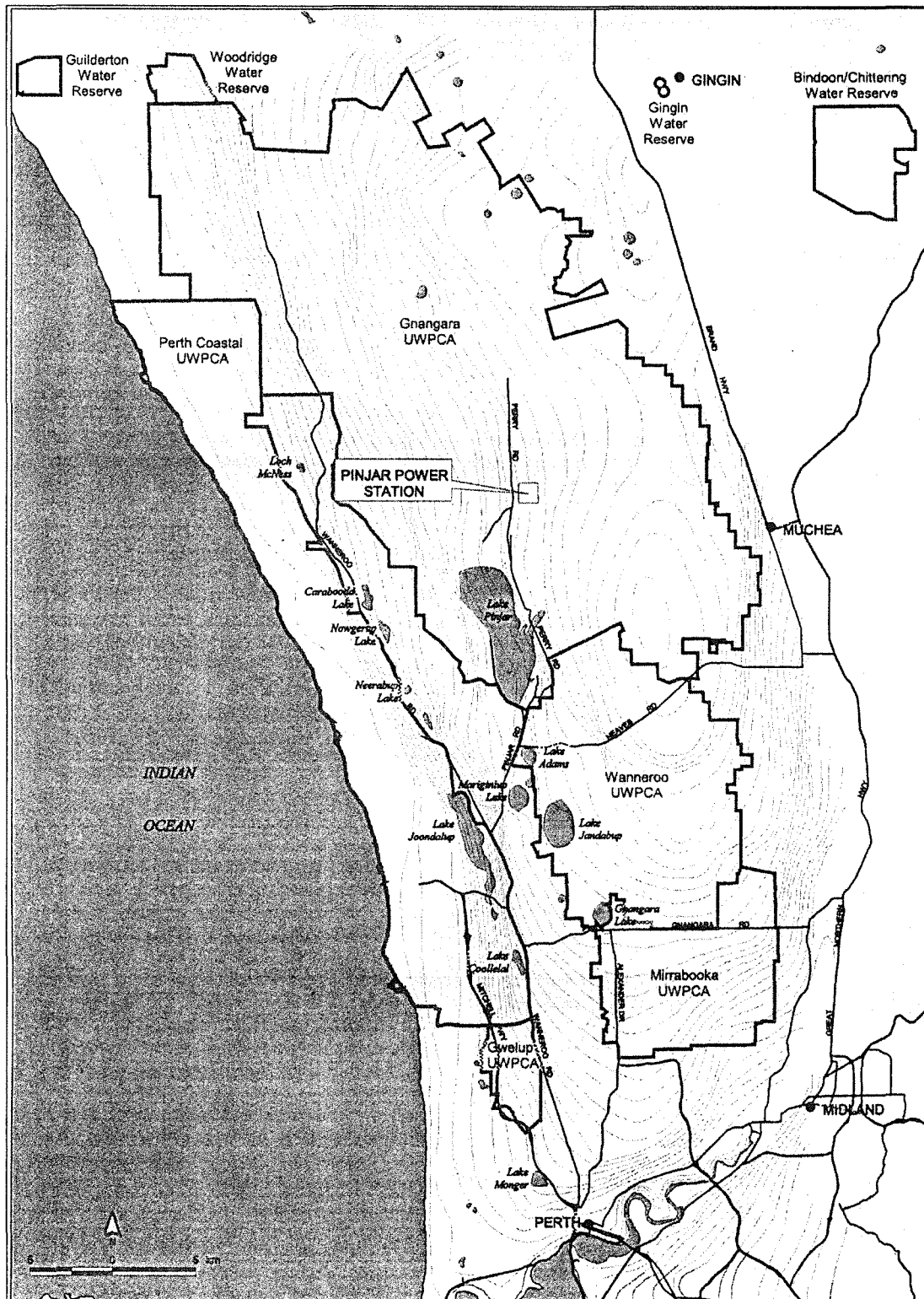
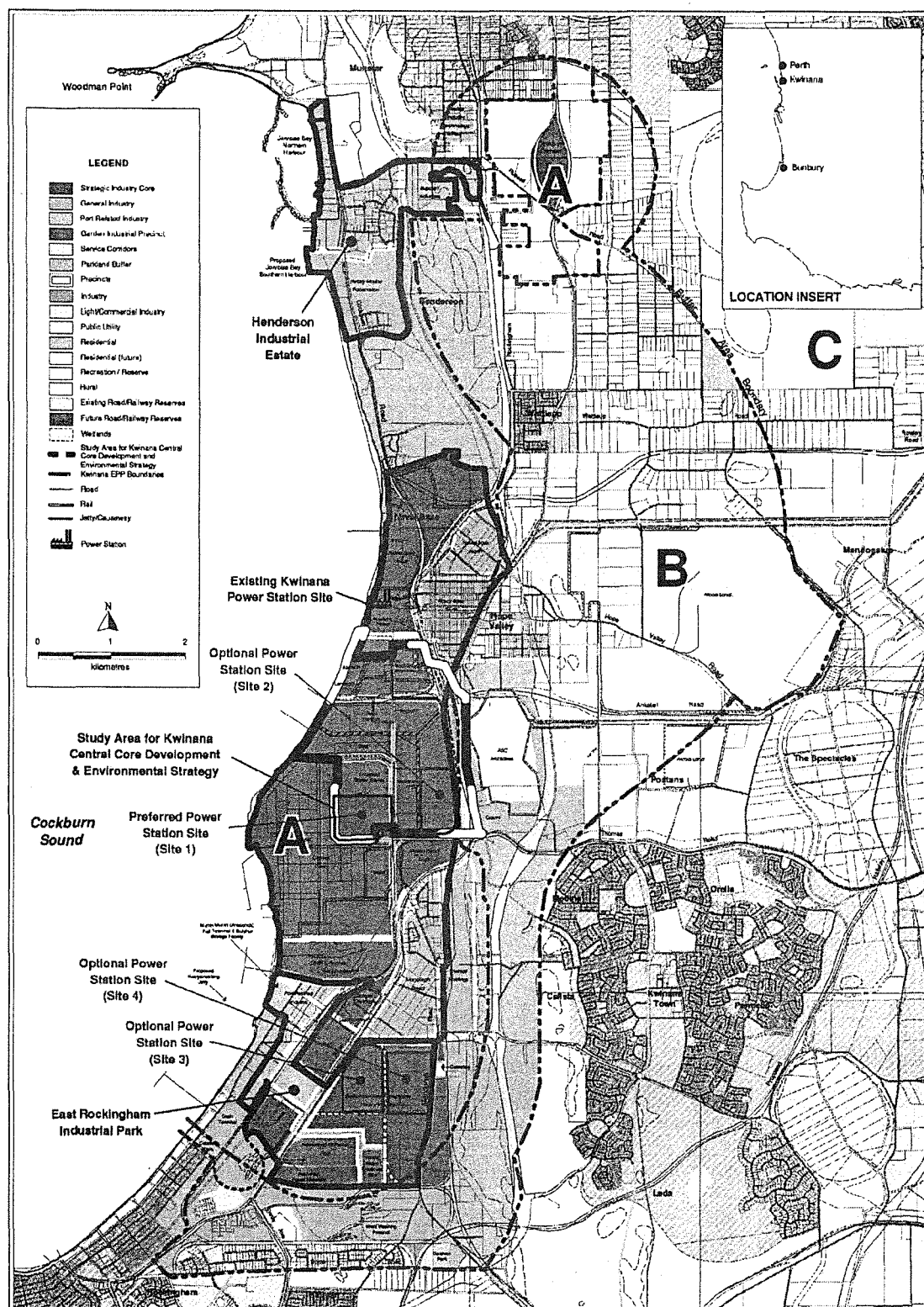


Figure 1a: Location of Pinjar power generation facility



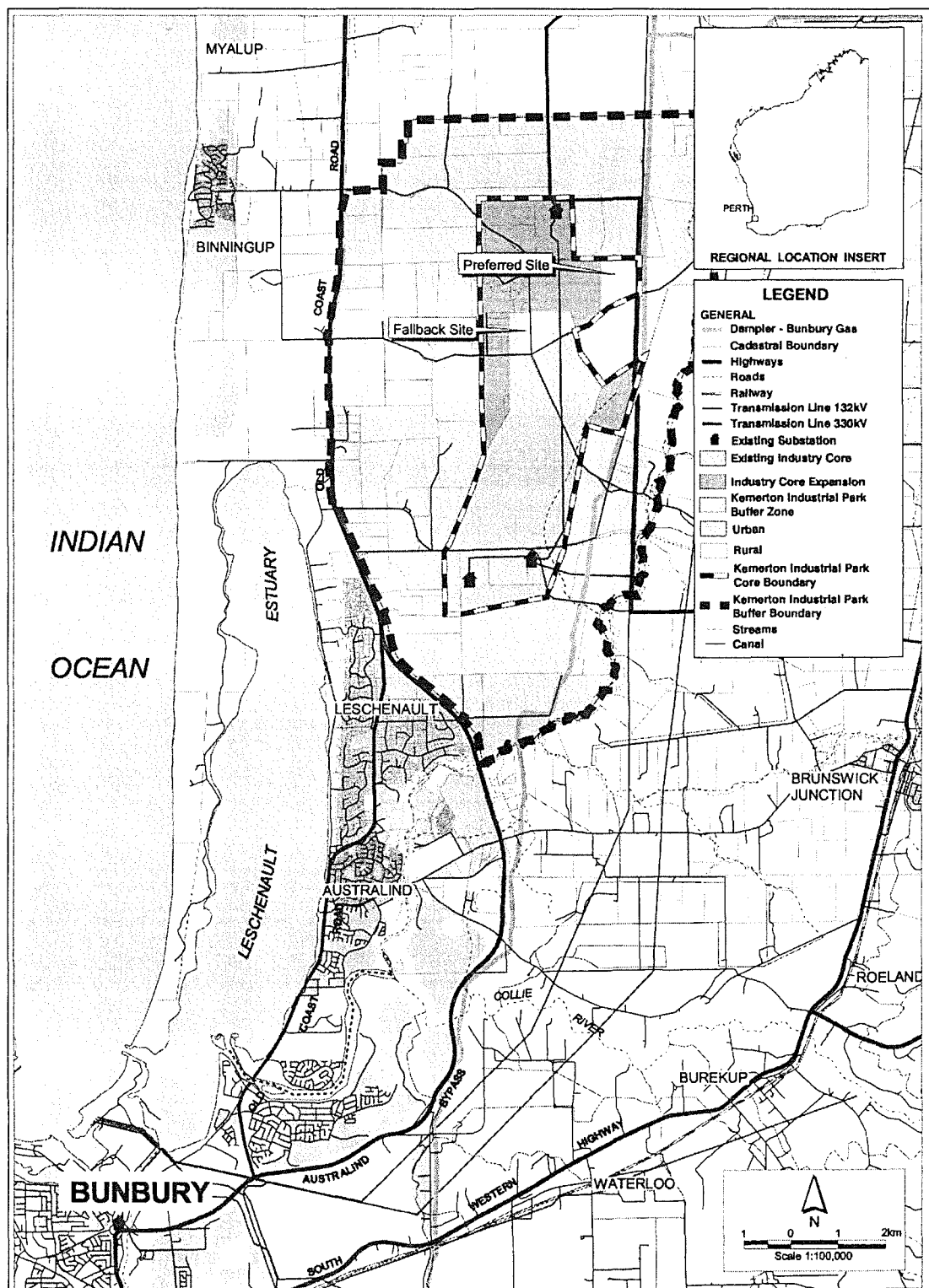


Figure 1c: Location of Kemerton power generation facility



Figure 1d: Location of Bunbury power generation facility

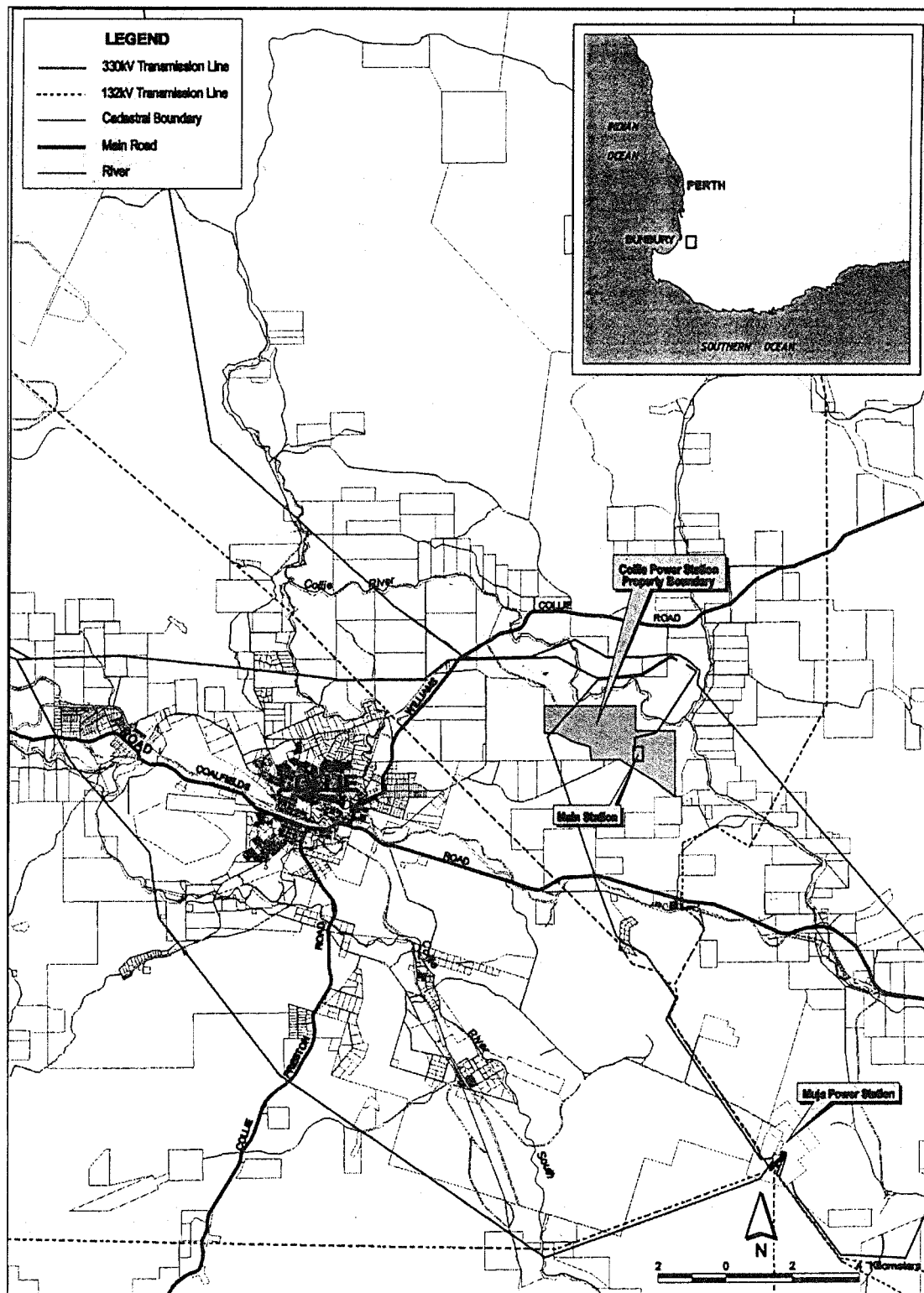


Figure 1e: Location of Collie power generation facility

3. Relevant environmental factors

Appendix A of the SER contains a copy of the EPA's guidelines for the strategic assessment and identifies the issues to be addressed.

Having considered appropriate references, public and government submissions and the proponent's response to submissions, in the EPA's opinion, the following are the strategic environmental factors relevant to one or more of the sites:

- a) Vegetation;
- b) Specially Protected (Threatened) Fauna;
- c) EPP lakes and other specially protected wetlands;
- d) Rivers and ephemeral streams;
- e) Greenhouse gas emissions;
- f) Gaseous and particulate emissions;
- g) Noise;
- h) Marine ecosystems;
- i) Groundwater;
- j) Risk and hazards; and
- k) Heritage issues.

Details on the relevant strategic environmental factors are contained in Sections 3.1 - 3.11. The description of each factor shows why it is important and how the development of power generation facilities at the various sites may impact upon the environment.

Objectives for each factor have been included to assist in providing guidance to any potential developers. Objectives for any or all factors may change for any subsequent proposal based on this strategic assessment and any subsequent information that becomes available.

3.1 Vegetation

The EPA's strategic environmental objective for this factor is to maintain the abundance, species diversity, geographic distribution and productivity of vegetation communities.

Pinjar

The site is within the boundaries of Bush Forever Site 380 but has been set aside for a power station and has been previously disturbed in part by the development and operation of existing power generation facilities.

The SER has indicated that undisturbed areas of the site support banksia woodland which is also well represented in excellent condition in the surrounding area. Of the 0.74ha which would need to be cleared for additional power generation facilities, only 0.28ha is previously undisturbed native vegetation.

Although four rare flora species are located in the area surrounding the site these would not be impacted, and no Declared Rare or Priority Flora are known to occur on the site.

Future proponents of power generation facilities would be required to adopt management strategies including:

- a detailed vegetation survey of the site in Spring in consultation with CALM;
- minimising the extent of vegetation clearing;
- dieback hygiene and weed management;
- site rehabilitation; and
- consultation with the Bush Forever Office.

Submissions

Submissions suggested that although removal of remnant vegetation at Pinjar is small, consideration should be given to replacement with a piece of bushland that can be secured for conservation and management adjacent to the Bush Forever site and/or rehabilitation projects elsewhere. In its response, Western Power has drawn attention to its commitment to rehabilitation/tree planting, as illustrated by the Western Power Greening Challenge, which saw the 4 millionth tree planted this year along with numerous other environmental projects.

Specific responsibility for rehabilitation of vegetation at Pinjar would fall to future proponents of power generation facilities, rather than with Western Power. However, Western Power would encourage consideration and reporting on any such actions during the Section 38 environmental approval process.

EPA advice

It is the EPA's opinion that at this site, a power generating facility of the type proposed can be managed to meet the EPA's environmental objective for this factor provided that:

- specific design parameters of any proposed power generating facilities are subject to section 38 assessment;
- the removal of any native vegetation is minimised and offset measures applied; and
- declared rare flora are managed in accordance with CALM's requirements.

Kwinana/East Rockingham

All sites are within the Kwinana/East Rockingham Industrial Area. The preferred site has been cleared and severely disturbed by industrial waste management practices.

The SER has indicated that the remnant vegetation present on site 1 (Mason Rd) and site 2 (former BHP land) consists of degraded remnants of the Quindalup Vegetation Complex. The sites are heavily weed infested and will require weed management to prevent further degradation of what remnant vegetation remains. There is a stand of mature tuart trees and dense thickets of acacia on site 2. It is unlikely that there are any declared rare, threatened or priority species on these sites.

At Site 3 (Office Road) and Site 4 (Mandurah Road) much of the vegetation has been degraded as a consequence of frequent fires, foraging by domestic livestock and rabbits and trafficking through the area by vehicles. Site 3 contains scattered acacia, hakea and melaleuca shrubs with tuart groves near the south west corner. Most of Site 4 is cleared but there is good quality remnant tuart near the corner of Office Road and Old Mandurah Road.

A linear swale with grass trees cuts across the centre of Site 3 and may contain a degraded section of a Threatened Ecological Community (19a or 19b). The area is not currently being considered by the State government authorities for retention but uncertainty remains until the vegetation strategy is finalised and approved.

Future proponents of power generation facilities would be required to adopt management strategies including:

- a detailed vegetation survey of the site in Spring in consultation with CALM;
- minimising the extent of vegetation clearing;
- maximum retention of the vegetation on the eastern edge of site 1;
- dieback hygiene and weed management;
- site rehabilitation; and
- consultation with the Bush Forever Office.

The outcome of the proponent assessing optional sites in Kwinana and addressing issues raised in submissions is that:

- a revised development concept on site 2 ensures retention of the tuart trees; and
- a strategy to manage vegetation issues in the East Rockingham Industrial Park area is being developed by the Office of Major Projects in consultation with DEWCP.

Submissions

The City of Rockingham indicated that a 'Green Corridor' is proposed to pass through IP14 at Kwinana and that this needs to be taken into consideration in assessing that site. In its response Western Power has indicated that the City of Rockingham is currently producing a Greening Plan for Rockingham, a key objective of which is to identify Green corridors. The Plan is still in draft form and the feasibility of providing green linkages within IP14 falls within the jurisdiction of LandCorp.

A submission indicated that the vegetation report does not provide sufficient information to determine the value of the vegetation. In its response Western Power outlines the work done and draws attention to on-going assessment including the development of a vegetation management strategy.

A submission suggests that the presence of *Xanthorrhoea preissii* at the preferred site is indicative of a wetland and may indicate the presence of threatened ecological community 19. Western Power points out that while threatened ecological community 19 does include *Xanthorrhoea preissii* and *Acacia saligna*, no sedges, the main indicator of this threatened ecological community, were recorded from either Site 1 or Site 2. Site 3 is likely to contain a degraded section of the threatened ecological community 19a or 19b. The area is not currently being considered by the State government authorities for retention but uncertainty remains until the vegetation strategy is finalised and approved.

EPA advice

It is the EPA's opinion that at these sites, a power generating facility of the type proposed can be managed to meet the EPA's strategic environmental objective for this factor provided that:

- specific design parameters of any proposed power generating facilities are subject to section 38 assessment;
- the removal of any native vegetation is minimised and offset measures applied; and
- declared rare flora are managed in accordance with CALM's requirements.

Kemerton

The sites are within the Kemerton Industrial Park. The preferred site has been disturbed by grazing and commercial tree planting.

The SER has indicated that most of the preferred site is on a blue gum plantation. A small section at the south consists of jarrah, marri and banksia woodland varying from good to poor condition in which the understorey has been impacted by grazing or soil disturbance, leaving only a proportion of the expected remnant shrub species.

Probably as a result of grazing, weeds are widespread on the site but are generally non-aggressive annual herbs and grasses common throughout the sandy areas of the South West of Western Australia.

A range of vegetation communities have been identified along the proposed wastewater pipeline route. The Marriott Road section supports predominantly jarrah over banksia woodland in excellent condition, with occasional tall marri and a diverse understorey except at the west end where weeds have severely invaded. Two Priority 3 Flora species were recorded in this section of the route.

West of Old Coast Road and for the eastern section of Buffalo Road the proposed pipeline route is in degraded pasture with no features of any conservation significance. Further west in Buffalo Road where the route crosses the northern margin of the Leschenault Estuary, the vegetation is a mosaic of degraded weedy roadside and pasture, with samphire shrubland in relatively good condition.

From the end of Buffalo Road to the coast the route is adjacent to an existing pipeline corridor. The surrounding vegetation is sparse spinifex shrubland with the secondary dunes supporting dense stands of acacia. Further inland, there are increasingly dense peppermint stands of tall shrubs to low trees with some tuart in dune swales. No Declared Rare Flora were recorded during the field survey, but two Priority 3 Flora species were recorded along Marriott Road.

Future proponents of power generation facilities would be required to adopt management strategies including:

- a detailed vegetation survey of the site and pipeline route in Spring in consultation with CALM);
- minimising the extent of vegetation clearing;
- dieback hygiene and weed management; and
- site rehabilitation.

Submissions

A number of submissions raised questions in regard to clearing of vegetation for the proposed wastewater pipeline and its possible impact on Declared Rare Flora and a System 6 area. Western Power has recognised that some vegetation removal is inevitable but that future proponents of power generation facilities would be required to have appropriate management strategies in place and prior to any construction work proceeding, a further flora search would be conducted in Spring to ensure that any DRF and Priority Flora in the corridor are identified. The final wastewater pipeline route would minimise disturbance and rehabilitation plans would be developed in consultation with CALM and DEP.

The EPA has previously reviewed the implications of clearing vegetation for industrial development as proposed in the Kemerton Expansion Study. The EPA recommended further studies to develop an understanding of the interaction between surface water, groundwater and dependent ecological systems with the aim of developing a water management strategy so that the development and operation of Kemerton is environmentally sustainable. The results of this study will be available to the future proponents of power generation facilities.

Western Power also points out that the indicative site layout has been moved north as far as noise limitations will allow, in order to avoid clearing of remnant vegetation.

EPA advice

It is the EPA's opinion that at these sites, a power generating facility of the type proposed can be managed to meet the EPA's strategic environmental objective for this factor provided that:

- specific design parameters of any proposed power generating facilities are subject to section 38 assessment;
- the removal of any native vegetation is minimised and offset measures applied; and
- declared rare flora are managed in accordance with CALM's requirements.

Bunbury

The site is within the Bunbury port industrial area and is highly disturbed with only the coastal foredune and halophytic river complex associations surviving.

The SER has indicated that Western Power has rehabilitated much of the coastal foredune vegetation and an area at the far northern end of the site, on the former ash ponds. A small amount of remnant vegetation still exists in the vicinity of the plant site but none of this is on the site itself which was cleared of vegetation for construction of the Old Bunbury Power Station.

It is most unlikely that there are any declared rare, threatened or priority species on the site.

Future proponents of power generation facilities would be required to adopt management strategies including:

- minimising the extent of vegetation clearing;
- weed management; and
- site rehabilitation.

Submissions

A submission suggested that there should be a commitment to local revegetation and foreshore rehabilitation. Western Power has indicated that much of the coastal foredune vegetation and an area at the far northern end of the site has already been rehabilitated by Western Power as a part of the rehabilitation plan for the old Bunbury Power Station. The northern site has been returned to the City of Bunbury for use as a recreation reserve, but has not yet been opened to the public.

Future proponents of power generation facilities would be required to develop and implement a rehabilitation plan and where possible, native species would be used for the rehabilitation process.

EPA advice

It is the EPA's opinion that at this site, a power generating facility of the type proposed can be managed to meet the EPA's environmental objective for this factor provided that:

- specific design parameters of any proposed power generating facilities are subject to section 38 assessment.

Collie

The site consists of historically grazed land and has been set aside for power station development.

The SER has indicated that the 500ha site has been previously used for grazing and little vegetation was removed in the construction of the existing power station. About 60ha of remnant jarrah and marri forest remains on the southern part of the site and some 13ha of seasonally inundated wetlands lie to the east and west of the plant. The generating facility would occupy about 1.7ha of the cleared land. The site is surrounded by about 1400ha of buffer zone consisting of pasture, bluegum plantation, jarrah forest and wetland vegetation.

Future proponents of power generation facilities would be required to adopt management strategies including:

- depending on plant layout, a detailed vegetation survey of the site in Spring in consultation with CALM;
- minimising the extent of vegetation clearing;
- dieback hygiene and weed management; and
- site rehabilitation.

Submissions

There were no significant issues raised in respect to vegetation on the Collie site.

EPA advice

It is the EPA's opinion that at this site, a power generating facility of the type proposed can be managed to meet the EPA's strategic environmental objective for this factor provided that:

- specific design parameters of any proposed power generating facilities are subject to section 38 assessment;
- the removal of any native vegetation is minimised and offset measures applied; and
- any declared rare flora are managed in accordance with CALM's requirements.

3.2 Specially Protected (Threatened) Fauna

The EPA's strategic environmental objective for this factor is to protect Specially Protected (Threatened) Fauna, consistent with the provisions of the *Wildlife Conservation Act 1950*.

Pinjar

The site is within the boundaries of Bush Forever Site 380 but has been set aside for a power station and has been previously disturbed by the development and operation of existing power generation facilities. No additional power line or gas pipeline service corridors are anticipated.

The SER has indicated that the site is previously disturbed and it is unlikely that any significant fauna species utilise the site itself but adjacent bushland is likely to support a range of introduced and native fauna including some rare and priority species.

To minimise the impacts on fauna and their habitats any future proponents of power generation facilities would be required to adopt management strategies which would minimise disturbance of vegetation and the habitats that it provides. This would be achieved by the implementation of the management strategies proposed for the protection of vegetation. The proposed noise management strategies would reduce indirect impacts on fauna.

Submissions

There were no significant issues raised in respect of fauna at the Pinjar site.

EPA advice

It is the EPA's opinion that at this site, a power generating facility of the type proposed can be managed to meet the EPA's strategic environmental objective for this factor provided that:

- specific design parameters of any proposed power generating facilities are subject to section 38 assessment; and
- proponents of power generation facilities liaise with CALM in relation to management strategies.

Kwinana/East Rockingham

All sites are within the Kwinana/East Rockingham Industrial Area. The preferred site has been cleared and severely disturbed by industrial waste management practices.

The SER has indicated that Site 1 (Mason Rd) and site 2 (former BHP land) are heavily weed infested and little of the original vegetation types remain to provide useful fauna habitat. It is unlikely that any significant fauna species utilise these sites. Vegetation on sites 3 and 4 may have the potential to provide fauna habitat or movement corridors.

To minimise the impacts on fauna and their habitats, any future proponents of power generation facilities would be required to adopt management strategies which would minimise disturbance of vegetation and the habitats that might be provided by vegetation. This would be achieved by the implementation of the management strategies proposed for the protection of vegetation and by the use of existing corridors for gas and, transmission lines wherever possible. The proposed noise management strategies would reduce indirect impacts on fauna.

Submissions

A submission queried the role of the area around the Kwinana site as an ecological linkage between other regionally significant areas. Western Power has responded that the Bush Forever process identified sites that were in good condition and regionally significant for the whole of the Swan Coastal Plain, including those with important functions as ecological corridors. None of the proposed sites were identified in that process.

EPA advice

It is the EPA's opinion that at these sites, a power generating facility of the type proposed can be managed to meet the EPA's strategic environmental objective for this factor provided that:

- specific design parameters of any proposed power generating facilities are subject to section 38 assessment.

Kemerton

The sites are within the Kemerton Industrial Park. The preferred site has been disturbed by grazing and commercial tree planting.

The SER has indicated that the small section of woodland in the south of the site and the various vegetation communities along the pipeline route are likely to provide useful habitat for a range of native fauna including some rare and priority species.

To minimise the impacts on fauna and their habitats any future proponents of power generation facilities would be required to adopt management strategies which would minimise disturbance of vegetation and the habitats that are provided by it. This would be achieved by the implementation of the management strategies proposed for the protection of vegetation and by the use of existing corridors for gas, transmission lines and the wastewater pipeline wherever possible. The proposed noise management strategies would reduce indirect impacts on fauna.

Future proponents of power generation facilities would also be encouraged to investigate opportunities for reinstatement of habitat in degraded areas of the buffer zone, perhaps in cooperation with other industries and the local community.

Submissions

A submission queried the lack of a detailed fauna study. Western Power has responded that section 6.8.2.1 of the Kemerton SER document stated that 'given the strategic level of this assessment, habitat and distribution based assessment of potential occurrence has only been undertaken for threatened fauna taxa'. A more detailed fauna study of the area would be undertaken by future proponents of power generation facilities during the Section 38 environmental assessment process.

EPA advice

It is the EPA's opinion that at these sites, a power generating facility of the type proposed can be managed to meet the EPA's strategic environmental objective for this factor provided that:

- specific design parameters of any proposed power generating facilities are subject to section 38 assessment; and
- proponents of power generation facilities liaise with CALM in relation to management strategies.

Bunbury

The site is within the Bunbury port industrial area and is highly disturbed with only the coastal foredune and halophytic river complex associations surviving.

The SER has indicated that in view of the history of the site it is unlikely that any significant fauna species utilise the site itself but adjacent water bodies, mudflats, mangroves and freshwater soaks provide habitat and feeding areas for waterbirds.

Marine and estuarine fauna are sufficiently distant from the site to not be directly impacted. Future proponents of power generation facilities would be required to comply with the requirements of Leschenault Inlet Management Authority and to implement management strategies consistent with the Leschenault Waterways Management Programme (Waterways Commission, 1992). The proposed noise management strategies would reduce indirect impacts on fauna.

Submissions

A submission suggested that noise and gaseous/particulate emissions may impact on wetland bird species using the Preston River delta and southern tidal flats. Western Power has responded that the site is situated in an industrial zone and is surrounded by other industrial premises that contribute to noise and gaseous emission levels in the area. These sources, including general rail and shipping activity and bulk handling activities, have coexisted with this important waterbird refuge for many years. The site was previously occupied by a coal-fired power station with significantly greater emissions which coexisted with the waterbird refuge for over forty years.

EPA advice

It is the EPA's opinion that at this site, a power generating facility of the type proposed can be managed to meet the EPA's strategic environmental objective for this factor provided that:

- specific design parameters of any proposed power generating facilities are subject to section 38 assessment.

Collie

The site consists of historically grazed land and has been set aside for power station development.

The SER has indicated that in view of the history of the site it is unlikely that any significant fauna species are present and any that may be present would be common and widespread.

To minimise the impacts on fauna and their habitats, future proponents of power generating facilities would be required to minimise disturbance of vegetation and the habitats that are provided by vegetation, through the management strategies aimed at protecting vegetation. The proposed noise management strategies would reduce indirect impacts on fauna.

Submissions

There were no significant issues raised in respect of fauna at the Collie site.

EPA advice

It is the EPA's opinion that at this site, a power generating facility of the type proposed can be managed to meet the EPA's strategic environmental objective for this factor provided that:

- specific design parameters of any proposed power generating facilities are subject to section 38 assessment; and
- proponents of power generation facilities liaise with CALM in relation to management strategies.

3.3 EPP lakes and other specially protected wetlands

The EPA's strategic environmental objective for this factor is to retain the integrity, functions and environmental values of protected wetlands, and to ensure that EPP lakes are protected and their key ecological functions are maintained.

Pinjar

The site is located within the area of the Gnangara groundwater mound where there are many wetlands.

The SER has indicated that the Gnangara Mound area is of regional significance because of its high conservation and recreational values and its close proximity to the Perth metropolitan area. In proximity to the Pinjar site, many of the wetlands are ephemeral with some larger water-bodies. Most are less than 2m deep being a reflection of the water table which slopes gently to the lakes from the east. Lake levels fluctuate in response to changes in the water table.

The swampy area about 1km east of Pinjar site is classed as "Conservation" in the Wetlands Geomorphic Database.

Future power generating facilities would not directly impact on any wetlands of conservation significance, however there may be potential for indirect impacts through accidental release of contaminants during construction or operation. Future proponents of power generation facilities would be required to minimise such impacts through project design and management strategies with reference to EPA Draft Guidance No.26 *'Management of Surface Run-Off from Industrial and Commercial Sites'*

Submissions

There were no significant issues raised in respect of wetlands at the Pinjar site.

EPA advice

It is the EPA's opinion that at this site, a power generating facility of the type proposed can be managed to meet the EPA's strategic environmental objective for this factor provided that:

- specific design parameters of any proposed power generating facilities are subject to section 38 assessment; and
- proponents of power generation facilities demonstrate that any impacts on wetlands are avoided or minimised.

Kemerton

The SER has indicated that there are a number of perennial and seasonal wetlands and swamps in the Kemerton area, particularly to the east and west of the industrial core. The preferred plant site lies just north of a series of EPP wetlands. The proposed wastewater pipeline route is across the northern boundary of the Leschenault Estuary where fringing wetlands have been listed as areas of conservation significance.

The SER has identified potential impacts on wetlands during construction and operation of a power station and has indicated that potential proponents would be required to manage drainage and hydrology impacts with reference to EPA Draft Guidance No.26 *'Management of Surface Run-Off from Industrial and Commercial Sites'*. This would include proper management of site risks and the development of a stormwater management plan. Such a plan would include requirements for separation of clean water from potentially contaminated stormwater through such mechanisms as bunding, sediment traps and storage and testing of stormwater prior to discharge. Where the wastewater pipeline crosses drainage features, pipeline bridges would be constructed to avoid interference with drainage patterns.

Submissions

A submission suggested that EPP wetlands may be affected by vegetation clearing or drawdown for groundwater extraction. Western Power has indicated that the majority of the vegetation clearing required at the preferred site involves the removal of plantation blue gums. The wetlands east of the Kemerton Industrial Core are classified as EPP wetlands. It is anticipated that as the shallow groundwater system is recharged by direct infiltration of rainfall and lateral flow from the Mialla Mound, clearing of blue gums is unlikely to have a major deleterious impact on these wetlands because the removal of blue gums would tend to increase infiltration and raise groundwater levels.

These issues may require further investigation by future proponents of power generation facilities. The findings of the water study for Kemerton (Aquaterra, 2002) could also be incorporated, as it is likely to provide an increased understanding of the interactions between surface water, groundwater and dependent ecological systems.

A submission pointed out that a portion of a conservation category wetland is within the site. In response to this the site layout and lease boundary have been modified to maintain a minimum of 200m separation to the nearest wetland.

A submission suggested that development of in-ground evaporation ponds may require more vegetation clearing, may affect hydraulic conductivity through the superficial aquifer and consequently the wetland chain and the Wellesley River. Western Power has advised that an evaporation pond is an option but that as a result of the revised layout, there would be no requirement for clearing of native vegetation and since the evaporation pond would be lined there is unlikely to be any impact on the hydraulic conductivity through the superficial aquifer.

A submission requested more details of the proposed re-routing of the agricultural drain. Western Power has responded that the drain would be re-routed around the edge of the site such that it maintains its existing flow pattern and does not impact on any surrounding wetlands.

A submission pointed out that approximately 10 years ago heavy winter rains resulted in surface water lying on both sites and asked how this will be managed. Western Power has responded that it is expected that the site would be cut and filled to provide a suitable foundation for the plant and stormwater drainage designed such that flooding of the site is avoided.

EPA advice

It is the EPA's opinion that at these sites, a power generating facility of the type proposed can be managed to meet the EPA's strategic environmental objective for this factor provided that:

- specific design parameters of any proposed power generating facilities are subject to section 38 assessment; and
- proponents of power generation facilities demonstrate that any impacts on wetlands are avoided or minimised.

Bunbury

The site is close to the Leschenault Estuary which is an important South West wetland.

The SER has indicated that the northern end of Leschenault Estuary is a breeding ground and refuge for migratory birds and the estuary is a significant summer refuge for waterfowl. Key waterbird habitats are fringing samphire marshes, wetlands and mudflats including mudflats at the mouths of the Preston and Collie Rivers and mangroves on Anglesea Island which are within about 1km from the site.

The SER has identified potential impacts on Leschenault Estuary during construction and operation of a power station and has indicated that potential proponents would be required to manage drainage and hydrology impacts with reference to EPA Draft Guidance No.26 *'Management of Surface Run-Off from Industrial and Commercial Sites'*. This would include proper management of site risks and the development of a stormwater management plan. Such a plan would include requirements for separation of clean water from potentially contaminated stormwater through such mechanisms as bunding, sediment traps and storage and testing of stormwater prior to discharge.

Potential proponents would also be required to comply with the requirements of the Leschenault Inlet Management Authority (LIMA) for the protection of the Leschenault Estuary. Management strategies would need to be consistent with the Leschenault Waterways Management Programme and LIMA policy of no net increase of nutrient discharged within the Management Area.

Submissions

There were no significant issues raised in respect of wetlands at the Bunbury site.

EPA advice

It is the EPA's opinion that at this site, a power generating facility of the type proposed can be managed to meet the EPA's strategic environmental objective for this factor provided that:

- specific design parameters of any proposed power generating facilities are subject to section 38 assessment; and
- proponents of power generation facilities liaise with LIMA in relation to the protection of Leschenault Estuary.

Collie

The site is in historically grazed land set aside for power station purposes. There are wetlands adjacent to the existing flyash ponds and east of the water storage ponds with varying vegetation structure and floristic composition. The westernmost wetland is likely to be of higher conservation value and is characterised by a small seasonal pool. Both wetlands are influenced by nutrients from agricultural activities. About 30ha of land surrounding the western wetland has been fenced off and rehabilitation work is in progress.

The SER has indicated that there will be no direct impact on the wetlands from development of additional power generation facilities. Nevertheless, potential proponents would be required to manage drainage and hydrology impacts with reference to EPA Draft Guidance No.26 *'Management of Surface Run-Off from Industrial and Commercial Sites'*. This would include proper management of site risks and the development of a stormwater management plan. Such a plan would include requirements for separation of clean water from potentially contaminated stormwater and the stormwater drainage system would be linked to the existing system.

Submissions

There were no significant issues raised in respect of wetlands at the Collie site.

EPA advice

It is the EPA's opinion that at this site, a power generating facility of the type proposed can be managed to meet the EPA's strategic environmental objective for this factor provided that:

- specific design parameters of any proposed power generating facilities are subject to section 38 assessment; and
- proponents of power generation facilities demonstrate that any impacts on wetlands are avoided or minimised.

3.4 Rivers and ephemeral streams

The EPA's strategic environmental objective for this factor is to maintain the integrity, functions and environmental values of rivers and ephemeral streams, and to ensure that alterations to surface drainage do not adversely impact native vegetation.

Pinjar

The nearest surface streams to the Pinjar site are the Ellen Brook and minor tributaries approximately 14km to the east. Some drainage lines in the area carry surface water from the Gngara Mound area during the winter months towards Lake Pinjar.

The SER has indicated that future power generating facilities would not directly impact on any rivers or ephemeral streams of significance, however there may be potential for indirect impacts through accidental release of contaminants during construction or operation. Future proponents of power generation facilities would be required to minimise such impacts through project design and management strategies with reference to EPA Draft Guidance No.26 *'Management of Surface Run-Off from Industrial and Commercial Sites'*.

Submissions

There were no significant issues raised in respect of rivers and ephemeral streams at the Pinjar site.

EPA advice

It is the EPA's opinion that at this site, a power generating facility of the type proposed can be managed to meet the EPA's strategic environmental objective for this factor provided that:

- specific design parameters of any proposed power generating facilities are subject to section 38 assessment.

Kwinana/East Rockingham

There are no significant surface drainage features on any of the sites at Kwinana.

The SER has indicated that future power generating facilities would not directly impact on any rivers or ephemeral streams, however there may be potential for indirect impacts on surface drainage through accidental release of contaminants during construction or operation. Future proponents of power generation facilities would be required to minimise such impacts through project design and management strategies with reference to EPA Draft Guidance No.26 *'Management of Surface Run-Off from Industrial and Commercial Sites'*

Submissions

There were no significant issues raised in respect of rivers and ephemeral streams at the Kwinana site.

EPA advice

It is the EPA's opinion that at these sites, a power generating facility of the type proposed can be managed to meet the EPA's strategic environmental objective for this factor provided that:

- specific design parameters of any proposed power generating facilities are subject to section 38 assessment.

Kemerton

The Kemerton Industrial core area is relatively flat and subject to inundation. The major drainage system is the Wellesley River, east of the Kemerton Industrial Park. Several minor drainage channels in the cleared agricultural areas feed the Wellesley River but the Wellesley River does not directly drain the Kemerton Industrial Park

The preferred site and proposed wastewater pipeline intersect an east-flowing agricultural drainage channel which discharges into the Wellesley River.

The SER has identified potential impacts on surface hydrology during construction and operation of a power station and has indicated that potential proponents would be required to manage drainage and hydrology impacts with reference to EPA Draft Guidance No.26 *'Management of Surface Run-Off from Industrial and Commercial Sites'*. This would include proper management of site risks and the development of a stormwater management plan. Such a plan would include requirements for separation of clean water from potentially contaminated stormwater through such mechanisms as bunding, sediment traps and storage and testing of stormwater prior to discharge.

Where the wastewater pipeline crosses drainage features, pipeline bridges would be constructed to avoid interference with drainage patterns.

Submissions

There were no significant issues raised in respect of rivers and ephemeral streams other than those addressed under 'wetlands', at the Kemerton site.

EPA advice

It is the EPA's opinion that at these sites, a power generating facility of the type proposed can be managed to meet the EPA's strategic environmental objective for this factor provided that:

- specific design parameters of any proposed power generating facilities are subject to section 38 assessment.

Bunbury

The Collie and Preston Rivers drain into the Leschenault Estuary in close proximity to the site which is located on relatively low land that is close to the coastline. No rivers or streams traverse the Bunbury site.

The SER has indicated that future power generating facilities would not directly impact on any rivers or ephemeral streams, however there may be potential for indirect impacts on surface drainage through accidental release of contaminants during construction or operation. Future proponents of power generation facilities would be required to minimise such impacts through project design and management strategies with reference to EPA Draft Guidance No.26 *'Management of Surface Run-Off from Industrial and Commercial Sites'*

Submissions

There were no significant issues raised in respect of rivers and ephemeral streams at the Bunbury site.

EPA advice

It is the EPA's opinion that at this site, a power generating facility of the type proposed can be managed to meet the EPA's strategic environmental objective for this factor provided that:

- specific design parameters of any proposed power generating facilities are subject to section 38 assessment.

Collie

The Collie Power Station lies in the drainage basin of the Collie River East Branch. The East branch of the Collie River is a perennial stream characterised by fluctuating flows and high salinity levels. The South Branch of the Collie River does not flow over substantial reaches but isolated pools tend to outlast most droughts. There are two seasonal streams that drain the Collie Power Station site.

The SER has indicated that there will be no direct impact on rivers and ephemeral streams from development of additional power generation facilities but groundwater abstraction has the potential to cause adverse effects (see section 3.9 on Groundwater in this report). Nevertheless, potential proponents would be required to manage drainage and hydrology impacts with reference to EPA Draft Guidance No.26

'Management of Surface Run-Off from Industrial and Commercial Sites'. This would include proper management of site risks and the development of a stormwater management plan. Such a plan would include requirements for separation of clean water from potentially contaminated stormwater and the stormwater drainage system would be linked to the existing system.

Western Power is actively involved with the Collie Water Advisory Group (CWAG), convened to advise State Cabinet on issues associated with the use and disposal of water in the Collie basin.

Submissions

There were no significant issues raised in respect of rivers and ephemeral streams at the Collie site.

EPA advice

It is the EPA's opinion that at this site, a power generating facility of the type proposed can be managed to meet the EPA's strategic environmental objective for this factor provided that:

- specific design parameters of any proposed power generating facilities are subject to section 38 assessment.

3.5 Greenhouse gas emissions

The EPA's strategic environmental objective for this factor is to ensure that potential greenhouse gas emissions emitted from proposed projects are adequately addressed and best practicable measures and technologies are used in Western Australia to minimise Western Australia's greenhouse gas emissions.

Pinjar

This site is expected to continue to be used only for peak power generation using open cycle gas turbine generating plant able to respond quickly to changes in power supply demands.

Kwinana/East Rockingham

This site is expected to be used for peak power generation using open cycle gas turbine generating plant and base load power generation using combined cycle gas turbine and steam turbine plant.

Kemerton

This site is expected to be used for peak power generation using open cycle gas turbine generating plant and base load power generation using combined cycle gas turbine and steam turbine plant.

Bunbury

This site is expected to be used for peak power generation using open cycle gas turbine generating plant able to respond quickly to changes in power supply demands.

Collie

This site is expected to be used for base power generation using coal fired steam turbine generating plant.

Discussion

The SER has indicated that Australia is a party to international agreements to reduce greenhouse gas emissions such as the United Nations Framework Convention on Climate Change which aims to stabilise emissions of greenhouse gases to a level that would prevent dangerous human-induced interference with the climate system. Since the production and supply of energy accounts for over half of Australia's greenhouse gas emissions, greenhouse gas issues are important when considering the development of additional power generating facilities.

The National Greenhouse Strategy identifies a number of strategies for limiting greenhouse emissions in each of three broad areas:

- reducing the greenhouse intensity of energy supply;
- harnessing renewable energy; and
- improving end use energy efficiency.

Within these broad areas, strategies relevant to electricity generation include:

- improved fuel use and generation efficiency and application of national Generator Efficiency Standards;
- emissions reporting;
- promotion of cogeneration and renewable energy opportunities; and
- identifying opportunities for energy parks around power stations.

Western Power has responded to the greenhouse gas issue by entering into a Cooperative Agreement with the Commonwealth in 1997. Within this agreement Western Power:

- has installed or is installing high efficiency gas fired co-generation and combined cycle generating plant;
- is planning for further replacement of ageing generation plant with higher efficiency plant;
- has installed renewable energy generation including the 22MW Albany wind farm, and is planning for further renewable energy acquisitions to 2010; and
- is involved in tree plantations and reforestation projects as carbon sinks.

Although greenhouse gas emissions associated with electricity supply to the South West Interconnected System (SWIS) have increased by about 1.9Mtpa (about 20%) over the period 1990 to 2000, the emission rate has decreased from 0.98 tonnes CO_{2e}/MWh in 1990 to 0.89 in 2000 and is expected to fall to 0.85 tonnes CO_{2e}/MWh by 2004. By 2010 the emission rate is expected to fall to 0.70 tonnes CO_{2e}/MWh if gas fuel is used for new base load plant or 0.76 tonnes CO_{2e}/MWh if coal fuel without mitigation is used for new base load plant.

Submissions

A number of issues were raised in submissions:

It was suggested that although carbon intensity has been declining, Western Power should aim to achieve the Kyoto Protocol target of no more than 8% increase in emissions over 1990 levels. Western Power has responded that the 'Kyoto Protocol target' is a national target for which neither the Australian nor State governments have yet determined principles for allocation across jurisdictions or sectors of economic activity. The target is not applied at an enterprise level in Australia or in Western Australia but serves as an indicative benchmark against which to compare forecast emission and emission abatement activity.

Despite a forecast increase in electricity demand of 176% of 1990 levels by 2010 the generation technologies and energy sources expected to be proposed through the power procurement process, together with those to be utilised in Western Power's plant replacement program, can meet the forecast demand while constraining greenhouse gas emissions to between 124% and 136% of 1990 levels.

It is suggested that Western Power's ultimate aim should be to be greenhouse neutral. Western Power has responded that the ultimate aim of electricity supply development is that it be sustainable, embodying the social, environmental and economic dimensions of development. Greenhouse neutrality is but one aspect of a sustainable electricity supply. Meeting the social and economic requirements of electricity supply to 2010 will require the continued use of fossil fuels in Western Australia, on a scale that cannot be displaced or fully offset by renewable energy or carbon sequestration.

A submission suggested that greenhouse reporting should include an indication of the technology used. Western Power has advised that the greenhouse gas emission reporting in Table 3-1 of the SER is based on existing plant and also provides estimates of typical new technology for coal and gas. The technology assumed for coal is that employed at the Collie Power Station – pulverised coal plant of a nominal 38% thermal efficiency, which is the current best practice for this type of plant.

Other proven coal technologies such as super critical thermal plant and fluidised bed combustion can achieve lower greenhouse gas emission intensities but operational constraints of the SWIS require a plant size which is not the economic optimum for this type of plant.

Other technologies are in development or have limited commercial application. These are discussed in Appendix B of the SER document for Collie, where size and reliability considerations are noted to limit the potential for deployment of these technologies in the SWIS.

A submission raised the issue of carbon sequestration, pointing out that tree planting to offset greenhouse gas emission adds \$10 - \$35 per MWh. Western Power has agreed with the cost estimate and advised that the generation cost of the most viable renewable energy technologies presently ranges from about \$50 to \$150 per MWh. While this is more than the cost of sequestration through tree planting, it delivers the additional benefit of useable energy.

A submission suggests that there is no difference in greenhouse emissions from coal or gas if the analysis is done from source to consumption including CO₂ extracted from natural gas prior to supply as a fuel. Western Power has responded that tables 3-2 and 3-3 of the SER present a comparison of indicative life cycle emissions from a coal-fired and natural gas combined cycle plant based on studies in the US. The emissions for natural gas plant include emissions from extraction and it is concluded that, although consideration of 'life cycle' greenhouse gas emissions adds more to the greenhouse intensity of gas than to that of coal there remains a substantial difference between the greenhouse intensity of the two fuels, with gas being the lower emitter.

A submission asked if Western Power had considered options for the sequestration of CO₂ within geological formations. Western Power has advised that geological sequestration of CO₂ in Western Australia is not considered a feasible option in the foreseeable future because:

- the engineering of technologies to capture CO₂ emissions at a power station scale is yet to be demonstrated;
- capture, transport and injection of CO₂ emissions is highly energy intensive; and
- effective, long term sequestration is not assured. In particular, Collie basin coal measures are characterised by relatively poorly developed coals in deposits not structurally suited to contain gases.

EPA advice

The EPA is aware that the demand for electricity in Western Australia will continue to grow. The rate of this growth can be reduced somewhat through demand management but there will be a continuing need for additional electricity generating facilities while the population grows and usage per person increases.

Ideally, additional demand should be satisfied through electricity generating facilities which minimise the production of greenhouse gases, assuming that other environmental requirements are not unreasonably compromised. The EPA will support the achievement of this aim by public and private enterprises. In any event, the greenhouse gas intensity of supplies should continue to be reduced.

Renewables will be an important means of achieving this. The EPA, however, recognises that in assessing electricity generating proposals supply agencies will need to be able to give consideration to the size of the supply required, technical issues (eg the need for rapid response to peak demands) and strategic requirements (eg. maintaining a balance of sources and types of fuel).

The EPA has previously (EPA, 1990) advised that its preference in relation to electricity demand is, in declining order of rank:

- conservation and efficiency improvements;
- renewable energy sources such as wind and solar energy;
- gas, including combined cycle, turbines;
- new technology coal plants;
- old technology coal plants; and
- petroleum fuel plants.

If power stations are proposed which do not result in the least greenhouse gas intensity, the EPA expects that mitigation actions would be investigated during the s38 process and adopted as appropriate.

It is the EPA's opinion that at all sites, power generating facilities of the types proposed can be managed to meet the EPA's environmental objective for this factor provided that:

- specific design parameters of any proposed power generating facilities are subject to section 38 assessment;
- if the fuel source has a higher greenhouse gas emission intensity, such as coal, the EPA would expect the proponent to demonstrate appropriate measures to mitigate greenhouse gas emissions.

3.6 Gaseous and particulate emissions

The EPA's strategic environmental objectives for this factor are to:

1. ensure that best practicable measures are taken to minimise discharges of gaseous and particulate emissions to the atmosphere;
2. protect surrounding land users such that gaseous and particulate emissions will not adversely affect their welfare and amenity or cause health problems;
3. ensure that conditions which could promote the formation of photochemical smog are managed to minimise the generation of smog and any subsequent impacts.

Pinjar

The atmospheric emissions of significance from the proposed plant expansion would be oxides of nitrogen (NO_x), sulphur dioxide (SO₂) (when the power station is operating on liquid fuel) and, to a lesser degree particulates and unburnt hydrocarbons. NO_x, particulate matter and SO₂ may be important on a local scale and NO_x has the potential to lead to photochemical smog.

There are no other large industrial sources located in the immediate vicinity of the Pinjar Gas Turbine Station, and further large-scale industrial development in the area is unlikely in the foreseeable future.

The SER has indicated that ground level concentrations from the proposed expansion were predicted using the DEP's air dispersion model DISPMOD, local meteorological data and emission characteristics for the source and taking into consideration the effect of adjacent chimney stacks.

Although any proposed gas turbine facility would be expected to be installed with low-NO_x burners in accordance with EPA's Guidance Statement 15, the major component of atmospheric emissions is still likely to be NO_x. The predicted maximum 1-hour average concentration of NO₂ from the proposed and existing power station with all units running at full load continuously on natural gas is 151ug/m³ just outside the site boundary. At the nearest residences, 4.5km to the south-south-west of the site, the predicted maximum 1-hour concentration is 57ug/m³ compared to the NEPM standard of 246ug/m³ for populated areas.

In the event of sufficient gas not being available due to pipeline failure or excessive peak demand, the turbines would be operated on liquid fuel. In these circumstances NO_x emissions are significantly higher and some SO₂ is generated (depending on the sulphur content of the liquid fuel).

Modelling of a range of liquid fuel scenarios has indicated that NEPM standards for NO₂ could be exceeded just outside the plant boundary but at the nearest residence the maximum 1-hour concentration is about 95ug/m³ – which is less than half the NEPM standard. A significant reduction in NO_x emissions from liquid fuel could be achieved by NO_x control measures such as water injection. However, if NO_x suppression for liquid fuel requires water injection; the environmental impacts of producing the requisite quantity of demineralised water are likely to outweigh the benefits of NO_x suppression for a fuel that is expected to be used for only 100 hours per year.

The maximum 1-hour concentration of SO₂ outside the site boundary is predicted to be about 190ug/m³ if the sulphur content of the liquid fuel is 0.6%. This compares to a NEPM standard of 570ug/m³.

Modelling of the impact of expansion of the Pinjar facility on photochemical smog generation indicates only minor changes over existing conditions.

Submissions

A submission asked what monitoring is undertaken at existing facilities at Pinjar, what licence limits are there on emissions, how these compare to other industrial licence limits and whether licence limits have ever been exceeded and if so what action has been taken by DEP and Western Power. Western Power has responded that the licence conditions specify annual stack testing requirements and to date, Western Power has been in compliance with the licence conditions. There are no licence emission limits because the units are used for peaking duty only. The Pinjar Gas Turbine Station is unique in that it is the only site used solely for peaking purposes. It would not be meaningful to compare the licence conditions to other power stations that are run for base load or mid-merit load generation.

A submission has asked why water injection is not proposed to be used to reduce NO_x emissions when burning liquid fuel in gas turbines. Western Power has responded that future proponents of power generating facilities would be required to install low NO_x burners on gas turbine units. The SER acknowledges that water injection when burning on liquid fuel can reduce NO_x emissions and represents environmental best practice for NO_x emissions. However, the SER also agrees that future proponents of power generating facilities may have grounds to seek a relaxation of the guidelines when operating on liquid fuel, given that the power station would only operate on liquid fuels for less than 100-hours per year.

The intent of the SER documents is to gain 'in principle' consideration of likely power station developments. The technology to be implemented will be selected by future proponents of power generating facilities and will be subject to the Section 38 environmental assessment process.

Submissions sought clarification on the reliability of gas supply and the need for liquid fuel to be used other than in the event of physical disruption of the gas supply. Western Power has responded that to guarantee the supply of gas to a power station, the developer would have to enter into a contract with a gas supplier to supply the gas and to reserve the required capacity in the gas pipeline to run the plant at full load. The reservation of capacity for every hour of the year in the pipeline is a significant cost and proves uneconomical in the case of peaking plant that is used for less than 10% of the time. Typically, peaking units attempt to source gas from a spot market, however no guarantee exists that gas would be available on the spot market when the peaking unit would be required.

The air quality issues associated with generating plant operating on liquid fuel are mitigated due to the low utilisation factor (less than 100 hours per year). In minimising the total delivered cost of electricity, Western Power uses available plant on a least cost basis. Given that liquid fuel is considerably more expensive than gas or coal, its use would only occur in cases of emergency and after all other fuel sources are exhausted.

A submission suggested that produce from agriculture and horticulture may be contaminated by emissions. Western Power has responded that guidelines developed by the World Health Organisation are used to protect vegetation from the impacts of air emissions. Based on the air quality modelling, average NO_x and SO₂ concentrations are expected to be below the WHO guidelines. Moreover, the predicted values are very conservative, as they assume that the power station would be operated continuously on liquid fuels, whereas this is expected to occur for less than 100-hours per year.

EPA advice

It is the EPA's opinion that at this site, a power generating facility of the type proposed can be managed to meet the EPA's strategic environmental objective for this factor provided that:

- specific design parameters of any proposed power generating facilities are subject to section 38 assessment; and
- any future proponent ensures that the NO_x controls meet the requirements of EPA Guidance Statement 15 or subsequent updates thereto.

Kwinana/East Rockingham

The atmospheric emissions of significance from the proposed plant would be oxides of nitrogen (NO_x), sulphur dioxide (SO₂) (when the power station is operating on liquid fuel) and, to a lesser degree particulates and unburnt hydrocarbons. NO_x, particulate matter and SO₂ may be important on a local scale and NO_x has the potential to lead to photochemical smog.

Existing industries in the Kwinana area generate significant atmospheric emissions and the region is covered by an Environmental Protection Policy (EPP) relating to atmospheric wastes which defines limits and standards for total suspended particulates and SO₂.

The SER has indicated that the DEP's dispersion model DISPMOD was used to determine the impact of the proposed power station on local levels of NO₂ and SO₂. This model was run with the standard input configuration used by the DEP for the Kwinana EPP studies, but with a finer 500m grid. The site was modelled in isolation and in combination with existing and proposed new industries. During the assessment period, modelling studies were undertaken for the preferred site in the central core of the Kwinana Industrial Area and the fallback sites in the East Rockingham Industrial Park.

Although any proposed gas turbine facility would be expected to be installed with low-NO_x burners in accordance with EPA's Guidance Statement 15, the major component of atmospheric emissions is still likely to be NO_x. In the event of sufficient gas not being available due to pipeline failure or excessive peak demand, the turbines would be operated on liquid fuel. In these circumstances NO_x emissions are significantly higher and some SO₂ is generated (depending on the sulphur content of the liquid fuel).

For the preferred Mason Rd site, the predicted maximum 1-hour average concentration of NO₂ at the Hope Valley monitoring station, is 165ug/m³ from a combination of existing and proposed industry sources and a worst case mix of gas and liquid fuel in the proposed power station running at full load. This compares to the NEPM standard of 246ug/m³ for populated areas. A significant reduction in NO_x emissions from liquid fuel could be achieved by NO_x control measures such as water injection, however, the environmental impacts of producing the requisite quantity of demineralised water need to be considered against the benefits of NO_x suppression for a fuel that is expected to be used for only 100 hours per year.

For a power station considered in isolation, predicted maximum 1-hour ground level SO₂ concentrations when operating on gas would be negligible, at most 0.028% of the relevant limits and standards. For the same liquid fuel scenario outlined above, maximum 1-hour SO₂ concentrations from the proposed power station in isolation are predicted to be up to 293ug/m³ in the industrial area, 155ug/m³ in the buffer area and 120ug/m³ in the residential area. These concentrations would be at most 21%, 15% and 17% of the Kwinana EPP limits. However, within the EPP area emissions of SO₂ are fully allocated to existing industries. Recognising that liquid fuels would only be used for a short period each year, it would therefore be necessary for future proponents of power generating facilities to work with the DEP and Kwinana industries in a re-determination of allowable emissions under the EPP.

Modelling of the impact of expansion of the Kwinana facility on photochemical smog generation indicates only minor changes.

Submissions

Submissions on the Pinjar site in relation to NO_x control and the reliability of the gas supply are also relevant to this site.

A submission has suggested that although emissions are expected to be within standards there is growing concern that exposure to low levels of air emissions could be responsible for long term health problems. The power station should use the least polluting fuel and be required to continually monitor emissions, report to the community and continually upgrade emission control technologies.

Western Power has advised that the primary fuel supply would be natural gas but that provision is made for the use of liquid fuel in peak load plant when gas is not available. If the power station were expanded to include base load capacity, then sufficient gas demand would exist to secure a gas supply contract and liquid fuel would only be required as an emergency or standby fuel.

Future proponents of power generating facilities would be required to undertake emission monitoring to verify the assumptions made in the modelling assessment. Cumulative monitoring of ambient ground level concentrations is already undertaken in the Kwinana area. Reporting on emissions and control technologies would need to be addressed by future proponents of power generating facilities in the section 38 assessment process.

The Department of Mineral and Petroleum Resources raised concern about the use of scarce heavy industrial land in the Kwinana area for a power station.

EPA advice

The construction of a gas fuelled power station on scarce heavy industrial land in Kwinana is a matter which would require careful consideration by Government. The site is appropriately zoned and provides advantages of a buffer zone for noise and air emissions and economic advantages of proximity to co-generation opportunities, existing infrastructure and major consumers. The Department of Planning Infrastructure has raised no objection to use of the site.

It is the EPA's opinion that at these sites, a power generating facility of the type proposed can be managed to meet the EPA's strategic environmental objective for this factor provided that:

- specific design parameters of any proposed power generating facilities are subject to section 38 assessment;
- any future proponent works with the DEP and Kwinana industries in a re-determination of allowable emissions under the EPP; and
- any future proponent ensures that the NO_x controls meet the requirements of EPA Guidance Statement 15 or subsequent updates thereto.

Kemerton

The atmospheric emissions of significance from the proposed plant would be oxides of nitrogen (NO_x), sulphur dioxide (SO₂) (when the power station is operating on liquid fuel) and, to a lesser degree particulates and unburnt hydrocarbons. NO_x, particulate matter and SO₂ may be important on a local scale and NO_x has the potential to lead to photochemical smog.

Existing industries in the Kemerton Industrial Park area generate significant atmospheric emissions and previous studies have been undertaken to provide an indication of the capacity of the estate to accommodate a range of potential industries.

The SER has indicated that ground level concentrations from the proposed plant were predicted using the DEP's air dispersion model DISPMOD, local meteorological data and emission characteristics for the source and taking into consideration the effect of existing and potential industries.

Although any proposed gas turbine facility would be expected to be installed with low-NO_x burners in accordance with EPA's Guidance Statement 15, the major component of atmospheric emissions is still likely to be NO_x. In the event of sufficient gas not being available due to pipeline failure or excessive peak demand, the turbines would be operated on liquid fuel. In these circumstances NO_x emissions are significantly higher and some SO₂ is generated (depending on the sulphur content of the liquid fuel).

For the preferred north-eastern site, the predicted maximum 1-hour average concentration of NO₂ occurs within the buffer area and is 157ug/m³ from a combination of existing industry sources and a worst case mix of gas and liquid fuel in the proposed power station running at full load. Outside the buffer area the maximum 1-hour concentration is 103ug/m³. This compares to the NEPM standard of 246ug/m³ for populated areas. A significant reduction in NO_x emissions from liquid fuel could be achieved by NO_x control measures such as water injection, however, the environmental impacts of producing the requisite quantity of demineralised water need to be considered against the benefits of NO_x suppression for a fuel that is expected to be used for only 100 hours per year.

When operating on gas the maximum ground level concentration of SO₂ attributable to the power station would be 0.11ug/m³ and there would be no discernable impact compared to existing SO₂ levels of about 320ug/m³ within the buffer and 80ug/m³ (14% of the NEPM standard) outside the buffer. For the power station using liquid fuel under a similar industry and fuel combination as described above, maximum 1-hour SO₂ concentrations are predicted to be 320ug/m³ in the buffer area and 122ug/m³ outside the buffer area compared to a NEPM standard of 570ug/m³ for populated areas.

Submissions

Submissions on the Pinjar site in relation to NO_x control and the reliability of the gas supply are also relevant to this site.

A submission has queried the integrity of the meteorological data used in the modelling. Western Power has advised that meteorological data for the assessment was obtained from the meteorological station within the Kemerton Industrial Park as monitored by the Bureau of Meteorology for LandCorp. This meteorological data set was selected as it was the data set used in air quality assessment for the expansion of the Kemerton Industrial Park, is the closest data set that is available and was developed in response to criticism over the use of the Glen Iris meteorological data set.

A submission has suggested that independent monitoring is needed of cumulative emissions from Kemerton Industrial Park. Western Power has responded that as cumulative monitoring is an issue that is common to all industries within the Kemerton Industrial Park, any cumulative air quality monitoring for the Kemerton Industrial Park would be undertaken under the direction of the Kemerton Industrial Park Co-ordinating Committee in conjunction with industry.

EPA advice

It is the EPA's opinion that at these sites, a power generating facility of the type proposed can be managed to meet the EPA's strategic environmental objective for this factor provided that:

- specific design parameters of any proposed power generating facilities are subject to section 38 assessment; and
- any future proponent ensures that the NO_x controls meet the requirements of EPA Guidance Statement 15 or any updates thereto.

Bunbury

The atmospheric emissions of significance from the proposed plant would be oxides of nitrogen (NO_x), sulphur dioxide (SO₂) (when the power station is operating on liquid fuel) and, to a lesser degree particulates and unburnt hydrocarbons. NO_x, particulate matter and SO₂ may be important on a local scale and NO_x has the potential to lead to photochemical smog.

The SER has indicated that ground level concentrations from the proposed plant were predicted using the DEP's air dispersion model DISPMOD and the Victorian EPA's model Ausplume, local meteorological data and emission characteristics for the source.

Although any proposed gas turbine facility would be expected to be installed with low-NO_x burners in accordance with EPA's Guidance Statement 15, the major component of atmospheric emissions is still likely to be NO_x. In the event of sufficient gas not being available due to pipeline failure or excessive peak demand, the turbines would be operated on liquid fuel. In these circumstances NO_x emissions are significantly higher and some SO₂ is generated (depending on the sulphur content of the liquid fuel).

The predicted maximum 1-hour average concentration of NO₂ at a residential zoned area is 135ug/m³ from the proposed power station running at full load on liquid fuel. This compares to the NEPM standard of 246ug/m³ for populated areas. A significant reduction in NO_x emissions from liquid fuel could be achieved by NO_x control measures, however, the environmental impacts of producing the requisite quantity of demineralised water need to be considered against the benefits of NO_x suppression for a fuel that is expected to be used for only 100 hours per year.

For the same liquid fuel combination, maximum 1-hour SO₂ concentrations at a residential zoned area are predicted to be 185ug/m³ compared to a NEPM standard of 570ug/m³ for populated areas.

Submissions

Submissions on the Pinjar site in relation to NO_x control and the reliability of the gas supply are also relevant to this site.

EPA advice

It is the EPA's opinion that at this site, a power generating facility of the type proposed can be managed to meet the EPA's strategic environmental objective for this factor provided that:

- specific design parameters of any proposed power generating facilities are subject to section 38 assessment; and
- any future proponent ensures that the NO_x controls meet the requirements of EPA Guidance Statement 15.

Collie

The atmospheric emissions of significance from the proposed plant would be oxides of nitrogen (NO_x), sulphur dioxide (SO₂), particulates and unburnt hydrocarbons. NO_x, particulate matter, unburnt hydrocarbons and SO₂ may be important on a local scale and NO_x has the potential to lead to photochemical smog.

An existing coal fuelled power station is on the proposed site and other, older coal fuelled facilities are located at Muja, about 16km south-east of the site. It is anticipated that any future facilities would operate with lower NO_x and particulate emissions.

The SER reviewed previous modelling undertaken for a 1990 proposal for the existing Collie Power Station. During the assessment period the adequacy of this approach was questioned by DEP and further work was undertaken. This work has reviewed meteorological and SO₂ monitoring data, developed a variable SO₂ emission file, undertaken validation and calibration of the TAPM model and then used that model to predict ground level concentrations. It is noted that the model appears to predict somewhat higher concentrations than are measured at monitoring sites.

Model predictions were undertaken for a base case of emissions for 2001 and future emissions in 2008 when the proposed power generation facility would be operational and the older Muja A and B power stations would have been retired from service.

In 2008 the predicted maximum 1-hour average concentration of SO₂ at the residential area of Collie is 320ug/m³ compared to 340ug/m³ in 2001. The equivalent second highest levels are 290ug/m³ and 300ug/m³ respectively. This compares to the NEPM standard of 570ug/m³ for populated areas. Within the Collie Power Station buffer area ground level concentrations of SO₂ are predicted to increase from 290ug/m³ in 2001 to 300ug/m³ in 2008 whilst air quality in the countryside around the Muja facilities is expected to significantly improve by 2008.

A similar analysis has not been undertaken for NO_x or particulates on the basis that the 1990 modelling indicated concentrations well below the NEPM standard.

Although the additional modelling which has been undertaken has provided a greater level of confidence, the EPA is of the view that further model verification would be advisable before a specific power station proposal is put forward.

Submissions

The DEP has indicated that an adequate air quality assessment for Collie requires a comprehensive regional air quality study to develop and validate a dispersion model using the extensive monitoring and meteorological data set gathered by SECWA/Western Power since 1992. Western Power has responded that it committed to undertaking further regional air quality modelling studies during the public review period to confirm the cumulative impacts of sulphur dioxide from a 600MW station, with results provided to the public and the EPA assessment process through the Proponent's Response to Submissions. A comprehensive report has been provided to the DEP Air Quality Branch, and key findings are summarised in the response to submissions (Appendix 4).

A submission asked whether consideration has been given to reducing SO₂ emissions by mechanisms such as stripping sulphur from the coal, injecting lime or through flue gas desulphurisation. Western Power has advised that such options have been considered but that these and other similar measures for SO₂ emission reduction were not considered feasible as the slight improvement in the quality of air emissions does not justify the high cost of implementation.

A submission queried the potential for emissions of "air toxics" such as dioxins and furans, at all sites but particularly in relation to coal burning at Collie. Western Power has reviewed the work done by State and Federal agencies and concluded that a coal fuelled power station of the type envisaged at Collie would be likely to emit about 1g of dioxins and furans per year. Most dioxin removal/destruction technologies used in the industrial sectors are aimed at reducing dioxin and furan concentrations to 0.1ng/m³ or less, which is the order of magnitude expected from uncontrolled power stations.

Nevertheless, the final choice of control technology will be the responsibility of future proponents of power generating facilities who would need to provide a rigorous analysis and discussion of the technology during the Section 38 environmental assessment process.

A submission has suggested that the precipitators at Muja C and D do not work well. Western Power has responded that any new coal-fired plant installed at the Collie Power Station would have electrostatic precipitators similar to those installed on the existing Collie Power Station plant, monitoring of which has demonstrated that particulate emissions are well below the licence limits.

EPA advice

It is the EPA's opinion that at this site, a power generating facility of the type proposed can be managed to meet the EPA's strategic environmental objective for this factor provided that:

- specific design parameters of any proposed power generating facilities are subject to section 38 assessment; and
- Western Power works with the DEP to ensure that air dispersion modelling and validation is adequate.

3.7 Noise

The EPA's strategic environmental objective for this factor is to ensure compliance with the *Environmental Protection (Noise) Regulations*.

Pinjar

The Pinjar site is surrounded by State Forest with the nearest residence about 4.5km away. The existing power station is the only significant noise source in the area and is not a source of noise complaints.

Monitoring and modelling of the existing facility has indicated that noise levels at the nearest residence meet the requirements of the *Environmental Protection (Noise) Regulations*. However, at the site boundary noise exceeds the allowable levels. Western Power has identified options for noise mitigation and has applied for an exemption under Section 17 of the regulations.

The SER has indicated that noise modelling was undertaken using SoundPLAN with two calculation algorithms appropriate for close-field and far-field situations to assess noise levels at the site boundary and at the nearest residence respectively. Three weather scenarios were modelled, one with neutral weather, the others representing 'worst case' day and night conditions in accordance with the EPA's *Draft Guidance for Assessment of Environmental Factors No. 8 – Environmental Noise*.

The modelling indicates that noise levels at the nearest residence would increase by 0.5dB(A) with the installation of the proposed additional facilities. Such an increase would not be audibly detectable.

The predicted noise levels at the nearest receiver for all units operating are at least 5dB(A) below the assigned levels, and therefore the proposed new units would not be considered a 'significant contributor' of noise at the nearest residence.

Submissions

There were no significant issues raised in respect of noise at the Pinjar site.

EPA advice

It is the EPA's opinion that at this site, a power generating facility of the type proposed can be managed to meet the EPA's strategic environmental objective for this factor provided that:

- specific design parameters of any proposed power generating facilities are subject to section 38 assessment.

Kwinana/East Rockingham

The sites are within the Kwinana Industrial Area where there are numerous noise sources. Noise modelling in 1998 indicated that residents at both Hope Valley and Medina receive noise from industries at levels which are allowable under the *Environmental Protection (Noise) Regulations* (BSD, 1998). Nevertheless, residents of Hope Valley and Medina have expressed concern at noise levels.

The SER has indicated that noise modelling has been undertaken for the preferred site and two fallback options using the Environmental Noise Model software package and environmental parameters to represent the 'worst case' in accordance with the EPA's *Draft Guidance for Assessment of Environmental Factors No. 8 – Environmental Noise*. During the assessment period further modelling work was undertaken to assess the forth site option and the noise characteristics of all four site options were compared.

The results of the modelling indicate that enhanced noise attenuation would be required to ensure compliance with the requirements of the regulations. Future proponents of power generating facilities would therefore need to consider such measures as:

- acoustic enclosures for gas turbines located inside a building/s;
- acoustic treatment of all fans and ducting;
- acoustic enclosures over all outdoor pumps; and
- reduction in exhaust velocities of gas turbine and air fans.

Submissions

A submission suggested that the noise impact of site 3 has not been assessed and is of concern because residents of North Rockingham already experience unacceptable noise at times. Western Power has responded that a full noise assessment was initially undertaken on Sites 1, 2 and 3 and a comparison of these sites on the basis of noise was presented in the SER. The results of noise modelling for Site 3 indicate that noise levels in North Rockingham would be at or less than 30dB(A). Enhanced noise attenuation has been allowed for in the design to ensure that the proposed power station would be an insignificant contributor to noise in residential areas.

Through the public submission process, Western Power has been requested to consider another site in the East Rockingham Industrial Park, further to the east with frontage to Mandurah Road. This site has also been assessed for noise compliance and it has been demonstrated that a power station at this location could also comply with noise criteria.

EPA advice

It is the EPA's opinion that at all four sites, a power generating facility of the type proposed can be managed to meet the EPA's strategic environmental objective for this factor provided that:

- specific design parameters of any proposed power generating facilities are subject to section 38 assessment; and
- enhanced noise attenuation measures are implemented to ensure the appropriate regulations are met.

Kemerton

The sites are within the Kemerton Industrial Park where there are other noise sources. The Park is surrounded by a buffer area designed to provide adequate separation between industry and residential areas. However, there are currently a number of residences within the buffer area.

The SER has indicated that noise modelling has been undertaken for the preferred site and for the fallback option using the Environmental Noise Model software package and environmental parameters to represent the 'worst case' in accordance with the EPA's *Draft Guidance for Assessment of Environmental Factors No. 8 – Environmental Noise*. In addition to modelling the proposed plant in isolation a cumulative assessment was carried out with an indicative mix of potential industries in the Park.

The results of the modelling indicate that enhanced noise attenuation would be required to ensure compliance with the requirements of the regulations. Future proponents of power generating facilities would therefore need to consider such measures as:

- 'super' attenuated enclosures, e.g. double skinning;
- installation of barriers such as concrete walls;
- additional silencing on air intakes and exhausts;
- identification of tonal noise emitters and provision of suitable attenuation; and
- reduction in exhaust velocities of gas turbine and air fans.

Submissions

A submission has queried the wind speed used in the modelling and suggested that the 35dB(A) contour should be shown. Western Power has responded that a wind speed of 3m/s was assumed and that the assigned noise level criteria for sensitive receptors outside the boundary of the Kemerton Industrial Park during night-time is 40dB(A). Therefore the 40dB(A) contour is the most appropriate when cumulative noise levels are considered.

EPA advice

It is the EPA's opinion that at both sites, a power generating facility of the type proposed can be managed to meet the EPA's strategic environmental objective for this factor provided that:

- specific design parameters of any proposed power generating facilities are subject to section 38 assessment; and
- enhanced noise attenuation measures are implemented to ensure the appropriate regulations are met.

Bunbury

The site is adjacent to the Bunbury Port where there are other noise sources.

The SER has indicated that noise modelling has been undertaken for the site using the Environmental Noise Model software package and environmental parameters to represent the 'worst case' in accordance with the EPA's *Draft Guidance for Assessment of Environmental Factors No. 8 – Environmental Noise*.

The results of the modelling indicate that enhanced noise attenuation would be required to ensure compliance with the requirements of the regulations. Future proponents of power generating facilities would therefore need to consider such measures as:

- acoustic enclosures for gas turbines located inside a building/s;
- acoustic treatment of all fans and ducting;
- acoustic enclosures over all outdoor pumps; and
- reduction in exhaust velocities of gas turbine and air fans.

Submissions

There were no significant issues raised in respect of noise at the Bunbury site.

EPA advice

It is the EPA's opinion that at this site, a power generating facility of the type proposed can be managed to meet the EPA's strategic environmental objective for this factor provided that:

- specific design parameters of any proposed power generating facilities are subject to section 38 assessment; and
- enhanced noise attenuation measures are implemented to ensure the appropriate regulations are met.

Collie

Land use in the vicinity of the Collie Power Station Site is dominated by forestry, grazing, agriculture and mining and the nearest residence is approximately 3.8km away, within the power station buffer area. The next closest residence is about 5km to the north-east. Mining operations about 2km south of the site are another source of noise in the area.

Noise monitoring and modelling have indicated that for some wind conditions the noise level at the plant boundary exceeds the allowable limits under the regulations but noise levels at the edge of the buffer area meet regulatory requirements for residences and no formal complaints have been received in relation to the Collie Power Station.

The SER has indicated that noise modelling has been undertaken for the site using the Environmental Noise Model software package for a range of meteorological conditions and environmental parameters including those designed to represent the 'worst case' in accordance with the EPA's *Draft Guidance for Assessment of Environmental Factors No. 8 –Environmental Noise*.

The modelling has indicated that noise levels comply with the regulations at the closest residence which is just inside the northern boundary of the buffer zone and at all other residences. Noise levels at the site boundary are predicted to be greater than the boundary criteria for rural areas of 60dB(A) for some meteorological conditions and therefore future proponents of power generating facilities would need to determine management measures to ensure the regulated levels are met.

Submissions

There were no significant issues raised in respect of noise at the Collie site.

EPA advice

It is the EPA's opinion that at this site, a power generating facility of the type proposed can be managed to meet the EPA's strategic environmental objective for this factor provided that:

- specific design parameters of any proposed power generating facilities are subject to section 38 assessment.

3.8 Marine ecosystems

The EPA's strategic environmental objective for this factor is to maintain the abundance, species diversity, geographic distribution and productivity of marine communities.

Kwinana/East Rockingham

The preferred site is about 1000m from Cockburn Sound and there are no proposals for discharge to the Cockburn Sound but there is some potential for indirect discharge through contamination of groundwater.

For expansions beyond the initial 240MW, the preferred option is that cooling water be taken from the Cape Peron sewage pipeline and for the brine discharge from the cooling system and the demineralisation plant to be returned to the pipeline.

The SER has indicated that as the waste cooling water quantities from a 240MW or 360MW open cycle power station are relatively small, it would likely be disposed of on-site through evaporation. There is a potential for pond or pipeline leakage to reach the marine environment through groundwater or surface flow.

Potential proponents would be required to develop a Saline Water Management Plan and if wastewater is discharged to evaporation in ponds on the sites then the ponds would be expected to include an impermeable liner and be designed to ensure a potential overflow would be contained locally.

Any proposal to use seawater for cooling or to discharge thermal effluent into Cockburn Sound would be subject to further referral to the EPA and the Water Corporation would be responsible to undertake any approvals for wastewater disposal through the Cape Peron main.

The Water Corporation has established water quality acceptance criteria for the Cape Peron pipeline, and any potential proponent would be required to comply with those criteria.

Submissions

A submission suggested that the disposal of demineralisation water through Cape Peron outfall should not be allowed. Western Power has advised that the proposed power station has incorporated waste minimisation objectives by identifying the opportunity to recycle and reuse wastewater. The result of recycling treated municipal effluent from the Water Corporation and discharging cooling tower blow-down into the Cape Peron pipeline gives a net reduction of about 10,700 ML/yr of wastewater being discharged from the Cape Peron pipeline. Wastewater would be required to meet the Water Corporation's acceptance criteria for the Cape Peron pipeline to ensure that the receiving environment is appropriately protected.

A submission has suggested that the recommendations of the draft Environmental Management Plan for Cockburn Sound should be implemented where applicable to the Kwinana sites. Western Power points out that the preferred option of wastewater re-use and disposal is consistent with the Plan.

EPA advice

It is the EPA's opinion that at these sites, a power generating facility of the type proposed can be managed to meet the EPA's strategic environmental objective for this factor provided that:

- specific design parameters of any proposed power generating facilities are subject to section 38 assessment.

Kemerton

A water cooled, combined cycle, gas turbine power plant on the site would have the potential to impact on the marine environment through ocean disposal of waste water.

The SER has indicated that the preferred option for wastewater disposal would be through a centralised wastewater treatment facility but due to the uncertain timing of the proposed power station and of the centralised wastewater treatment facility, the feasibility of disposal of wastewater through the existing Collie Power Station ocean outfall facility north of Leschenault Inlet has been considered.

The quality of the water discharged to the ocean would be dependent on the quality of the water supply to the plant and on the chemicals such as biocides and corrosion inhibitors required for pre-treatment of the water.

By the time the effluent reaches the ocean outfall, concentrations of biocides and corrosion inhibitors would be expected to be approximately 0.1ppm due to decomposition and therefore would require a dilution of 33:1 to meet the ANZECC/ARMCANZ Water Quality Guidelines.

TDS in the wastewater is not expected to exceed 5,000mg/L which is much lower than the salinity of sea water but its temperature would be higher than the receiving sea water. At the existing Collie Power Station ocean outfall a 99% level of habitat protection at the boundary of the mixing zone requires a dilution of about 60:1.

The dilution capability of the Collie Power Station ocean outfall with existing and extended diffuser configurations was assessed using the PLUMES model of the United States EPA which has been extensively validated and used within the Perth coastal waters area.

The results of the modelling indicate that increased discharge through the existing or an extended outfall diffuser would result in adequate dilution to meet environmental guidelines. Recent observations suggest that there is not expected to be any impact on the seagrasses in the vicinity of the outfall.

Submissions

There were no significant issues raised in respect of marine ecosystems for the Kemerton site.

EPA advice

It is the EPA's opinion that at these sites, a power generating facility of the type proposed can be managed to meet the EPA's strategic environmental objective for this factor provided that:

- specific design parameters of any proposed power generating facilities are subject to section 38 assessment.

Bunbury

The Bunbury site is adjacent to Koombana Bay and, although there are no proposals for discharge to the bay, there is some potential for indirect discharge through contamination of groundwater.

The SER has indicated that as the waste cooling water quantities from a 240MW or 360MW open cycle power station are relatively small, it would likely be managed on-site through evaporation. There is a potential for pond or pipeline leakage to reach the marine environment through groundwater or surface flow.

Potential proponents would be required to develop a Saline Water Management Plan and if wastewater is discharged to evaporation in ponds on the site then the ponds would be expected to include an impermeable liner and be designed to ensure a potential overflow would be contained locally.

Submissions

There were no significant issues raised in respect of marine ecosystems at the Bunbury site.

EPA advice

It is the EPA's opinion that at this site, a power generating facility of the type proposed can be managed to meet the EPA's strategic environmental objective for this factor provided that:

- specific design parameters of any proposed power generating facilities are subject to section 38 assessment.

Collie

The existing Collie Power Station disposes of cooling water through an ocean outfall north of Leschenault Inlet. An additional water-cooled, coal fired, steam turbine power plant on the site would have the potential to impact on the marine environment through additional ocean disposal of waste water. The SER has indicated that wastewater disposal would be through the existing Collie Power Station ocean outfall.

The quality of the water discharged to the ocean would be dependent on the quality of the water supply to the plant and on the chemicals such as biocides and corrosion inhibitors required for pre-treatment of water. By the time the effluent reaches the ocean outfall, concentrations of biocides and corrosion inhibitors would be expected to be approximately 0.1ppm due to decomposition and therefore require a dilution of 33:1 to meet the ANZECC/ARMCANZ Water Quality Guidelines.

TDS in the wastewater is not expected to exceed 5,000mg/L which is much lower than the salinity of sea water but its temperature would be higher than the receiving sea water. At the existing Collie Power Station ocean outfall a 99% level of habitat protection at the boundary of the mixing zone requires dilution of about 60:1.

The dilution capability of the existing Collie Power Station ocean outfall was assessed using the PLUMES model of the United States EPA which has been extensively validated and used within the Perth coastal waters area.

The results of the modelling indicate that increased discharge through the existing outfall diffuser would result in adequate dilution to meet environmental guidelines. Recent observations suggest that there is not expected to be any impact on the seagrasses in the vicinity of the outfall.

Submissions

There were no significant issues raised in respect of marine ecosystems for the Collie site.

EPA advice

It is the EPA's opinion that at this site, a power generating facility of the type proposed can be managed to meet the EPA's strategic environmental objective for this factor provided that:

- specific design parameters of any proposed power generating facilities are subject to section 38 assessment.

3.9 Groundwater

The EPA's strategic environmental objective for this factor is to maintain the quality of groundwater so that existing and potential uses, including ecosystem maintenance, are protected.

Pinjar

The Pinjar site is on the western edge of the Gnangara Mound which supplies water for the Perth region. The area is also classified as a Priority 1 Zone which is intended to give the highest level of groundwater protection with the aim of ensuring that there is no degradation of water resources in the area. The existing Pinjar Gas Turbine Station is a non-conforming use within the area and is currently licensed by the Water Corporation to abstract 10,000kL/year of groundwater for the purpose of domestic use and fire fighting.

The SER has stated that previous audits of the existing operations have identified the greatest risk of contamination to groundwater to be the transport of fuel, oil, chemicals and wastes to and from the site. The existing operating and maintenance procedures comply with the DEP licence conditions.

The proposed expansion would result in an increase in the volume of fuel and chemicals transported to and stored on the site, and an increase in the activities associated with their usage. These activities are currently being managed successfully.

The current licensed abstraction of 10,000kL/yr is sufficient to meet the fresh water supply requirements for domestic usage, wash-down and reticulation for the expansion, provided a demineralisation plant is not installed on the site. If a demineralisation plant is required, a new water abstraction licence would need to be negotiated.

Future proponents of power generation facilities would be required to minimise potential impacts from accidental release of contaminants during construction or operation through project design and management strategies with reference to EPA Draft Guidance No.26 *'Management of Surface Run-Off from Industrial and Commercial Sites'*.

Submissions

A submission has suggested that the high importance of the Gngangara groundwater mound gives rise to the expectation that protection of groundwater quality will be a high priority. Western Power has advised that the protection of groundwater quality over the Gngangara groundwater mound has always been given highest priority by Western Power. The same high priority of containment and management of discharges to protect groundwater resources from any proposed expansion at Pinjar would be enforced through management strategies outlined in the Pinjar SER document.

A submission has queried whether there are any options to avoid a demineralisation plant as it would result in the water demand exceeding the current licence. Western Power has responded that by far the greatest demand for demineralised water would be for NO_x suppression when operating on liquid fuel, should this be required. Other options for future proponents of power generating facilities are to truck in demineralised water using 100 to 200 truckloads per year or seek an exemption from the EPA to allow the plant to run on liquid fuel without NO_x suppression.

EPA advice

It is the EPA's opinion that at this site, a power generating facility of the type proposed can be managed to meet the EPA's environmental objective for this factor provided that:

- specific design parameters of any proposed power generating facilities are subject to section 38 assessment;
- the current high priority of containment and management of discharges to protect groundwater resources is maintained and enforced.

Kwinana/East Rockingham

The Kwinana Industrial Area lies on an unconfined superficial aquifer which flows generally westwards to the sea. The groundwater has been contaminated by various spills and leakages in the past.

The SER has indicated that future proponents of power generation facilities would be required to minimise potential impacts from accidental release of contaminants during construction or operation through project design and management strategies with reference to EPA Draft Guidance No.26 *'Management of Surface Run-Off from Industrial and Commercial Sites'*.

Submissions

There were no significant issues raised in respect of groundwater at the Kwinana sites.

EPA advice

It is the EPA's opinion that at these sites, a power generating facility of the type proposed can be managed to meet the EPA's strategic environmental objective for this factor provided that:

- specific design parameters of any proposed power generating facilities are subject to section 38 assessment.

Kemerton

The Kemerton Industrial Park is underlain by an unconfined superficial aquifer. The depth to the watertable over much of the area is less than 2m and extensive areas of wetland (both permanent and seasonal) occur in the eastern and western parts of the Park. The shallow groundwater system is recharged by direct infiltration of rainfall and lateral flow from a low groundwater mound north-east of the Park.

The SER has indicated that groundwater in the superficial aquifer ranges in salinity from 100 to 1,500mg/L TDS with local areas up to 8,600mg/L. At the preferred site the depth to groundwater is likely to be about 0.5 to 1m and flow is in an east-south-easterly direction. For most of the length of the proposed wastewater pipeline route, the groundwater is deeper than 2m from the surface, however, there may be areas where the groundwater is closer to the surface.

Although there would be no direct discharge of wastewater or contaminated stormwater, the groundwater could potentially be contaminated through spillages and inadequate management of storm water run-off.

Future proponents of power generation facilities would be required to minimise potential impacts from accidental release of contaminants during construction or operation through project design and management strategies with reference to EPA Draft Guidance No.26 *'Management of Surface Run-Off from Industrial and Commercial Sites'*.

Submissions

A submission has queried the implications of the recently completed Kemerton Water Study (Aquaterra, 2002). Western Power has responded that a detailed report was received by the Kemerton Industrial Park Co-ordinating Committee in June 2002 describing a total management approach. The report is currently under review by the various stakeholders and the results are not expected to be released until the third or fourth quarter 2002.

Western Power is not in a position to comment at this stage on the findings of the report. However, it will be made available to future proponents of power generation facilities to support the Section 38 environmental assessment process.

A submission asked whether consideration has been given to using wastewater from the new sewage treatment plant at Kemerton. Western Power has responded that the Water Corporation has been awarded the contract for the provision of water supply services for the Kemerton Industrial Park and has advised that they are able to supply the quantity of scheme water required to meet the power station requirements. The Water Corporation has also advised that they may have treated domestic wastewater available for reuse and therefore, one of the options available to future proponents of power generating facilities is the use of this treated wastewater.

EPA advice

It is the EPA's opinion that at these sites, a power generating facility of the type proposed can be managed to meet the EPA's strategic environmental objective for this factor provided that:

- specific design parameters of any proposed power generating facilities are subject to section 38 assessment.

Bunbury

The Bunbury site lies on superficial deposits of silty sands extending to a depth of about 30m, overlying basalt. Some areas of the site are on man-made fill and some areas may also be underlain by estuarine or swamp deposits. Soils are generally saline and groundwater is at a depth of 2 to 3m.

The site was previously occupied by a coal-fired power station which was decommissioned in 1999. Following an environmental site assessment to determine the extent of contamination on site, the site has now been remediated. It is expected that the site will soon be in a condition to be certified as successfully remediated.

The SER has indicated that although the shallow groundwater system is susceptible to contamination, this upper aquifer is not considered to have any potential as a local water supply.

Future proponents of power generation facilities would be required to minimise potential impacts from accidental release of contaminants during construction or operation through project design and management strategies with reference to EPA Draft Guidance No.26 *'Management of Surface Run-Off from Industrial and Commercial Sites'*.

Submissions

There were no significant issues raised in respect of groundwater at the Bunbury site.

EPA advice

It is the EPA's opinion that at this site, a power generating facility of the type proposed can be managed to meet the EPA's strategic environmental objective for this factor provided that:

- specific design parameters of any proposed power generating facilities are subject to section 38 assessment.

Collie

At the Collie site, groundwater is mainly contained within the sandstones and coal measures and provides the major source of water to the coal mines, power stations, for domestic and stock watering, and maintains the river pools and associated environment. All the mines extend below the water table and dewatering of the aquifers has taken place since 1988.

The SER has indicated that groundwater currently serves as a water supply for the power stations both from mine dewatering operations and water supply borefields. The introduction of wastewater recycling at Muja Power Station has significantly reduced demand on external groundwater resources.

In line with the current water management strategy based on the Collie Basin Water Resource Management Strategy (CWAG, 1999) it is expected that the current water allocation licence issued to Western Power, which allows for the abstraction of 9.5GL/year from Western Power borefields and disused mines, will be amended to restrict the amount of groundwater abstraction and encourage the use of more saline surface water from the Wellington-Harris reservoir system.

Future proponents of power generation facilities would be required to confirm a water supply strategy in consultation with the WRC and the Water Corporation, and would be required to explore all potential opportunities to maximise water reuse.

Submissions

A submission observed that the SER does not clearly specify the Collie Water Advisory Group strategy for usage of groundwater as a back up source until 2006, after which groundwater is to be used only as an emergency source. If mine dewatering supply is not available, infrastructure to obtain water from other storages (e.g. Wellington and Harris reservoirs) should be in place as soon as possible and definitely before 2006.

Western Power has responded that the CWAG long-term strategies are presently under development. However the present understanding is that there may not be sufficient surface water in Wellington Dam for Western Power needs. The whole strategy is currently under review and future proponents of power generation facilities would be required to develop a water supply strategy in consultation with the Water and Rivers Commission and the Water Corporation and would be required to explore all potential opportunities to maximise water reuse.

A submission has asked what measures will be undertaken to achieve long term supplementation of the pools of the Collie River South Branch since groundwater recovery in Cardiff Sub-basin at Collie will take about 30 years if no further abstraction occurs. Western Power has responded that supplementation of the pools has not been formally implemented. Discussions are required between Western Power and the Water and Rivers Commission to finalise details.

A submission has suggested that there should be closer consideration of air cooling for all plants and particularly Collie. Western Power has advised that in order to maximise the thermal efficiency of a condensing steam turbine plant in a combined cycle plant or coal-fired plant, the exhaust steam must be condensed at the lowest practical pressure. To condense the steam under these conditions, it must first be sufficiently cooled so that only water is returned to the water circuit of the boiler.

There are advantages and disadvantages of both air and water cooling. The major advantage of air cooled plant is its very low or zero requirement for cooling water supplies, lessening the environmental impact on the local water supplies. However, air cooled plants have an impact on the economic viability of the power station both in capital and operating costs. Air cooling at any of the sites has not been discounted but the SER has taken a conservative approach by assessing a water cooled plant and it is likely that a developer who chooses air cooling would also fit within the specification of the site.

EPA advice

It is the EPA's opinion that at this site, a power generating facility of the type proposed can be managed to meet the EPA's strategic environmental objective for this factor provided that:

- specific design parameters of any proposed power generating facilities are subject to section 38 assessment; and
- future proponents liaise with Water Corporation and CWAG to optimise water management.

3.10 Risk and hazards

The EPA's strategic environmental objective for this factor is to ensure that risk from the proposal is as low as reasonably achievable and complies with acceptable standards and EPA criteria.

Pinjar

The Pinjar site is surrounded by State Forest with the nearest residence about 4.5km away.

The SER has indicated that a preliminary review has been performed of hazardous materials and processes that may be used in the operation of a generic 240MW open cycle, gas fuelled power station. The outcome of this review indicates that, based on the National Occupational Health and Safety Commission's Control of Major Hazard Facilities document (NOHSC, 1996), the proposed power station would not be considered a major hazard facility.

The main issue for risk management at the site is the potential for contamination of the Gnangara Mound water resource for which there are existing systems and procedures in place. However, future proponents of power generation facilities may be required to undertake a Quantitative Risk Analysis to confirm that the development meets the EPA criteria.

Submissions

There were no significant issues raised in respect of risks and hazards at the Pinjar site.

EPA advice

It is the EPA's opinion that at this site, a power generating facility of the type proposed can be managed to meet the EPA's strategic environmental objective for this factor provided that:

- specific design parameters of any proposed power generating facilities are subject to section 38 assessment.

Kwinana/East Rockingham

The sites are within the Kwinana Industrial Area which is surrounded by a buffer area aimed at protecting the community from the risk of industrial accidents.

The SER has indicated that risk assessments have been performed for all hazardous industries built in the Kwinana Industrial Area since 1985. A cumulative risk assessment of all activities in the area and a full development scenario was updated in 1998 (AEA, 1998). This assessment assumed notional high risk industries in approximately the same locations as the preferred power station site and the East Rockingham fallback sites. The assessment indicated that the EPA residential criteria would be met.

Given that the power station would pose a lower individual off-site risk than a petrochemical plant, it is expected that the EPA residential criteria would be met for the proposed power station. However, future proponents of power generation facilities may be required to undertake a Quantitative Risk Analysis to confirm that the development meets the EPA criteria.

Submissions

There were no significant issues raised in respect of risks and hazards at the Kwinana site.

EPA advice

It is the EPA's opinion that at these sites, a power generating facility of the type proposed can be managed to meet the EPA's strategic environmental objective for this factor provided that:

- specific design parameters of any proposed power generating facilities are subject to section 38 assessment.

Kemerton

The sites are within the Kemerton Industrial Park which includes a buffer zone which has been developed to protect the community from potential impacts of industry including the risk of industrial accidents.

The SER has indicated that risk assessment modelling was undertaken in 1997 (Woodward Clyde, 1997) to determine the impact of existing and hypothetical industry development within Kemerton Industrial Park. The modelling showed that the individual risk from these industries met the EPA's criteria and due to the buffer separation between the industrial development and residential areas, societal risks were also acceptable.

The preferred power station site and the fallback site are located within parcels of land assigned a high risk designation. Given that a power station would not be classified as a high risk industry, it is expected that the EPA residential criteria would be met for the proposed power station. However, future proponents of power generation facilities may be required to undertake a Quantitative Risk Analysis to confirm that the development meets the EPA criteria.

Submissions

There were no significant issues raised in respect of risks and hazards at Kemerton.

EPA advice

It is the EPA's opinion that at these sites, a power generating facility of the type proposed can be managed to meet the EPA's strategic environmental objective for this factor provided that:

- specific design parameters of any proposed power generating facilities are subject to section 38 assessment.

Bunbury

The site has been previously occupied by a coal fuelled power station and is within the Bunbury port industry zone.

The SER has indicated that a preliminary review has been performed of hazardous materials and processes that may be used in the operation of a generic 360MW open cycle, gas fuelled power station. The outcome of this review indicates that, based on the National Occupational Health and Safety Commission's Control of Major Hazard Facilities document, the proposed power station would not be considered a major hazard facility. It also concluded that:

- the transport of hazardous goods to the power station imposes no greater risk than other material cartage in the region;
- the transport of hydrocarbon products to the power station poses a low risk, but has the potential to cause severe impacts on Leschenault Estuary; and
- the risk created by a new gas pipeline lateral to the site is no greater than the risk associated with the existing gas pipeline in the area.

Future proponents of power generation facilities may be required to undertake a Quantitative Risk Analysis to confirm that the development meets the EPA criteria.

Submissions

There were no significant issues raised in respect of risks and hazards at the Bunbury site.

EPA advice

It is the EPA's opinion that at this site, a power generating facility of the type proposed can be managed to meet the EPA's environmental objective for this factor provided that:

- specific design parameters of any proposed power generating facilities are subject to section 38 assessment.

Collie

The Collie site has been designated for a power station and currently supports a 300MW coal fuelled facility. The site is surrounded by a buffer zone which has been developed to protect the community from potential impacts of industry including the risk of industrial accidents.

The SER has indicated that a preliminary review has been performed of hazardous materials and processes that may be used in the operation of a generic 600MW coal fuelled power station. The outcome of this review indicates that, based on the National Occupational Health and Safety Commission's Control of Major Hazard Facilities document, the proposed power station would not be considered a major hazard facility. It also concluded that:

- the buffer zone would be sufficient to contain any potential public risk;
- the transport of hazardous goods to the power station imposes no greater risk than existing material cartage;
- the transport of hydrocarbon products to the power station poses a low risk, but has the potential to cause severe impacts on rivers and wetlands.

Future proponents of power generation facilities may be required to undertake a Quantitative Risk Analysis to confirm that the development meets the EPA criteria.

Submissions

There were no significant issues raised in respect of risks and hazards at Collie.

EPA advice

It is the EPA's opinion that at this site, a power generating facility of the type proposed can be managed to meet the EPA's strategic environmental objective for this factor provided that:

- specific design parameters of any proposed power generating facilities are subject to section 38 assessment.

3.11 Heritage issues

The EPA's strategic environmental objective for this factor is to ensure that changes to the biophysical environment do not adversely affect historical and cultural associations and comply with relevant heritage legislation.

Pinjar

The Pinjar site has been significantly disturbed in the construction and operation of the current power generating facilities.

The SER has indicated that no archaeological or ethnographic sites have been recorded in any of the areas of the Pinjar Gas Turbine Station or associated facilities but there is a potential for as yet unrecorded Aboriginal sites in the immediate vicinity. There is a low to moderate potential for previously unrecorded ethnographic sites to be reported within the broader area.

To ensure that potential disturbance to Aboriginal heritage sites is minimised, future proponents of power generation facilities would be required to undertake an archaeological survey of previously undisturbed areas of the site and maintain consultation with representatives of any Aboriginal groups that have associations with the area to be disturbed.

Submissions

A submission drew attention to European heritage sites in the vicinity of the site. Western Power has responded that due to the distance between the proposed Pinjar development and Albert Thomas House, there is not expected to be any direct disturbance to this heritage site.

EPA advice

It is the EPA's opinion that at this site, a power generating facility of the type proposed can be managed to meet the EPA's strategic environmental objective for this factor provided that:

- specific design parameters of any proposed power generating facilities are subject to section 38 assessment.

Kwinana/East Rockingham

The preferred Kwinana site has been significantly disturbed through various industrial waste management activities. Other optional sites have been subject to less disturbance.

The SER has indicated that given the disturbance history of the preferred site, there is a low potential for surface archaeological material to be found and there is a low to moderate potential for surface archaeological material to be located in the uncleared portions of the optional power station sites. Therefore development of any of the sites should only proceed with contingency plans in place to deal with such discoveries, should they occur.

To ensure that potential disturbance to Aboriginal heritage sites is minimised, future proponents of power generation facilities would be required to undertake an archaeological survey of previously undisturbed areas of the site and maintain consultation with representatives of any Aboriginal groups that have associations with the area to be disturbed.

Submissions

A submission drew attention to European heritage sites in the vicinity of the site. Western Power has responded that there would be no direct disturbance to any of the identified heritage sites from the proposed power station development.

EPA advice

It is the EPA's opinion that at these sites, a power generating facility of the type proposed can be managed to meet the EPA's strategic environmental objective for this factor provided that:

- specific design parameters of any proposed power generating facilities are subject to section 38 assessment.

Kemerton

The preferred site at Kemerton has been subject to surface disturbance through clearing, grazing and tree planting. Less disturbance has occurred at the fallback site.

The SER has indicated that fifteen Aboriginal sites are located within a 5km radius of the proposed development and three sites are in the vicinity of the proposed route of the wastewater pipeline.

Due to the lack of detailed survey coverage, it is likely that the Aboriginal heritage potential of the Kemerton area has not been fully evaluated. Given this, future proponents of power generation facilities would need to take appropriate steps to ensure on-going compliance with the provisions of the Aboriginal Heritage Act 1972.

To ensure that potential disturbance to Aboriginal heritage sites is minimised, future proponents of power generation facilities would be required to undertake an archaeological survey of previously undisturbed areas of the site and maintain consultation with representatives of any Aboriginal groups that have associations with the area to be disturbed.

Submissions

A submission drew attention to European heritage sites in the vicinity of the site. Western Power has responded that as the identified heritage site is located 2km from both the preferred and fallback sites at Kemerton, there is not expected to be any direct disturbance resulting from the development.

EPA advice

It is the EPA's opinion that at these sites, a power generating facility of the type proposed can be managed to meet the EPA's strategic environmental objective for this factor provided that:

- specific design parameters of any proposed power generating facilities are subject to section 38 assessment.

Bunbury

The Bunbury site has been previously occupied by a coal fuelled power station and has been severely disturbed including reclamation with dredge spoil.

The SER has indicated that given the disturbed nature of the site, it is unlikely that surface archaeological material will be found. However, there is a moderate potential for subsurface archaeological material to be found in the area since the coastal dune systems between Perth and Busselton are rich in Aboriginal burials, which can be up to 2m below the present ground surface. A known burial site is located in close proximity to the southern boundary of the site. As a result, future development of the site should only proceed with contingency plans in place to deal with such discoveries, should they occur.

To ensure that potential disturbance to Aboriginal heritage sites is minimised, future proponents of power generation facilities would be required to undertake an archaeological survey of previously undisturbed areas of the site and maintain consultation with representatives of any Aboriginal groups that have associations with the area to be disturbed.

Submissions

A submission drew attention to European heritage sites in the vicinity of the site. Western Power has responded that as the identified heritage sites are located 1km and 4km from the site there is not expected to be any direct disturbance resulting from the development.

EPA advice

It is the EPA's opinion that at this site, a power generating facility of the type proposed can be managed to meet the EPA's strategic environmental objective for this factor provided that:

- specific design parameters of any proposed power generating facilities are subject to section 38 assessment.

Collie

The site has been disturbed by grazing activity and more recently by the development of the Collie power station.

The SER has indicated that no archaeological or ethnographic sites have been recorded within the site but one mythological and two ethnographic sites were identified during ethnographic and archaeological surveys undertaken in 1990 (SECWA, 1990) , the nearest of which is 1 km from the site. There is a low to moderate potential for previously unrecorded ethnographic sites to be reported within the area.

To ensure that potential disturbance to Aboriginal heritage sites is minimised, future proponents of power generation facilities would be required to undertake an archaeological survey of previously undisturbed areas of the site and maintain consultation with representatives of any Aboriginal groups that have associations with the area to be disturbed.

Submissions

A submission suggested that the site has European heritage value since it is part of a land grant to the Salvation Army in the late 1890s. Western Power has responded that they have been unable to establish whether the Collie power station site is located on land that was originally included in the Salvation Army Grant, but the property is not listed on either the Shire of Collie municipal inventory or the register of places managed by the Heritage Council of Western Australia.

EPA advice

It is the EPA's opinion that at this site, a power generating facility of the type proposed can be managed to meet the EPA's strategic environmental objective for this factor provided that:

- specific design parameters of any proposed power generating facilities are subject to section 38 assessment.

4. Conditions and Commitments

This report to the Minister for the Environment and Heritage is provided under section 16(e) of the *Environmental Protection Act* which does not provide for the application of conditions and procedures to the proposal. However, Western Power has provided an array of commitments to ameliorate the impacts on the environment of any future proposal to install power generating facilities on any of the sites.

4.1 Proponent's commitments

The following environmental management commitments have been identified in the SER documents and would be expected to be adopted by future proponents of power generating facilities. They assume that the final power station will be designed such that the plant characteristics fall within the same parameters as those assessed during the development of this section 16(e) report. If that is not the case, future proponents of power generating facilities would be required to perform additional environmental impact studies during the section 38 environmental assessment process. Future proponents of power generating facilities would be expected to develop a range of additional specific management commitments during the section 38 environmental assessment process.

Pinjar

Topic	Action	Objective	Timing	Advice
Environmental Management	The Preferred Bidder will be required to prepare an Environmental Management Plan for the construction and operational phases of the project.	Ensure detailed planning is performed for all key environmental factors. Specific management plans will include: Dust, Clearing, Noise, Waste, Stormwater, Hydrocarbon, Hazardous Materials and Emergency Response.	Preliminary Construction and Operational Management Plans will be developed for submittal to Western Power as part of the final bidding process. The Preferred Bidder will submit the Construction Environmental Management Plan to the DEP during the Work's Approval process, prior to construction. The Operational Environmental Management Plan will be submitted prior to commissioning.	DEP
Terrestrial Flora and Vegetation	The Preferred Bidder will be required to undertake vegetation surveys of the previously undisturbed areas of the proposed plant site.	Although vegetation surveys have been performed for the site, spring surveys shall be performed for both areas to ensure all potential species of significance are recorded.	Prior to submittal of the Section 38 Environmental Review Document.	CALM
Aboriginal Heritage	The Preferred Bidder will be required to perform a survey of the previously undisturbed areas of the proposed plant site for archaeological sites.	Ensure that the existence of any archaeological material is determined and managed appropriately.	Prior to submittal of the Section 38 Environmental Review Document.	Department of Indigenous Affairs

Kwinana/East Rockingham

Topic	Action	Objective	Timing	Advice
Environmental Management	The Preferred Bidder will be required to prepare an Environmental Management Plan (EMP) for the construction and operational phases of the project.	Ensure detailed planning is performed for all key environmental factors. Specific management plans would include: Dust, Clearing, Noise, Waste, Stormwater Saline Water, Hydrocarbon, Hazardous Material and Emergency Response.	Preliminary Construction and Operational Management Plans will be developed for submittal to Western Power as part of the final bidding process. The Preferred Bidder will submit the Construction EMP to the DEP during the Work's Approval process, prior to construction. The Operational EMP will be submitted prior to commissioning.	DEP
Terrestrial Flora and Vegetation	The Preferred Bidder will be required to undertake vegetation surveys of the plant site and infrastructure corridors during spring.	A site inspection indicates that the vegetation and habitat present on the preferred site is largely degraded and holds little ecological value. However, a vegetation survey has not been performed for the infrastructure corridors. Spring surveys shall be performed for both areas to ensure all potential species of significance are recorded.	Prior to submittal of the Section 38 Environmental Review Document.	CALM, Specialist Consultant.
Air Quality	The Preferred Bidder will be required to participate in re-determination of SO ₂ allocations in Kwinana.	Ensure cumulative ambient SO ₂ levels remain below the required standards.	Prior to submittal of the Section 38 Environmental Review Document.	DEP
Aboriginal Heritage	The Preferred Bidder will be required to perform a site survey for archaeological sites.	Ensure that the existence of any archaeological material is determined and managed appropriately.	Prior to submittal of the Section 38 Environmental Review Document.	Dept of Indigenous Affairs.

Kemerton

Topic	Action	Objective	Timing	Advice
Environmental Management	The Preferred Bidder will be required to prepare an EMP for the construction and operational phases of the project.	Ensure detailed planning is performed for all key environmental factors. Specific management plans would include: Dust, Clearing, Marine, Noise, Waste, Stormwater, Saline Water, Hydrocarbon, Hazardous Material and Emergency Response.	Preliminary Construction and Operational Management Plans will be developed for submittal to Western Power as part of the final bidding process. The Preferred Bidder will submit the Construction Environmental Management Plan to the Department of Environmental Protection (DEP) during the Work's Approval process, prior to construction. The Operational Environmental Management Plan will be submitted prior to commissioning.	DEP
Terrestrial Flora and Vegetation	The Preferred Bidder will be required to undertake vegetation surveys of the plant site and infrastructure corridors.	Although vegetation surveys have been performed for the site and the wastewater pipeline corridor, spring surveys shall be performed for both areas to ensure all potential species of significance are recorded.	Prior to submittal of the Section 38 Environmental Review Document.	CALM, Specialist Consultant.
Aboriginal Heritage	The Preferred Bidder will be required to perform a site survey for archaeological sites.	Ensure that the existence of any archaeological material is determined and managed appropriately.	Prior to submittal of the Section 38 Environmental Review Document.	Department of Indigenous Affairs

Bunbury

Topic	Action	Objective	Timing	Advice
Environmental Management	The Preferred Bidder will be required to prepare an Environmental Management Plan for the construction and operational phases of the project.	Ensure detailed planning is performed for all key environmental factors. Specific management plans would include: Dust, Clearing, Noise, Waste, Stormwater, Saline Water, Hydrocarbon, Hazardous Material and Emergency Response.	Preliminary Construction and Operational Management Plans would be developed for submittal to Western Power as part of the final bidding process. The Preferred Bidder would submit the Construction Environmental Management Plan to the DEP during the Work's Approval process, prior to construction. The Operational Environmental Management Plan would be submitted prior to commissioning.	DEP
Aboriginal Heritage	The Preferred Bidder will be required to perform a site survey for archaeological sites.	Ensure that the existence of any archaeological material is determined and managed appropriately.	Prior to submittal of the Section 38 Environmental Review Document.	Department of Indigenous Affairs

Collie

Topic	Action	Objective	Timing	Advice
Environmental Management	The Preferred Bidder will be required to prepare an Environmental Management Plan for the construction and operational phases of the project.	Ensure detailed planning is performed for all key environmental factors. Specific management plans would include: Dust, Clearing, Marine, Noise, Waste, Stormwater, Saline Water, Hydrocarbon, Hazardous Material and Emergency Response.	Preliminary Construction and Operational Management Plans will be developed for submittal to Western Power as part of the final bidding process. The Preferred Bidder will submit the Construction Environmental Management Plan to the DEP during the Work's Approval process, prior to construction. The Operational Environmental Management Plan will be submitted prior to commissioning.	DEP
Terrestrial Flora and Vegetation	The Preferred Bidder would be required to assess the need for a vegetation survey of the plant site and any new infrastructure corridors once the final layout/s are confirmed.	Although vegetation surveys have been performed for the site and the wastewater pipeline corridor, additional surveys may be required for the final layout of the generating plant or any new infrastructure corridors.	Prior to submittal of the Section 38 Environmental Review Document.	CALM, Specialist Consultant.
Aboriginal Heritage	The Preferred Bidder will be required to perform a site survey for archaeological sites.	Ensure that the existence of any archaeological material is determined and managed appropriately.	Prior to submittal of the Section 38 Environmental Review Document.	Department of Indigenous Affairs
Water Supply	The Preferred Bidder will be required to confirm a water supply strategy in consultation with the WRC and the Water Corporation, and will be required to explore all potential opportunities to maximise water reuse.	Ensure that a suitable water source is available for the proposed power station expansion and that the impacts of water supply have been addressed. (Note that an assessment of the impacts of water supply will be the responsibility of the Water Corporation).	Prior to submittal of bid to Western Power.	Water & Rivers Commission and the Water Corporation

5. Conclusions

The discussion of environmental factors responds to Western Power Corporation's request for early advice on any environmental constraints which may apply to the installation of power generation facilities at sites at Pinjar, Kwinana, Kemerton, Bunbury and Collie.

There are no specific proposals for construction of power generation facilities but the SER documents provide details of likely types of facility which future proponents might install. More specific details of power generation facilities at specific sites will be provided by proponents and will undergo section 38 assessment.

In assessing the sites the EPA has reached the conclusion that a power generating facility of the type proposed could be managed at all of them such that it is unlikely that the EPA's objectives would be compromised. The following issues are highlighted:

- Greenhouse gases – the EPA has previously (EPA, 1990) advised that its preference in relation to electricity demand is, in declining order of rank:
 - conservation and efficiency improvements;
 - renewable energy sources such as wind and solar energy;
 - gas, including combined cycle, turbines;
 - new technology coal plants;
 - old technology coal plants; and
 - petroleum fuel plants.

The EPA is aware that the demand for electricity in Western Australia will continue to grow. The rate of this growth can be reduced somewhat through demand management but there will be a continuing need for additional electricity generating facilities.

Ideally, additional demand should be satisfied through electricity generating facilities which minimise the production of greenhouse gases, assuming that other environmental requirements are not unreasonably compromised. The EPA will support the achievement of this aim by public and private enterprises.

Renewables will be an important means of achieving this. The EPA, however, recognises that in assessing electricity generating proposals supply agencies will need to be able to give consideration to the size of the supply required, technical issues (eg the need for rapid response to peak demands) and strategic requirements (eg. maintaining a balance of sources and types of fuel).

If power stations are proposed which do not result in the least greenhouse gas intensity, the EPA expects that mitigation actions would be investigated during the s38 process and adopted as appropriate.

NO_x control – the EPA expects the best practice of low-NO_x burners to be installed in all gas turbines. A significant reduction in NO_x emissions from liquid fuel could be achieved by NO_x control measures such as water injection. However, if NO_x suppression for liquid fuel requires water injection, the environmental impacts of producing the requisite quantity of demineralised water need to be considered against the benefits of NO_x suppression for a fuel that is expected to be used for only 100 hours per year.

- Pinjar – the protection of the groundwater at Pinjar has always been a priority for Western Power and the same high priority is expected to be enforced for additional gas fired plant at this location.

Every effort should be made to minimise the clearing of bush and, if bush is cleared, consideration should be given to its replacement with an equivalent or better piece of bushland that can be secured for conservation and management adjacent to the Pinjar Bush Forever site or by rehabilitation projects elsewhere.

- Kwinana/East Rockingham – the preferred gas fired proposal would re-use effluent from the Cape Peron outfall which would result in a desirable net reduction of over 10ML/year in effluent discharge. Seawater cooling is also an option but would be subject to a separate referral process should the proponent wish to pursue that option.
- Kemerton – the initial plant layout for a gas fired plant appeared to impact on adjacent wetlands. The layout has been revised to avoid direct impact but management strategies will need to be detailed in the s.38 assessment to address potential indirect impacts from drainage, pipe leaks etc.

Final design of a wastewater pipeline route will need to be addressed in the s.38 assessment of a specific proposal and will need to ensure minimum disturbance to vegetation.

- Bunbury – although the site is within 2km of the Preston River delta and southern tidal flats, a new gas fired electricity generating facility would likely be less intrusive than the previous coal-fired power station with which the waterbirds co-existed for many years.

The local community needs to be closely consulted in relation to the visual impact of a new power station as part of the s.38 assessment if this site is preferred by a proponent.

- Collie – Western Power should liaise with DEP over the next year to ensure confidence in the modelling methodology for the s.38 assessment.

A coal-fired power station of about 300MW would be expected to emit about 1 gram of dioxins and furans per year. An assessment of the significance of this emission and control measures, if necessary, will need to be addressed by any future proponent in the s.38 assessment.

Any s.38 submission by a future proponent needs to clearly explain the intended water management strategy and its interaction with the 1999 Collie Basin Water Resource Management Strategy formulated by the Collie Water Advisory Group.

Discussion of combustion technologies and the selection of the most appropriate technology would be expected to be a significant part of the s.38 assessment of a specific proposal.

Overall, the EPA advises future proponents that, in putting forward proposals for power generating facilities, they should take into account:

- the issues raised in Western Power's SER documents;
- the public submissions and Western Power's response to them; and
- this report.

6. Recommendations

The EPA submits the following recommendations to the Minister for the Environment and Heritage:

1. That the Minister notes that this report provides early advice on any environmental constraints which may apply to the installation of power generation facilities at sites at Pinjar, Kwinana, Kemerton, Bunbury and Collie;
2. That the Minister considers the report on the relevant strategic environmental factors as set out in Section 3;
3. That the Minister notes that future specific proposals for power generation facilities at specific sites will need to undergo section 38 assessment.
4. That the Minister notes that the EPA has concluded that at all of the sites, a power generating facility of the type proposed could be managed such that it is unlikely that the EPA's strategic environmental objectives would be compromised.

Appendix 1

List of submitters

Organizations:

City of Bunbury
City of Rockingham
City of Wanneroo
Cockburn Sound Management Council
Conservation Council of WA
Department for Planning & Infrastructure
Department of Conservation & Land Management
Department of Environmental Protection, Water & Rivers Commission
Department of Indigenous Affairs
Environment Centre of WA (Inc.)
Heritage Council of WA
Kemerton Industrial Park Coordinating Committee
Leschenault Inlet Management Authority
Office of Energy
Office of Major Projects
Shire of Harvey
Town of Kwinana
Water Corporation

Individuals:

Mr G Edwards
Messrs R & L Edwards
Mr M Farren
Mr J Foster
Ms J M Jenkins
Mr R Peake
Ms R Siewert
M Smith
Mr A G Thomson
Mr G Tothill
K Waterhouse
Dr P K Weaver

Appendix 2

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Appendix 3

Summary of identification of relevant strategic environmental factors from SER documents.

Note: An additional site at East Rockingham (site 4) was included in the assessment process as well as modifications to the site development concepts for Kemerton (see Appendix 4, Section 1.4). These changes are not reflected in the following Tables.

Pinjar

Preliminary Environmental Strategic Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Relevant Environmental Factors
BIOPHYSICAL			
Terrestrial Flora and Vegetation	Removal of approximately 0.28 hectares of intact Banksia bushland and 0.04 hectare of regrowth vegetation, which is part of Bush Forever Site 380. There is the potential for the spread of weeds and dieback during construction.	Although removal of remnant vegetation at Pinjar is small, consideration should be given to replacement with a piece of bushland that can be secured for conservation and management adjacent to the Bush Forever site and/or rehabilitation projects elsewhere.	Considered to be a relevant environmental factor
Fauna	Removal of habitats in areas required for the plant and switchyard expansion.	There were no significant issues raised in respect of fauna	Considered to be a relevant environmental factor
Surface Water and Groundwater Quality	The proposed expansion would result in an increase in the volume of fuel and chemicals transported to and stored on the site, and an increase in the activities associated with their usage. However, these activities are currently being managed successfully, and therefore additional fuel/chemicals required for the proposed expansion should be manageable provided equivalent management strategies are adopted. A new groundwater abstraction licence would be required if a • demineralisation plant is installed on-site.	The high importance of the Gngara groundwater mound gives rise to the expectation that protection of groundwater quality will be a high priority. Are there any options to avoid a demineralisation plant as it would result in the water demand exceeding the current licence	Considered to be a relevant environmental factor

Preliminary Environmental Strategic Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Relevant Environmental Factors
POLLUTION			
Gaseous and Particulate Emissions	The proposed expansion would emit NO _x , SO ₂ (when the power station is operating on liquid fuel) and, to a lesser extent, particulates and unburnt hydrocarbons. Air dispersion modelling indicates that concentrations of NO ₂ , SO ₂ and particulates would be within NEPM standards at the nearest residential areas and within the WHO standards for vegetation anywhere on the modelled grid.	What monitoring is undertaken at existing facilities at Pinjar, what licence limits are there on emissions, how these compare to other industrial licence limits and whether licence limits have ever been exceeded and if so what action has been taken by DEP and Western Power. Water injection is not proposed to be used to reduce NOX emissions when burning liquid fuel gas turbines. Clarification needed on the reliability of gas supply and the need for liquid fuel to be used other than in the event of physical disruption of the gas supply. Produce from agriculture and horticulture may be contaminated by emissions.	Considered to be a relevant environmental factor
Dust	Dust would be generated during the construction phase of the project. Dust emissions arising from construction activities may have the potential to adversely impact on human health, visual amenity, and the surrounding vegetation and fauna. The proliferation of dust during construction also has a nuisance value.	There were no significant issues raised in respect of dust	Not considered to be a relevant environmental factor
Greenhouse Gas Emissions	Greenhouse gas impacts were assessed for the SWIS as a whole for Western Power's plant retirement/replacement and Power Procurement Program to the year 2010. Two options were compared: - Option A – The installation of 240MW open cycle capacity by 2005/06 and a further 540MW of gas-fired power generation plant by 2010, consisting of 120MW of open cycle peaking plant and 420MW of combined cycle plant. - Option B – Is the same as Option A except that 300MW of the combined cycle plant in use by 2010 is assumed to be provided by a coal-fired power station. The SWIS carbon intensity is	Although carbon intensity has been declining, Western Power should aim to achieve the Kyoto Protocol target of no more than 8% increase in emissions over 1990 levels. Western Power's ultimate aim should be to be greenhouse neutral. Greenhouse reporting should include an indication of the technology used. Tree planting to offset greenhouse gas emission adds \$10 - \$35 per MWh. There is little difference in greenhouse emissions from coal or gas if the analysis is done from source to consumption including CO ₂ extracted from natural gas prior to supply as a fuel. Has Western Power considered options for the sequestration of CO ₂ within geological formations.	Considered to be a relevant environmental factor

Preliminary Environmental Strategic Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Relevant Environmental Factors
	predicted to continue to decrease to either 0.70 or 0.76 tonnes CO_{2e}/MWh for Option A and B respectively by 2010. This is a reduction of 29 or 22% respectively from the 1990 carbon intensity of 0.98 tonnes CO_{2e}/MWh. The resultant CO₂ equivalent greenhouse emissions, with the predicted increase in electricity sent out in 2010 are estimated to be 11.3 and 12.4Mtpa respectively. This is around 24 to 36% higher than the 1990 emissions of 9.079Mtpa in 1990.		
Noise and Vibration	Noise will be generated during the construction and operational phases of the project. Noise modelling of the power station indicates that with the proposed expansion, noise levels at the nearest sensitive receiver are predicted to increase by 0.5dB(A) with all units operating and will still be well below the regulatory noise criteria at these receivers. The existing power station and the expansion are also not expected to significantly contribute to the cumulative noise levels at the nearest residences. It is predicted that the greatest increase in noise levels from the inclusion of the proposed expansion is predicted to be 1.8dB(A) at a boundary location west south west of the plant. The average site boundary noise increase is predicted to be 0.3dB(A). Vibration is not expected to be an issue.	There were no significant issues raised in respect of noise.	Considered to be a relevant environmental factor

Preliminary Environmental Strategic Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Relevant Environmental Factors
Waste	The construction and operation of the proposed power station will result in the generation of minor quantities of solid waste (<5tpa). The construction and operation of the proposed power station will result in the generation of minor quantities of domestic waste (peaking at 15kL/day during construction and up to 0.3kL/day during operation).	There were no significant issues raised in respect of waste.	Not considered to be a relevant environmental factor
Hydrocarbon and Hazardous Materials	The operation of the power station would require the transportation, storage and handling of additional quantities of hydrocarbon products including liquid fuel, lubricating oils and greases and degreasers. Hazardous materials such as herbicides, acids and solvents may also be used and stored on-site. The potential impacts associated with these activities include: - Discharge of hydrocarbons to the environment contaminating surface and ground waters, the atmosphere and soil; - Creation of acute and/or chronic toxic hazards; and - Creation of flammable or explosive hazards. The Pinjar Station is located within a Priority 1 Zone of the Gnamptara Underground Water Pollution Control Area (UWPCA), which is intended to give the highest level of protection to the water resources in the area. It is therefore important that hydrocarbon and hazardous materials are managed in a manner that does not result in contamination of the groundwater.	The site needs to continue to be managed in accordance with current practices and licence conditions to avoid groundwater contamination.	See groundwater

Preliminary Environmental Strategic Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Relevant Environmental Factors
SOCIAL SURROUNDINGS			
Social and Economic Issues	The proposed power station would offer benefits to the local communities through direct and indirect employment, the use of local labour, service industries and local supplies of materials, particularly during construction. The construction phase is expected to extend over a period of up to 24 months and the construction workforce for each development stage is expected to peak at around 250 personnel. There may be social impacts on the local community resulting from this transient workforce, however these would be temporary in nature. During the operational phase of the power station, on-site manning levels would be around 5 personnel. This level of manning could easily be accommodated within the nearby communities. There are not expected to be any significant impacts on tourism or recreation from the power station.	There were no significant issues raised in respect of social and economic issues.	Will be not assessed
Visual Impact	The installation of two additional 120MW gas turbine units at the site would result in the site being slightly more visually prominent from the access road to, and within 2km of, the site. While the site would be slightly more visually prominent, this section of road has little general traffic, and visual impacts on the general public would be negligible, particularly when viewed alongside existing structures.	There were no significant issues raised in respect of visual impact.	Not considered to be a relevant environmental factor

Preliminary Environmental Strategic Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Relevant Environmental Factors
Transport	The construction phase would result in increased traffic on the access roads to the power station. This increased traffic would result from workforce commuting and construction related deliveries of material and equipment. All traffic would access the power station site through the existing access roads.	The high importance of the Gngara groundwater mound gives rise to the expectation that protection of groundwater quality will be a high priority.	Not considered to be a relevant environmental factor
Aboriginal Heritage	There is the potential for previously unrecorded Aboriginal sites to be located within the proposed power station site.	Archaeological surveys should be undertaken and ethnographic consultations conducted with local Aboriginal communities and Native Title claimants.	Considered to be a relevant environmental factor
Public Safety	Any industrial development that involves the storage, transportation or processing of hazardous substances could pose risk to employees, the public and the environment. A preliminary review of hazardous materials and processes that may be used in the operation of the power station indicates that the power station could be categorised as being Low Risk. The main issue for risk management at the Pinjar Gas Turbine Station is considered to be potential contamination of the Gngara Mound. However, there are existing systems and procedures in place to manage and mitigate potential groundwater contamination.	There were no significant issues raised in respect of risks and hazards.	Considered to be a relevant environmental factor

Kwinana

Preliminary Environmental Strategic Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Relevant Environmental Factors
BIOPHYSICAL			
Terrestrial Flora and Vegetation	During the construction phase, direct impacts on flora and vegetation would result from clearing for the power station site, construction laydown areas and infrastructure corridors. The proposed power transmission route is yet to be confirmed, however the preferred route passes through land previously used for industrial purposes and along existing road reserves. For the initial 240MW the proposed gas lateral would be approximately 400m in length and laid in an existing service corridor. For the ultimate 1,080MW power station, the gas lateral would also be extended along previously disturbed corridors.	A 'Green Corridor' is proposed to pass through IP14 at Kwinana. The presence of <i>Xanthorrhoea preissii</i> at the preferred site is indicative of a wetland and may indicate the presence of threatened ecological community 19.	Considered to be a relevant environmental factor
Fauna	During construction the potential impacts on fauna and their habitats would be through the removal of habitat areas required for the power station site, construction laydown areas and infrastructure corridors.	The Kwinana site may have a role as an ecological linkage between other regionally significant areas.	Considered to be a relevant environmental factor
Marine Environment	Known contamination occurs on the preferred power station site and there is potential for an indirect impact on Cockburn Sound through the transport of contaminated groundwater. This Strategic Environmental Review is not requesting EPA advice on the use of seawater for cooling. Options involving the use of seawater for cooling, or discharge of thermal effluent into Cockburn Sound would be subject to further referral as an adjunct to the present referral, should they be considered in the future.	The disposal of demineralisation water through Cape Peron outfall should not be allowed. The recommendations of the draft Environmental Management Plan for Cockburn Sound should be implemented where applicable.	Considered to be a relevant environmental factor
Surface Water and Groundwater Quality	Potential exists for further groundwater contamination as a result of contaminated stormwater infiltrating to the superficial aquifer.	There were no significant issues raised in respect of surface water and groundwater quality.	Considered to be a relevant environmental factor

Preliminary Environmental Strategic Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Relevant Environmental Factors
Water Supply	This Strategic Environmental Review is not requesting EPA advice on the use of seawater for cooling. Options involving the use of seawater for cooling, or discharge of thermal effluent into Cockburn Sound would be subject to further referral as an adjunct to the present referral, should they be considered in the future. The options for cooling water supply are largely determined by power station configuration and water disposal requirements. Options have been determined for both the low water requirements of an initial 240MW power station and the requirements of a power station of capacity up to 1,080MW. A suitable cooling water strategy for a water cooled 1,080MW power station would be to recycle Cape Peron treated municipal effluent with reinjection back into the Cape Peron pipeline. The Cape Peron pipeline discharges to the Sepia Depression, south of Cockburn Sound. Determination of the potential impacts at the outfall is the responsibility of the Water Corporation, however the discharge of waste cooling water from the power station into the Cape Peron outfall would need to meet individual acceptance criteria developed by the Water Corporation	There were no significant issues raised in respect of water supply.	See marine environment.
POLLUTION			
Gaseous and Particulate Emissions	The proposed power station would emit NO_x, SO₂ (when the power station is operating on liquid fuel) and, to a lesser extent, particulates and unburnt hydrocarbons. NO_x emissions could impact on smog levels in the region. Air dispersion modelling indicates that concentrations of NO₂, and particulate would be within NEPM standards. SO₂ levels emitted during operation on liquid fuel would require a redetermination of the SO₂ allocations under the Kwinana EPP.	Also see submissions on Pinjar. Although emissions are expected to be within standards there is growing concern that exposure to low levels could be responsible for long term health problems.	Considered to be a relevant environmental factor

Preliminary Environmental Strategic Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Relevant Environmental Factors
Dust during Construction	Dust would be generated during the construction phase of the project. Dust emissions arising from construction activities may have the potential to adversely impact on human health and visual amenity. The proliferation of dust during construction also has a nuisance value.	There were no significant issues raised in respect of dust during construction.	Not considered to be a relevant environmental factor
Greenhouse Gas Emissions	Greenhouse gas impacts were assessed for the SWIS as a whole for Western Power's plant retirement/replacement and Power Procurement Program to the year 2010. Two options were compared: - Option A – The installation of 240MW open cycle capacity by 2005/06 and a further 540MW of gas-fired power generation plant by 2010, consisting of 120MW of open cycle peaking plant and 420MW of combined cycle plant. - Option B – Is the same as Option A except that 300MW of the combined cycle plant in use by 2010 is assumed to be provided by a coal-fired power station. The SWIS carbon intensity is predicted to continue to decrease to either 0.70 or 0.76 tonnes CO₂/MWh for Option A and B respectively by 2010. This is a reduction of 29 or 22% respectively from the 1990 carbon intensity of 0.98 tonnes CO₂/MWh. The resultant CO₂ equivalent greenhouse emissions, with the predicted increase in electricity sent out in 2010 are estimated to be 11.3 and 12.4Mtpa respectively. This is around 24 to 36% higher than the 1990 emissions of 9.079Mtpa in 1990.	Although carbon intensity has been declining, Western Power should aim to achieve the Kyoto Protocol target of no more than 8% increase in emissions over 1990 levels. Western Power's ultimate aim should be to be greenhouse neutral. Greenhouse reporting should include an indication of the technology used. Tree planting to offset greenhouse gas emission adds \$10 - \$35 per MWh. There is little difference in greenhouse emissions from coal or gas if the analysis is done from source to consumption including CO₂ extracted from natural gas prior to supply as a fuel. Has Western Power considered options for the sequestration of CO₂ within geological formations.	Considered to be a relevant environmental factor
Noise and Vibration	Noise will be generated during the construction and operational phases of the project. Noise modelling of the power station in isolation indicates that the proposed plant will meet the Noise Regulations at the nearest residences and at the site boundary. Noise modelling of the power station has also shown it to meet the criteria for "not significantly contributing" to noise levels at the closest residence, as defined in the Noise Regulations. Vibration is not expected to be an issue.	The noise impact of site 3 has not been assessed and is of concern because residents of North Rockingham already experience unacceptable	Considered to be a relevant environmental factor

Preliminary Environmental Strategic Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Relevant Environmental Factors
Waste	The construction and operation of the proposed power station will result in the generation of minor quantities of solid waste (<10tpa). The construction and operation of the proposed power station will result in the generation of minor quantities of domestic waste (peaking at 15kL/day during construction and up to 0.3kL/day during operation). Waste cooling water would be disposed of either to on-site lined evaporation ponds or piped to the Cape Peron pipeline for discharge into the Sepia Depression. This has the potential to lead to contamination of soil, nearby surface and ground waters with salt and impacts on vegetation from moderately saline water leaking from the bottom of the evaporation ponds or from pipeline leaks/ruptures.	There were no significant issues raised in respect of waste management.	Not considered to be a relevant environmental factor
Hydrocarbon and Hazardous Materials	Mishandling of pre-existing contamination could potentially cause environmental and safety impacts. The operation of the power station would require the transportation, storage and handling of hydrocarbon products including liquid fuel, lubricating oils and greases and degreasers. Hazardous materials such as herbicides, acids, solvents and explosives (if blasting required) may also be used and stored on-site. The potential impacts associated with these activities include: - Discharge of hydrocarbons to the environment contaminating surface and ground waters, the atmosphere and soil; - Creation of acute and/or chronic toxic hazards; and - Creation of flammable or explosive hazards.	There were no significant issues raised in respect of the management of hydrocarbon and hazardous materials.	See groundwater

Preliminary Environmental Strategic Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Relevant Environmental Factors
SOCIAL SURROUNDINGS			
Social and Economic Issues	The proposed power station would offer benefits to the local communities through employment, the use of local labour, service industries and local supplies of materials, particularly during construction. The construction phase is expected to extend over a period of up to 24 months and the construction workforce for each development stage is expected to peak at around 250 personnel. There may be social impacts on the local community resulting from this transient workforce, however these would be temporary in nature. During the operational phase of the power station, permanent on-site personnel would range from 5 to 30 personnel, depending on the size and configuration of the power station. There are not expected to be any significant impacts on tourism or recreation from the power station.	European heritage sites are in the vicinity of the site..	Not considered to be a relevant environmental factor
Visual Impact	As the preferred power station site is in the central core of the KIA, the potential impact on visual amenity is expected to be minimal. Stack heights would be similar to or lower than those of surrounding industries.	There were no significant issues raised in respect of visual impact.	Not considered to be a relevant environmental factor
Transport	Potential road transport impacts would be generally restricted to issues related to construction workforce movements and construction material movements.	There were no significant issues raised in respect of transport.	Not considered to be a relevant environmental factor
Aboriginal Heritage	Given the disturbance history of the preferred power station site, it is assessed that there is a low potential for surface archaeological material to be found within it. There is a low potential for previously unrecorded ethnographic sites to be reported within the study area.	Archaeological surveys should be undertaken and ethnographic consultations conducted with local Aboriginal communities and Native Title claimants.	Considered to be a relevant environmental factor

Preliminary Environmental Strategic Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Relevant Environmental Factors
Public Safety	Any industrial development that involves the storage, transportation or processing of hazardous substances could pose risk to employees, the public and the environment. A preliminary review of hazardous materials and processes that may be used in the operation of the power station indicates that the power station could be categorised as being Low Risk. Given that the power station poses a lower individual off-site risk than a petrochemical plant, then the 2020 scenario indicates that the EPA residential criteria would be met for the proposed power station development. The Kwinana International Motorplex is located within the air quality buffer and attracts large crowds during racing events. However the Motorplex site is approximately 1,300m from the preferred power station site. Given this distance, the proposed power station is not expected to pose a societal risk to the Motorplex site.	There were no significant issues raised in respect of public safety.	Considered to be a relevant environmental factor

Kemerton

Preliminary Environmental Strategic Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Relevant Environmental Factors
BIOPHYSICAL			
Terrestrial Flora and Vegetation	The conceptual power station layout on the preferred site would result in approximately 2.5 hectares of native vegetation being disturbed. In developing this conceptual layout, the disturbance of native vegetation on the south of the site has been minimised. This layout was placed as far to the north as far as possible, subject to compliance with the noise criteria at the northern boundary. There may be further scope for the Preferred Bidder to reduce the impact upon the native vegetation through refinement of the layout during the detailed design phase. Removal of vegetation for construction of the wastewater pipeline in some locations along the corridor. The maximum width of area that would be disturbed is approximately 11m, however only a 5m easement would be required for long-term access and the remainder of the corridor would be rehabilitated following construction. There is the potential for the spread of weeds and dieback during construction. Where clearing of vegetation can not be avoided, priority flora species may be removed. There is also a high potential for currently unidentified populations of annual (spring flowering) DRF and Priority Flora in the Marriott Road section of the wastewater pipeline.	Clearing of vegetation for the proposed wastewater pipeline may impact on Declared Rare Flora and a System 6 area.	Considered to be a relevant environmental factor
Fauna	Removal of habitats in areas required for the plant, wastewater pipeline and other infrastructure. Fragmentation of habitats by the wastewater pipeline corridor.	A submission queried the lack of a detailed fauna study.	Considered to be a relevant environmental factor

Preliminary Environmental Strategic Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Relevant Environmental Factors
Marine Environment	The proposed power generation plant may have the potential to impact the marine environment through a wastewater disposal ocean outfall facility. It is proposed that the wastewater would be disposed of through the existing Collie Power Station ocean outfall. This may require a 100m extension of the existing diffuser. There is the potential for up to 42m2 of seagrass community to be disturbed for an extension of the diffuser. Dispersion modelling of the wastewater discharged into the marine environment has determined that adequate dilution would be achieved to meet environmental guidelines based on a 99% level of protection.	There were no significant issues raised in respect of marine environment.	Considered to be a relevant environmental factor
Surface Water and Groundwater Quality	Surface drainage will be intercepted and diverted around the plant site. Although there would be no direct discharge of wastewater or contaminated stormwater into wetlands or the Wellesley River or its tributaries, there is the potential for contaminants to be transported to the Leschenault Estuary and other wetlands.	A submission has queried the implications of the recently completed Kemerton Water Study - Phase 2 study for LandCorp, DMPR and WRC. Has consideration has been given to using wastewater from the new sewage treatment plant at Kemerton?	Considered to be a relevant environmental factor
POLLUTION			
Gaseous and Particulate Emissions	The proposed power station would emit NO _x , SO ₂ (when the power station is operating on liquid fuel) and, to a lesser extent, particulates and unburnt hydrocarbons. Air dispersion modelling indicates that concentrations of NO ₂ , SO ₂ and particulates would be within NEPM standards and WHO criteria for vegetation.	Also see submissions on Pinjar. A submission has queried the integrity of the meteorological data used in the modelling. Independent monitoring is needed of cumulative emissions from Kemerton Industrial Park.	Considered to be a relevant environmental factor
Dust	Dust would be generated during the construction phase of the project. Dust emissions arising from construction activities may have the potential to adversely impact on human health, visual amenity, and the surrounding vegetation and fauna. The proliferation of dust during construction also has a nuisance value.	There were no significant issues raised in respect of dust.	Not considered to be a relevant environmental factor

Preliminary Environmental Strategic Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Relevant Environmental Factors
Greenhouse Gas Emissions	Greenhouse gas impacts were assessed for the SWIS as a whole for Western Power's plant retirement/replacement and Power Procurement Program to the year 2010. Two options were compared: - Option A – The installation of 240MW open cycle capacity by 2005/06 and a further 540MW of gas-fired power generation plant by 2010, consisting of 120MW of open cycle peaking plant and 420MW of combined cycle plant. - Option B – Is the same as Option A except that 300MW of the combined cycle plant in use by 2010 is assumed to be provided by a coal-fired power station. The SWIS carbon intensity is predicted to continue to decrease to either 0.70 or 0.76 tonnes CO_{2e}/MWh for Option A and B respectively by 2010. This is a reduction of 29 or 22% respectively from the 1990 carbon intensity of 0.98 tonnes CO_{2e}/MWh. The resultant CO₂ equivalent greenhouse emissions, with the predicted increase in electricity sent out in 2010 are estimated to be 11.3 and 12.4Mtpa respectively. This is around 24 to 36% higher than the 1990 emissions of 9.079Mtpa in 1990.	Although carbon intensity has been declining, Western Power should aim to achieve the Kyoto Protocol target of no more than 8% increase in emissions over 1990 levels. Western Power's ultimate aim should be to be greenhouse neutral. Greenhouse reporting should include an indication of the technology used. Tree planting to offset greenhouse gas emission adds \$10 - \$35 per MWh. There is little difference in greenhouse emissions from coal or gas if the analysis is done from source to consumption including CO₂ extracted from natural gas prior to supply as a fuel. Has Western Power considered options for the sequestration of CO₂ within geological formations.	Considered to be a relevant environmental factor
Noise and Vibration	Noise will be generated during the construction and operational phases of the project. Noise modelling of the power station in isolation indicates that the proposed plant will meet the Noise Regulations at the nearest residences and at the site boundary. Noise modelling of the power station in combination with the potential future industry mix developed for the Kemerton Expansion Study indicates that the Noise Regulations will be achieved at the boundary of the buffer zone. Vibration is not expected to be an issue.	A submission has queried the wind speed used in the modelling and suggested that the 35dB(A) contour should be shown.	Considered to be a relevant environmental factor

Preliminary Environmental Strategic Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Relevant Environmental Factors
Waste	The construction and operation of the proposed power station will result in the generation of minor quantities of solid waste (<10tpa). The construction and operation of the proposed power station will result in the generation of minor quantities of domestic waste (peaking at 15kL/day during construction and up to 0.3kL/day during operation). Waste cooling water would be disposed of either to on-site evaporation ponds or piped to an ocean outfall. This has the potential to lead to contamination of soil, nearby surface and ground waters with salt and impacts on vegetation from moderately saline water leaking from the bottom of the evaporation ponds or from pipeline leaks/ruptures.	There were no significant issues raised in respect of waste management.	Not considered to be a relevant environmental factor
Hydrocarbon and Hazardous Materials	The operation of the power station would require the transportation, storage and handling of hydrocarbon products including liquid fuel, lubricating oils and greases and degreasers. Hazardous materials such as herbicides, acids, solvents and explosives (if blasting required) may also be used and stored on-site. The potential impacts associated with these activities include: - Discharge of hydrocarbons to the environment contaminating surface and ground waters, the atmosphere and soil; - Creation of acute and/or chronic toxic hazards; and - Creation of flammable or explosive hazards.	There were no significant issues raised in respect of hydrocarbon and hazardous materials.	See groundwater

Preliminary Environmental Strategic Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Relevant Environmental Factors
SOCIAL SURROUNDINGS			
Social and Economic Issues	The proposed power station would offer benefits to the local communities through employment, the use of local labour, service industries and local supplies of materials, particularly during construction. The construction phase is expected to extend over a period of up to 24 months and the construction workforce for each development stage is expected to peak at around 250 personnel. There may be social impacts on the local community resulting from this transient workforce, however these would be temporary in nature. During the operational phase of the power station, permanent on-site personnel would range from 5 to 30 personnel, depending on the size and configuration of the power station. This level of manning could easily be accommodated within the nearby communities. There are not expected to be any significant impacts on tourism or recreation from the power station.	There were no significant issues raised in respect of social and economic issues.	Not considered to be a relevant environmental factor
Visual Impact	From a comparison of the height of the structures within the proposed power station and the results of the visual impact assessment for the proposed expansion of the Kemerton Industrial Park, it is unlikely that the power station would be visible from any areas to the west of the Park. However, the power station may be visible from farmhouses and other locations to the east of the Park.	What is the visibility of a power station at Kemerton when viewed from the east, given the relatively flat nature of the land?	Not considered to be a relevant environmental factor
Transport	The construction phase would result in increased traffic on the access roads to the Kemerton Power Station. This increased traffic would result from workforce commuting and construction related deliveries of material and equipment. All traffic would access the power station site through the existing access roads or roads developed under the Kemerton Expansion Final Concept Plan.	There were no significant issues raised in respect of transport.	Not considered to be a relevant environmental factor

Preliminary Environmental Strategic Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Relevant Environmental Factors
Aboriginal Heritage	There is the potential for three archaeological sites to be impacted by the proposed wastewater pipeline corridor. Due to the lack of detailed survey coverage, it is also likely that other Aboriginal sites may be present in the project area.	Archaeological surveys should be undertaken and ethnographic consultations conducted with local Aboriginal communities and Native Title claimants.	Considered to be a relevant environmental factor
Public Safety	Any industrial development that involves the storage, transportation or processing of hazardous substances could pose risk to employees, the public and the environment. A preliminary review of hazardous materials and processes that may be used in the operation of the power station indicates that the power station could be categorised as being Low Risk and would be contained with the High Risk Category assigned to the proposed site under the Kemerton Expansion Study.	There were no significant issues raised in respect of public safety.	Considered to be a relevant environmental factor

Bunbury

Preliminary Environmental Strategic Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Relevant Environmental Factors
BIOPHYSICAL			
Terrestrial Flora and Vegetation	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 and there is very little remnant vegetation remaining in the vicinity of the power station site, none of which 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. There is the potential for the spread of weeds and dieback during construction.	There should be a commitment to local revegetation and foreshore rehabilitation.	Considered to be a relevant environmental factor
Fauna	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. No significant 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 remnant vegetation. The fauna of the nearby wetlands, 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. However, there may be potential indirect impacts on fauna in habitat around the site from factors such as noise during construction.	Gaseous/particulate emissions may impact on wetland bird species using the Preston River delta and southern tidal flats.	Considered to be a relevant environmental factor
Marine Environment	Although there would be no direct discharge of wastewater or contaminated stormwater into the marine environment, there is the potential for contaminants to be transported there by indirect processes.	There were no significant issues raised in respect of marine environment.	Considered to be a relevant environmental factor

Preliminary Environmental Strategic Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Relevant Environmental Factors
Surface Water and Groundwater Quality	Surface drainage will be intercepted and diverted around the plant site. Although there would be no direct discharge of wastewater or contaminated stormwater into wetlands, there is the potential for contaminants to be transported to the Leschenault Estuary and other wetlands. Water for the power station would be abstracted from the existing groundwater bores. As the amount of water required is minimal and well below the licensed abstraction rate, impacts on groundwater resources are expected to be minimal.	There were no significant issues raised in respect of surface water and groundwater quality.	Considered to be a relevant environmental factor
POLLUTION			
Gaseous and Particulate Emissions	The proposed power station would emit NO _x , SO ₂ (when the power station is operating on liquid fuel) and, to a lesser extent, particulates and unburnt hydrocarbons. Air quality modelling indicates that concentrations of NO ₂ , SO ₂ and particulates would be within NEPM standards.	Also see submissions on Pinjar.	Considered to be a relevant environmental factor
Dust	Dust would be generated during the construction phase of the project. Dust emissions arising from construction activities may have the potential to adversely impact on human health, visual amenity, and the surrounding vegetation and fauna. The proliferation of dust during construction also has a nuisance value.	There were no significant issues raised in respect of dust.	Not considered to be a relevant environmental factor

Preliminary Environmental Strategic Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Relevant Environmental Factors
Greenhouse Gas Emissions	Greenhouse gas impacts were assessed for the SWIS as a whole for Western Power's plant retirement/replacement and Power Procurement Program to the year 2010. Two options were compared: - Option A – The installation of 240MW open cycle capacity by 2005/06 and a further 540MW of gas-fired power generation plant by 2010, consisting of 120MW of open cycle peaking plant and 420MW of combined cycle plant. - Option B – Is the same as Option A except that 300MW of the combined cycle plant in use by 2010 is assumed to be provided by a coal-fired power station. The SWIS carbon intensity is predicted to continue to decrease to either 0.70 or 0.76 tonnes CO₂/MWh for Option A and B respectively by 2010. This is a reduction of 29 or 22% respectively from the 1990 carbon intensity of 0.98 tonnes CO₂/MWh. The resultant CO₂ equivalent greenhouse emissions, with the predicted increase in electricity sent out in 2010 are estimated to be 11.3 and 12.4Mtpa respectively. This is around 24 to 36% higher than the 1990 emissions of 9.079Mtpa in 1990.	Although carbon intensity has been declining, Western Power should aim to achieve the Kyoto Protocol target of no more than 8% increase in emissions over 1990 levels. Western Power's ultimate aim should be to be greenhouse neutral. Greenhouse reporting should include an indication of the technology used. Tree planting to offset greenhouse gas emission adds \$10 - \$35 per MWh. There is little difference in greenhouse emissions from coal or gas if the analysis is done from source to consumption including CO₂ extracted from natural gas prior to supply as a fuel. Has Western Power considered options for the sequestration of CO₂ within geological formations.	Considered to be a relevant environmental factor
Noise and Vibration	Noise will be generated during the construction and operational phases of the project. Noise modelling of the power station in isolation indicates that the proposed plant will meet the Noise Regulations at the nearest residences and at the site boundary. The power station is also not expected to significantly contribute to the cumulative noise levels at the nearest residences. Vibration is not expected to be an issue.	There were no significant issues raised in respect of noise.	Considered to be a relevant environmental factor
Waste	The construction and operation of the proposed power station will result in the generation of minor quantities of solid waste (<5tpa). The construction and operation of the proposed power station will result in the generation of minor quantities of domestic waste (peaking at 15kL/day during construction and up to 0.3kL/day during operation).	There were no significant issues raised in respect of waste management.	Not considered to be a relevant environmental factor

Preliminary Environmental Strategic Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Relevant Environmental Factors
Hydrocarbon and Hazardous Materials	The operation of the power station would require the transportation, storage and handling of hydrocarbon products including liquid fuel, lubricating oils and greases and degreasers. Hazardous materials such as herbicides, acids and solvents may also be used and stored on-site. The potential impacts associated with these activities include: - Discharge of hydrocarbons to the environment contaminating surface and ground waters, the atmosphere and soil; - Creation of acute and/or chronic toxic hazards; and - Creation of flammable or explosive hazards.	There were no significant issues raised in respect of hydrocarbon and hazardous material.	See groundwater
SOCIAL SURROUNDINGS			
Social and Economic Issues	The proposed power station would offer benefits to the local communities through direct and indirect employment, the use of local labour, service industries and local supplies of materials, particularly during construction. The construction phase is expected to extend over a period of up to 24 months and the construction workforce for each development stage is expected to peak at around 250 personnel. There may be social impacts on the local community resulting from this transient workforce, however these would be temporary in nature. During the operational phase of the power station, on-site manning levels would be around 5 personnel. This level of manning could easily be accommodated within the nearby communities. There are not expected to be any significant impacts on tourism or recreation from the power station.	There were no significant issues raised in respect of social and economic issues.	Considered to be a relevant environmental factor
Visual Amenity	A visual impact assessment of the New Bunbury Power Station would be visible from a number of locations surrounding the site. The power station would be most visible from points closest to the site, such as the Dolphin Discovery Centre and Marlston Hill Foreshore. The visual impact is expected to be less than that from the old Bunbury Power Station.	The local community needs to be closely consulted in relation to the visual impact of a new power station.	Considered to be a relevant environmental factor

Preliminary Environmental Strategic Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Relevant Environmental Factors
Transport	The construction phase would result in increased traffic on the access roads to the power station. This increased traffic would result from workforce commuting and construction related deliveries of material and equipment. All traffic would access the power station site through the existing access roads.	Leschenault Homestead may be impacted by new or re-aligned roads.	Not considered to be a relevant environmental factor
European Heritage	There is not expected to be any impacts on shipwrecks or other European heritage sites from the proposal.	European heritage sites are in the vicinity of the site.	Not considered to be a relevant environmental factor
Aboriginal Heritage	There is the potential for previously unrecorded Aboriginal sites to be located within the proposed power station site.	Archaeological surveys should be undertaken and ethnographic consultations conducted with local Aboriginal communities and Native Title claimants.	Considered to be a relevant environmental factor
Public Safety	Any industrial development that involves the storage, transportation or processing of hazardous substances could pose risk to employees, the public and the environment. A preliminary review of hazardous materials and processes that may be used in the operation of the power station indicates that the power station could be categorised as being Low Risk.	There were no significant issues raised in respect of public safety.	Considered to be a relevant environmental factor

Collie

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Relevant Environmental Factors
BIOPHYSICAL			
Terrestrial Flora and Fauna	During the construction phase, the main impacts on flora and vegetation would be through clearing for the new generating unit and the cooling tower although there may be some clearing associated with infrastructure corridors. The clearing of land for flyash disposal is not being considered as part of this environmental assessment process and only 1.7ha of previously disturbed land is required for the additional generating plant. There is potential for indirect impacts to flora and vegetation during the construction phase, which may include 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. There may be indirect impacts on fauna in habitat adjacent to the site from factors such as noise.	There were no significant issues raised in respect of vegetation.	Considered to be a relevant environmental factor
Marine Environment	The volume of wastewater generated from the proposed Collie Power Station expansion would depend on the quality of supply water. However, It has been assumed for this study that the wastewater, consisting mainly of saline blowdown from the cooling towers, would be via the existing ocean outfall. The existing saline water disposal pipeline and outfall was designed and constructed for a 600MW power station. Dispersion modelling of the wastewater discharged into the marine environment has determined that adequate dilution would be achieved to meet environmental guidelines based on a 99% level of protection.	There were no significant issues raised in respect of marine environment.	Considered to be a relevant environmental factor

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Relevant Environmental Factors
Water Supply	Western Power is in the process of developing a water management strategy for the Collie Basin. This is based on the 1999 Collie Basin Water Resource Management Strategy formulated by the Collie Water Advisory Group (CWAG). The Water and Rivers Commission (WRC) allocation policy currently adheres to this strategy, which has the following main directives: - Maximum use should be made of surface water from Wellington and Harris reservoirs; - Mine dewatering should serve as the primary groundwater supply; - The use of groundwater resources should be restricted as much as possible; and - Groundwater should only be abstracted in the vicinity of the South Branch of the Collie River in an emergency situation. Any future increased water demand would be met either from surface water resources (eg Wellington Dam) or through wastewater recycling. Both strategies would require the up-grade of water treatment facilities and the up-grade and/or extension of infrastructure.	The current water allocation is also available to other users. CWAG strategy is to maximise use of surface water.	Considered to be a relevant environmental factor
Surface Water and Groundwater Quality	Although there would be no direct discharge of wastewater or contaminated stormwater, the expanded Collie Power Station has the potential to contaminate water resources.	CWAG strategy is to maximise use of surface water. What measures will be undertaken to achieve long term supplementation of the pools of the south branch? There should be closer consideration of air cooling for all plants and particularly Collie. The SER does not clearly specify the CWAG strategy for usage of groundwater as a back up source only until 2006	Considered to be a relevant environmental factor
POLLUTION			
Gaseous and Particulate Emissions	The proposed power station would emit NO_x, SO₂ and, to a lesser extent, particulate and unburnt hydrocarbons. Predicted ambient concentrations of sulphur dioxide from a 600MW power station in isolation and with existing sources were assessed using computer modelling in 1990. The results indicate that for all residences, except possibly those within 5km to the east of Muja Power Station, concentrations would be well below the NEPM with an expansion of the Collie Power Station. Preliminary modelling indicates that the net impact of retiring Muja A/B and	The DEP has indicated that an adequate air quality assessment for Collie requires a comprehensive regional air quality study to develop and validate a dispersion model. Has consideration been given to reducing SO₂ emissions by mechanisms such as stripping sulphur from the coal, injecting lime or through flue gas desulphurisation. What is the potential for emissions of "air toxics" such as dioxins and furans, at all sites but particularly in relation to coal burning at Collie? The precipitators at Muja C and D do not work well.	Considered to be a relevant environmental factor

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Relevant Environmental Factors
	expanding the Collie Power Station by 300MW would be a significant improvement in air quality in the Muja area, with the concentrations in the rest of the Collie region remaining well below the standards. Modelling of NO₂ was presented within SECWA (1990) for a 600MW power station with existing sources. Noting the conservative assumptions used in this study, it is likely that concentrations would be well below the NEPM. Sulphur dioxide and NO_x have the potential to impact on vegetation. Previous modelling (SECWA, 1990) predicted that annual levels (with 600MW installed at Collie Power Station) would be well below World Health Organisation Standards. Vegetation monitoring performed by Western Power between 1997 and 2000 has indicated that no statistical impact of ambient SO₂ on vegetation could be determined. Particulate modelling in SECWA (1990) indicated that groundlevel concentrations for an expanded 600MW power station, assuming conservative emissions, would be at most 1.5% of the NEPM standard and indicated that the contribution from the Collie Power Station to particulate levels in the region would be negligible. In the 1990 assessment a review was conducted on the likelihood of acid deposition in the Collie region. This indicated that some changes in the pH of rainfall could occur, however measurable adverse (or beneficial) effects would be unlikely.		
Dust from Construction	Dust would be generated during the construction phase of the project. Dust emissions arising from construction activities may have the potential to adversely impact on human health, visual amenity, and the surrounding vegetation and fauna. The proliferation of dust during construction also has a nuisance value.	There were no significant issues raised in respect of marine environment.	Not considered to be a relevant environmental factor

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Relevant Environmental Factors
Greenhouse Gas Emissions	Greenhouse gas impacts were assessed for the SWIS as a whole for Western Power's plant retirement/replacement and Power Procurement Program to the year 2010. Two options were compared: - Option A – The installation of 240MW open cycle capacity by 2005/06 and a further 540MW of gas-fired power generation plant by 2010, consisting of 120MW of open cycle peaking plant and 420MW of combined cycle plant. - Option B – Is the same as Option A except that 300MW of the combined cycle plant in use by 2010 is assumed to be provided by a coal-fired power station. The SWIS carbon intensity is predicted to continue to decrease to either 0.70 or 0.76 tonnes CO_{2e}/MWh for Option A and B respectively by 2010. This is a reduction of 29 or 22% respectively from the 1990 carbon intensity of 0.98 tonnes CO_{2e}/MWh. The resultant CO₂ equivalent greenhouse emissions, with the predicted increase in electricity sent out in 2010 are estimated to be 11.3 and 12.4Mtpa respectively. This is around 24 to 36% higher than the 1990 emissions of 9.079Mtpa in 1990.	Although carbon intensity has been declining, Western Power should aim to achieve the Kyoto Protocol target of no more than 8% increase in emissions over 1990 levels. Western Power's ultimate aim should be to be greenhouse neutral. Greenhouse reporting should include an indication of the technology used. Tree planting to offset greenhouse gas emission adds \$10 - \$35 per MWh. There is little difference in greenhouse emissions from coal or gas if the analysis is done from source to consumption including CO₂ extracted from natural gas prior to supply as a fuel. Has Western Power considered options for the sequestration of CO₂ within geological formations.	Considered to be a relevant environmental factor
Noise and Vibration	Noise will be generated during the construction and operational phases of the project. Noise during construction is not expected to impact on the closest residence. Modelling of the noise emission propagation from the expanded power station was performed by SVT. Noise modelling indicates that no residences would experience noise level above 35d(B). The closest residence is approximately 3.8km to the north east of the Collie Power Station site, just within the northern boundary of the buffer zone. The 35dB(A) contour extends up to this residence for winds from the south and south west. Noise levels outside the buffer zone are less than 35dB(A) for all wind conditions except for a southerly, south westerly, westerly and north westerly wind. For these conditions the 35dB(A) noise contour can extend outside	There were no significant issues raised in respect of noise.	Considered to be a relevant environmental factor

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Relevant Environmental Factors
	the buffer zone by some 500 metres, however there are no residences located within this area. Noise levels at the site boundary are predicted to be greater than the boundary criteria for rural areas for some meteorological conditions. Vibration is not expected to be an issue.		
Waste	The construction and operation of the proposed power station will result in the generation of minor additional quantities of solid waste (<10tpa). The construction and operation of the proposed power station will result in the generation of minor quantities of domestic waste (peaking at 15kL/day during construction and up to 0.3kL/day during operation). The existing domestic wastewater system at the Collie Power Station was designed to manage the requirements of a construction workforce and would therefore be capable of managing the operational workforce for the proposed second unit. Waste cooling water would be disposed of either to on-site evaporation ponds or piped to an ocean outfall. This has the potential to lead to contamination of soil, nearby surface and ground waters with salt and impacts on vegetation from moderately saline water leaking from the bottom of the evaporation ponds or from pipeline leaks/ruptures.	There were no significant issues raised in respect of waste management.	Not considered to be a relevant environmental factor
Hydrocarbon and Hazardous Materials	The operation of the power station would require the transportation, storage and handling of hydrocarbon products including liquid fuel, lubricating oils and greases and degreasers. Hazardous materials such as herbicides, acids, solvents and explosives (if blasting required) may also be used and stored on-site. The potential impacts associated with these activities include: - Discharge of hydrocarbons to the environment contaminating surface and ground waters, the atmosphere and soil; - Creation of acute and/or chronic toxic hazards; and - Creation of flammable or explosive hazards.	There were no significant issues raised in respect of hydrocarbon and hazardous materials.	See groundwater

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Relevant Environmental Factors
SOCIAL SURROUNDINGS			
Social and Economic Issues	The proposed power station would offer benefits to the local communities through employment, the use of local labour, service industries and local supplies of materials, particularly during construction. The construction phase is expected to extend over a period of up to 30 months and the construction workforce for each development stage is expected to peak at around 400 personnel. There may be social impacts on the local community resulting from this transient workforce, however these would be temporary in nature. During the operational phase of the power station, permanent on-site personnel would range from 10 to 25 personnel. This level of manning could easily be accommodated within the nearby communities. There are not expected to be any significant impacts on tourism or recreation from the power station.	There were no significant issues raised in respect of social and economic issues.	Considered to be a relevant environmental factor
Visual Impact	The tallest plant structure at the existing Collie Power Station is the main exhaust stack. As the existing exhaust stack has been sized for 600MW, no additional stacks would be required. As a result, the visual appearance of the power station will not be altered significantly and the view from public roads would remain similar to that which is currently visible. The visual impact due to the proposed expansion of the station will therefore be minimal. However, during cool days, when the plume from the main exhaust is visible, the plume from the stack may be larger than usual with the larger flow of exhaust gases.	There were no significant issues raised in respect of visual impacts.	Not considered to be a relevant environmental factor

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Relevant Environmental Factors
Transport	The South West region has an extensive road network. Main road links to the north are via the South Western Highway and the Old Coast Road. The Coalfields Highway is also a significant transport link, which travels east from the South Western Highway at Roelands through Collie and intersects with the Albany Highway at West Arthur. The Collie Power Station is accessed via the Williams Collie Road which meets the Coalfields Highway at the eastern edge of the Collie townsite. Given that the construction workforce for development would be expected to peak at 400 personnel, mid way through the period, a worst case maximum of approximately 800 vehicle movements a day could be expected for this workforce, assuming that no car pooling arrangements. Additional movements related to delivery of construction material would also occur. All traffic would access the power station site through the existing access roads	There were no significant issues raised in respect of transport.	Not considered to be a relevant environmental factor
Aboriginal Heritage	There is the potential for previously unrecorded Aboriginal sites to be located within the proposed power station site.	Archaeological surveys should be undertaken and ethnographic consultations conducted with local Aboriginal communities and Native Title claimants.	Considered to be a relevant environmental factor
Public Safety	Any industrial development that involves the storage, transportation or processing of hazardous substances could pose risk to employees, the public and the environment. A preliminary review of hazardous materials and processes that may be used in the operation of the power station indicates that the power station could be categorised as being Low Risk.	There were no significant issues raised in respect of public safety.	Considered to be a relevant environmental factor

Appendix 4

Summary of Submissions and Proponent's Response to Submissions

Please refer to Attached Document

Western Power Corporation

Strategic Planning for Future Power Generation

Pinjar Power Station Expansion

Kwinana/East Rockingham Power Station

Kemerton Power Station

New Bunbury Power Station

Collie Power Station Expansion

Strategic Planning for Future Power Generation

Response to Submissions

August 2002

Western Power Corporation

This is an attachment to Bulletin 1067

Strategic Planning for Future Power Generation

Pinjar Power Station Expansion

Kwinana/East Rockingham Power Station

Kemerton Power Station

New Bunbury Power Station

Collie Power Station Expansion

Strategic Planning for Future Power Generation

*Response to Submissions
August 2002*

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Contents

1	Introduction	1
1.1	Background	1
1.2	Response to Submissions	2
1.3	Energy Source Options and Management of Greenhouse Gases....	3
1.4	Site Optimisation	6
2	Atmospheric Emissions	13
2.1	Modelling	13
2.2	Monitoring	17
2.3	Best Practice	18
2.4	Fuel	20
2.5	SO ₂ , NO _x etc	22
2.6	Air Toxics etc	24
2.7	Greenhouse Gases	30
3	Flora, Fauna and Wetlands	35
3.1	Water Birds	35
3.2	Wetlands and Surface Water	36
3.3	Vegetation	39
3.4	Fauna and Fauna Habitats	48
4	Water	49
4.1	Groundwater	49
4.2	Water Supply	51
4.3	Water Quality	53
4.4	Marine	54
5	Social	57
5.1	Heritage	57
5.2	Visual Amenity	62
5.3	Noise	65
5.4	Community Health	67
5.5	Social Benefits	67
6	Project Justification	69
7	Infrastructure/Planning	75
7.1	Wastewater Disposal	75
7.2	Access	77
7.3	Planning	78
8	Resources	89
9	References	93
Appendix A	Revised Development Concepts for Kwinana/East Rockingham, Kemerton and Bunbury	A-1
Appendix B	Noise Contours for Kwinana/East Rockingham Sites 3 and 4	B-1
Appendix C	Collie Power Station Expansion Regional Air Quality Contours	C-1

1 Introduction

1.1 Background

Western Power Corporation (Western Power) is the principal generator, transmitter, distributor and retailer of electricity in Western Australia. As early as 2004/05, Western Power will require access to additional generating capacity to continue to reliably meet the electricity requirements of its business and residential customers within the South West Interconnected System (SWIS). The *Electricity Corporation Act 1994* requires Western Power to procure any substantial new generation capacity through a non-discriminatory and open procurement process. This process allows suitably qualified companies to compete for the opportunity to supply electricity to Western Power and is known as the SWIS Power Procurement Process.

To accelerate the process and ensure the availability of suitable sites for the bidding process, Western Power is seeking strategic environmental approval under Section 16(e) of the *Environmental Protection Act 1986* for a number of potential power station sites. The objective of the Section 16(e) SER is to obtain advice and "in principle" approval prior to submission of final tenders, enabling full specification of environmental performance for the facilities in the tender process. Furthermore, the approach will ensure final approval for the facilities is attainable to meet the commissioning date.

Bidders may decide to identify and develop their own site. However, they will be required to demonstrate that environmental clearance and access to the site can be provided to suit the overall project development timeframe. Following the bidding process, a Preferred Bidder will be chosen and will be required to undertake a detailed Environmental Review of each confirmed development proposal at the selected site in accordance with Section 38 of the *Environmental Protection Act 1986*.

Strategic Environmental Review (SER) documents were prepared by Sinclair Knight Merz on behalf of Western Power for the following sites:

- ❑ Expansion of the existing Pinjar Gas-Fired Power Station from 575MW to 815MW (installation of an additional 240MW gas-fired capacity) (Western Power Corporation, 2002a);
- ❑ Construction of a new gas-fired power station within the Kwinana Industrial Area (initially of 240MW with capacity to expand up to 1,080MW) (Western Power Corporation, 2002b);
- ❑ Construction of a new gas-fired power station within the core of the Kemerton Industrial Park (initially of 240MW with capacity to expand up to 1,080MW) (Western Power Corporation, 2002c);
- ❑ Construction of a new gas-fired power station at the Old Bunbury Power Station site (initially of 240MW with capacity to expand to a maximum of 360MW) (Western Power Corporation, 2002d); and
- ❑ Expansion of the existing Collie Coal fired Power Station from 300MW to 600MW (installation of an additional 300MW coal fired unit) (Western Power Corporation, 2002e).

The SER documents were available for public comment for a four-week period commencing Monday 17 June and closing on Monday 15 July 2002.

At the commencement of the public review period, Western Power continued its stakeholder and public consultation program with the establishment of attended displays in Kwinana/Rockingham, Bunbury/Harvey and Collie. Fact sheets and feedback forms were available during the review period. Copies of the SER documents were also available to the community in hard copy form via the Internet.

1.2 Response to Submissions

This document responds to the questions and issues arising from a number of submissions received during the public review period from the public and decision-making authorities. The submissions were received from:

- ☐ Kemerton Industrial Park Co-ordinating Committee (KICC);
- ☐ Heritage Council of Western Australia;
- ☐ Water and Rivers Commission, Cockburn Sound Management Council;
- ☐ Conservation Council (one for each site);
- ☐ Environment Centre of WA;
- ☐ City of Wanneroo;
- ☐ Office of Major Projects in the Department of Minerals and Petroleum Resources (MPR);
- ☐ City of Rockingham;
- ☐ Department of Indigenous Affairs;
- ☐ Office of Energy;
- ☐ Department for Planning and Infrastructure (DPI);
- ☐ Department of Conservation and Land Management (CALM);
- ☐ Town of Kwinana;
- ☐ Water Corporation;
- ☐ Department of Environment, Water and Catchment Protection (DEWCP) – Air Quality Management Branch;
- ☐ Shire of Harvey;
- ☐ Leschenault Inlet Management Authority (LIMA);
- ☐ Environmental Protection Authority (EPA) – Marine Branch;
- ☐ Department of Environment, Water and Catchment Protection (DEWCP) – Ecological Systems Branch; and
- ☐ Nine private submissions.

In total, 114 issues were raised. The list of issues was developed by the Department of Environment, Water and Catchment Protection (DEWCP) and is structured under the environmental factors listed below:

- ☐ Atmospheric Emissions;
- ☐ Flora, Fauna and Wetlands;
- ☐ Water;
- ☐ Social;
- ☐ Project Justification;
- ☐ Infrastructure/Planning; and
- ☐ Resources.

Western Power's responses to these submissions are provided in **Sections 2** through to **8** of this document.

Arising out of these submissions are several key strategic issues related to the management of greenhouse gases, the role of renewable energy sources, fuel diversity and site selection issues at Kwinana and Kemerton. These issues are addressed in the following **Sections 1.3** and **1.4**.

1.3 Energy Source Options and Management of Greenhouse Gases

1.3.1 Role of Renewables

As part of its greenhouse management strategy, Western Power is committed to the implementation of renewable energy options under the *Renewable Energy (Electricity) Act 2000*. Western Power's commitments under the Act increase steadily towards 700,000 Renewable Energy Certificates (RECs) in 2010. To meet these commitments, Western Power opened the 22MW Albany Wind Farm in October 2001 and is actively working towards further renewable electricity generation.

Western Power is constructing a 1MW demonstration bio-energy plant at Narrogin based on the Integrated Wood Processing of coppiced mallee. The plant is scheduled for operation in early 2003, and is intended to prove the feasibility of further full-scale, 5MW plants in the South West.

A commitment to a further wind farm at Esperance, though not part of the South West Interconnected System (SWIS), has recently been made.

Other renewable generation initiatives are being considered in order to pursue Western Power's intent to meet its RECs commitments.

The ultimate aim of electricity supply development is that it be sustainable, embodying the social, environmental and economic dimensions of development. Greenhouse neutrality is but one aspect of a sustainable electricity supply. Meeting the social and economic requirements of electricity supply in the 2002-2010 timeframe will require the continued use of fossil fuels in Western Australia, on a scale that cannot be fully displaced or offset by renewable energy or carbon sequestration (refer to Section 3.5.4 of the SER documents).

Section 3.2 of the SER documents provides a review of the energy source options available and the advantages and disadvantages of each option. A selection of renewable energy and conventional fossil fuel fired technology is compared in **Table 1-1**.

■ **Table 1-1 Comparison of Renewable Energy and Conventional Energy Options**

Technology	Capital Cost (\$/kW)	Total Cost (c/kW)	Availability (%)	Area Required (ha/MW)	Typical Installed Capacity ² (MW)
Wind	1,800	7 - 9	33	12 ³	1 - 20
Solar PV	6,500	30 - 50	25	100	0.001 - 0.1
Biomass	2,500	8 - 12	90	1500 ⁴	1-10
Coal-fired Steam Turbine	1,500	4 - 7 ⁵	95	0.3 ⁶	120 - 2,000
Combined Cycle Gas Turbine	1,000	4 - 7 ⁵	98	0.1 ⁶	120 - 500
Open Cycle Gas Turbine	500	7 - 12 ⁵	98	0.1 ⁶	20 - 500

Notes:

- 1) Total Cost includes capital and operating expenses.
- 2) Typical refers to plant installed in Australia.
- 3) Wind area can be used for other compatible activities.
- 4) Based upon coppiced mallee and allowing for integration of other agricultural activities.
- 5) Varies with fuel price and operating regime.
- 6) Excludes areas of coal and gas fields.

Table 1-1 shows that wind energy technologies come closest to providing a cost competitive renewable energy source, however there are technical and commercial constraints upon the use of wind power, as discussed below. Other renewable energy technologies are still more expensive than conventional power generation options for the SWIS. This cost position will close as the capital and running costs associated with renewable energy options decrease and costs associated with fossil fuel plants increase. This Table also shows the large area requirements of renewable energy options and smaller typical installed capacity.

1.3.2 The Potential for Wind Power

Renewable generators include a number of technology options, however in recent times wind energy has proved the most viable. Wind energy is both one of the most promising sources of renewable energy for Western Australia and at the same time the most problematic to integrate within the SWIS.

Limitations to Wind Power Integration

Unlike conventional fossil fuel generators, wind generators are intermittent in operation and are not able to reliably produce their rated output when required to meet demand. It follows that renewable sources of generation such as wind will incur greater use of security services provided by Western Power for the reliable and secure operation of the power system than conventional generators, and will increase the overall cost of providing these services. These security services include in particular, frequency control and voltage control, but also standby generation reserves and power system stability services.

To ensure adequate frequency control with a high penetration of wind generation, additional spinning reserve will be required. This will require the dispatch of additional partially loaded fast response gas turbine generators.

The South West Interconnected System

In considering what is appropriate for WA, it should be appreciated that almost all other power systems (whether in Europe, America or eastern Australia) are interconnected, whereas the SWIS remains isolated. Other systems therefore benefit from access to the reserve generation capacity and rotating inertia of neighbouring connected systems that stabilise system frequency when fluctuations in load and generator output occur.

The SWIS with a peak load of about 2,600MW (and importantly an overnight load as low as 925MW) is small in comparison to most other power systems. Because interconnection is not viable, it remains electrically isolated from the power systems of eastern and southern Australia and, without the benefits of back up from other systems, is more vulnerable to frequency instability caused by fluctuations in load and generation.

Therefore, higher amounts of wind generation within the SWIS could precipitate substantial operational change. Base load steam units, not suited to frequent stopping and starting and with limited capacity to respond to sudden system load fluctuations, may need to be taken out of service regularly overnight and/or it may be necessary to run additional (open cycle) gas turbines to provide sufficient fast response spinning reserve.

The consequences of having to stop and start steam generators and provide additional spinning reserves from gas turbine and other generators would be lower efficiency fuel burn and greater fuel and other operating costs for Western Power generators, with attendant environmental impacts.

In addition to the costs of generation reserves and generator rescheduling, the amount of wind generation which the System can integrate will depend on several other factors, including the dynamic performance of wind generators, the geographic diversity of sources of wind generation and whatever other practical measures are available to mitigate the effect of load variations caused by wind generators.

1.3.3 The Way Forward

Western Power is a leader in environmental management and in commercial development of renewable energy projects and fully supports the connection of additional sources of renewable energy to its power systems serving WA.

The growth of renewable sources of energy generation will reduce dependence on fossil fuels and provide environmental benefits through abatement of greenhouse gas emissions. It will increase diversity of fuel sources and provide opportunities for electricity retailers to fulfil their renewable energy obligations under the *Renewable Energy (Electricity) Act 2000* through the purchase of renewable energy and Renewable Energy Certificates. Sources of renewable generation in remote regions may also provide regional economic benefits. Depending on several factors, especially availability at times of high system load, renewable generators may significantly contribute to the aggregate pool of generation plant capacity required to meet the system load.

Western Power will continue to pursue developments in renewable energy. However none of the renewable options currently available are capable of meeting the scale of the predicted power generation requirements (initially 240MW followed by about 300MW). Therefore for the SWIS Power Procurement Process, Western Power has focussed upon the conventional energy sources of coal, natural gas and liquid fuel.

1.3.4 Fuel Diversity

Coal-fired power generation presently produces more than 75% of the total energy generated on the SWIS with the bulk of the remainder being produced from natural gas. The generation plant retirement and replacement program now under way (separately from this power procurement process) will alter this mix between coal and gas for major generation, reducing the amount of coal utilised.

Coal-fired power generation produces more greenhouse emissions at the generating plant site, as well as on a life cycle basis, than does generation based upon natural gas. However, given the current natural gas pipeline transport capacity constraints and the costs associated with expansion of the pipeline, there is a need to maintain a diversity of energy sources to ensure security of power supply for the State and energy cost competitiveness.

1.4 Site Optimisation

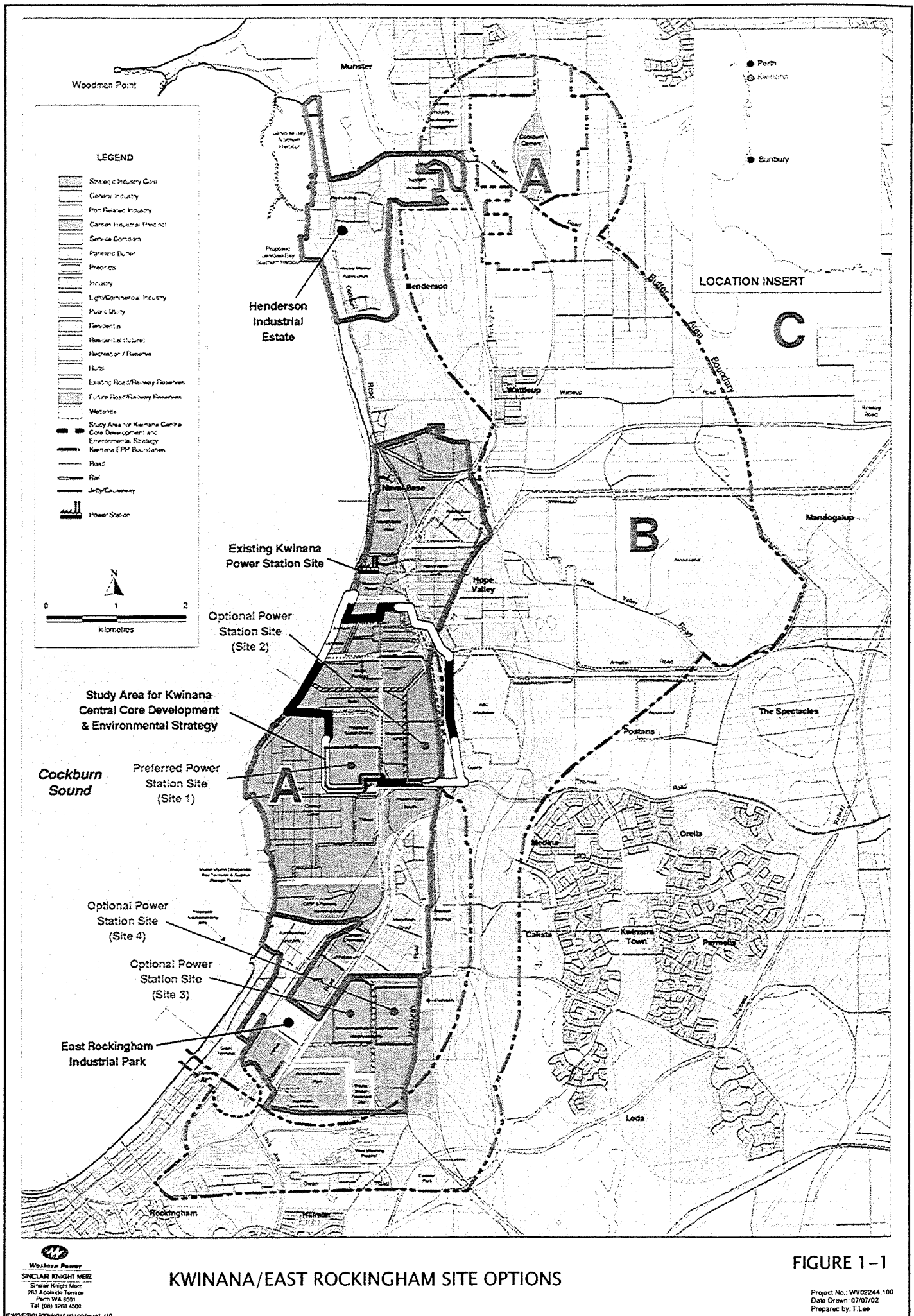
As a result of public submissions through the public review period, modifications to the site layouts at Kwinana, Kemerton and Bunbury and a review of the fallback sites at Kwinana and Kemerton has occurred in consultation with LandCorp, the Office of Major Projects within the Department of Mineral and Petroleum Resources (MPR) and local authorities.

1.4.1 Kwinana/East Rockingham Industrial Area

In the Kwinana SER document it was determined that due to land use constraints, either the central core or the East Rockingham Industrial Park would be the most suitable areas of land for establishing a strategic power station site. The Kwinana SER document identified three suitable sites (Sites 1 to 3) within these areas and presented a review of the site options with respect to the constraints (refer to Section 4.5.2 of the Kwinana SER document). During the public review period, modifications to the site layouts at these sites have occurred and an additional fallback site (Site 4) has been identified within East Rockingham Industrial Park. A description of these modifications is as follows:

- ❑ **Site 1:** The preferred power station site is Lot 15 Mason Road in the central core of the Kwinana Industrial Area. The Kwinana SER document presented detailed environmental studies for this site. This site is constrained due to contamination and competing interest for the site. During the public review period, the development concept for this site has been refined to fit in around the contaminated areas and allow for phased development from east to west to accommodate progressive remediation by LandCorp. The revised site layout is shown in **Figure A-1 of Appendix A**.
- ❑ **Site 2:** This fallback site is in the central core of the Kwinana Industrial Area, north of Mason Road on Donaldson Road (on former BHP land). This site is constrained in width and there is no room for a standard switchyard. A Gas Integrated Switchyard (GIS) would be required at considerable cost penalty. There are also pre-existing contamination constraints on this site which may require a phased development from south to north. A site layout has been developed for this site and is shown in **Figure A-2 of Appendix A**.
- ❑ **Site 3:** This fallback site is located in the south east corner of Office Road and Patterson Road in the East Rockingham Industrial Park. There is a preference by land development authorities to retain this site for higher profile industry in recognition of the value of the Patterson Road frontage. A site layout for this site is shown in **Figure A-3 of Appendix A**.
- ❑ **Site 4:** Land development authorities would prefer to shift Site 3 further to the east to create a combined utility complex incorporating the possible desalination plant on Site 4. This site is located on Mandurah Road frontage and is within the East Rockingham Industrial Park. A development concept for this site is shown in **Figure A-4 of Appendix A**.

LandCorp owns all four sites. The locations of the sites are indicated on **Figure 1-1**.



To confirm the acceptability of these site options with regard to environmental impacts, the following reviews have been performed:

- ❑ Noise – An assessment was performed for all four sites;
- ❑ Air Quality – Sites 1 and 3 were assessed in detail. Sites 1 and 2 were considered to be sufficiently close to each other that the results of the assessment for Site 1 are assumed to represent the potential impacts for Site 2. Similarly, Sites 3 and 4 are considered to be sufficiently close to each other that the results for Site 3 are assumed to represent the potential impacts for Site 4;
- ❑ Public Safety – A review of previous cumulative risk assessment was done with respect to all four sites; and
- ❑ Flora and Fauna Issues – A review was performed of existing data related to the four sites.

For all other environmental impacts, the specific location of the site within the Kwinana Industrial Area is not considered a significant factor. A summary of the above studies follows.

1.4.1.1 Comparison of Noise Impacts for Site Options

Herring Storer Acoustics was commissioned to perform a noise impact assessment for all four sites (Herring Storer Acoustics, 2002b). A comprehensive discussion of the relevant noise criteria, methodology and assumptions used in the noise assessment is provided in Section 8.4.3 of the Kwinana SER document.

The main noise sensitive residential areas with respect to the four site options are:

- ❑ Medina;
- ❑ Hope Valley;
- ❑ Leda; and
- ❑ North Rockingham.

In addition, with respect to Site 4, there are two residential premises located along Mandurah Road within the vicinity of the site. One of these houses is owner occupied and the other is Hymus House, which is vacant and is on the Municipal Inventory (refer to the response to **Issue 75, Section 5.1.8.2**). The occupied premises is a non-conforming use under the various planning schemes.

Table 1-2 provides a comparison of the predicted noise impacts at the closest residential areas in each of these locations, for the ultimate power station development at the four site options. An assessment has been made of whether the predicted noise levels (from the power station) received at the residences could meet the design criteria. The design criteria is defined as being at least 5dB(A) below the assigned criteria such that the power station would be classed as “not significantly contributing” to noise levels at the receptor.

Noise contours from the power station at Sites 3 and 4 are given in **Appendix B**.

■ **Table 1-2 Noise Levels at Closest Residential Areas**

	Site 1 (Mason Rd)	Site 2 (Donaldson Rd)	Site 3 (Office Rd)	Site 4 (Mandurah Rd)
Hope Valley				
Noise Level	30	41	ND ³	ND ³
Compliance with "Design Criteria"	✓	X	✓	✓
Medina (edge of Area B)				
Noise Level	29	33	27	30
Compliance with "Design Criteria"	✓	✓	✓	✓
Medina (200m from Area B)				
Noise Level	27	31	26	ND ³
Compliance with "Design Criteria"	✓	X	✓	✓
North Rockingham				
Noise Level	ND ³	ND ³	30	27
Compliance with "Design Criteria"	✓	✓	✓	✓
Leda				
Noise Level	ND ³	ND ³	ND ³	32
Compliance with "Design Criteria"	✓	✓	✓	X
Mandurah Rd Premises				
Noise Level	ND ³	ND ³	ND ³	50
Compliance with "Design Criteria"	✓	✓	✓	✓

Notes:

- 1) Source: Herring Storer Acoustics (2002b).
- 2) Design criteria is defined to be at least 5dB(A) below the assigned criteria such that the power station would be classed as "not significantly contributing" to noise levels at a receptor.
- 3) ND – noise levels were not determined for locations sufficiently far away from the proposed site that negligible noise impact would occur.

The results indicate that site options 1 and 3 would be the most acceptable with respect to noise. Sites 2 and 4 could be designed to comply with the noise regulations, but there would be a cost penalty associated with additional noise attenuation requirements.

1.4.1.2 Comparison of Air Quality Impacts for Site Options

The Mason Road site (Site 1) and the Office Road site (Site 3) were assessed for air quality impacts. The assessment was performed using the DEWCP dispersion model DISPMOD to predict ground level concentrations of NO₂ and SO₂. For a comprehensive discussion on the air quality criteria, modelling methodology and assumptions refer to Section 8.4.1 of the Kwinana SER document where the assessment of the preferred site (Site 1) is detailed.

Comparison of NO₂ impacts

For the assessment of local NO₂ impacts, the power station was modelled in isolation and in combination with existing and proposed new industries. Results are presented for the ultimate power station development options at Site 1 and Site 3 in Table 4-2 of Section 4.5.2.2 of the Kwinana SER document. This Table indicates that a power station at Site 3 (or Site 4) would lead to slightly higher maximum ground level concentrations at the nearest residences than for a power station located at Site 1 or Site 2.

An assessment of the cumulative impacts on ground level NO₂ was performed by adding the modelled results for the proposed power station sites, along with the proposed GOWA and Hismelt operations, to observed NO_x levels at the DEWCP's

Monitoring Stations. Results are presented for Site 1 and Site 3 in Table 4-3 of Section 4.5.2.2 of the Kwinana SER document at the two DEWCP monitoring sites. This Table indicates that:

- ❑ Operation of the Hismelt and GOWA plant would increase 1-hour NO₂ concentrations to 54% and 36% of the NEPM standards at Hope Valley and North Rockingham;
- ❑ A power station sited at Site 1 (or Site 2) would increase maximum 1-hour concentrations at Hope Valley to between 60 and 67% of the NEPM, whilst increasing levels slightly to 38% at North Rockingham;
- ❑ A power station sited at Site 3 (or Site 4) would have negligible effect on cumulative impacts at the Hope Valley monitoring site with maximum 1-hour concentrations predicted to remain at 54%. At North Rockingham, the concentrations would only increase if the power station operates on liquid fuel without water injection (to 54% of the NEPM);
- ❑ Therefore, it is concluded that concentrations at both monitors would remain well below the NEPM for the range of station options considered, though with higher concentrations at Hope Valley due primarily to existing and planned or approved sources in that area.

Comparison of SO₂ Impacts

Predicted maximum concentrations within the three areas of the Kwinana EPP for a power station located either at Site 1 or Site 3 are in Table 4-4 of Section 4.5.2.2 of the Kwinana SER document. This Table indicates that for the power station under normal operations, when operating on gas, the resultant ground level concentrations of SO₂ are negligible. As such, all sites are acceptable with regards to meeting ambient SO₂ concentrations when operating on natural gas.

When the power station operates on liquid fuel (for less than 100-hours per year), Site 1 (or Site 2) is predicted to have the greater impact within the industrial area, whilst Site 3 (or Site 4) would have a greater impact on the residential areas in Areas B and C. This is the result of the slightly closer proximity of Site 1 to Area B and C and the frequency of winds in these directions.

Sources of SO₂ within the Kwinana Industrial Area are regulated by the Kwinana EPP, with industry given a maximum permissible emission limit as allocated in the 1992 determination (EPA, 1992). Since this initial determination, a review of the allocations has been conducted but not yet finalised. Without details on the new emission allocation, an assessment as to whether a power station that uses liquid fuel can fit within the Kwinana EPP can not be made. However results from the 1992 determination indicate that there are significant emission sources near Site 1 (and Site 2) and without a reduction in allocated emissions for industries in the Mason Road area, there may be constraints on SO₂ emissions from a proposed power station. Therefore, although Site 1 (or Site 2) is the preferred site when considered in isolation, Site 3 (or Site 4) is likely to be more acceptable when cumulative impacts are considered.

1.4.1.3 Comparison of Public Safety Issues for Site Options

Risk assessments have been performed for all hazardous industries built in the Kwinana Industrial Area since 1985. The cumulative risk of all activities in the Kwinana Industrial Area has most recently been studied in *Kwinana Cumulative Risk Assessment*, a review by AEA Technology completed in 1995 and updated in 1998. The 1998 update was a review of the risk associated with the full development scenario detailed in

the Fremantle Rockingham Industrial Area Regional Strategy (FRIARS). This scenario includes the addition of notional high-risk industries (such as petrochemical and aluminium trifluoride plants) in the Kwinana Industrial Area and indicated that the EPA residential criteria are met for development under the preferred FRIARS strategy. In the full development scenario study, a petrochemical plant was modelled in approximately the location of the preferred power station site. The East Rockingham Industrial Estate was also included in the previous risk assessment, and a major hazard facilities were assumed to be located in the areas encompassed by Site 3 and Site 4. Since the Power Station is not considered a major hazard facility, all four sites would be acceptable in terms of risk and public safety.

1.4.1.4 Comparison of Vegetation Impacts for Site Options

Site 1 (Mason Road) and Site 2 (Donaldson Road): A desktop review and site visit was performed of Site 1 and Site 2 by Biota Environmental Services (Biota Environmental Services, 2002a). The full detail of this study as it pertains to the preferred site is provided in Section 7.3.1 and Section 7.3.2 of the Kwinana SER document. The study made the following conclusions:

- ❑ Both of these sites are heavily weed infested and little of the original vegetation types remain, which implies that the fauna utilising the site is potentially limited.
- ❑ It is unlikely that there is any flora of significance on either site.
- ❑ Four species of threatened fauna were identified in a search of CALM databases. While all could possibly occur in the area, the degraded nature of both sites makes it unlikely that they would be present.
- ❑ Site 2 retains a stand of mature Tuart trees and considerable dense thickets of native *Acacia rostelliers* and *A. saligna*, suggesting this site is likely to have higher conservation significance than Site 1 (The revised development concept ensures retention of this stand of Tuart trees).
- ❑ Site 1 has been heavily disturbed, including a recent fire and historical materials extraction. As a result of these processes, this site is likely to have little conservation significance. There is a stand of vegetation on the east side of the site that has been recognised in the previous landscape strategy for the central core. The revised development concept for this site ensures retention of this landscape strip.

Site 3 (Office Road) and Site 4 (Mandurah Road): Much of the vegetation on Sites 3 and 4 has been degraded as a consequence of frequent fires, foraging by domestic livestock and rabbits and trafficking through the area by vehicles. Site 3 contains scattered *Acacia/Hakea/Melaleuca* shrubs across most of the site. Tuart groves occur on the south west corner of the site and dense acacia scrub occurs on the south east corner of the site. A large proportion of Site 4 is cleared, however a community of good quality remnant Tuart is located at the corner of Office Road and Old Mandurah Road. The remainder of Site 4 contains acacia scrub extending in a band from Site 3 in the south west (Information taken from the *East Rockingham Industrial Park Landscape Master Plan* (Quilty Environmental Consulting & Thompson Palmer Pty Ltd, 1993)).

The Office of Major Projects in the Department of Mineral and Petroleum Resources has recently commissioned ATA Environmental to perform a vegetation survey to determine the significance of the remnant vegetation in the East Rockingham Industrial Park. A strategy to manage vegetation issues in this area is being developed in consultation with DEWCP. Preliminary feedback from ATA Environmental (Paul van der Moezel *pers comm*, 2002) indicates that there is one linear swale mapped as having Grass Trees (*Xanthorrhoea preissii*) which cuts across the centre of Site 3. This area is

most likely to contain a degraded section of the Threatened Ecological Community 19a or 19b. The area is not currently being considered by the state government authorities for retention but uncertainty remains until the vegetation strategy is finalised and approved.

1.4.1.5 Pre-existing Contamination

There are issues with pre-existing contamination on Site 1 (Mason Road) and Site 2 (Donaldson Road). LandCorp is currently undertaking testing at Site 1 and Site 2 to identify the extent of contamination on the land. Once that testing is complete, a program of remediation would be established for the removal of contamination in accordance with the requirements of all relevant authorities. Whilst the program of testing and remediation would be undertaken as soon as practicable, it is unlikely that the testing and remediation will be completed prior to 30 June 2003.

1.4.1.6 Summary Of Site Comparison

All four sites have been included in previous risk assessments for the Kwinana Industrial Area. The Power Station would not be considered a major hazard facility and would fit on all sites.

In terms of power and gas infrastructure Sites 1 or 2 would be preferred, although there are issues with pre-existing contamination on both sites and the remediation requirements may delay the availability of the sites.

All four sites would be designed to comply with the noise regulations although Site 2 (Donaldson Road) and Site 4 (Mandurah Road site) would incur a cost penalty due to additional noise attenuation requirements.

All four sites could accommodate a power station based on air quality considerations, although Sites 3 (Office Road) and 4 (Mandurah Road) would be preferred when considering cumulative effects with existing emissions.

Western Power is seeking 'strategic advice' on all four sites within the Kwinana Industrial Area.

1.4.2 Kemerton Industrial Park

The site layout for the preferred site at Kemerton has been further refined as a result of public submissions during the public review period. The new layout is shown in **Figure A-5 of Appendix A**. In this revised layout, the plant has been placed further to the north over the blue gum plantation to ensure that disturbance to the remnant vegetation in the southern portion of the preferred site is minimised. This revised layout also provides a distance of approximately 200m from the conservation category wetland in this portion of vegetation (refer to **Issue 33, Section 3.2.3.2**).

Modifications to the lease boundary of the fallback site (Site A) are also being negotiated with LandCorp and MPR. The current proposal is to realign the service corridor proposed under the Final Concept Plan of the Kemerton Expansion (see Figure 4-2 of the Kemerton SER document) to be adjacent to the existing 132kV transmissions line corridor. Additional area on the west side of Wellesley Road would be required for the power station under this plan. The revised site layout is shown in **Figure A-6 of Appendix A**.

1.4.3 Bunbury Power Station Site

During the public review period, the Bunbury Port Authority purchased the Bunbury Power Station site from Western Power. It is proposed that Western Power will lease the land back from the Port Authority for the proposed power station development. To ensure that the land available for port related industries is optimised, the lease boundaries and site layout has been rationalised in consultation with the Port Authority. The layout has been revised to shift the plant further to the north east to allow suitable set backs to adjacent land uses as shown in **Figure A-7 of Appendix A**.

As discussed in Section 4.6.2 of the Bunbury SER documents, the Bunbury Port Authority is also undertaking other strategies to optimise the use of Port Authority Land including:

- ❑ Realignment of the existing transmission lines which presently run diagonally across Port Authority land to the south east of the proposed power station site; and
- ❑ Realignment of the Turkey Point access road away from the port industries.

The above strategies are independent of the proposed power station development and will be dependent upon the action taken by the Bunbury Port Authority.

2 Atmospheric Emissions

2.1 Modelling

2.1.1 Issue 1

2.1.1.1 Question

An adequate air quality assessment for Collie requires a comprehensive regional air quality study to develop and validate a dispersion model using the extensive monitoring and meteorological data set gathered by SECWA/Western Power since 1992.

2.1.1.2 Response

A preliminary air quality assessment was presented in Section 8.4.1 of the Collie SER document. Predicted ambient concentrations of sulphur dioxide from a 600MW power station in isolation and with existing sources were assessed based on computer modelling in 1990 (SECWA, 1990; ETRS, 1990). The results indicated that for all residences, cumulative concentrations would be well below the NEPM with an expansion of the Collie Power Station, given the retirement of ageing assets at Muja (Stages A and B) scheduled for 2006.

Western Power committed to undertaking further regional air quality modelling studies during the public review period to confirm the cumulative impacts of sulphur dioxide from a 600MW station, with results provided to the public and the EPA assessment process through the Proponent's Response to Submissions. A comprehensive report has been provided to the DEWCP Air Quality Branch, and key findings are summarised below.

The comprehensive study has incorporated the following scope of work:

- ☐ Review of surface and upper air meteorological data;
- ☐ Review of ambient sulphur dioxide monitoring data;
- ☐ Development of a variable sulphur dioxide emission file for modelling purposes;
- ☐ Incorporation of the above into an appropriate dispersion model with model validation and calibration undertaken against the ambient sulphur dioxide monitoring data; and
- ☐ Using the validated model, prediction of ground level concentrations of sulphur dioxide for a suitable expansion scenario.

Meteorological Data Monitoring Program

Western Power has undertaken an extensive monitoring program of meteorological parameters in the Collie Region since 1995 as part of study to assess the ambient sulphur dioxide levels in the Collie region:

- ☐ A series of surface measurements of wind speed, wind direction, air temperature, relative humidity, barometric pressure and rainfall, using 10, 18 and 36m towers were undertaken at various locations between 1995 and present;
- ☐ A Sound Detection and Ranging System (SODAR) was placed at the Shotts monitoring site and measured 30-minute average winds at 30-metre height intervals from 30m to 450m from 6 August 1996 to 11 May 1999; and
- ☐ A Radio Detection and Ranging System (radar) for measuring wind and temperature profiles was operated at the Western 2 monitoring site from 19/11/96 to 5/5/98.

Ambient Sulphur Dioxide Monitoring Program

To assess the ambient sulphur dioxide levels, Western Power Corporation undertakes the "Collie Regional Sulphur Dioxide Monitoring Network" that monitors the ambient concentrations of sulphur dioxide at three locations at any time in the Collie Coal Basin. These locations are shown in **Figure C-1** and include:

- The permanent sites at Collie and Shotts, which have operated since March 1995; and
- A "mobile" monitor that was sited at Cardiff from March 1995 to November 1996, at Jackson's Farm from December 1996 to November 1998 and at Bluewater from November 1998 to date.

A summary of the historical trend of the monitoring data from the three monitoring sites which are currently in operation is provided in Section 8.4.1.2.4 of the Collie SER document. This data indicates that the 1-hour concentrations have been at most 64% of the NEPM and at most 48% and 11% of the 24-hour and annual standards respectively. For a typical year (taken as the median value) the 1-hour concentrations are lower, ranging between 30 to 45% of the NEPM standard. Based on analysis of wind direction and other meteorological data, it is apparent that ground level concentrations of sulphur dioxide at the monitoring stations attributable to the existing Collie Power Station are between 22 and 40% of the NEPM.

Modelling Methodology

To predict the ground level concentrations of sulphur dioxide in the Collie region, TAPM (v2) (The Air Pollution Model) developed by CSIRO has been used. This model has been selected because of its ability to simulate a range of dispersion processes (including convection, fumigation, building wake effects and terrain effects) over fairly long distances from source (upwards of 16km). A comparison of the predictive meteorological ability of TAPM was conducted for the year 1997 when upper winds were available, with validation of predicted versus actual monitored ground level concentrations of sulphur dioxide for the year 2001. The year 2001 was selected to correspond with the Collie Power Station operating at the highest capacity factor, and with coal sulphur contents representative of the long-term average.

The model validation process concluded that the TAPM modelling system is conservative, and generally over-predicts the 1-hour average ground level concentrations of sulphur dioxide, with the maximum and second highest concentration over-predicted by 22% at Collie, 17% at Bluewater and 117% at Shotts. Similarly, the model over-predicts for the 24-hour and annual averaging periods.

Ambient Air Quality Criteria

A discussion of air quality criteria is presented in Section 8.4.1.1 of the Collie SER. With respect to appropriate ambient air quality criteria, the National Environmental Protection Measure (NEPM) standards specify a maximum concentration and the goal that is to be achieved within 10 years (i.e. by 2008). The DEWCP intends to implement the NEPM through the development of a state wide Environmental Protection Policy, as discussed in the document *Developing a Statewide Air Quality Environmental Protection Policy* (EPA, 1999b). This document proposes that these standards apply outside industrial areas and residence free buffer areas around industrial estates. For the purpose of this assessment, these levels are taken to apply outside the buffer boundary of the Collie Power Station (see **Figure C-1**) at any residential premises. This is a more

stringent application of the standard than is intended by the NEPM, which is designed to be applied to populations rather than individuals.

Modelling Results

The year 2008 was selected as an appropriate snapshot in time to review the future air quality in the Collie region, as compared to the base case (2001). By this time, expansion of the Collie Power Station would have come into service through the second stage of Power Procurement, and the ageing assets at Muja Power Station (Stages A and B) would have been replaced by more efficient combined cycle plant and retired from service (scheduled for 2006). Also, the National Environmental Protection Measure (NEPM) air quality standard is planned to be implemented by 2008.

Predicted ground level concentrations from TAPM for the years 2001 and 2008 are presented in **Appendix C** for various averaging periods. These contours indicate that an expansion of the existing Collie Power Station would have little effect on air quality in residential areas throughout the Collie Region. A summary of the predicted concentrations at nearby residential areas and monitoring locations is given in **Table 2-1**.

■ **Table 2-1 Summary of Predicted SO₂ Concentrations at Various Residential and Monitoring Locations for the 2001 and 2008 Modelled Cases**

Location	2 nd Highest 1-hour Average		Maximum 24-hour Average		Annual Average	
	Concentration ($\mu\text{g}/\text{m}^3$)	NEPM (%)	Concentration ($\mu\text{g}/\text{m}^3$)	NEPM (%)	Concentration ($\mu\text{g}/\text{m}^3$)	NEPM (%)
Modelled 2001						
Collie	300	53	59	26	4.9	9
Cardiff	225	39	70	31	6	11
Buckingham	425	75	110	48	9	16
Shotts ¹	354	62	88	39	5.6	10
Bluewater ¹	200	35	57	25	5.7	10
Modelled 2008						
Collie	290	51	45	20	4.5	8
Cardiff	200	35	59	26	4	7
Buckingham	340	60	85	37	8	14
Shotts ¹	310	54	65	29	5.2	9
Bluewater ¹	250	44	62	27	7.5	13

Notes:

- 1) Shotts and Bluewater are not residential areas. These values are presented as these locations are close to the Collie Power Station and monitoring stations exist at these locations.

Comparison of the predicted ground level concentrations of sulphur dioxide with the NEPM standards indicates that:

- In the Collie residential areas and in the townsites of Cardiff and Buckingham, the second highest 1-hour average ground level concentrations are predicted to be below the NEPM 1-hour standard at present (2001 Base Case) and levels are predicted to be even lower in 2008;
- At some residences within 5km to the north east of the Muja Power Station, the existing concentrations (2001 base case, **Figure C-1**) are predicted to be at the NEPM standard for existing sources. However, the model has been demonstrated to be conservative and it is likely that the actual concentrations are lower than those predicted such that concentrations at these residences are below the NEPM at present. By 2008, air quality is predicted to improve, and ground level concentrations at these closest residences would significantly decrease;

- ❑ The existing 24-hour average ground level concentrations are predicted to be below the NEPM 24-hour standard at all residences, and levels are predicted to be even lower in 2008.; and
- ❑ The annual average ground level concentrations for the existing situation (2001 Base Case) and the 2008 future scenario are predicted to be relatively minor at all residential areas, and well below the NEPM.

In conclusion, the expansion of the Collie Power Station would have negligible effect on the air quality in the residential areas of the Collie Region.

2.1.2 Issue 2

2.1.2.1 Question

At Kemerton, meteorological data has been obtained from monitoring stations operated by the Bureau of Meteorology on behalf of LandCorp. This data set is not well known and some demonstration of its integrity is needed. Consideration should be given to using other data sets from stations outside the region to provide a sensitivity analysis.

2.1.2.2 Response

Meteorological data for the assessment was obtained from the meteorological station within the Kemerton Industrial Park as monitored by the Bureau of Meteorology for LandCorp. This meteorological data set was selected as it was the data set used in air quality assessment for the expansion of the Kemerton Industrial Park (Woodward Clyde, 1997) and is the closest data set that is available.

The Kemerton Industrial Park Expansion Study (Woodward Clyde, 1997) states that this data set was developed in response to criticism over the use of the Glen Iris meteorological data set in previous air quality modelling studies done for the Kemerton Industrial Park.

The Kemerton station was installed in 1994 to collect meteorological data suitable for use in modelling assessments, and consists of a 10m tower which logged the following every 10-minutes:

- ❑ Average wind speed, wind direction and standard deviation in wind direction over the 10-minute period;
- ❑ Minimum and maximum gust over the 10-minute period;
- ❑ Temperature at 10m and 1.5m at the end of the 10-minute period;
- ❑ Minimum and maximum temperature at both 10m and 1.5m over the 10-minute period; and
- ❑ Dew point at 1.5m at the end of the 10-minute period and the minimum and maximum dew point temperature during that period.

Data collected over the year 1995 was used for construction of the air quality data set as it comprised a complete year with reasonable data return of 90% (Woodward Clyde, 1997). The data set consisted of 322 complete days or 88.2% of the year, with data gaps spread approximately evenly throughout the year.

The meteorological data was processed into a form suitable for modelling primarily using DEWCP models. Heat fluxes were derived using the DEWCP soil heat flux model as well as sensible heat fluxes from the solar radiation using the method outlined in ETRS (1990) as used in the Collie Power Station assessment. Additional data

required for these models was obtained from measurements of solar radiation at Capel (Iluka) and rainfall from Myalup (Water Corporation).

During the daytime, the sensible heat flux was estimated using the formula from ETRS (1990) whilst the estimate from soil were used at night. Derived stability classes are presented in **Table 2-1**. Estimates of the mixing depth were obtained using the DEWCP Well Mixed Layer (WML) model.

■ **Table 2-2 Stability Classes**

	A	B	C	D	E	F
Percentage Occurrence	2.1	8.9	21.5	35.9	15.0	16.5

2.2 Monitoring

2.2.1 Issue 3

2.2.1.1 Question

Independent monitoring is needed of cumulative emissions from Kemerton Industrial Park.

2.2.1.2 Response

The Kemerton Industrial Park is one of a number of Strategic Industrial Areas that has been established by the Government of Western Australia (through LandCorp and MPR) within Western Australia for resource processing industries. The Strategic Industrial Areas are carefully planned and are designed to promote synergy between industry, comply with strict environmental guidelines and have buffer zones to protect the safety and amenity of surrounding land uses.

Development at the Kemerton Industrial Park and management of the Park is overseen by the Kemerton Industrial Park Co-ordinating Committee, which includes State Government, local government, industry and community interests. Therefore, as cumulative monitoring is an issue that is common to all industries within the Kemerton Industrial Park, any cumulative air quality monitoring for the Kemerton Industrial Park could be expected to be undertaken under the direction of the Kemerton Industrial Park Co-ordinating Committee in conjunction with industry.

An example of such an arrangement is the cumulative monitoring of ambient ground level concentrations undertaken in the Kwinana Industrial Area, where the Kwinana Industries Council (which was formed to better unify and co-ordinate the interaction between industry and the community) and the DEWCP monitor air quality in the Kwinana/Rockingham/Cockburn region.

2.2.2 Issue 4

2.2.2.1 Question

*What monitoring is undertaken at existing facilities at **Pinjar**? What are the licence limits on emissions? How do these compare to other industrial licence limits? Have licence limits ever been exceeded and if so what action has been taken by DEWCP and Western Power?*

2.2.2.2 Response

The licence conditions for the existing Pinjar Gas Turbine Station that relate to air quality specify that:

- Annual stack testing must be completed for all gas-fuelled turbines to determine the concentrations of nitrogen oxide, nitrogen dioxide and oxygen. Recently the list of substances to be monitored has also been supplemented with sulphur dioxide, particulates, carbon monoxide and volatile organic compounds; and
- The number of tests shall be adequate to define the relationship between the temperature and the emissions. Western Power has an agreement with the DEWCP that two tests, one at a low temperature and the other at a high temperature, are sufficient to satisfy this condition.

To date, Western Power has been in compliance with the licence conditions. There are no licence limits established for Pinjar Gas Turbine Station, given that the units are used for peaking duty only.

The Pinjar Gas Turbine Station is unique in that it is the only site used solely for peaking purposes. It would not be meaningful to compare the licence conditions to other power stations that run base/mid-merit load (i.e. Muja, Kwinana or Collie), given that licence conditions are set on a site-by-site basis.

2.3 Best Practice

2.3.1 Issue 5

2.3.1.1 Question

At the Pinjar, Kwinana, Kemerton and Bunbury sites, modelling indicates that there is a significant increase in NO₂ impacts if liquid fuel is used without water injection. While the EPA Guidance Statement does not mention gas turbines operating on liquid fuel, it is clear that water injection dramatically reduces NO_x emissions and represents environmental best practice. The Guidance Statement states that any request for relaxation of guidelines "will be considered on a case-by-case basis, and will require the proponent to demonstrate that appropriate air quality standards would be met, and to provide a robust justification for the departure from the Guidance Statement requirements".

2.3.1.2 Response

The Preferred Bidder would be required to install low NO_x burners on gas turbine units (which is deemed "Best Practice"), to reduce NO_x emissions when operating on the primary fuel, being natural gas.

The Atmospheric Emissions – Air Quality Criteria sections in Section 8 of the Pinjar, Kwinana, Kemerton and Bunbury SER Documents acknowledge that water injection when burning on liquid fuel can reduce NO_x emissions and represents environmental best practice for NO_x emissions. However, these sections also acknowledge that the Preferred Bidder may have grounds to seek a relaxation of the guidelines when operating on liquid fuel, given that the power station would only operate on liquid fuels for less than 100-hours per year. This argument could also be supported by the fact that the European Commission has recently introduced new emission criteria for power plant, which exempt gas turbines for emergency use that operate less than 500-hours per year from the limits (Cassidy, 2002).

The intent of the SER documents is to gain 'in principle' approval for likely power station developments. The SER documents therefore present and assess a range of possible options, including burner technology. The technology implemented in the power station developments will be selected by the Preferred Bidder and will be subject to the Section 38 environmental approval process under the *Environmental Protection Act 1986*. It would therefore be the responsibility of the Preferred Bidder under the Section 38 environmental approval process to argue for a relaxation of the guidelines when operating on liquid fuel should they choose not to install water injection for liquid fuel.

The reader is also directed to the response to **Issue 14 (Section 2.5.3.2)** for further information.

2.3.2 Issue 6

2.3.2.1 Question

Why is water injection not used when operating on gas?

2.3.2.2 Response

The SER documents state that the Preferred Bidder would be required to install low NO_x burners on all gas turbines to reduce NO_x emissions when operating on natural gas. This is deemed "Best Practice". The Preferred Bidder may propose to use water injection to reduce NO_x emissions, which can achieve similar emission reductions as dry low NO_x burners. However, dry low NO_x burners were specified in the SER documents and are expected to be selected for the following reasons:

- ☐ Dry low NO_x burners don't require any water whereas water injection would require substantial quantities of water (84ML/yr for a 240MW open cycle plant and 1,802ML/yr for a 1,080MW combined cycle plant). This option could therefore not be implemented in areas where the water supply is restricted;
- ☐ Water injection would require the construction of a demineralisation plant;
- ☐ Effluent (blow-down) from the demineralisation plant would be produced for water injection, which would need to be neutralised in separate treatment ponds prior to disposal; and
- ☐ Water injection has greater maintenance requirements.

Therefore dry low NO_x burners are a more sustainable option when operating on gas.

2.3.3 Issue 7

2.3.3.1 Question

The standards for emissions should be compared to EU and USEPA standards.

2.3.3.2 Response

Attachment 5 of the Environmental Protection Authority (EPA) Guidelines for the Strategic Environmental Reviews (presented in Appendix A of the SER documents), comprises guidance notes for the DEWCP's expectations with respect to air quality modelling. Point 3 of these guidance notes states that the proponent must assess the magnitude of the predicted impact of primary and secondary pollutants of concern against the "relevant standards", with the definition of "relevant standards" being '*guidelines/goals/standards which the EPA/DEP has adopted or advised or, in the absence of an EPA/DEP position, guidelines/goals/standards proposed by the*

proponent on the basis of national or international practice and/or field investigations of environmental sensitivity'.

The results of the air quality modelling for the pollutants of concern (NO_x and SO₂) are compared against the criteria outlined in Section 8.4.1.1 of the SER documents. This section presented criteria for both emissions at source and the resultant ambient ground level concentrations.

For the emissions at source, the criteria presented were the Australian Environmental Council (AEC) and National Health and Medical Research Council (NHMRC) guidelines for new stationary sources (AEC/NHMRC, 1986) and the EPA guidance for NO_x emissions from gas turbine (EPA, 1999a). These are the standards that have been adopted by the EPA/DEWCP and therefore meet the criteria for relevant standards as defined above. This section also refers to European Commission emission limit values for power plants.

For ambient ground level concentrations, the Western Australian EPA does not have statewide standards, however there are national standards in the form of the National Environmental Protection Measure (NEPM) standards (NEPC, 1998). These NEPM standards and goals have not been implemented in legislation throughout WA as yet, however the DEWCP intends to implement them through the development of a state wide Environmental Protection Policy, as discussed in the document *Developing a Statewide Air Quality Environmental Protection Policy* (EPA, 1999b). Therefore, the predicted ground level concentrations from the proposed power stations were compared to NEPM standards in the SER documents. For impacts on vegetation from atmospheric emissions, the SER documents used the World Health Organisation (WHO) guidelines (WHO, 2000) as the relevant standards.

2.4 Fuel

2.4.1 Issue 8

2.4.1.1 Question

What guarantees are there for long term supply of gas?

2.4.1.2 Response

To guarantee the supply of gas to a power station, the developer would have to enter into a contract with a gas supplier to supply the gas and to reserve the required capacity to run the plant at full load in the gas pipeline. The reservation of capacity for every hour of the year in the pipeline is a significant cost and proves uneconomical in the case of peaking plant that is typically dispatched for less than 10% of the time. Typically, peaking units attempt to source gas from a spot market, however no guarantee exists that gas would be available on the spot market when the peaking unit would be required. For this reason the initial plant being procured is required to be able to run on liquid fuel. The current gas pipeline transport capacity constraints limits the availability of spot gas and the costs associated with expansion also support the need to maintain a diversity of energy sources to ensure security of power supply to the State.

Also refer to **Issue 10 (Section 2.4.3.2)** for further information.

2.4.2 Issue 9

2.4.2.1 Question

What are the specifications of the proposed liquid fuel (e.g. sulphur content)?

2.4.2.2 Response

The exact specifications of the liquid fuel that would be used by the Preferred Bidder cannot be confirmed at this stage. However, the SER documents have assumed that the sulphur content of the liquid fuel could range from 0.25% by weight (for GT grade distillate) to 0.6% (for F301) (refer to atmospheric emissions sections of the SER documents).

2.4.3 Issue 10

2.4.3.1 Question

The situation where "sufficient gas is not available on the spot market and the Preferred Bidder has not established a gas reserve contract" is not an acceptable reason for using liquid fuel. The operator should ensure that gas is available under all circumstances other than physical disruption of the gas supply.

2.4.3.2 Response

As discussed in the response to **Issue 8 (Section 2.4.1.2)**, reservation of gas transport capacity would need to exist for every hour of the year to guarantee gas supply, as the peaking plant could be called upon at any time. As peaking plant is expected to run less than 10% of the time this would clearly be a waste of resources, both in terms of money and pipeline capacity. A requirement to guarantee gas for peaking plant would achieve little and significantly add to the cost of electricity and gas. The air quality issues associated with generating plant operating on liquid fuel are mitigated when one considers the low utilisation factor (less than 100 hours per year).

In minimising the total delivered cost of electricity, Western Power dispatches available plant on a least cost basis. Given that liquid fuel is considerably more expensive than gas or coal, dispatch of liquid-fired plant would only occur in cases of emergency and after all other fuel sources are exhausted.

The reader is also referred to **Issue 13 (Section 2.5.2.2)** for further information.

2.4.4 Issue 11

2.4.4.1 Question

*Significant amounts of diesel fuel are required to operate a coal burning power station; is this the case at **Collie** and what effects does this have on emissions?*

2.4.4.2 Response

Diesel is only used at the Collie Power Station for start up and shut down of the plant and for changing between coal mills (i.e. the Collie Power Station is never run on diesel to generate electricity). As the Collie Power Station is a base load plant, start up and shut downs only occur a small number times a year. During the financial year 2001/2002, a total of 822 tonnes (967kL) of liquid fuel was used at the power station. This is insignificant compared to the amount of coal burnt over this period, which was

over a million tonnes. Therefore, effects on emissions from diesel consumption are minimal.

2.5 SO₂, NO_x etc

2.5.1 Issue 12

2.5.1.1 Question

Has consideration been given to reducing SO₂ emissions at Collie by mechanisms such as stripping sulphur from the coal, injecting lime or through flue gas desulphurisation?

2.5.1.2 Response

Various options for minimising SO₂ emissions, including stripping sulphur from coal, injecting lime and flue gas desulphurisation, have been considered for the Collie Power Station. These and other similar measures of SO₂ emission reduction were not considered feasible, as the slight improvement in the quality of air emissions does not weigh up against the high cost of implementation. It should also be noted that at present there are no facilities in Australia that undertakes flue gas desulphurisation.

2.5.2 Issue 13

2.5.2.1 Question

Although emissions at Kwinana are expected to be within standards there is growing concern that exposure to low levels could be responsible for long term health problems. The power station should use the least polluting fuel and be required to continually monitor emissions, report to the community and continually upgrade emission control technologies.

2.5.2.2 Response

Fuel Source

As discussed in Section 5.4.1 of the Kwinana SER document, the primary fuel supply to the plant would be natural gas, sourced from one of the major suppliers in the North West of Western Australia. However, provision was also made for the open cycle power station to operate on liquid fuel under the following circumstances:

- ❑ For a power station development of open cycle gas turbines for peaking duties, securing sufficient natural gas supplies can result in "take or pay" contracts that are uneconomic because of the relatively small quantities involved and the variable power demands of the peaking regime. To avoid reserving gas that may not be used but has to be paid for, the Preferred Bidder may operate on liquid fuel. This liquid fuel would be used whenever sufficient gas is not available on the spot market (i.e. there is no surplus gas available for resale by other purchasers or suppliers);
- ❑ A disruption in the gas supply to the power station from incidents such as pipeline ruptures. In this case liquid fuel would be used as an emergency fuel until gas supplies are restored; and
- ❑ When a gas supply to the site cannot be established, as could be the case should existing gas supply constraints in the Dampier to Bunbury Natural Gas Pipeline (DBNGP) not be resolved in time for the first tranche of power procurement. In this case, the power station may be fuelled by liquid fuel until the natural gas supply is resolved.

For an open cycle gas turbine plant in peaking mode, it is anticipated that up to 100-hours of operation per year could be necessary on this liquid fuel, which is only 1.1% of the year.

If the power station were expanded to include base load capacity, then sufficient gas demands would exist to secure a gas supply contract. Therefore liquid fuel would only be required as an emergency or standby fuel supply to cover the possible temporary loss of natural gas in the event that the gas supplier could not guarantee supply for 100% of the year.

The reader is referred to **Issue 8 (Section 2.4.1.2)** and **Issue 10 (Section 2.4.3.2)** for further information.

Monitoring

The Preferred Bidder would be required to undertake emission monitoring following the commissioning of the project to verify the assumptions made in the modelling assessment. Monitoring of NO_x and SO₂ emissions from stacks would be undertaken as a minimum on a routine basis and during periods when the power station is operating on liquid fuel.

As discussed in the response to **Issue 3 (Section 2.2.1.2)**, cumulative monitoring of ambient ground level concentrations is already undertaken in the Kwinana Industrial Area, which would include the area of influence of the proposed new Kwinana Power Station.

Reporting

The reporting program and schedule to be implemented by the Preferred Bidder would be developed by the Preferred Bidder and reported in the Section 38 Environmental Review document.

Emission Control Technologies

The Preferred Bidder would report on the emission control technologies that they would implement in the Section 38 Environmental Review document.

2.5.3 Issue 14

2.5.3.1 Question

All power stations should aim to meet lowest achievable emission rates through such measures as flue gas de-sulphurisation rather than just meet today's standards.

2.5.3.2 Response

Western Power has adopted the position of requiring the Preferred Bidder to implement "Best Practice" in relation to the proposed power stations.

A common theme in the discussion of "Best Practice" is the need for economic considerations as part of the definition of "Best Practice". This approach appears to be the intent of the EPA and Western Australian Planning Commission (WAPC) as described in guidance and legislative documents issued by these authorities.

The concept of "Lowest Achievable Emission Rate" is used sparingly by regulatory authorities, as it does not consider economic and energy issues. "Lowest Achievable Emission Rate" is applied only *"where air quality standards are not being met and new emission sources are required to provide emission offsets that more than compensate for the proposed emission increases"* (USEPA New Source Performance Standards as advised by the DEWCP (2002)).

The position of Lowest Achievable Emission Rate is not currently justified for implementation on the proposed power stations. However, the Preferred Bidder would be required to demonstrate that "Best Practice" has been adopted as part of the tender process and the Section 38 Environmental Review for the final project.

For the four power station sites proposed to utilise gas turbine technology, the Preferred Bidder would be required to comply with the requirements issued for emissions of oxides of nitrogen from gas turbines (EPA, 1999a). These guidelines require that *"all reasonable and practicable measures should be taken to minimise the discharge of waste into the environment"*. This strongly suggests that the EPA consider economic factors as part of their deliberations.

No specific guidance is available from the EPA applicable to coal fired power stations. However, the Preferred Bidder would be required to demonstrate that all reasonable and practicable measures have been implemented to minimise discharges if the Collie Power Station Expansion proceeds. Discussion of Best Practice and specifically how it applies to the proposed Collie Power Station is included as Appendix B of the Collie SER document.

2.6 Air Toxics etc

2.6.1 Issue 15

2.6.1.1 Question

What is the potential for emissions of "air toxics" such as dioxins and furans, at all sites and how will they be managed – particularly in relation to coal burning at Collie.

2.6.1.2 Response

Background

Air Toxics are gaseous, aerosol or particulate pollutants that are present in the air in low concentrations with characteristics such as toxicity or persistence so as to be a hazard to human, plant or animal life. Air toxics include the following general categories of compounds: volatile and semi-volatile organic compounds, polycyclic aromatic hydrocarbons, heavy metals, dioxins and furans.

Air toxics are regulated by the individual States. However, a co-ordinated approach is now occurring on a national basis:

- ❑ The Ambient Air Toxics National Environment Protection Measure (NEPM) is anticipated to be developed to Draft stage by April 2003. A Discussion Paper on the Ambient Air Toxics NEPM was released for public comment in March 2002;
- ❑ The Living Cities: Air Toxics Program was established by the Commonwealth Government to focus attention on this area; and
- ❑ The National Dioxins Program was endorsed by State and Territory Environment Ministers in June 2001.

Under the Living Cities: Air Toxics program, respirable particulate matter has been classified as a priority pollutant for indoor air. The indoor air requirement of this program has been added to prevent overlap into the Ambient Air Quality NEPM that legislatively excludes consideration of indoor air. Respirable particulate matter includes material less than 10 microns in diameter, which is covered in the ambient environment through the Ambient Air Quality NEPM made in 1998 and the proposed amendments to that NEPM which will cover particulate material less than 2.5 microns in diameter.

Dioxins and furans

Air toxics come from a range of sources including industrial processes, motor vehicles and domestic sources such as wood heaters, lawnmowers, paints, pesticides and tobacco smoke.

The 2002 revised edition of the "Sources of Dioxins and Furans in Australia" (Environment Australia, 2002) concludes that:

"...based on the sources currently included [in the study] the total quantity of CDD/CDF [polychlorinated dibenzodioxin and dibenzofuran] released into the Australian atmosphere range between 150 and 2100 grams annually."

And that:

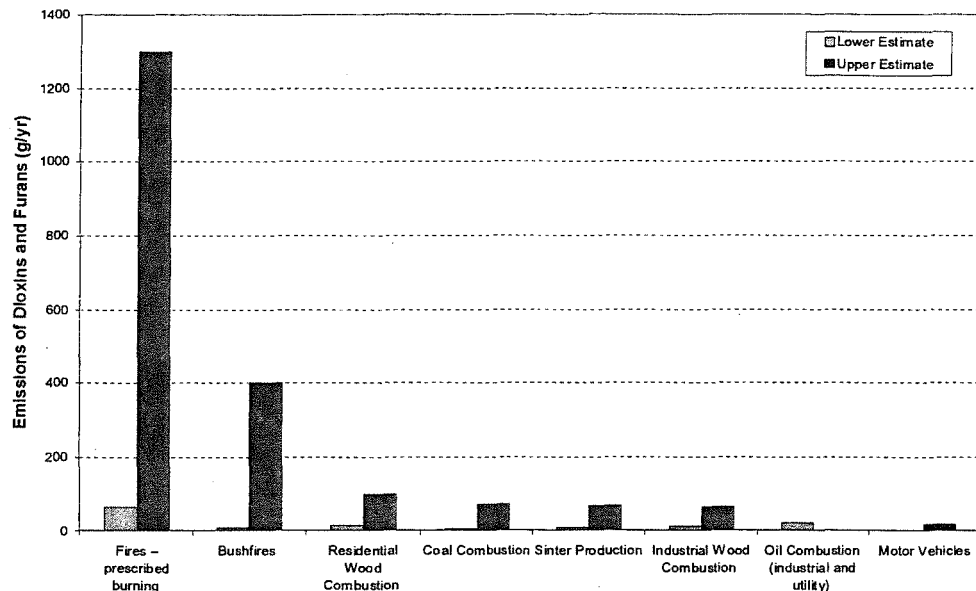
"Based on the upper bound of each range, biomass combustion from prescribed burning and wild bushfires are potentially the most significant sources of CDD/CDF compounds in Australia. These two sources contribute approximately 75 percent to the total CDD/CDF estimates."

The second major group of sources are (in decreasing order of contribution):

- 1) Residential wood combustion;*
- 2) Coal combustion (utility and industrial);*
- 3) Sinter production; and*
- 4) Industrial wood combustion.*

... These four sources contribute about 15% to the total estimates (based on upper bound estimates) and, when combined with prescribed burning and bushfires, account for approximately 95% of total dioxin emissions."

An estimation of the emissions of dioxins and furans from a few select emission sources in Australia, including the major sources outlined above, is given in **Figure 2-1**.



■ **Figure 2-1 Emission Estimates of Dioxins and Furans from Select Australian Sources (after Environment Australia, 2002)**

Of the five possible sites for power stations proposed in the SER documents, only Collie is designated for coal-fired power. The proposed Collie power station expansion is estimated to consume a nominal 1.2 million tonnes per year of coal. The National Pollutant Inventory (NPI) Emission Estimation Technique Manual for Fossil Fuel Electric Power Generation (NPI Fossil Fuel Manual) (Environment Australia, 1999) quotes an emission factor of 8.8×10^{-10} kilograms of polychlorinated dioxins and furans per tonne of coal. This equates to an annual emission of approximately 1 gram of dioxins and furans, compared to the estimated total of 150 to 2,100 grams emitted in Australia per year.

The above estimate of emissions of dioxins and furans is based on typical data. The NPI emission factor is rated as “below average” for certainty.

Source Testing of Dioxin and Furan Emissions

Dioxin tests were conducted at NSW power stations in 1999 for the NPI. Findings of this study indicate that the levels of dioxin emitted by power stations are very low and are not a matter for concern. Annual dioxin emissions based on measurement range from 0 to 2 grams per year across the different power stations reporting to the NPI. Measurements of emissions from firing on oil or gas are not available. However, dioxins from natural gas firing are reputedly not detectable (NPI Fossil Fuel Manual, Table 13).

Management of Dioxins and Furan Emissions

There is limited information on control strategies for dioxins and furans from power stations. Most dioxin removal/destruction technologies used in the industrial sectors are aimed at reducing dioxin and furan concentrations to 0.1 ng/m^3 or less, which is the order of magnitude expected from uncontrolled power stations. The options for control may include:

- ❑ Minimise de novo synthesis. This means rapidly cooling flue gases through the de novo temperature range (from about 400 to about 250°C). Generally, the use of economisers etc in power station boilers ensures flue gas temperatures in the plant exhaust are close to 200°C.
- ❑ Low temperature fabric filter (less than 150°C). Some thermal power stations operate with high temperature fabric filters, which can contribute to dioxins. It is generally considered that dioxin emissions are best controlled by operating a baghouse below 150°C.
- ❑ Using expensive catalytic bags within the fabric filter. Relatively new advances in fabric filter technology have allowed catalyst impregnated bags to be used to destroy dioxins within the bag filter unit. This control method is theoretically possible but somewhat unproven in power stations.
- ❑ Using a catalytic reduction system downstream of a fabric filter or an electrostatic precipitator. Some de-NO_x catalysts also remove dioxins, however these may require re-heating the flue gases to bring temperature up to optimum conditions for control purposes, which is unproven in power stations.
- ❑ Good combustion practices can maximise the destruction of organics during the combustion process and minimise the downstream formation of dioxins and furans by controlling the amounts of particulate carried with the flue gas. (This method is employed by the Collie Power Station).

It may also be possible to employ activated carbon injection, as is typically done on waste incinerators but, again, this technology is used to reduce dioxins to the order of 0.1 ng/m³ and is not used on power stations to our knowledge.

The final choice of control technology will be the responsibility of the Preferred Bidder under the Power Procurement Process. The Preferred Bidder would need to provide discussion of the technology during the Section 38 environmental approval process once the favoured site has been selected and power station technology has been defined.

Western Power is a recognised stakeholder in the consultation process for the national program to address dioxins through the Electricity Supply Association of Australia.

2.6.2 Issue 16

2.6.2.1 Question

*Future formal assessments of **all sites** should address respirable particulates (PM_{2.5} and PM₁₀), VOC and PAH in more detail, given that NEPMs are being developed for these pollutants.*

2.6.2.2 Response

Estimates have been provided in the SER documents for emissions of particulates, VOCs and PAHs based on typical power station configurations. Of these, particulates (as PM₁₀) have been modelled to predict ground level concentrations. The resulting ground level concentrations were predicted to be less than 2.2% of the NEPM standard for Pinjar, less than 1.4% at Kemerton, less than 1.6% at Bunbury, less than 1.4% at Kwinana and less than 1.5% at Collie.

Once a specific site has been nominated with a detailed project, further assessment of these compounds should be undertaken by the Preferred Bidder during the Section 38 environmental approval process.

The effectiveness of a future assessment of PM_{2.5} particulates will depend on the availability of appropriate criteria for the assessment. Currently there is no agreed criterion for assessing PM_{2.5} particulates: only a proposal to amend the Ambient Air Quality NEPM for their inclusion.

2.6.3 Issue 17

2.6.3.1 Question

Produce from agriculture and horticulture may be contaminated by emissions from Pinjar.

2.6.3.2 Response

Guidelines developed by the World Health Organisation (2000) are used to protect vegetation from the impacts of air emissions (**Table 2-3**). These guidelines represent the maximum allowable ground level concentration for SO₂ and NO_x for the protection of various categories of vegetation. These can be compared to the emissions that are predicted from the proposed expansion at Pinjar to determine the potential impacts on vegetation.

■ **Table 2-3 World Health Organisation (WHO) Air Quality Guidelines for Europe (WHO, 2000)**

Pollutant	Vegetation Category	Guideline (µg/m ³)	Time Period
Sulfur dioxide	Agricultural Crops	30	Annual and winter mean (6 month winter)
	Forests and Natural Vegetation	20	Annual and winter mean (6 month winter)
	Lichens	10	Annual Mean
Oxides of nitrogen	All Vegetation	75	24-hour
	All Vegetation	30	Annual Mean

Based on air quality modelling using the air quality dispersion model DISPMOD, the predicted 24-hour and annual average NO_x concentrations are expected to be 59µg/m³ and 6µg/m³ respectively. These levels are below the WHO guidelines of 75µg/m³ for the 24-hour average and 10µg/m³ for the annual average (**Table 2-3**). Moreover, the predicted values are very conservative, as they assume that the power station would be operated continuously on liquid fuels, whereas this is expected to occur for less than 100-hours per year. As the maximum predicted concentrations have been used for comparison here, it is expected that in most locations, the actual concentration of the pollutant would be much lower than predicted. It is therefore concluded that NO_x impacts on agriculture and horticulture would be negligible.

The maximum predicted annual SO₂ concentration (based on the assumption that the power station would be running continuously on liquid fuels) is expected to be approximately 1.55µg/m³, well below the criteria for the most sensitive organism (lichens at 10µg/m³). This is again an overestimate of the impact, given that the station would run on liquid fuels for less than 100-hours per year. The annual concentrations would therefore be much lower. Moreover, as the maximum predicted concentrations have been used for comparison here, it is expected that in most locations, the actual concentration of the pollutant would be much lower than predicted and it is concluded that SO₂ impacts on agriculture and horticulture would be negligible.

2.6.4 Issue 18

2.6.4.1 Question

The precipitators at Collie C and D do not work well. What monitoring is done and what evidence is there that performance is satisfactory?

2.6.4.2 Response

This response assumes that the question is referring to the precipitators at Muja C and D and not Collie C and D (as these units do not exist).

The aim of the SER documents is to gain environmental advice on expansion of the existing Collie Power Station. This process is unrelated to the operation of the existing Muja Power Station and therefore it is not appropriate to address issues associated with the Muja Power Station in this document.

Any new coal-fired plant installed at the Collie Power Station would have electrostatic precipitators to remove particulates from exhaust gases. These precipitators would be similar to that installed on the existing Collie Power Station plant. The Collie Power Station Environmental Protection Operating Licence No. 6637/5 contains the following conditions:

- The licensee shall ensure that the concentration of particulate matter in the exit gases from the main stack does not exceed 80mg/m^3 (under normal operating conditions, expressed dry at 0 degrees Celsius and 1.0 atmosphere, corrected to 12% CO_2 and measured in accordance with AS4323.2-1995 or other method approved by the Director).
- The following sampling program shall be implemented:
 - Quarterly monitoring of particulates, NO_x and SO_2 at the ID fan to the stack transition stack.

Emissions from the stack are monitored in November, February, May and August of each annual reporting year as required by the Operating Licence. The results of the stack testing relevant to particulate emissions for the 2000-2001 reporting year are given in **Table 2-4** (refer to Table 8-10 of the Collie SER document for emission data relevant to other pollutants).

■ **Table 2-4 Summary of Collie Power Station Main Stack Air Emissions 2001-2002**

Parameter	Units	Sampling Date					Licence Limit
		28/02/01	12/06/01	3/08/01	2/12/01	20/03/02	
Stack Exit Velocity	m/s	14.4	16.9	16.6	14.0	14.9	NA
Stack Exit Temperature	°C	152	148	158	150	154	NA
Stack Moisture Content	%v/v	8.2	10.6	9.0	10.3	11.5	NA
Flow Rate, dry @ STP	m^3/min	17,100	19,680	18,720	16,200	16,859	NA
Particulate Matter, dry @ STP corrected to 7% oxygen	mg/m^3	18	6.2	15	3.3	8.3	80 upper limit
MW Load Sent Out	MW	300	300	300	300	302.5	

As can be seen from **Table 2-4**, the particulate emissions from the existing Collie Power Station are well below the Operating Licence limits. It can be assumed that the precipitators installed on the new plant at the Collie Power Station would have similar emissions and would have similar monitoring and reporting requirements.

2.7 Greenhouse Gases

2.7.1 Issue 19

2.7.1.1 Question

Although carbon intensity has been declining, Western Power should aim to achieve the Kyoto Protocol target of no more than 8% increase in emissions over 1990 levels.

2.7.1.2 Response

The 108% “Kyoto Protocol target” is a national target for which neither the Australian nor State governments have yet determined principles for allocation across jurisdictions or sectors of economic activity. Therefore, the 108% target is not applied at an enterprise level in Australia or in Western Australia. It does, however, serve as an indicative benchmark against which to compare forecast emission and emission abatement activity.

As detailed in Section 2.1.2 of the SER documents, demand for electricity on the South West Interconnected System (SWIS) is forecast to grow to some 176% of 1990 levels by 2010 (refer to Figure 2-2 of the SER documents). Meeting demand on this scale, while also meeting the capacity, reliability and price expectations of electricity consumers and the Government, requires the full range of energy sources available in Western Australia for electricity generation to be considered.

The generation technologies and energy sources expected to be proposed through the power procurement process, together with those to be utilised in Western Power’s plant replacement program, can meet the forecast demand while constraining greenhouse gas emissions to between 124% and 136% of 1990 levels (refer to Figures 3-6 and 3-7 of the SER documents). Renewable energy and “greenhouse neutral” generation options are encouraged and will be developed by Western Power and others over the period, as will carbon sequestration options, however their capacity to reduce the emissions to 108% by 2010 is subject to technical and economic limitations.

Reduction of electricity demand below that forecast will also contribute to achieving a 108% emissions target. Moderated electricity demand will arise from actions of many parties, not only Western Power, and will be part of a wider greenhouse response.

2.7.2 Issue 20

2.7.2.1 Question

Western Power's ultimate aim should be to be greenhouse neutral.

2.7.2.2 Response

The ultimate aim of electricity supply development is that it be sustainable, embodying the social, environmental and economic dimensions of development. Greenhouse neutrality is but one aspect of a sustainable electricity supply. Meeting the social and economic requirements of electricity supply in the 2002-2010 timeframe will require the continued use of fossil fuels in Western Australia, on a scale that cannot be displaced or fully offset by renewable energy or carbon sequestration (refer to Section 3.5.4 of the SER documents).

2.7.3 Issue 21

2.7.3.1 Question

Greenhouse reporting should include an indication of the technology used.

2.7.3.2 Response

The greenhouse gas emission reporting in Table 3-1 of the SER documents is based on existing plant and also provides estimates of typical new technology for coal and gas. The technology assumed for coal in Table 3-1 of the SER documents is the same sort of technology as the Collie Power Station, i.e. pulverised coal plant of a nominal 38% thermal efficiency, which is the current best practice for this type of plant.

Other proven coal technologies such as super critical thermal plant and fluidised bed combustion were discussed in Appendix B ("Coal fired power station best practice report") of the SER document for Collie. Because of their generally higher thermal efficiencies these technologies can have greenhouse gas emission intensities in the 800s (kg CO₂/MWh). However, as also discussed in the SER document for Collie, operational constraints of the SWIS can require a plant size (MW capacity) which is not the economic optimum for the type of plant.

Technologies in development or with limited commercial application include integrated gasification combined cycle (IGCC), low emission boiler system (LEBS) and pressurised fluidised bed combustion (PFBC). These are technologies being developed to manage specific emission characteristics and their greenhouse gas performance depends on their configuration and the fuel feedstock. In ideal thermal efficiency circumstances they can achieve greenhouse gas emission intensities around 700 to 800kg CO₂/MWh on coal. Again, these are discussed in Appendix B of the SER document for Collie, where size and reliability considerations are noted to limit the potential for deployment of these technologies in the SWIS.

2.7.4 Issue 22

2.7.4.1 Question

The discussion in section 3.5.4 should be extended to include renewable energy e.g. the performance of the Albany wind farm should be included in Tables 3-1, 3-2 and 3-3.

2.7.4.2 Response

The first point raised in Section 3.5.4 of the SER documents – Mechanisms for Reduction of Greenhouse Gas Emissions is to "Optimise use of renewable energy sources for electricity generation". Tables 3-1, 3-2 and 3-3 of the SER documents detail emission from conventional power plant. A wind farm would have no emissions and has therefore not been included in these Tables.

2.7.5 Issue 23

2.7.5.1 Question

Section 3.5.4.2.1 should include a discussion of a third option with 300MW of renewable energy and 100MW of demand management.

2.7.5.2 Response

As discussed in Section 3.2 Evaluation of Energy Sources in the SER documents, none of the renewable energy options currently available are capable of meeting the required scale of power generation, being 240MW peaking and 300MW of base load. Western Power already has a program in place to achieve 100MW of Demand Management. This program is aimed at recruiting customers onto curtailable and interruptible tariffs and encouraging the use of cheap off-peak electricity.

2.7.6 Issue 24

2.7.6.1 Question

Tree planting to offset greenhouse gas emission adds \$10 - \$35 per MWh; how does this influence the economic viability of renewable energy options?

2.7.6.2 Response

Tree planting to offset greenhouse gas emissions costs about \$10 to \$35 per tonne of CO₂ sequestered. Relating this to the cost of renewable energy depends on the renewable energy technology considered and the carbon intensity of the electricity that it displaces.

The generation cost of the most viable renewable energy technologies presently ranges from about \$50 to \$150 per MWh and the carbon intensity of the South West Interconnected System is presently about 0.94 tonnes CO₂ per MWh. CO₂ avoidance by renewable energy therefore costs around \$53 to \$160 per tonne of CO₂. While this is more than the cost of sequestration through tree planting, it does deliver the additional benefit of useable energy.

2.7.7 Issue 25

2.7.7.1 Question

Tree planting to offset greenhouse gas emission would require very large plantations.

2.7.7.2 Response

Agreed. Plantation sequestration rates vary according to the tree species, rainfall, soil type and planting density. Assuming typical sequestration rates of a strong growing species planted at 1,500 stems per hectare in a good rainfall region in the south west of WA, take-up of 100,000 tonnes of CO₂ per year would require a plantation of about 2,800 hectares. As sequestration rates diminish in a mature forest, further planting would be required at that time if the annual CO₂ offset were to be maintained.

2.7.8 Issue 26

2.7.8.1 Question

The suggestion is made that there is no difference in greenhouse emissions from coal or gas if the analysis is done from source to consumption including CO₂ extracted from natural gas prior to supply as a fuel.

2.7.8.2 Response

Table 3-2 and Table 3-3 of the Strategic Environmental Review documents presents a comparison of indicative life cycle emissions from a coal-fired and natural gas combined cycle plant based on studies in the US presented in Spath and Mann (2000). The emissions presented in these Tables for natural gas plant include emissions from extraction and, noting the differences in relative age of the plant and assumptions involved, the studies indicate the following on a life cycle basis:

- Emissions of CO_{2e} on a life cycle basis derive predominantly from combustion at the power stations. Therefore, greenhouse emissions from the power station are a good indicator of the overall life cycle emissions;
- Emissions of CO_{2e} on a life cycle basis for a gas-fired combined cycle plant are around half those for a conventional coal-fired power station; and
- Emissions of other pollutants are significantly higher on a life cycle basis from a coal-fired plant than from a gas-fired combined cycle plant.

It is concluded that, although consideration of “life cycle” greenhouse gas emissions adds more to the greenhouse intensity of gas than to that of coal (as opposed to comparing the fuels solely at point of combustion), there remains a substantial difference between the greenhouse intensity of the two fuels with gas being the lower emitter.

2.7.9 Issue 27

2.7.9.1 Question

Has Western Power considered options for the sequestration of CO₂ within geological formations such as coal seams that are unlikely to be mined in the future (e.g. Collie Basin, Vasse Coal Measures and Mt Lesieur Coal Measures) or exhausted natural gas reservoirs (e.g. Dongara)?

2.7.9.2 Response

Geological sequestration of CO₂ in Western Australia is not considered a feasible option in the foreseeable future because:

- The engineering of technologies to capture CO₂ emissions at a power station scale is yet to be demonstrated;
- Capture, transport and injection of CO₂ emissions is highly energy intensive; and
- Effective, long term sequestration is not assured. In particular, Collie basin coal measures, which are closest to existing power station CO₂ emission sites in Western Australia, are characterised by relatively poorly developed coals in deposits not structurally suited to contain gases.

2.7.10 Issue 28

2.7.10.1 Question

At Collie has Western Power considered Enhanced Coal Bed Methane extraction, specifically in relation to:

- *potential sequestration of CO₂ derived from the combustion of coal?*
- *potential additional energy resources (methane gas) that may be accessed?*
- *cost impacts brought about through any energy efficiencies generated from this process?*

2.7.10.2 Response

The reader is directed to the response to **Issue 27 (Section 2.7.9.2)**. An additional observation is that Collie coal seams are not rich in retained methane because of the geophysical nature of the coal and surrounding strata. Enhanced Coal Bed Methane (ECBM) extraction is therefore not considered viable at Collie.

3 Flora, Fauna and Wetlands

3.1 Water Birds

3.1.1 Issue 29

3.1.1.1 Question

*Noise and gaseous/particulate emissions from a power station at the **Bunbury** site may impact on wetland bird species using the Preston River delta and southern tidal flats.*

3.1.1.2 Response

The Bunbury SER document acknowledges the importance of wetland values for the Leschenault Estuary (see Section 6.10 and 8.3.1 of the Bunbury SER document).

The proposed power station would be situated approximately 1.5 – 2km from the closest wetlands at the Preston River delta and southern tidal flats. The site is situated in an industrial zone and is surrounded by other industrial premises that contribute to noise and gaseous emission levels in the area. These sources, including general rail and shipping activity and bulk handling activities, have coexisted with this important waterbird refuge over many years.

The site of the new proposed Bunbury power station was previously occupied by a coal-fired power station that was built in 1957. This power station was decommissioned in 1999. A number of potential environmental impacts are associated specifically with the use of coal as a fuel in power stations, including:

- ☐ Greater emissions of greenhouse gases than other fuel sources; and
- ☐ Emissions of fly ash and sulphur products from the boiler flue gas.

Given that a coal-fired power station coexisted with the waterbird refuge for over forty years, and that gas is a relatively clean burning fuel compared with coal, it is concluded that emissions from a gas-fired power station at the Bunbury site would have no additional impact on this waterbird refuge.

3.1.2 Issue 30

3.1.2.1 Question

*There is no recognition in the **Kemerton** proposal of the Buffalo Rd section of the proposal being a major waterbird habitat (Waterways Commission, 1992).*

3.1.2.2 Response

Buffalo Road runs along the northern end of the Leschenault Estuary (refer to Figure 4-6 of the Kemerton SER document). The northern end of Leschenault Estuary 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.

There is not expected to be any direct impact on this habitat from construction of the wastewater pipeline as the pipeline would follow the road reserve north of Buffalo Road. However there may be the potential for indirect impacts from factors such as

noise and dust during construction. These impacts are expected to be minimal, as the construction period for this section of the pipeline would be of short duration. The Preferred Bidder would be required to prepare and implement a Construction Environmental Management Plan (Commitment 1), which would include strategies to minimise any potential impacts on these habitats (refer to Section 7.3.2.2 of the Kemerton SER document). If possible, the Preferred Bidder would also be required to ensure that the construction of this section is undertaken at a time that would minimise impacts on birds (i.e. based on their migratory behaviour).

3.2 Wetlands and Surface Water

3.2.1 Issue 31

3.2.1.1 Question

*EPP wetlands may be affected by vegetation clearing at **Kemerton** or drawdown for groundwater extraction.*

3.2.1.2 Response

The majority of the vegetation clearing required at the preferred Kemerton site involves the removal of plantation blue gums (refer to **Figure A-5**). The layout shown in this Figure may result in the clearance of a small area of the Jarrah and Marri Woodland vegetation in the southern half of the project site for boundary fences and firebreaks. This vegetation has been previously assessed by the Environmental Protection Authority (EPA) in their review of the Concept Plan for the expansion of the Kemerton Industrial Park and was included within the expanded industrial core (WAPC, 2000b).

A series of wetlands lie to the east of the Kemerton Industrial Core, some of which (including three which lie to the south of the preferred site) are classified as EPP wetlands. This wetland series is an expression of the local groundwater table. Therefore, as the shallow groundwater system is recharged by direct infiltration of rainfall and lateral flow from the Mialla Mound, a low groundwater mound located to the north east of the Park, clearing of blue gum plantation at the preferred site is unlikely to have a major impact on these wetlands. Also, surface runoff collected from uncontaminated areas of the site would be released to the environment (Section 7.3.4.2) thus maintaining infiltration of rainfall.

The proposal described in the Kemerton SER document relies on surface water sources rather than groundwater extraction to provide adequate water supply for the power station (Section 4.5.3 of the Kemerton SER document). Therefore, the influence of groundwater flows on wetlands to the south and east of the Kemerton site is unlikely to be affected by the proposal.

These issues may be further investigated by the Preferred Bidder should they choose to develop at Kemerton. The findings of the Aquaterra water study for Kemerton could also be incorporated, as this study has developed an increased understanding of the interactions between the significant values of surface water, groundwater and dependent ecological systems.

The reader is also directed to the response to **Issue 32 (Section 3.2.2.2)** for further information.

3.2.2 Issue 32

3.2.2.1 Question

*Portion of a conservation category wetland is within the **Kemerton** site, contrary to the SER.*

3.2.2.2 Response

Figure 5-1 of the Kemerton SER presented a preliminary concept plan for the preferred site with indicative lease boundaries, which did include a portion of conservation category wetland in the southern most section of the site. However, in response to submissions through the public review process and ongoing liaison with LandCorp, the site layout and lease boundary have been modified. The revised power station layout (**Figure A-5**) would maintain a minimum of 200m separation to the nearest wetland such that disturbance to wetland vegetation is avoided.

The EPA's management objective for conservation category wetlands is to maintain and enhance natural attributes and functions (EPA, 1993). Further discussion on the attributes and functions of this wetland and the design and management strategies to be implemented to ensure that these objectives are met would be provided by the Preferred Bidder in the Section 38 Environmental Review.

The reader is also directed to the response to **Issue 33** (Section 3.2.3.2) for further information.

3.2.3 Issue 33

3.2.3.1 Question

*No recognition has been made for the **Kemerton** site of the need for a minimum 200m buffer from the edge of wetland fringing vegetation to avoid impacts from pollution (e.g. salinity inputs) and changes in natural water levels.*

3.2.3.2 Response

The revised Kemerton power station development concept (**Figure A-5**) is separated from the conservation category wetland by a distance of approximately 200m and from the Environmental Protection Policy (EPP) wetland south of Treasure Road by a distance of approximately 300m.

In defining the extent of buffers for wetlands the EPA (1997) recommended that, as a guide, a minimum distance of 50m or 1m AHD from the furthest extent of the wetland vegetation whichever is the largest would be the minimum dryland buffer required by the EPA. A minimum buffer of 300m is required for intensive land uses (e.g. horticulture) that are likely to export nutrients to wetlands.

The proposed gas-fired power station at Kemerton is considered to have a very low potential of polluting wetlands. Project design features and management strategies to minimise potential impacts on wetlands surrounding the project area are discussed in Section 7.3.4 and 8.3.2 of the Kemerton SER document. This includes the development of a Stormwater Management Plan and separation of potentially contaminated stormwater from clean water.

The potential for contamination on the site is limited to small leaks and spills of liquid fuels, lubricants and water treatment chemicals (refer to Table 8-27 of Kemerton SER document). These materials and their storage areas are required to be licensed and approved by the Explosives and Dangerous Goods Division of the Department of Mineral and Petroleum Resources to ensure risk to the environment and public safety is minimised and acceptable. Management strategies would be implemented to regulate the storage and handling of hazardous materials, hydrocarbons and waste materials, further minimising the potential to impact on adjacent wetlands.

Management strategies to minimise impacts from saline water are presented in Section 8.4.6.2 of the Kemerton SER document. Evaporation ponds would be constructed with an impermeable liner and with sufficient capacity to prevent overflows. If a wastewater pipeline is installed several management strategies would be implemented including the need to install secondary containment around sections of the pipeline which may fall adjacent to wetlands, as stated in Section 8.4.6.2 of the Kemerton SER document.

Potential changes in natural water levels have been previously addressed in the response to **Issue 31 (Section 3.2.1.2)**.

3.2.4 Issue 34

3.2.4.1 Question

*Development of in-ground evaporation ponds at **Kemerton** may require more vegetation clearing, may affect hydraulic conductivity through the superficial aquifer and consequently the wetland chain and the Wellesley River.*

3.2.4.2 Response

An option available to the Kemerton site is to install an evaporation pond to dispose of wastewater from an open cycle power plant. Wastewater from a combined cycle plant is proposed to be disposed via pipeline through the existing Collie Power Station outfall. As discussed in the response to **Issue 37 (Section 3.3.1.2)**, the clearing requirements for an evaporation pond were included in the Kemerton SER document. As a result of the revised layout, there would be no requirement for clearing of native vegetation for the evaporation pond (**Figure A-5**).

The evaporation pond would be lined and therefore is unlikely to impact on the hydraulic conductivity through the superficial aquifer.

3.2.5 Issue 35

3.2.5.1 Question

*Approximately 10 years ago heavy winter rains resulted in surface water lying on both sites at **Kemerton**; how will this potential be managed?*

3.2.5.2 Response

It is expected that the site would be cut and filled to provide a suitable foundation for the plant. A stormwater drainage system would be designed in accordance with the EPA's guidance statement 'Management of Surface Run-off from Industrial and Commercial Sites' such that flooding of the site is avoided. Further detail of the construction and stormwater management of the power station would be provided by the

Preferred Bidder during subsequent environmental approvals if Kemerton is selected as the preferred site.

3.2.6 Issue 36

3.2.6.1 Question

*Given the close proximity of the site to conservation category wetlands, more details of the proposed re-routing of the agricultural drain at the **Kemerton** site should be given.*

3.2.6.2 Response

The preferred power station site intersects an agricultural drain which flows eastwards discharging into the Wellesley River. This drain is shown on Figure 6-2 of the Kemerton SER document and on **Figure A-5** of this document. This drain would be re-routed around the edge of the site such that it maintains its existing flow pattern. This re-routing is therefore not expected to impact on any surrounding wetlands. Further details of re-routing of the drain would be provided by the Preferred Bidder in the Section 38 Environmental Review Document, once the site layout has been finalised.

3.3 Vegetation

3.3.1 Issue 37

3.3.1.1 Question

*Concerns in relation to the **Kemerton** site that:*

- ☐ *clearing of vegetation for an ocean outfall pipeline will impact on areas of potential conservation value including Declared and Priority Flora;*
- ☐ *no assessment has been made of the potential need for clearing to accommodate evaporation ponds;*
- ☐ *vegetation removal may affect groundwater levels and consequently affect wetlands.*

3.3.1.2 Response

Wastewater Pipeline – Clearing Requirements

The proposed wastewater pipeline route described in the Kemerton SER is an indicative route that is subject to further analysis prior to finalisation. A detailed flora study is required to complete this analysis, in order to ensure that all Declared Rare and Priority Flora in the proposed corridor have been identified. The final pipeline route would be selected to minimise disturbance to important areas of vegetation.

Several previous studies have described the flora of the Kemerton Industrial Park, including an investigation in 2002 by Biota Environmental Services to specifically survey the area under consideration for the proposed power station development. No Declared Rare Flora was recorded during this most recent survey, although two Priority Flora species were identified along the Marriott Road section of the proposed pipeline corridor. Both of these species are Priority 3 Flora, which are classified as taxa which are known from several populations, at least some of which are not believed to be under threat. Some sections of the route are relatively intact and have the potential to contain unidentified Declared Rare and Priority Flora. The survey also identified several sections of the proposed pipeline corridor that have been previously cleared and are currently in poor condition.

Removal of some vegetation would be required for the pipeline construction. In order to minimise the impact of this clearing and any other disturbance of the vegetation in the area, the Preferred Bidder would be required to have appropriate management strategies in place. Prior to any construction work proceeding, a further flora search would be conducted to ensure that any DRF and Priority Flora in the corridor are identified. The final wastewater pipeline route would be selected based on the results of this study to minimise disturbance by following existing infrastructure corridors and other previously disturbed ground. Rehabilitation plans would be developed in consultation with the Department of Conservation and Land Management (CALM) and implemented to ensure that disturbed areas are returned to their original condition as much as practicable. In addition, the CALM would be consulted regarding potential management strategies, including the possible requirement for relocation of significant flora.

While some clearing of vegetation would be unavoidable, the Preferred Bidder would be required to ensure that the extent of this disturbance is minimised as much as practicable.

Evaporation Pond – Clearing Requirements

Although not specifically labelled, an evaporation pond was shown on the conceptual power station site layout in Figure 5-1 of the Kemerton SER document (to the left of the plant). The revised plant layout (**Figure A-5**) also indicates the expected location of the evaporation pond which has been relocated to the north of the site to increase the separation distance to wetlands. A total lease area of approximately 45 hectares is required for the ultimate development concept, of which approximately 30 hectares would be cleared. To ensure that disturbance to the remnant vegetation in the southern portion of the preferred site is minimised, the revised plant layout has been placed further to the north over the blue gum plantation as discussed in **Section 1.4.2**. While it is expected that some clearing is required to accommodate the evaporation pond, no remnant vegetation would be removed for the pond.

Summary of Impact of Vegetation Clearing on Wetlands

While removal of some portion of the blue gum plantation at the Kemerton site is required should the development proceed, the impact of this clearing on local wetlands is not expected to be significant. The series of wetlands located to the east and south of the Kemerton Industrial Core are classified as EPP wetlands, which are expressions of the local groundwater table. As this groundwater aquifer is recharged through direct infiltration and lateral flow from the Mialla Mound recharge, it is unlikely that the removal of blue gum plantation on the proposed power station site would have a major impact. For further information on this issue, the reader is referred to the response to **Issue 31 (Section 3.2.1.2)**.

The EPA previously reviewed the implications of clearing vegetation for industrial development as proposed in the Kemerton Expansion Study (EPA, 1998). The proposed power station development would not involve clearing of any areas that were not previously earmarked for industrial development. Following on from recommendations made in the EPA assessment report, Aquaterra was engaged to complete the second phase of water studies for the Kemerton Industrial Estate that included the following objectives:

- The development of a level of understanding between significant values of the surface water, groundwater and dependent ecological systems; and

- The development of a refined Water Management Strategy that identifies the relationships between water and environmental values and issues, so that the development and operation of Kemerton is environmentally sustainable.

The results of this study will be available to the Preferred Bidder during the Section 38 environmental approval process. The reader is referred to the response to **Issue 58** (Section 4.1.5.2).

3.3.2 Issue 38

3.3.2.1 Question

*There is no map showing the service corridor for the proposed wastewater pipeline route for the **Kemerton** proposal and it is not clear whether the planned service corridor (BSD Consultants, 1997) includes the Marriott Rd portion of the proposed route.*

3.3.2.2 Response

Within the Kemerton Industrial Park, the wastewater pipeline would utilise the planned service corridor, which is proposed in the development of the Final Concept Plan for the Kemerton Industrial Park (refer to Section 4.5.4.2 of the Kemerton SER document). The proposed route of the wastewater pipeline is shown in Figure 4-6 of the Kemerton SER document. Although the service corridor is not specifically labelled in this Figure, the service corridor can be seen running down the centre of the Kemerton Industrial Park.

The Marriott Rd portion of the proposed wastewater pipeline route is not included in the main central Service Corridor for the Kemerton Industrial Park Final Concept Plan, however it has been included in the Structure Plan as a minor service corridor (BSD Consultants, 1997).

3.3.3 Issue 39

3.3.3.1 Question

*There is no mention that the proposed **Kemerton** wastewater pipeline route crosses through a System 6 Area – C66 Leschenault Inlet.*

3.3.3.2 Response

The Buffalo Road section of the Kemerton wastewater pipeline route lies within the northern section of the C66 Leschenault Inlet System 6 Area.

For the proposed wastewater pipeline, disturbance during construction would be restricted to a corridor less than 11m wide. The final corridor would be selected to be parallel to, and where possible within, previously disturbed areas along Buffalo Road and the Collie Power Station Wastewater Pipeline. This area would be reduced to a 5m easement (where existing access is not provided) for long-term access and the remainder of the corridor would be rehabilitated following construction.

As the pipeline construction would require clearing of only a small area (estimated at 3.3ha) of vegetation within the large System 6 area, the EPA is likely to provide informal advice on the proposal and formal assessment may not be required (EPA,

2001). This would be addressed by the Preferred Bidder during the Section 38 environmental approval process.

3.3.4 Issue 40

3.3.4.1 Question

*There are insufficient details in regards to the methodology used for on ground vegetation survey at **Kemerton**. Was the surveying consistent with Gibson et al 1994?*

3.3.4.2 Response

The survey methodology followed that currently considered standard for the Swan Coastal Plain. All vascular flora present within a 10 × 10 m quadrat were recorded, as were habitat descriptions (soil, landform, substrate etc), vegetation condition and a description of the vegetation community based on species composition, strata and density (all of which were listed in the methodology of the supporting technical report (Biota Environmental Services, 2002b), which was provided to the DEWCP). The survey plots were flagged but not permanently marked. The methodology applied to the collection of vegetation structure data (strata and density) was more specific than that used by the Muir (1977) classification (e.g. by recording a shrub as 0.8 – 1.2m at a density of <2% and 1.2 – 1.5m tall at 15 – 20% in the field). This could be converted to the Muir scale or any other scale if necessary. The methodology was therefore generally consistent with the Floristic Survey of the Swan Coastal Plain.

The methodology for this survey was clearly identified in the vegetation report as a preliminary assessment only (see survey aims below). This was primarily in recognition that the timing was not suitable for a thorough, detailed flora and vegetation assessment and that more detailed work would be completed on the preferred site at a later stage of the approvals process.

“The principal aims of this survey were to:

- ❑ Assess vegetation condition within the power station site and along the proposed wastewater pipeline route;
- ❑ Assess fauna habitats and potential rare species occurrence within both components of the study area; and
- ❑ Identify populations of significant flora species along the proposed wastewater pipeline route.”

Additional limitations on the methodology and findings of the Biota report were clearly highlighted in the supporting technical report (Biota Environmental Services, 2002b) which was provided to the DEWCP.

3.3.5 Issue 41

3.3.5.1 Question

*Vegetation mapping should be undertaken for the preferred power station site at **Kemerton**.*

3.3.5.2 Response

A vegetation and flora survey of the preferred power station site was undertaken by Biota Environmental Services (2002b) and reported in Section 6.8.1.4 of the Kemerton SER document. This survey identified two vegetation associations on the plant site, one

being a blue gum plantation and the other being a Jarrah, Marri and Banksia woodland. These communities can be clearly identified in Figure 5-1 of the Kemerton SER document (also refer to **Figure A-5 of Appendix A**). It was therefore not considered necessary to prepare a vegetation map.

The Preferred Bidder will be required to undertake further vegetation surveys of this area during the Section 38 environmental approval process (Commitment 2).

3.3.6 Issue 42

3.3.6.1 Question

*Table 6.2 of the **Kemerton** document should be called *Vegetation Condition Scale* rather than *Vegetation Classification Scale*, and the source of the scale used should be referenced. There is no condition map given, which is an important omission that should be addressed.*

3.3.6.2 Response

Table Heading

This table in the original vegetation report (Biota Environmental Services, 2002b) was not given this heading but the introductory paragraph describes it as a '*vegetation condition assessment... classification scale*'. As a title we agree that '*Vegetation Condition Scale*' is more appropriate.

Vegetation Condition Scale Reference

This is modified from a widely used but apparently not formally published scale. A version of this scale is used in Bush Forever, which has also not been referenced. A Floristic Survey of the Southern Swan Coastal Plain (Gibson *et. al.*, 1994) refers to a five point vegetation condition scale developed by Malcolm Trudgen in an unspecified and unpublished report in 1991, although the scale itself is not included in the report. Some modifications were made to this in an attempt to make the scale less ambiguous and subjective in application.

Vegetation Condition Map

The text of the vegetation report (Biota Environmental Services, 2002b) contains a detailed description of vegetation condition and reference to vegetation condition scale within each vegetation community and/or pipeline section. As noted in this source report, it was difficult at the time of the survey to accurately assess the vegetation, primarily due to poor seasonal timing. Herbaceous species such as Drosera, Stylidium, orchids and other native herbs were absent, as were many weeds. Determining the vegetation condition in detail would not have been possible as noted in the response to **Issue 43 (Section 3.3.7.2)** and highlighted in the limitations statement of the supporting technical report. Additionally, this survey was intended as a preliminary assessment only, largely based on desktop review, with a brief field survey of flora and vegetation. A more detailed assessment during an appropriate season would be required to collect the data required for valid vegetation condition maps.

3.3.7 Issue 43

3.3.7.1 Question

*The condition of vegetation at **Kemerton** was mapped at the end of summer (late February to early March), which is not appropriate for this community type.*

3.3.7.2 Response

As stated in Section 6.8.1.2 of the Kemerton SER document, it is acknowledged that the vegetation survey was not undertaken during a suitable season and is therefore not considered an adequate documentation of the flora. However given the timing of the SER document preparation, it was not possible to undertake surveys in a more suitable season. Therefore the summer survey was undertaken to provide a preliminary appraisal of the vegetation and it is noted that this work needs to be supplemented by suitable seasonal work.

To ensure that this issue is addressed, Western Power proposed Commitment 2, which requires the Preferred Bidder to undertake vegetation surveys of the plant site and infrastructure corridors during spring (refer to Table 11-1 of the Kemerton SER document).

3.3.8 Issue 44

3.3.8.1 Question

*There is no clear explanation as to why the power station at **Kemerton** is not moved as far north as possible to avoid clearing any native vegetation.*

3.3.8.2 Response

As discussed in Section 1.4.2 of this report, in response to submissions through the public review process and ongoing liaison with LandCorp, the site layout and lease boundary have been modified such that disturbance to remnant vegetation in the southern portion of the preferred site is minimised (**Figure A-5**).

The layout is placed as far north as possible, with the noise criteria at the northern boundary being the limiting factor. The reader is referred to Section 8.4.3.1 of the Kemerton SER document, which outlines the noise criteria applicable to the operation of the power station.

3.3.9 Issue 45

3.3.9.1 Question

*Although removal of remnant vegetation at **Pinjar** is small, Western Power should consider rehabilitation projects elsewhere and could possibly assist local efforts in this regard.*

3.3.9.2 Response

Western Power's commitment to rehabilitation/tree planting is illustrated by the Western Power Greening Challenge, which will see the 4 millionth tree planted this year along with numerous other environmental projects.

With respect to the Pinjar expansion proposal, Western Power prepared the **Pinjar** SER document to seek strategic environmental advice and 'in principle approval' for a power

generating facility at Pinjar Gas Turbine Station. As such, Western Power is the proponent for the Strategic Environmental Review, but as part of the SWIS Power Procurement Process they may not be the Preferred Bidder for development of the facility. Consequently, the responsibility for rehabilitation of vegetation would fall with the Preferred Bidder, rather than with Western Power. However, Western Power would encourage the Preferred Bidder to consider this proposal and report on any such actions during the Section 38 environmental approval process.

During rehabilitation planning and implementation, the Preferred Bidder may choose to consider relevant projects elsewhere that could be incorporated at Pinjar. The rehabilitation planning may also involve local assistance, which would have reciprocal benefits to all those involved.

3.3.10 Issue 46

3.3.10.1 Question

*Given the new clearing legislation there is also a requirement for no net loss of bushland. Therefore the portion of Bush Forever site 380 cleared at **Pinjar** should be replaced with a piece of bushland that can be secured for conservation and management adjacent to the Bush Forever site.*

3.3.10.2 Response

This issue would be addressed by the Preferred Bidder during the Section 38 environmental approval process (see the response to **Issue 45, Section 3.3.9.2**).

3.3.11 Issue 47

3.3.11.1 Question

*A "Green Corridor" is proposed to pass through IP14 at **Kwinana**; this needs to be taken into consideration in assessing that site.*

3.3.11.2 Response

The City of Rockingham is currently producing a Greening Plan for Rockingham. A key objective of the Plan is to identify Green corridors to provide wildlife movement between areas of remnant bushland. The City of Rockingham notes that one corridor is proposed to pass through the IP14 area. This Plan is still in draft form and not released to the public. Issues relating to the "Green Corridor" and the feasibility of providing green linkages within the East Rockingham Industrial Park (IP14) falls within the jurisdiction of LandCorp/MPR.

Previous planning for the East Rockingham Industrial Park (IP14) by LandCorp and MPR has set aside a number of areas for conservation and buffer purposes. The eastern parkland buffer area was set aside as a conservation park under CALM in the mid 1990s. A strip of bush adjacent to Wells Park was designated parkland buffer and also an area in the south west corner.

Currently discussions are taking place between MPR, LandCorp and DEWCP over conservation of a wetland area in the General Industry precinct. The basis of an agreement with the EPA to conserve this area would be that the remainder of IP14 land zoned industry could be developed for industry.

3.3.12 Issue 48

3.3.12.1 Question

*The vegetation report for **Kwinana** has very limited information on the vegetation of the area so it is difficult to determine the value of the vegetation.*

3.3.12.2 Response

Sites 1 and 2

A desktop review and site visit was performed of Site 1 and Site 2 by Biota Environmental Services. The methodology of this survey was primarily a desktop review, supplemented by a brief site visit. This was clearly identified in the supporting technical report (Biota Environmental Services, 2002a). The large number, density and cover of weed species and the small amount of original condition vegetation types present suggested that both sites have been subject to degrading processes. As noted in the report, the preferred site has already been assessed as part of a Public Environmental Review (PER) by the DEWCP (Barker & Associates, 2000; EPA, 2000). The EPA Bulletin did not raise any issues pertaining to flora and fauna associated with this location.

A range of literature, including PER documents, EPA Bulletins and additional supportive studies were sourced as part of this desktop review, including a number of PER documents for nearby bush land, and the Bush Forever publications. None of these documents identified any issues with vegetation that would apply to either site. Expert advice was also sought from the Western Australian Museum and the CALM on these sites, including database searches of relevant databases. The results of this and on-site inspection of habitat conditions indicated that it is unlikely that there are any flora or fauna of significance on either location.

Finally, the vegetation report recommended that prior to any work being carried out at either location detailed flora and fauna investigations should be carried out, highlighting that the report was only a desktop flora and fauna assessment and not intended to provide a detailed assessment of the vegetation of the site and its conservation context.

Sites 3 and 4

The Office of Major Projects in the Department of Mineral and Petroleum Resources has recently commissioned ATA Environmental to perform a vegetation survey to determine the significance of the remnant vegetation in the East Rockingham Industrial Park. A strategy to manage vegetation issues in this area is being developed in consultation with DEWCP. The area is not currently being considered by the state government authorities for retention but uncertainty remains until the vegetation strategy is finalised and approved.

3.3.13 Issue 49

3.3.13.1 Question

*The presence of *Xanthorrhoea preissii* at the **Kwinana** preferred site is indicative of a wetland and may indicate the presence of a threatened ecological community (19).*

3.3.13.2 Response

Sites 1 and 2

Threatened ecological community type 19 is described as “sedgeland in Holocene dune swales” (Gibson *et al.*, 1994). While it does include *Xanthorrhoea preissii* and *Acacia saligna* (both recorded on site), it also includes a range of additional shrubs and herbs that were not recorded from the location. It should also be noted that no sedges, the main indicator of this threatened ecological community, were recorded from either Site 1 or Site 2. It is therefore unlikely that threatened ecological community 19 occurs on this site. No evidence was found of this community type during a site visit.

Sites 3 and 4

Preliminary feedback from ATA Environmental (Paul van der Moezel *pers comm*, 2002) indicates that there is one linear swale mapped as having Grass Trees (*Xanthorrhoea preissii*) which cuts across the centre of Site 3. This area is most likely to contain a degraded section of the Threatened Ecological Community 19a or 19b. The area is not currently being considered by the state government authorities for retention but uncertainty remains until the vegetation strategy is finalised and approved.

3.3.14 Issue 50

3.3.14.1 Question

Kunzea sp. is not found on the Quindalup and rarely on Cottesloe Complex Central and South (and only in association with wetlands) and therefore is unlikely to be present at the Kwinana site unless planted.

3.3.14.2 Response

While a member of the *Kunzea* genus was identified on Site 1, it was not possible to identify it to species level. As a preliminary assessment only, systematic collection and identification of plant specimens was not undertaken.

Kunzea has a number of species and subspecies present in Western Australia. A search of the CALM Florabase returns 29 current taxa of this genus. According to Marchant *et al.* (1987), three species are likely to be found in the Perth region; *Kunzea ericifolia*, *K. micrantha* and *K. recurva*, although *K. recurva* is unlikely to be present as it is recorded from gravel slopes of the Darling Scarp. Both *K. ericifolia* and *K. micrantha* are described as being found on the Coastal Plain, usually associated with water courses or winter-wet depressions (Marchant *et al.*, 1987). It is also worth noting that a planted windbreak was present on the site so it is possible that the species has escaped from historical plantings in the area.

3.3.15 Issue 51

3.3.15.1 Question

There should be a commitment to local revegetation and foreshore rehabilitation at Bunbury.

3.3.15.2 Response

Much of the coastal foredune vegetation has already been rehabilitated by Western Power as a part of the rehabilitation plan for the old Bunbury Power Station. Western Power has also rehabilitated an area at the far northern end of the site, on the former ash

ponds. This site has been returned to the City of Bunbury for use as a recreation reserve, but has not yet been opened to the public. In addition, as a part of the management strategies described in Section 7.3.1.2 of the Bunbury SER document, the Preferred Bidder would be required to develop and implement a rehabilitation plan for the proposed New Bunbury Power Station site. Where possible, native species would be used for the rehabilitation process. The reader is also directed to the response to **Issue 79 (Section 5.2.3.2)** for further information.

3.4 Fauna and Fauna Habitats

3.4.1 Issue 52

3.4.1.1 Question

There is no explanation as to why there wasn't a fauna study undertaken in the Kemerton proposal.

3.4.1.2 Response

Section 6.8.2.1 of the Kemerton SER document stated that 'given the strategic level of this assessment, habitat and distribution based assessment of potential occurrence has only be undertaken for threatened fauna taxa'. A more detailed fauna study of the area would be undertaken by the Preferred Bidder during the Section 38 environmental approval process.

3.4.2 Issue 53

3.4.2.1 Question

The role of the area around the Kwinana site as an ecological linkage between other regionally significant areas has not been determined.

3.4.2.2 Response

The Bush Forever process identified sites that were in good condition and regionally significant for the whole of the Swan Coastal Plain, including those with important functions as ecological corridors. None of the proposed power station sites were identified in this process, but may still have some functions in this respect. This would, however, be limited to avifauna only. The generally degraded nature of the sites indicates that they are unlikely to be regionally significant. The presence of nearby major roads and surrounding light and heavy industry is further likely to separate these sites and prevent local linkages for ground-dwelling fauna.

The preferred site and the three fallback options are all located on industrial zoned land that has been previously earmarked by the State planning and development authorities as being suitable for industrial development. Previous planning studies for the area have considered ecological values and functions. For example, the Hope Valley-Wattelup Redevelopment Master Plan's preferred option includes conservation areas.

Refer also to the response to **Issue 47 (Section 3.3.11.2)**.

4 Water

4.1 Groundwater

4.1.1 Issue 54

4.1.1.1 Question

*The high importance of the Gngangara groundwater mound gives rise to the expectation that protection of groundwater quality will be a high priority at **Pinjar**.*

4.1.1.2 Response

The protection of groundwater quality over the Gngangara groundwater mound has always been given highest priority by Western Power. The same high priority of containment and management of discharges to protect groundwater resources from any proposed expansion at Pinjar would be enforced through management strategies outlined in Sections 7.3.3, 7.4.3 to 7.4.5, 8.3.1, 8.3.2 and 8.4.4 to 8.4.7 of the Pinjar SER document.

4.1.2 Issue 55

4.1.2.1 Question

*If a demineralisation plant is installed at **Pinjar** the water demand would exceed the current licence – are there any options to avoid this?*

4.1.2.2 Response

By far the greatest demand for demineralised water would be for NO_x suppression when operating on liquid fuel, should this be required. To meet the projected 100-hours per year on liquid fuel, some 6,000kL of demineralised water would be required for this purpose. To provide this water, a demineralisation plant could be constructed on the site.

Alternatives to an on-site demineralisation plant are:

- ☐ Demineralised water could be trucked in from off-site and stored on-site in suitable tanks. Given that the gas turbines would require approximately 60kL per hour of demineralised water when operating on liquid fuel and the capacity of transport trucks is either 30kL or 60kL, 100 to 200 truckloads of demineralised water would be transported to the site per year. There may be environmental or cost implications associated with this option; or
- ☐ Exemption by the EPA to allow the plant to run on liquid fuel without NO_x suppression. This would occur for approximately 100-hours per year. Note that the air quality modelling in this Strategic Environmental Review has assessed this scenario (refer to Section 8.4.1.5.2 of the Pinjar SER document).

4.1.3 Issue 56

4.1.3.1 Question

*Section 8.3.1.1.2 of the **Collie** report does not clearly specify the CWAG (1999) strategy for usage of groundwater as a back up source only until 2006, after which groundwater is to be used only as an emergency source. If mine de-watering supply is not available, infrastructure to obtain water from other storages (e.g.. Wellington and Harris reservoirs) should be in place as soon as possible and definitely before 2006.*

4.1.3.2 Response

The CWAG long-term strategies are presently under development. However the present understanding is that there may not be sufficient surface water in Wellington Dam for Western Power needs. The whole strategy is currently under review.

4.1.4 Issue 57

4.1.4.1 Question

Groundwater recovery in Cardiff Sub-basin at Collie will take about 30 years (if no further abstraction occurs). Therefore, the pools of the south branch will require artificial supplementation. What measures will be undertaken to achieve long term supplementation?

4.1.4.2 Response

This has not been formally implemented. Discussions are required between Western Power and the Water and Rivers Commission to finalise details.

4.1.5 Issue 58

4.1.5.1 Question

*Aquaterra (2002) has recently completed a major study **Kemerton Water Study - Phase 2** study for LandCorp, MPR and WRC. What are the implications of the findings of this report?*

4.1.5.2 Response

The Environmental Protection Authority has previously assessed the Kemerton Expansion Study (EPA, 1998). From this assessment a number of recommendations were made to undertake further investigations of the Industrial Area, including the need to further investigate groundwater abstraction.

In response to this recommendation, Aquaterra was engaged by the Kemerton Technical Working Group, comprising LandCorp, MPR and the Water and Rivers Commission (WRC), to complete the second phase of water studies for the Kemerton Industrial Estate. The major objectives for the Phase 2 study were as follows:

- ❑ Acquisition of additional hydrogeological data and the assessment of these new data together with existing information to address a range of specific (water-related) environmental objectives;
- ❑ The development of a level of understanding of the interactions between the significant values of the surface water, groundwater and dependent ecological systems (this was largely achieved through the development and use of a multi-layered groundwater model); and
- ❑ The development of a refined Water Management Strategy that identifies inter-relationships between water and environmental values and issues, so that the development and operation of Kemerton is environmentally sustainable.

In June 2002, the Kemerton Industrial Park Co-ordinating Committee (through the MPR, LandCorp and the Water and Rivers Commission), received Aquaterra's detailed report on water supply, groundwater allocation and management in the Kemerton area. A total management approach was developed and described. This report is currently under review by the above mentioned stakeholders and the results are not expected to be released until later in 2002 or early 2003.

Western Power is not in a position to comment at this stage on the findings of the report. However, the Preferred Bidder will need to incorporate the findings in the Section 38 environmental assessment process.

4.2 Water Supply

4.2.1 Issue 59

4.2.1.1 Question

Has consideration been given to using wastewater from the new sewage treatment plant at Kemerton?

4.2.1.2 Response

As discussed in Section 5.4.4 of the Kemerton SER document, the Water Corporation has been awarded the Contract (by the Office of Water Regulation) for the provision of water supply services for the Kemerton Industrial Park. The Water Corporation has advised that they are able to supply the quantity of scheme water required to meet the power station requirements subject to the lead times stated.

The Water Corporation is investigating the provision of water supply services for the Kemerton Industrial Park. A number of options are available as follows (Section 4.5.3 of the Kemerton SER document):

- ☐ Future Brunswick River Dam;
- ☐ Surplus from Harvey Dam;
- ☐ Wellington Dam, abstracted from the Collie River; and
- ☐ Groundwater.

The proposal described in the Kemerton SER document relies on surface water sources to provide adequate water for the power station. The Water Corporation has also advised that they may have treated domestic wastewater available for reuse at Kemerton.

One of the options available to the Preferred Bidder is the use of this treated wastewater. The Preferred Bidder would be required to negotiate the supply of water to the power station with the Water Corporation. The source of the water supply to be used by the Preferred Bidder, should they decide to develop at Kemerton, would be reported in the Section 38 Environmental Review document.

4.2.2 Issue 60

4.2.2.1 Question

The use of water from Harris reservoir is a short-term measure for Collie; Wellington dam is to be the primary source.

4.2.2.2 Response

The existing Western Power water supply strategy for the Collie Power Station includes plans for the installation of a new pipeline from Wellington Dam to the Collie Power Station and reducing the current use of water from Harris River Dam by restricting use to emergency situations only. Management strategies for the proposed expansion aim to source most of the water required from mine dewatering discharge. The majority of the additional water needs are planned to come from Wellington Dam rather than Harris

River Dam. If potable water from Harris River Dam is supplied to the power station, it should be seen as only a temporary measure.

The Preferred Bidder would be required to develop a water supply strategy in consultation with the Water and Rivers Commission and the Water Corporation and would be required to explore all potential opportunities to maximise water reuse (Commitment 4).

4.2.3 Issue 61

4.2.3.1 Question

*There should be closer consideration of air cooling for **all plants** and particularly Collie.*

4.2.3.2 Response

In order to maximise the thermal efficiency of a condensing steam turbine plant in a combined cycle plant or coal-fired plant, the exhaust steam must be condensed at the lowest practical pressure. This pressure is less than atmospheric and is hence a partial vacuum. To condense the steam under these conditions, it must first be sufficiently cooled so that only steam condensate (i.e. water) is returned to the water circuit of the boiler/s (the condensing of the steam helps also to maintain the vacuum in the condenser).

There are several methods of cooling the steam, the most common being:

- ❑ Water-cooling – being via finned tubes through which cold water flows, the source of the cold water being either diverted from the sea or a river or from a cooling tower arrangement; and
- ❑ Air-cooling – this option uses cold air as the cooling medium, however in this case the steam flows through the finned tubes with the air being blown over the tubes. The air-cooled condenser is hence like a large radiator including a fan.

The advantages of an air-cooled condenser are:

- ❑ Its ability to operate with minimal or zero requirement for supplies of cooling water;
- ❑ The impact on water supplies in the area are hence dramatically reduced; and
- ❑ No visible plumes (steam) in any weather conditions.

The disadvantages of air cooling condensers are:

- ❑ The cooling medium is air, therefore there is no latent heat of vaporisation effect as with water cooling, hence dry bulb air temperatures determine the cooling performance of the plant;
- ❑ Air-cooled condensers cannot therefore cool the steam exhaust as effectively as a water-cooled condenser and are more effected by changes in ambient conditions than water-cooled plant. Because of the above, air-cooled condensed power stations have a lower power output than a similar water cooled power station (by approximately 5 to 10%) and a lower efficiency (by around 1 to 2%);
- ❑ Air-cooled condensers are two to four times more expensive than equivalent water-cooled condensers. The actual value would depend on the cost of water supply and reticulation;
- ❑ Air-cooling plant is a large structure and would increase the visual impact of the power station. For example, a large power station with a 120MW steam turbine can have a condenser of up to 80m × 50m in area and 30m in height with 20 fans. An

air cooled condenser is hence a large structure which must be located alongside the steam turbine to minimise steam flow losses in the piping and turbine of the condenser;

- The fans of an air condenser can be noisier than conventional water cooled plant using mechanical draft cooling towers however current designs now have noise attenuation measures fitted which can in some cases result in noise levels no more than a conventional mechanical draft cooling tower. These noise attenuation measures naturally add capital cost to the condensing plant; and
- The large quantity of piping and tubing making up the condenser is under vacuum, and the potential for leakage of air into the condenser is greater (with subsequent degradation in performance) than a conventional water-cooled condenser. Care has to be exercised during design and construction to minimise this potential.

In conclusion, the major advantage of air cooled plant is its very low or zero requirement for cooling water supplies, lessening the environmental impact on the local water supplies. However they do have an impact on the economic viability of the power station both in capital and operating costs.

The purpose of the SER is to ascertain that the proposed sites are suitable to accommodate power generating facilities. Air cooling at any of these sites has not been discounted but is seen as less of an environmental impact than a water-cooled plant as it does not require large quantities of water for cooling or produce large quantities of wastewater (cooling water brine discharge). The SER has taken a conservative approach by assessing a water cooled plant and it is likely that a developer who chooses air cooling would also fit within the specification of the site.

4.2.4 Issue 62

4.2.4.1 Question

The supplier of potable water at Bunbury is Aquwest not the Water Corporation.

4.2.4.2 Response

This has been noted.

4.3 Water Quality

4.3.1 Issue 63

4.3.1.1 Question

At Collie the risk to the water quality of Wellington reservoir has not been adequately addressed in relation to construction or operational impacts and the risk of saline leakage from the pipeline.

4.3.1.2 Response

The Collie SER document assumed that the existing wastewater pipeline would be capable of handling volumes from both the existing plant and the proposed expansion. Therefore there would not be any construction activities or impacts associated with pipeline.

Section 8.4.7 of the Collie SER document discusses the management of potential environmental impacts of operating the wastewater pipeline. This Section states that the

Preferred Bidder would be required to manage and monitor the saline water system in accordance with the existing management systems. The existing management strategies are also discussed in this Section and include a primary leak detection system that is capable of automatically shutting down the pipeline in the event of a leakage or failure. This system is supplemented by other measures such as non-return valves at low points adjacent to major watercourses to minimise the volume of water released from the pipe in the event of a breakage.

4.3.2 Issue 64

4.3.2.1 Question

The water management plan at Collie should involve the WRC and the WC.

4.3.2.2 Response

As stated in Section 8.3.1.3 of the Collie SER document, the Preferred Bidder would be required to confirm a water supply strategy in consultation with the Water and Rivers Commission and the Water Corporation and will be required to explore all potential opportunities to maximise water reuse (Commitment 4). The Preferred Bidder would also be required to develop a comprehensive water management strategy that is documented in a Water Management Plan, key aspects of which are summarised in Table 8-2 of the Collie SER document.

4.3.3 Issue 65

4.3.3.1 Question

One option for improving water quality in the Wellington reservoir is to divert water from the Collie River, concentrate the salinity and dispose of highly saline water outside the catchment. Any spare capacity in the Collie pipeline could be useful for this purpose.

4.3.3.2 Response

Any spare capacity in the Collie pipeline could potentially be used for this purpose, subject to environmental and technical investigations. However if the Collie Power Station expands, the spare capacity in this pipeline would be taken up by the expansion.

4.4 Marine

4.4.1 Issue 66

4.4.1.1 Question

The disposal of additional wastewater (Kwinana demineralisation water) through Cape Peron outfall should not be allowed.

4.4.1.2 Response

The proposed power station in Kwinana/East Rockingham has incorporated waste minimisation objectives by identifying the opportunity to recycle and reuse wastewater. The preferred source of water (about 12,705ML/yr required) for the power station is treated municipal effluent from the Water Corporation's Woodman Point wastewater treatment plant. This wastewater is currently being discharged south of Cockburn Sound via the Cape Peron pipeline. The greatest source of wastewater would be blow-

down (heated brine) from the cooling system (about 2,000ML/yr). Only a small portion of wastewater would be produced from the demineralisation plant (about 4ML/yr).

Re-use of this wastewater in the process is prohibited by the high total dissolved content of the brine (about twice that of seawater). The result of recycling treated municipal effluent from the Water Corporation and discharging cooling tower blow-down into the Cape Peron pipeline gives a *net reduction* of about 10,700 ML/yr of wastewater being discharged from the Cape Peron pipeline.

Several options for wastewater discharge are discussed in Section 4.5.3 of the Kwinana SER document. Discharge into the Cape Peron pipeline with an outfall located in the Sepia depression south of Cockburn Sound is the preferred option and is consistent with the Kwinana Water Recycling Project being proposed by the Water Corporation to improve water efficiency and environmental management in the Kwinana Industrial Area. Wastewater would be required to meet the Water Corporation's acceptance criteria for the Cape Peron pipeline to ensure that the receiving environment is provided the appropriate protection.

The reader is also directed to the response to **Issue 67 (Section 4.4.2.2)** for further information.

4.4.2 Issue 67

4.4.2.1 Question

*The recommendations of the draft Environmental Management Plan for Cockburn Sound (Dec 2000) should be implemented where applicable to the **Kwinana** sites.*

4.4.2.2 Response

A *Draft Environmental Management Plan for Cockburn Sound and its Catchment* was prepared by the Cockburn Sound Management Council in December 2001 (Cockburn Sound Management Council, 2001). One of the recommendations made in the Draft Plan is to support the proposal to treat effluent in the Cape Peron pipeline and discharge the wastewater offshore. The preferred option of wastewater disposal considered in Section 4.5.3 of the Kwinana SER document is consistent with this recommendation.

Further recommendations made in the Draft Plan aim to ensure future developments are guided by the principle of no net loss of ecological or social function in Cockburn Sound and encourage co-operative best management towards reducing nutrient loads to Cockburn Sound. By discharging wastewater south of Cockburn Sound and complying with water quality criteria imposed by the Water Corporation for wastewater within the Cape Peron pipeline, the proposed power station development would assist in reducing nutrient loads and preventing further loss of ecological or social function in Cockburn Sound. These opportunities would be further investigated by the Preferred Bidder during the Section 38 environmental approval process.

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5 Social

5.1 Heritage

5.1.1 Issue 68

5.1.1.1 Question

The Department of Indigenous Affairs stresses the need for archaeological surveys and ethnographic consultations to be conducted prior to any development.

5.1.1.2 Response

The Preferred Bidder will be required to undertake surveys of previously undisturbed areas of the proposed plant site and any new infrastructure corridors as part of the Section 38 environmental approval processes.

5.1.2 Issue 69

5.1.2.1 Question

*In relation to the **Kemerton** site DIA advises that the Aboriginal Cultural Material Committee has assessed sites located within the vicinity of the proposed wastewater pipeline:*

*DIA4885 (Old Coast Road 2) – not a Site under the Act;
DIA4886 (Old Coast Road 3) – Section 5(a) and 39(2)(c);
DIA15371 (Buffalo Road Burial) – Section 5(a) and 39(2)(c).*

5.1.2.2 Response

The assessment of the above sites by the ACMC would afford appropriate management guidance as outlined in Section 9.6.2 of the Kemerton SER document.

5.1.3 Issue 70

5.1.3.1 Question

*There is no mention of Local Government inventories of heritage places in the **Pinjar, Kwinana, Bunbury** or **Collie** documents.*

5.1.3.2 Response

The municipal inventories of heritage places in the Pinjar, Kwinana, Kemerton, Bunbury and Collie regions have been searched.

The main issue concerning disturbance to heritage sites is the forced relocation due to development. As the proposed power station sites are not located within areas already occupied by heritage properties, the developments would not cause any heritage property to be relocated. In addition, due to the distance between the heritage sites and the proposed power station site options, no direct disturbance is expected.

Full details of the heritage sites found on each of the local government municipal inventories are listed below. In the following responses discussing heritage issues, distances between heritage properties and the proposed power station sites are measured to the proposed lease boundary. Within the power station lease property, the Preferred Bidder would be required to maintain a buffer zone, subject to firebreak restrictions.

Consequently, the distances provided are conservative estimates, and the heritage properties would be located even further from the power station site of disturbance.

Pinjar

Within the Pinjar area, only one property was identified on the municipal inventory maintained by the Wanneroo Council. This property, Albert Thomas House, is discussed in detail in the response to **Issue 72 (Section 5.1.5.2)**.

Kwinana/Rockingham

The inventory kept by the City of Rockingham lists several properties, including those discussed in the response to **Issue 75 (Section 5.1.8.2)**. Other properties include Day Cottage, an abattoir and stables, Sam Chalwell Cottage, and Rockingham Road Board site. These properties are contained within the East Rockingham Heritage Precinct.

Day Cottage is located on Day Road, Rockingham, and was constructed between 1883 and 1885 (City of Rockingham municipal inventory). The original owner was an inaugural member of the Rockingham Road Board. The property is also classified by the National Trust. Day Cottage is approximately 1.25km from the proposed power station site options 3 and 1.75km from site option 4.

An abattoir and stables are located on the corner of Dixon and Day Roads, Rockingham (City of Rockingham municipal inventory). These structures were constructed during the 1940s, although the abattoir was originally situated on a different property. The abattoir and stables are approximately 2km from site option 3 and 2.5km from site option 4.

The site of Sam Chalwell Cottage is situated on Day Road, Rockingham, although no buildings remain, and the property is currently vacant land (City of Rockingham municipal inventory). This site is approximately 1km from site option 3 and 1.2km from site option 4.

The Rockingham Road Board site is located on the corner of Office and Mandurah Roads, Rockingham (City of Rockingham municipal inventory). Although no buildings remain on site, the property is marked with stone and brass plinth. The site is approximately 800m from site option 3 and 100m from site option 4.

Kemerton

The municipal inventory maintained by the Shire of Harvey identifies several heritage properties within the Kemerton locality. The closest property is the Runnymede and Florries Cottage Group, which is located approximately 2km from the preferred site. This heritage site is discussed further in the response to **Issue 71 (Section 5.1.4.2)**.

Bunbury

The City of Bunbury inventory lists three properties in the general vicinity of the proposed development:

- ☐ Turkey Point Tearooms and Reserve, discussed in the response to **Issue 73 (Section 5.1.6.2)**;
- ☐ Leschenault Homestead, discussed in the response to **Issue 74 (Section 5.1.7.2)**; and
- ☐ Leschenault Cottage.

Leschenault Cottage is located on Estuary Drive, Bunbury, opposite the Leschenault Homestead. The cottage has been demolished but the site is still listed on the City of Bunbury municipal inventory and the Heritage Council of Western Australia database (Place Number 5606) due to its historical significance. As the property is located approximately 4km from the proposed power station site, there is not expected to be any direct disturbance.

Collie

The municipal inventory held by the Shire of Collie considers only heritage places within the Collie townsite. Consequently, no heritage sites were identified on this register in the area of the proposed development.

The power station site may be located on land that was originally included in a Salvation Army Grant, although the property is not listed on either the Shire of Collie municipal inventory or the register of places managed by the Heritage Council of Western Australia. Refer to the response to **Issue 76 (Section 5.1.9.2)** for further information.

5.1.4 Issue 71

5.1.4.1 Question

Runnymede and Florries Cottage Group has been identified about 2km from the Kemerton site. What is the likely impact on this site?

5.1.4.2 Response

The Runnymede and Florries Cottage Group was constructed in 1877 and is also known as Reading's Farm (Heritage Commission Registry of Places, 2002). This property is located on the corner of Runnymede and Wellesley Roads, Harvey. The property is classified by the National Trust and listed on the Shire of Harvey municipal inventory. As this site is located 2km from both the preferred and fallback sites at Kemerton, there is not expected to be any direct disturbance resulting from the development.

5.1.5 Issue 72

5.1.5.1 Question

Albert Thomas House has been identified close to the Pinjar site. What is the likely impact on this site?

5.1.5.2 Response

Albert Thomas House (also known as Sinagra House and Iopollo House) is located at 27 Perry Road, approximately 12km from the Pinjar site (Heritage Commission Registry of Places, 2002). It is listed as Place Number 9492 on the Heritage Council of Western Australia database, and is also recorded on the City of Wanneroo municipal inventory. The house was constructed in 1920, and is considered to be important due to the historical significance of settlement, pastoralism and industry in the area. Due to the distance between the proposed Pinjar development and Albert Thomas House, there is not expected to be any direct disturbance to this heritage site.

5.1.6 Issue 73

5.1.6.1 Question

*Turkey Point Tearooms and Reserve has been identified close to the **Bunbury** site. What is the likely impact on this site?*

5.1.6.2 Response

Turkey Point Tearooms are located on Leschenault Drive, Turkey Point (Heritage Commission Registry of Places, 2002). The site is listed as Place Number 5637 on the Heritage Council of Western Australia place register database, and is also recorded on the City of Bunbury municipal inventory. The Tearooms were constructed in 1900 and hosted numerous social and civic activities. The importance of the property as a historic site stem from these recreational functions held at the Tearooms. The Tearooms have subsequently been demolished, and the area is maintained as an urban park and recreational reserve. This reserve is located approximately 1km from the proposed Bunbury site, at the Turkey Point end of the headland, and is therefore not expected to experience any direct disturbance.

5.1.7 Issue 74

5.1.7.1 Question

*Is Leschenault Homestead likely to be impacted by development at the **Bunbury** site or new or re-aligned roads?*

5.1.7.2 Response

Leschenault Homestead is located close to the intersection of Estuary Drive and Old Coast Road (Heritage Commission Registry of Places, 2002). The site is listed as Place Number 344 on the Heritage Council of Western Australia database, is recorded on the City of Bunbury municipal inventory of heritage places, has been classified by the National Trust and is listed in the Register of the National Estate. The homestead was constructed between 1943 and 1874 in Victorian Colonial architectural style and is recognised as a gracious old home containing a wealth of historical data. As the site is located approximately 4km from the proposed Bunbury power station site it is not expected to experience any direct disturbance as a result of the proposed development.

Realignment of roads and transmission lines is proposed by the Bunbury Port Authority to optimise the use of Port Authority land. The access road to Turkey Point is planned to be realigned away from port industries, along the edge of Leschenault Estuary, as displayed in Figure 4-3 of the Bunbury SER document. This realignment is independent of the proposed power station development, and would occur even if the power station development does not proceed. Due to the distance between Leschenault Homestead and the Turkey Point access road, the road realignment would not directly disturb the heritage property.

5.1.8 Issue 75

5.1.8.1 Question

*Chesterfield Inn, Bell Cottage, East Rockingham Cemetery and Hyams Cottage have been identified close to the third optional site at **Kwinana**. What is the likely impact on these sites?*

5.1.8.2 Response

Chesterfield Inn is located on Chesterfield Road, Rockingham, and is listed on the inventories administered by both the Heritage Council of Western Australia (Place Number 2325) and the City of Rockingham (Heritage Commission Registry of Places). The Inn was originally constructed in 1856, and restored following a fire in 1912. The property is also classified by the National Trust. Chesterfield Inn is located approximately 700m from site option 3 and site option 4.

Bell Cottage is situated on Mandurah Road, Rockingham (Heritage Commission Registry of Places). The cottage was constructed in 1856 for James and Jane Bell, who were among the first settlers in the area. The property is listed on the Heritage Council of Western Australia database (Place Number 2329), classified by the National Trust and registered with the City of Rockingham municipal inventory. The site is one of the earliest land grants in the Rockingham region and the cottage is among the oldest structures in the area. The cottage is approximately 800m from site options 3 and 400m from site option 4.

East Rockingham Cemetery is located on Mandurah Road (near Office Street), Rockingham (Heritage Commission Registry of Places). The cemetery was constructed in 1842 and first used in 1866. The site is listed on the Heritage Council of Western Australia register of heritage places (Place Number 3145) and with the City of Rockingham's municipal inventory. The cemetery site is located approximately 800m from site option 3 and 50m from site option 4.

Hymus Cottage is situated on Mandurah Road, Rockingham (Heritage Commission Registry of Places). The site is listed as Place Number 2320 on the database maintained by the Heritage Council of Western Australia, and is also registered with the City of Rockingham municipal inventory. The original owners of the cottage were among the first settlers in the area. The cottage is located approximately 800m from site option 3 and 100m from site option 4.

There would be no direct disturbance to any of these heritage sites from the proposed power station development.

5.1.9 Issue 76

5.1.9.1 Question

The Collie site has European heritage value since it is part of a land grant to the Salvation Army in the late 1890s.

5.1.9.2 Response

In 1899, a Salvation Army Children's home was established on a grant of 28,000 acres of land just outside of Collie. Three homes were built on various parts of the site, to cater for boys and girls of various ages. These homes contributed significantly to the overall population of Collie until closed and sold in 1920. The three houses were located some distance from one another; Home One was situated on the Collie River, approximately 10km from Collie, Home Two was located approximately 32km from Collie on the Bingham River, and Home Three was halfway between Home One and Collie Townsite. While the Children's Home buildings were removed in the mid 1920s, the development represents one of the earliest places in Collie. The site may contain archaeological remains.

We have been unable to establish whether the Collie power station site is located on land that was originally included in the Salvation Army Grant, although the property is not listed on either the Shire of Collie municipal inventory or the register of places managed by the Heritage Council of Western Australia.

5.2 Visual Amenity

5.2.1 Issue 77

5.2.1.1 Question

*The local community needs to be closely consulted in relation to the visual impact of a power station on the **Bunbury** site.*

5.2.1.2 Response

A description of the visual impact of the Bunbury site was presented in Section 9.4 of the Bunbury SER document. This assessment included the use of a three-dimensional digital terrain model to provide views of the New Bunbury Power Station from a number of vantage points around the Bunbury area. The material has been made available for public scrutiny through the Strategic Environmental Review process.

In addition, Western Power has initiated a program of stakeholder consultation. A list of nine state authorities and interest groups and 15 local and regional authorities is provided in the Bunbury SER document. As described in Section 1.5 of the Bunbury SER document, the proposal is being assessed in a two-stage process. The first stage is under Section 16(e) of the *Environmental Protection Act 1986* where an SER is prepared and is intended to provide advice on a concept plan for which no firm development proposal currently exists. The second stage of assessment is under Section 38 of the *Environmental Protection Act 1986* where the Preferred Bidder would undertake a detailed environmental impact assessment of the fully defined power generating facility. Under this two-stage process, there would be further opportunities for public involvement in relation to visual amenity as the Preferred Bidder would be required to consult with stakeholders and the community. Further details of the environmental approval process are provided in Section 1.5 of the SER documents.

5.2.2 Issue 78

5.2.2.1 Question

*Visual amenity could be improved at **Bunbury** by rationalising the transmission lines.*

5.2.2.2 Response

Transmission lines currently run diagonally across Port Authority land to the south east of the proposed power station site, as indicated in Figure 4-3 of the Bunbury SER document in Section 4.6.2. This alignment sterilises a large portion of the Port Authority land.

The Bunbury Port Authority is currently undertaking several strategies to optimise the use of Port Authority land, including realignment of the existing transmissions lines and the Turkey Point access road. These strategies would be completed independently of the proposed power station development, and would occur even if the power station does not proceed.

As a part of the development of the new power station, transmission lines would be realigned to fit within the newly realigned access corridors. In addition, these transport corridors would be narrowed. Further rationalisation of transmission lines is not possible due to the destination requirements. The addition of a substation close to the Preston River could help to improve the visual amenity of the Bunbury site, however, the cost associated with a substation makes the option economically unfeasible.

5.2.3 Issue 79

5.2.3.1 Question

Vegetation screening buffers are needed at Bunbury to protect a proposed power boating facility north-west of the site. Extensive vegetation buffers will also reduce perceived noise and possibly reduce potential impacts on wildlife.

5.2.3.2 Response

The Bunbury Port Authority owns the land of the proposed site for the new power station development and would lease the land through Western Power to the Preferred Bidder for the development of the power station. Some screening already exists on the plant site in the form of large pine trees providing natural screening from the west/city side of the plant site.

In order to improve the visual amenity of the development, The Preferred Bidder would be required to undertake the following management strategies:

- ☐ Where possible, buildings would be coloured to blend into the surrounding terrain;
- ☐ Building graphics and signage would be restricted to areas where they are not visible from outside of the site boundary;
- ☐ All temporary disturbances would be rehabilitated and revegetated with local species;
- ☐ Screening vegetation would be planted within the building setback of the power station site (subject to firebreak restrictions); and
- ☐ A high standard of housekeeping would be maintained at all times.

In addition, the Preferred Bidder would be required to implement the following strategies to minimise 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;
- ☐ Dust mitigation measures would be implemented;
- ☐ A weed management and control plan would be implemented; and
- ☐ Materials that would be potentially hazardous to vegetation would be contained and managed.

Beyond these management strategies, the responsibility for establishing vegetation-screening buffers would lie with the Port Authority rather than the Preferred Bidder.

5.2.4 Issue 80

5.2.4.1 Question

*What is the visibility of a power station at **Kemerton** when viewed from the east, given the relatively flat nature of the land?*

5.2.4.2 Response

A visual impact assessment undertaken by BSD Consultants (2000) developed photomontages of typical views from the northern and western most areas of the proposed Kemerton expansion. This assessment showed that, in almost all cases where there is continuous vegetation coverage within the road reserves of public roads, the Kemerton Industrial Core would be screened from view by two dunal ridge lines and the vegetation. Views of the industrial park from the east were not developed as the study focused on views from the Old Coast Road, which is the major north south road for general traffic through the area.

It is expected that industry, including the power station, would be visible when viewed from the east. The average height of structures within the power station would be about 15 to 20m with stack heights up to 40m. Some screening is expected to be provided by existing native vegetation (shrubs and tall trees up to 20m in height) and plantation blue gums surrounding the preferred site and it is likely that only the upper half of the stacks would be clearly visible from the east.

5.2.5 Issue 81

5.2.5.1 Question

*What is the impact on adjacent properties at **Kemerton** not currently zoned as "buffer"?*

5.2.5.2 Response

Land adjacent and directly north of the preferred power station site is currently privately owned land. With the proposed expansion of the Kemerton Industrial Core it is intended that the remainder of this land will be progressively brought into public ownership and designated as part of the Kemerton Buffer Area.

A buffer area is an effective planning tool that allows industrial development to occur in a manner which protects existing and future sensitive land uses from potential amenity and environmental impacts. Having a parcel of land designated as a buffer area permits 'compatible land uses' only to be adopted to protect sensitive land uses from potential impacts of industry.

The Kemerton SER document describes a number of site options available for the establishment of the power station. The preferred site for the power station is presently located within the existing Kemerton Industrial Park Buffer zone, but within the area identified as Industrial Core under the Final Concept Plan for the Kemerton Industrial Park (refer to Section 4.2 of the Kemerton SER document). The land would need to be rezoned to 'Industrial (Heavy)' before it could be developed for a power station and this rezoning is consistent with the Draft Greater Bunbury Region Scheme (GBRS) (WAPC, 2000a). However, if the GBRS is not implemented in time for the power station development, a fallback site (Site A in Figure 4-4 of the Kemerton SER document) has

been identified for the power station that lies within land already zoned 'Industrial (Heavy)' under the existing Town Planning Scheme.

Under both of these scenarios a large buffer zone is provided between the site and northern private landowners. This would ensure that potential impacts on private landowners from air and noise emissions are minimised. This is described in further detail in Section 4.4 of the Kemerton SER document.

5.3 Noise

5.3.1 Issue 82

5.3.1.1 Question

*What wind speed was used in the **Kemerton** cumulative modelling; model output should also show the 35dB(A) contour.*

5.3.1.2 Response

As shown on the bottom of Figure 8-17 and in Table 8-21 of the Kemerton SER document, a wind speed of 3m/s was used for the Kemerton cumulative modelling assessment.

From the *Environmental Protection (Noise) Regulations 1997*, the assigned noise level criteria from the Kemerton Industrial Park at sensitive receptors during nighttime is 40dB(A). The Regulations account for the cumulative effect of multiple industrial sources in order to ensure that the total noise level would comply with the criteria at the premises. The Regulations state that, in order for an industry to be deemed as "not significantly contributing" to noise levels at a receptor, noise emissions from individual industries would need to be at least 5dB(A) below the assigned level. Therefore, for the power station in isolation, the 35dB(A) contour is also important as this is the noise level that the power station by itself must achieve to ensure that it is deemed as "not significantly contributing" to noise levels at a residential receptor. Figures 8-13 to 8-16 of the Kemerton SER document show both the 35 and 40dB(A) contours from the power station in isolation.

When cumulative noise levels are considered, the 40dB(A) contour is the only important contour as the total noise is being considered, not the noise from individual industries. This is compatible with previous noise planning studies for the area, such as those undertaken for the Kemerton Expansion Study and presented in the Industry 2030 report (WAPC, 2000b), which only show the 40dB(A) contour. Therefore, the cumulative modelling figure (Figure 8-17 of the Kemerton SER document) shows the 40dB(A) contour.

5.3.2 Issue 83

5.3.2.1 Question

*The noise impact of **Kwinana** site 3 has not been assessed and is of concern because residents of North Rockingham already experience unacceptable noise at times.*

5.3.2.2 Response

A full noise assessment was initially undertaken on Sites 1, 2 and 3 and a comparison of these sites on the basis of noise was presented in Section 4.5.2.1 of the Kwinana SER document. Further detail was provided in the supporting technical document (Herring Storer Acoustics, 2002a) and this report was provided to the DEWCP. The results of noise modelling for Site 3 (which is the site closest to North Rockingham) is provided in **Table 5-1** below.

■ **Table 5-1 Results for “Enhanced” Attenuated 1,080MW Station for Site 3**

Receiver Location	Noise Level dB(A)				
	Assigned Criteria	Design Criteria	Predicted Noise Level	Compliance with Assigned Criteria	Compliance with “Design” Criteria
Medina (edge of Area B)	40	35	27	Complies	Complies
Medina (200m from Area B)	35	30	26	Complies	Complies
North Rockingham (edge of Area B)	40	35	30	Complies	Complies
North Rockingham (200m from Area B)	35	30	<30	Complies	Complies

Notes:

- 1) Source: Herring Storer Acoustics (2002a)
- 2) Design criteria is defined to be at least 5dB(A) below the assigned criteria such that the power station would be classed as “not significantly contributing” to noise levels at a receptor.

Enhanced noise attenuation has been allowed for in the design to ensure that the proposed power station would be an insignificant contributor to noise in residential areas. The design criteria is such that noise emissions from the power station would be at least 5dB(A) below the assigned noise criteria under the Regulations. This is demonstrated by the noise modelling results shown in **Table 5-1** above.

A noise contour for Site 3 is presented in **Figure B-1** in **Appendix B**. These contours indicate that noise levels in residential areas of North Rockingham would be at or below 30dB(A). This is acceptable and the power station is not considered to “significantly contribute” (or is below 5dB(A) of the criteria) to noise levels.

Through the public submission process, Western Power has been requested to consider another site in the East Rockingham Industrial Park, further to the east with Mandurah Road frontage (Site 4). This site has also been assessed for noise compliance and it has been demonstrated that a power station at this location could also comply with noise criteria with respect to both North Rockingham and Medina/Leda residential areas (see **Figure B-2** in **Appendix B**).

A comparison of all four sites on the basis on noise considerations is provided in **Section 1.4.1.1**.

5.4 Community Health

5.4.1 Issue 84

5.4.1.1 Question

Given the growing community concern regarding possible links between long term, low level exposure to contaminants, Western Power should be required to carry out a community health risk assessment to identify the lowest risk sites.

5.4.1.2 Response

All of the sites were assessed against the relevant criteria for the protection of community health (refer to the Atmospheric Emissions Section of each SER document) to ensure that the developments comply with these criteria. The sites are also surrounded by buffer zones or set back from sensitive land uses.

5.5 Social Benefits

5.5.1 Issue 85

5.5.1.1 Question

The number of jobs created should be compared to those likely to be created if the SWIS requirement were met from renewable energy.

5.5.1.2 Response

The scale of capacity required for the SWIS, 240MW and 300MW, is too large for renewable technology to be applied and there are other technical constraints, which are outlined in Section 3.2 of the SER documents. Any discussion comparing the jobs created from renewable energy developments and conventional fuel power station would be inappropriate given renewable energy options have been deemed technically unsuitable for the SWIS Power Procurement requirements.

5.5.2 Issue 86

5.5.2.1 Question

The social and economic benefits of meeting the SWIS requirement from renewable energy should be discussed.

5.5.2.2 Response

As discussed above (Issue 85, Section 5.5.1.2) and in Section 3.2 of the SER documents, renewable energy is technically unsuitable for the requirements of the SWIS Power Procurement Process.



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6 Project Justification

6.1.1 Issue 87

6.1.1.1 Question

Further emphasis on demand management may be capable of reducing demand thus delaying the need for additional generating facilities.

6.1.1.2 Response

Western Power acknowledges the benefits of and actively pursues demand side initiatives, seeking to reduce peaks in demand. This is highlighted by contracts currently in place and others being developed for interruptible and curtailable loads. Demand side initiatives will continue to remain an integral element in Western Power's forecasting and generation planning. However, unless industry and the community are prepared to accept increasing interruption to power supplies then additional power generation is needed as early as 2004/05.

Interruptible and curtailable tariffs are available to customers by contacting Western Power, however, there are some natural barriers that prevent the tariffs from being economic for all customers.

6.1.2 Issue 88

6.1.2.1 Question

Could, for example, the \$160m to build stage 1 at Kwinana be used to install energy efficient street lighting that would save 240MW of energy?

6.1.2.2 Response

An investment in energy efficient street lighting would lead to a reduction in energy consumption, however, the SWIS is a summer peaking network, typically in the middle of hot summer days when the air conditioner load is at it's greatest, not in the evening when street lighting is required. Therefore, such an investment in energy efficient street lighting would not match the timing of the energy required. Refer to the discussion in Section 2 of the SER documents on the different types of capacity necessary to efficiently run an electricity network. For an investment to be evaluated against the cost of constructing a new peak load power station, the investment would need to reduce the peak demand, often referred to as Demand Management, which is discussed in the response to Issue 87 (Section 6.1.1.2).

6.1.3 Issue 89

6.1.3.1 Question

What is Western Power's liability under the Renewable Energy (Electricity) Act 2000? How much renewable energy is expected to be installed under that policy? How does the policy influence the economics of renewable energy options?

6.1.3.2 Response

As part of its greenhouse management strategy, Western Power is committed to the implementation of renewable energy options under the *Renewable Energy (Electricity) Act 2000*. Western Power's commitments under the Act increase steadily towards 700,000 Renewable Energy Certificates (RECs) in 2010. To meet these commitments, Western Power opened the 22MW Albany Wind Farm in October 2001 and is actively working towards further renewable electricity generation.

Western Power is constructing a 1MW demonstration bio-energy plant at Narrogin based on the Integrated Wood Processing of coppiced mallee. The plant is scheduled for operation in early 2003, and is intended to prove the feasibility of further full-scale, 5MW plants in the South West.

A commitment to a further wind farm at Esperance, though not part of the South West Interconnected System (SWIS), has recently been made.

Other renewable generation initiatives are being considered in order to pursue Western Power's intent to meet its RECs commitments. The quantity of capacity will depend greatly upon the availability of the technology.

Further discussion on this issue is given in **Section 1.3** and the response to **Issue 24 (Section 2.7.6.2)**.

6.1.4 Issue 90

6.1.4.1 Question

More emphasis should be placed on wind-farms which have been demonstrated in Albany to be compatible with other land uses. As the number of strategically located wind-farms increases the potential for continuous supply is enhanced.

6.1.4.2 Response

Western Power is continuously looking to capitalise on renewable energy opportunities. The decision to develop a wind farm in Albany was strategically driven. Analysis of climatic conditions and peak demands revealed system peaks usually occur on hot still summer days in Perth at which time strong winds are experienced in the Albany area. Placing wind farms in locations that experience similar climatic conditions to Albany ensures that energy is supplied to the SWIS at times when it most needed.

The unique weather conditions of Western Australia partially offsets the increased expense of developing renewable energy and wind farms are ensured of a future role in energy production for the SWIS. However, the issues discussed in **Section 1.3.2** need to be considered.

6.1.5 Issue 91

6.1.5.1 Question

*An analysis should be carried out of the potential for wind turbines throughout the **Kwinana** industrial area and buffer zone with a view to reducing the need/size for fossil-fuelled power stations.*

6.1.5.2 Response

As mentioned above (**Issue 90, Section 6.1.4.2**), analysis of climatic conditions and peak demands has been undertaken revealing peak demand occurs on hot still summer days in Perth. As such the develop of a wind farm in the Kwinana area would fail to provide energy at times of peak demand, therefore failing to avoid an investment in fossil fuel generation.

6.1.6 Issue 92

6.1.6.1 Question

How is the total delivered cost of electricity minimised by the generation facilities proposed?

6.1.6.2 Response

Minimisation of the total delivered cost of electricity from the SWIS Power Procurement Process takes into consideration the following factors:

- ☐ Capital and operating costs associated with the generation options proposed;
- ☐ The infrastructure costs required for the Power Station. For example, to connect the new Power station to the Grid and costs associated with the proposed plant fuel supply options; and
- ☐ Impact of the proposed plant on existing SWIS operations and electricity contracts associated with the SWIS.

The above factors along with sensitivities associated with the likely environmental costs and changes in system load and economic drivers were all factored into the cost analysis. These studies, verified by an independent expert commissioned by the Independent Person supervising the Power Procurement Process, have identified that the initial power procurement requirements would best be met by the installation of around 240MW of peaking capacity.

Additional information is provided in the response to **Issue 99 (Section 6.1.13.2)**.

6.1.7 Issue 93

6.1.7.1 Question

There is insufficient data to underpin the future demand graph (Figure 2-2), for instance does it take into account:

- ☐ *the impact of the government's new energy efficiency drive;*
- ☐ *the impact of likely "carbon taxes";*
- ☐ *recently announced generation facilities such as Alinta.*

6.1.7.2 Response

Western Power undertakes modelling for power demand forecasts to determine the need for new capacity. The notional new generation requirements in Figure 2-2 of the SER documents is based on these modelling studies and incorporate assumptions regarding demand side initiatives and the load retained by Western Power's retail division in the contestable and non contestable markets. Losses of loads or alternate IPP supply sources are incorporated where known. Sensitivities relating to cost structures (i.e. impact of carbon taxes) are incorporated into evaluation of new plant options.

6.1.8 Issue 94

6.1.8.1 Question

To what extent will the bid evaluation process take account of:

- ☐ *ability to minimise greenhouse impacts;*
- ☐ *ability to maximise renewable energy including taking advantage of government financial incentives;*
- ☐ *ability to facilitate energy efficiency measures;*
- ☐ *minimisation of overall environmental impacts.*

6.1.8.2 Response

Western Power is a signatory to the ESAA Code of Environmental Practice and was the first company in WA to sign a Greenhouse Cooperative Agreement. Key action items of this Cooperative agreement are energy efficiency in Western Power operations and use of energy efficient technologies, and including where possible renewable and alternative energy solutions. Best commercially available technology would facilitate successful passage through the Section 38 environmental approval process, while minimising the total delivered cost in accordance with Schedule 7 of the Electricity Act. All generation options submitted to Western Power will be subject to scrutiny for energy efficiency and impacts on the environment (assessed by Western Power and the DEWCP/EPA).

6.1.9 Issue 95

6.1.9.1 Question

What is the evidence for the statement that biomass systems "are generally only practical in small-scale operations in Western Australia"?

6.1.9.2 Response

The fuel for a Biomass system must be collected and delivered to the plant. It is difficult to source sufficient fuel within a reasonable proximity for plant much greater than 10MW. The transport cost for biomass plant is a key driver and, given the SWIS requirement of 240 and 300MW, biomass was discounted as being suitable.

6.1.10 Issue 96

6.1.10.1 Question

Comparing the "footprint" of a wind farm with that of a coal burning power station is misleading since the wind farm does not preclude other land uses such as cropping, grazing.

6.1.10.2 Response

In the discussion on footprint sizes in the SER documents (Section 3.2.1) it was acknowledged that the area around the turbines could be used for other purposes, such as cropping and grazing.

6.1.11 Issue 97

6.1.11.1 Question

It is suggested that Collie and Kemerton sites are best in relation to minimal community impact.

6.1.11.2 Response

The Strategic Planning for Future Power Generation proposal has at this stage, identified five suitable sites, each with different advantages and disadvantages. This would enable developers to choose a site most suited to their generation proposal. The purpose of the SER is aimed at ensuring that a range of suitable sites are set aside for present and future power generation purposes, not to indicate a preference for one site over another.

6.1.12 Issue 98

6.1.12.1 Question

The statement that a 400MW plant is too large to be accommodated in the SWIS limits the available options and requires greater justification.

6.1.12.2 Response

The comment with respect to the 400MW plant was made in relation to a base load super critical steam cycle coal fired plant currently under development and which have a minimum size of 400MW. For the SWIS system a 400MW base load unit currently represents a high percentage of the overall SWIS demand within the context of the minimum load, as low as 925MW overnight. There are number of factors which preclude a plant 400MW in size from being considered within this current procurement process, including:

- ☐ The need to run existing mid merit and base load plant and their turn down limits under low load;
- ☐ Obligations under fuel contracts;
- ☐ Risks associated with system stability if the largest unit on the system was to trip; and
- ☐ The cost of spinning reserve to support a unit of that size.

6.1.13 Issue 99

6.1.13.1 Question

The summer peak demand runs for about 9 hours and is predictable – this seems more like a base or mid merit load where more efficient generators (e.g. combined cycle) might be used. Open cycle turbines would then only be necessary to cope with the winter peaks.

6.1.13.2 Response

As outlined in Section 2.1.3 of the SER documents, demand varies during the day and different types of plant are better suited to meet these varying demand profiles. The planned increase in peaking capacity is required to meet the projected increase in peak demand that would come into effect around breakfast and evening times and at isolated times on very hot days to meet, for example, air conditioning loads. Adding a mid merit plant or base load plant is likely to be less cost effective to meet this short term duration peak loads. The existing plant portfolio is structured to meet the varying requirements of the SWIS demand profile and additional capacity is now necessary. The SWIS plant portfolio is better maintained by initially procuring peaking plant. The next stage of power procurement will be aimed at procuring base load plant. As the need for further capacity presents itself the portfolio of plant and system demands will be reassessed and decisions on the optimum plant to install will be made.

6.1.14 Issue 100

6.1.14.1 Question

It is suggested that the technology proposed for Collie is based on uncleaned, briquetted or crumbled coal burnt in poorly aspirated furnaces. Reference is made to potentially cleaner burning and more efficient coal fuel such as CENfuel (see www.cleancoaltech.com/technology/combustion.process.htm).

6.1.14.2 Response

The objective of the Collie SER document is to obtain advice and “in principle” approval of the Collie site as being suited to accommodate coal fired generating plant. Advances in coal generation technology are beginning to yield substantial benefits and it is anticipated that any expansion of the Collie Power Station would make use of some of these developments. For example, CENfuel, which is cleaned coal, is capable of being used in higher efficiency combined cycle gas turbine plants.

Ultimately the developer will have the responsibility for selection of the technology they choose to employ. However, the technology would need to be proven, as an isolated network such as the SWIS can not afford to run the risk, cost or time, of major plant failing to deliver any capacity.

7 Infrastructure/Planning

7.1 Wastewater Disposal

7.1.1 Issues 101 and 102

7.1.1.1 Questions

*The use of Marriott road **Kemerton** for an additional wastewater pipeline raises issues in respect of other services such as the existing ocean outfall pipeline and a proposed rail line; the provision of water, gas and power networks at **Kemerton** needs to be resolved; it is suggested that a central wastewater treatment plant should be installed at **Kemerton** rather than develop separate ocean outfalls. These issues need to be resolved before further development occurs.*

*A need to expand the outfall at **Kemerton** may provide the opportunity to establish a common user facility.*

7.1.1.2 Response

Considerable planning has been undertaken for the Kemerton Industrial Park since the development of the Park in 1985 (e.g. from the original Fieldman Planning Study to the most recent Expansion Study). A number of detailed studies undertaken over this period have focussed upon issues including rail, transport, gas and power networks, water supply and wastewater disposal. These studies have resulted in the current Final Concept Plan for the Park, which is presented in Figure 4-2 of the Kemerton SER document. This concept plan has been adopted by the Western Australian Planning Commission (WAPC) and endorsed by the State Government as the preferred strategic planning framework for Kemerton (WAPC, 2000b). This plan is not yet promulgated, however it is currently being implemented through a number of planning mechanisms including the Greater Bunbury Region Scheme (GBRS), land ownership, town planning schemes, local planning strategies, subdivision and development control and government policy.

Western Power has consulted with MPR and LandCorp throughout the Strategic Planning process and has endeavoured to ensure that the power station development is consistent with the Kemerton Final Concept Plan. However, the fact that the Final Kemerton Concept Plan and common user infrastructure is not yet in place should not delay the establishment of future industries such as the power station. Rather, the power station should be regarded as a trigger to bring forward the construction of common user infrastructure and services.

For example, at present, there is no common user wastewater disposal infrastructure that is able to accept and discharge wastewater from industries within the Kemerton Industrial Park and each industry is required to manage its own wastewater disposal facility. This could potentially result in multiple ocean outfalls, a scenario that is not viewed favourably by the MPR, DEWCP or EPA (Burns and Roe Worley Pty Ltd, 1998; EPA, 1998).

To address this issue, the MPR have previously proposed that a central wastewater facility be considered that receives wastewater from industry within the Park. The centralised facility would essentially consist of a collection facility, an ocean outfall facility (as this is the recommended option for wastewater disposal) and a pipeline

connecting the two. At present, this is still in a concept phase and will not be developed any further until there is industry within the Kemerton Industrial Park that has a need for wastewater disposal.

As stated in Section 4.5.4 of the Kemerton SER document, use of a central wastewater disposal facility would be the preferred option for disposal of wastewater from the power station. However, given the uncertain timing of the proposed power station and of the centralised wastewater facility, the option of disposal of wastewater through the existing Collie Power Station ocean outfall was also considered.

7.1.2 Issue 103

7.1.2.1 Question

*The wastewater pipeline at **Kemerton** would be better routed parallel to Treasure Rd on the south side and then parallel to the Old Coast Rd east of the swamp to Buffalo Rd; this would be shorter and avoid Aboriginal sites.*

7.1.2.2 Response

The proposed pipeline route follows the planned service corridor for the Final Concept Plan for the Kemerton Industrial Park (BSD Consultants, 1997) within Industrial Core of the Kemerton Industrial Park. From this point, the proposed route follows Marriott Road to Old Coast Road, where it crosses the road and traverses north to Buffalo Road (see Figure 4-6 of the Kemerton SER document). Selection of the proposed wastewater pipeline route was based upon the following for the different sections of the pipeline:

- ❑ Section of pipeline within the Kemerton Industrial Park – Utilisation of the planned service corridor, which was proposed in the development of the Final Concept Plan for the Kemerton Industrial Park (BSD Consultants, 1997); and
- ❑ Section of pipeline outside the Kemerton Industrial Park – This follows the route proposed by Burns and Roe Worley (1998) in *Industrial Water Supply and Wastewater Management for the Kemerton Industrial Park* and is based upon detailed environmental and engineering investigations.

The proposed pipeline route would also link up with the proposed central wastewater facility near Marriott Road.

A pipeline route running parallel to Treasure Rd on the south side and then parallel to the Old Coast Rd east of the swamp to Buffalo Rd would not be consistent with the Final Concept Plan for the Kemerton Industrial Park and may result in the sterilisation of valuable land within the Kemerton Industrial Park.

The final pipeline route would be determined by the Preferred Bidder and would be undertaken in consultation with MPR and LandCorp. Should the Preferred Bidder choose to propose an alternative alignment to that assessed in the Kemerton SER document, The Preferred Bidder would be required to ensure that the route selected is environmentally acceptable and a detailed assessment would be presented in the Section 38 Environmental Review document for the final development proposal.

7.2 Access

7.2.1 Issue 104

7.2.1.1 Question

Clarification of site access at Kemerton is needed.

7.2.1.2 Response

The Kemerton area is well serviced by road access from all directions as it lies between the major north-south road links of the South West of Western Australia. Within the Kemerton Industrial Area, Wellesley Road, Treasure Road and Marriott Road are the major roads providing access to the Park.

The road network system proposed for the Kemerton Industrial Park in the Kemerton Expansion Study (BSD Consultants, 1997) proposed that Marriott Road would operate as the main distributor road, and would be expected to carry the majority of the industrial traffic. An additional north-south link would be constructed for additional support and access, as indicated in Figure 5-2 of the Kemerton SER document. The Kemerton Expansion Study indicated that the existing road network combining Marriott Road with Old Coast Road is of a satisfactory standard to accommodate expected traffic movements and traffic volumes to 2020 and beyond.

Should the proposed power station at Kemerton be developed prior to the road network system improvements, the existing roads would be required to support the increased traffic demands. Currently, Wellesley Road, Marriott Road and Treasure Road provide access into the existing industrial core from the Old Coast Road.

Wellesley Road traverses the Kemerton Industrial Park and forms a T-junction with Marriott Road to the east of the Wellesley River. Wellesley Road has largely been superseded by Marriott Road as the east-west connection between Old Coast Road and the South West Highway. Marriott Road traverses the southern section of the Kemerton Industrial Core, linking Old Coast Road to South Western Highway. The other access road, Treasure Road, runs in an east-west direction from Old Coast Road across the Kemerton Industrial Park. This road is not in very good condition and the Shire has no plans for it to be upgraded.

A Gwalia haul road has been constructed through the Kemerton Industrial Park that runs from Marriott Road. Part of this haul road runs past and provides access to the preferred site. The Gwalia haul road is currently a private road for the Kemerton Silica Sand mine. It is intended that the portion of this haul road that provides access to the preferred site would be taken over by LandCorp for public use.

The possible combined impact of increased traffic densities on the existing internal road system from a number of developments has not been considered in this response. It is assumed that the road improvements as suggested by BSD Consultants (1997) will be in place before a significant number of industries are established.

7.3 Planning

7.3.1 Issue 105

7.3.1.1 Question

Kwinana/Cockburn Sound is unsuitable for industrial development; another power station will exacerbate the situation; alternative sites should be sought e.g. Byford, Oakford or Wandii.

7.3.1.2 Response

The Kwinana Industrial Area was established in the early 1950s and has developed as the State's primary area of industrial development, with major drivers being its proximity to the sheltered water of Cockburn Sound, a ready supply of labour from Perth and Fremantle, and a willingness by the government to develop a dedicated heavy industrial area (Sinclair Knight Merz, 2002).

Western Power has undertaken a comprehensive site selection study covering the region between Geraldton and Bunbury to identify suitable parcels of land to meet the future power generating requirements of the SWIS (Sinclair Knight Merz, 2000). This site selection process and the results of the study are provided in Section 3.4 of the Kwinana SER document. The following benefits were found from the study which demonstrates that a gas-fired power station within the Kwinana Industrial Area is one of five (Pinjar, Kwinana, Kemerton, Bunbury and Collie) of the most suitable sites:

- ❑ The Kwinana Industrial Area is an established major industrial area;
- ❑ Availability of services and infrastructure;
- ❑ Close to the major load demand of the SWIS, which would result in smaller transmission losses;
- ❑ Lower cost of connection to gas and transmission infrastructure;
- ❑ Availability of water through the Cape Peron pipeline and possibility of seawater cooling; and
- ❑ Detailed studies have already been conducted into air emissions, noise, water supply and waste management.

A gas-fired power station is a utility type industry that is relatively environmentally benign compared to typical heavy industry. Discharges from a power station include noise, air emissions and wastewater. The Kwinana SER document demonstrates the following:

- ❑ The power station would not significantly contribute to existing noise levels (Section 8.4.3.3 of the Kwinana SER document);
- ❑ Air emissions would comply with air quality standards including NEPM standards and Kwinana Environmental Protection Policy limits and standards (Section 8.4.1.4 of the Kwinana SER document); and
- ❑ The preferred water supply option would maximise the potential of wastewater recycling resulting in a net reduction of wastewater being discharged to the Cape Peron pipeline (Section 4.5.3 of the Kwinana SER document).

7.3.2 Issue 106

7.3.2.1 Question

Site D at Kemerton is not yet zoned industrial and therefore site A may be preferable in view of the time constraints however site D is preferred since the other sites are better suited to heavier industry.

7.3.2.2 Response

As discussed in Section 4.5.1 of the Kemerton SER document, Site D was selected as the preferred site within the Kemerton Industrial Park because of the following:

- ☐ Proximity to natural gas and power transmission lines;
- ☐ Noise emissions from the site would comply with criteria at the boundary of the buffer zone; and
- ☐ The site is consistent with the Final Concept Plan for the expansion of the Kemerton Industrial Park such that it minimises fragmentation of larger areas of the core, leaving these areas available for future major industrial developments (Figure 4-2 of the Kemerton SER document).

Site D is located within the existing Kemerton Industrial Park Buffer zone, but within the area identified as future Industrial Core under the Final Concept Plan for the Kemerton Industrial Park. This concept plan has been endorsed by the WAPC and the State Government and is currently being implemented through a number of planning mechanisms including the GBRS (WAPC, 2000b).

Access to the preferred site depends on the implementation of this Final Concept Plan. Given the uncertainties in the timing of implementation of the Final Concept Plan, Western Power will also secure access to a second site (Site A in Figure 4-2 of the Kemerton SER document) as a fallback site option. Site A is entirely contained within the existing Industrial Core.

In the meantime, discussions are underway with LandCorp, the local authority and the Regional Planning authority to initiate a rezoning of the Preferred Site (Site D), shown in **Figure A-5**. Modifications to the lease boundary of the fallback Site A are being negotiated with LandCorp and MPR, and the revised boundaries are discussed in **Section 1.4.2** and shown on **Figure A-6**.

7.3.3 Issue 107

7.3.3.1 Question

For all sites Western Power should be able to provide indicative data on the need for new major feeder roads, service corridors and power lines to enable the potential impacts to be estimated.

7.3.3.2 Response

A summary of the indicative requirements for new major feeder roads, service corridors and power lines is given in **Table 7-1**.

■ **Table 7-1 Indicative New Major Feeder Road, Service Corridor and Power Line Requirements for Each Site**

Site	Feeder Roads	Service Corridors	Power Lines	Switchyards	Gas Supply	Cooling Water Supply ¹	Other
Kwinana (Mason Rd) Site 1	No additional feeder road required.	Corridor for new power lines for initial and future developments.	New 330kV power lines 2.5km length.	Conventional open air	No major pipeline. 560m lateral required in existing easement.	From Cape Peron wastewater treatment system. ² Discharge to Cape Peron pipeline.	Ground contamination issues. Additional sound attenuation measures required.
Kwinana (Donaldson Rd) Site 2	No additional feeder road required.	Corridor for new power lines for initial and future developments.	New 330kV power lines 1.6km length.	GIS required because of site size constraints	No major pipeline or lateral required.	From Cape Peron wastewater treatment system. ² Discharge to Cape Peron pipeline.	Ground contamination issues. Minor additional sound attenuation required.
East Rockingham (Patterson Rd) Site 3	No additional feeder road required.	Corridor for new power lines for initial and future developments.	New 330kV power lines 6km length.	Conventional open air	New lateral of 3.25km, 250 mmNB required in Rockingham/Patterson Rd road reserve.	From Cape Peron wastewater treatment system. ² Discharge to Cape Peron pipeline.	Sterilisation of any commercial development along Rockingham/Patterson Rd.
East Rockingham (Mandurah Rd) Site 4	No additional feeder road required.	Corridor for new power lines for initial and future developments.	New 330kV power lines 5km length.	Conventional open air	New lateral 4km, 250 mmNB required in Rockingham/Patterson Rd road reserve and then along Office Rd reserve.	From Cape Peron wastewater treatment system. ² Discharge to Cape Peron pipeline.	Minor additional sound attenuation required.
Kemerton Preferred Site D	No additional feeder road required. Upgrade of access road required.	None required.	No new power lines	Conventional open air	New 5.34km, 250 mmNB required from MLV 154 in existing DB pipeline reserve.	From surface water sources. ³ Discharge to ocean via pipeline.	No particular constraints.
Kemerton Fallback Site A	No additional feeder road required.	Corridor for new power lines for initial and future developments.	New 330kV power lines 1.6km length.	Conventional open air	New 7.5km, 250 mmNB required from MLV 154 in existing DB pipeline reserve.	From surface water sources. ³ Discharge to ocean via pipeline.	No particular constraints.
Pinjar	No additional feeder road required.	None required.	None required	Conventional open air	No new pipelines required.	No cooling water supplies required.	Open cycle plant only, limited to 240MW maximum.
Bunbury	No additional feeder road required. Upgraded access road required.	None required for initial 240MW development. Further station development may require new corridor to existing transmission lines.	None required for initial 240MW development	GIS required because of site size constraints	New 31.5km, 250 mmNB required from MLV 154. Initially in DB pipeline reserve then along Australind By Pass reserve and then in Glen Iris service corridor.	No cooling water supplies required.	Open cycle plant only, limited to 360MW maximum.
Collie	No additional feeder road required.	None required.	None required.	None required.	None required.	Increased cooling water supplies required either from existing or new facilities.	Infrastructure facilities mostly already in place. Expansion of existing ash ponds required.

Notes:

- 1) Cooling water supplies are only required for combined cycle plant that utilise conventional evaporative cooling towers. No cooling water supplies are required for open cycle gas turbine plant or combined cycle plant with air-cooled condensing.
- 2) Seawater cooling is an option for all four sites in Kwinana/East Rockingham, but would be subject to a separate referral should this be considered by the Preferred Bidder.
- 3) The Preferred Bidder may wish to consider groundwater sources.

7.3.4 Issue 108

7.3.4.1 Question

*The **Pinjar** site is within the Priority 1 Public drinking Water Source Area and any expansion of activities would be considered incompatible unless the proponent can demonstrate that it can be managed to the satisfaction of the WRC.*

7.3.4.2 Response

The protection of groundwater quality over the Gnangara groundwater mound has always been given highest priority by Western Power. The same high priority of containment and management of discharges to protect groundwater resources from any proposed expansion at Pinjar would be enforced through management strategies outlined in Sections 7.3.3, 7.4.3 to 7.4.5, 8.3.1, 8.3.2 and 8.4.4 to 8.4.7 of the Pinjar SER document.

7.3.5 Issue 109

7.3.5.1 Question

*Use of the **Bunbury** site is inconsistent with its zoning (Port Industry) under TPS 5 and TPS 7 and with the Bunbury – Wellington Regional Plan, the Greater Bunbury Regional Scheme and the State Coastal Statement of Planning Policy – a power station would reduce the area available for activities which require a port location.*

7.3.5.2 Response

Town Planning Schemes

The Town Planning Schemes (TPS) applicable to the Bunbury site are the City of Bunbury Town Planning Scheme (TPS) Nos. 6 and 7. Under TPS No. 6 the site is zoned for 'Port Industry'. The city of Bunbury has advised that a proposed gas powered power station would be assessed as either a 'Public Utility' or 'General Industry' use which requires Council's discretionary approval under the 'Port Industry' zone (Roberts Day Group, 2002).

Draft TPS No. 7 is subject to final approval by the Minister for Planning. Under this scheme the site is also zoned for 'Port Industry' however there will be no 'Public Utility' use class. In this scenario the City of Bunbury has advised that a gas-fired power station would constitute a 'General Industry' or 'Hazardous Industry' use, which are both proposed to be classified 'A' uses in the 'Port Industry' zone (Roberts Day Group, 2002). The 'A' classification requires that the application be advertised for a two-week period.

Greater Bunbury Regional Scheme (Draft)

Under the draft Greater Bunbury Region Scheme, which is yet to be finalised and approved by the Minister for Planning, the site is zoned 'Port Installations'. An assessment of this zoning by Roberts Day Group (2002) indicates that the power station is consistent with this zoning.

Bunbury – Wellington Region Plan

The site is located in planning unit BU4/P1: Bunbury Port as defined in the Bunbury – Wellington Region Plan. Although the region plan indicates preference for the planning unit to support Port related industries the site currently supports the

decommissioned Old Bunbury Power Station. The benefits in siting a new power generating plant at this site are stated in Section 3.4.6 of the Bunbury SER document and include:

- ❑ The site is already disturbed, so no additional clearing would be required;
- ❑ The site is situated adjacent to other industrial and port facilities and additional land for a buffer would not be required; and
- ❑ The site was recently sold to the Bunbury Port Authority and could be leased back by Western Power for the purpose of power generation.

State Coastal Statement of Planning Policy (Draft)

This Policy is in draft form and has been recently issued for public comment by the Department for Planning and Infrastructure and is yet to be finalised and approved by the Minister for Planning. The objectives of the Policy are to provide for:

- ❑ Protection, conservation and enhancement in areas of landscape, nature reserve, indigenous and cultural significance;
- ❑ Public foreshore areas and access to these on the coast;
- ❑ The sustainable use of the coast for housing, tourism, recreation, ocean access, maritime industry, commercial and other activities in appropriate area; and
- ❑ The location of coastal facilities and development that takes into account coastal processes including erosion, accretion, storm surge, tides, wave conditions, sea level change and biophysical criteria.

Policy measures include the provision of a foreshore management plan, coastal development setback guidelines, requirement for clear demarcation between public and private land, assurance that waste and stormwater discharges are not likely to degrade the coastal environment, and consideration of strategic sites for coastal access.

The Bunbury SER document provides details on how the proposed power station would be managed in terms of the above Policy issues. A summary of how the proposed power station development would ensure compliance with the policy objectives is:

- ❑ No areas of landscape, nature reserve, indigenous and cultural significance are expected to be disturbed by the proposed power station (refer to Sections 7.3.1, 9.3, 9.6 and 9.7 of the Bunbury SER document);
- ❑ The proposed power station would not impede public access to the foreshore (refer to Section 4.6.2 and 9.3 of the SER);
- ❑ The proposed power station would not prevent access to Turkey Point, The Cut or other nearby areas that are used for recreation, nor is the power station expected to impact on other nearby recreational areas (refer to Section 4.6.2 and 9.3 of the Bunbury SER document); and
- ❑ The proposed power station development does not involve any ocean outfall or other coastal facilities (refer to Section 6.11 of the Bunbury SER document).

Compatibility with Port Operations

As discussed in **Section 1.4.3**, Western Power the site layout has been refined in consultation with the Port Authority to ensure that the land available for port related industries is optimised and the proposed power station does not compromise other port activities.

7.3.6 Issue 110

7.3.6.1 Question

The SER for Kwinana does not adequately justify the site within IP14 against the guiding principles, policies and criteria of Statement of Planning Policy No. 7.1.

7.3.6.2 Response

The sites within IP14 are fallback sites for the Kwinana area. Both sites are located in an area designated by the IP14 structure plan as Precinct 2 for 'Environmentally Acceptable Heavy Industry'.

The Statement of Planning Policy No 7.1 'Environmental Protection (Industrial Development)' was developed by the City of Rockingham in 1990 with the primary objective of establishing 'guiding principles and policies for the environmental acceptability of industrial development on industrial zoned land with the City of Rockingham, predominantly within the IP14 area.' This Policy is in draft form and has been included in the review of the City of Rockingham's Town Planning Scheme No. 1.

The Planning Policy is supported by specific policies addressing five environmental headings, which include air quality, risks and hazards, noise, water quality and social environment. The principles and criteria of each of these areas in relation to the proposal are discussed below.

Air Quality

The policy recommends the implementation of interim air quality guidelines (Table 7-2) for residential areas. The policy states that these interim levels are based on the lowest standards currently in force by the Victorian and WA EPA, the World Health Organisation and the National Health and Medical Research Council.

■ **Table 7-2 SPP No. 7.1 Recommended Interim Guidelines for Air Quality Parameters**

Contaminant	Standard ($\mu\text{g}/\text{m}^3$)	Limit
Nitrogen dioxide (1-hr average)	280	400
Ozone (1-hr average)	120	240

Section 8.4.1.4 of the Kwinana SER document predicts that maximum 1-hour concentrations of nitrogen dioxide at the nearest residential area would range from 7 to $12\mu\text{g}/\text{m}^3$ for the 240MW open cycle gas-fired power station to 100 to $125\mu\text{g}/\text{m}^3$ for the 540MW combined cycle with 360MW open cycle operating on liquid fuel without water injection. These levels are within the recommended guidelines stated in the City's Statement of Planning Policy.

More recently, air quality standards have been derived as a part of the National Environmental Protection Measure (NEPM) (NEPC, 1998). The DEWCP intends to implement these standards through the development of a statewide Environmental Protection Policy, as discussed in the document *Developing a Statewide Air Quality Environmental Protection Policy* (EPA, 1999b), and as such are more relevant for the proposed development than the recommendations of SPP No 7.1. These NEPM standards and goals, as indicated in Table 7-3, are generally more conservative than those recommended in Statement of Planning Policy No 7.1. The air quality

modelling work completed for the Kwinana SER document (Section 8.4.1.4) indicates that the expected concentrations of pollutants from the proposed power station development would comply with NEPM standards.

■ **Table 7-3 National Environmental Protection Measures – Standards and Goals**

Pollutant	Averaging Period	Maximum Concentration		Goals within 10 years Maximum allowable exceedances
		ppm	Equivalent ($\mu\text{g}/\text{m}^3$) ¹	
Carbon monoxide	8-hours	9.0	11,240	1 day a year
Nitrogen dioxide	1-hour	0.12	246	1 day a year
	1 year	0.03	62	none
Photochemical oxidants (as ozone)	1-hour	0.10	214	1 day a year
	4-hours	0.08	171	1 day a year
Sulfur dioxide	1-hour	0.20	570	1 day a year
	1 day	0.08	228	1 day a year
	1 year	0.02	57	none
Lead	1 year	-	0.5	none
Particles as PM ₁₀	1 day	-	50	5 days a year

The Statement of Planning Policy also supports the installation of the most sophisticated industrial pollution control technology available and integrated monitoring programmes to ensure emissions objectives. The Kwinana SER document (Section 8.4.1.1) specifies the requirement to achieve best practice in relation to air emissions and includes the options of water injection and dry low NO_x burners. At this conceptual proposal stage, detailed information on pollution control technology is not available. During the subsequent environmental approval process under Section 38, the Preferred bidder would be required to demonstrate Best Practice such that emissions are minimised as far as practicable.

Risks and Hazards

The Policy recommends the following requirements for new industries:

- ☐ Compliance with individual fatality risk criterion;
- ☐ Acceptable risk levels in residential areas;
- ☐ Compliance with the 50×10^{-6} per year individual fatality risk limit at the site boundary;
- ☐ Compliance with $0.5\text{--}1.0 \times 10^{-6}$ per year risk level for sensitive developments; and
- ☐ Compliance with 10×10^{-6} per year risk level for non-industrial activity in the buffer zone.

Risk and public health is discussed in Section 9.3 of the Kwinana SER document. At this conceptual stage of the proposal, it is not possible to undertake a quantitative risk assessment to estimate risk of fatality as detailed design information is not available. The Kwinana SER document does provide a preliminary review of the potential risks and concludes that (with reference of off-site risk):

- ☐ The proposed power station would impose no greater risk to the public and environment than existing surrounding industries in the industrial area;
- ☐ The transport of hydrocarbon products to the power station poses a low risk;
- ☐ The transport of hazardous goods to the power station is in minor volumes only and this imposed no greater risk than other material cartage in the region; and

- ❑ The risk created by a new gas pipeline lateral to the site is no greater than the risk associated with existing gas pipelines in the area.

Risk assessments performed for the Fremantle Rockingham Industrial Area Regional Strategy (FRIARS) included considering the effect of notional high-risk industries, such as petrochemical and aluminium trifluoride plants. As a part of a full development scenario study, a petrochemical plant was modelled in approximately the location of the preferred power station site (Site 1). The East Rockingham Industrial Park (IP14 Area) was also included in the previous risk assessment, and major hazard facilities were assumed to be located on the fallback sites (options 3 and 4), south of Office Road. This study indicated that the EPA residential criteria are met with the inclusion of high-risk industries. Since the power station is not considered a major hazard facility, all sites would be acceptable in terms of risk and public safety.

During subsequent environmental approvals under Section 38, the Preferred Bidder would be required to undertake a Quantitative Risk Assessment to confirm that the development meets relevant criteria.

Noise

The Policy reiterates the need for new industry to meet *Environmental Protection (Noise) Regulations 1997*. With relation to noise levels emitted from either option within the IP14 site, noise contours indicate that noise levels could be acceptable and the power station is not considered to “significantly contribute” (i.e. is below 5dB(A) of the criteria) to existing noise levels. This has been addressed previously in a similar query in **Issue 83 (Section 5.3.2.2)** and further discussion on this issues is given in **Section 1.4.1.1**.

Water Quality

The Policy states that planning approval should be based upon the principles of sustainable yield, assimilative capacity and a minimal pollution discharge target. On the basis of this principle the Policy recommends the following (with relevance to the proposal):

- ❑ No industrial requiring large groundwater draw should be permitted unless demonstrated that it is sustainable;
- ❑ No industry proposed to dispose liquid effluent on site by infiltration should be allowed;
- ❑ Industries proposing limited discharges should be assessed on their merits and cumulative effects;
- ❑ Discharges to the marine environment of significant volume and mass of contaminants should not be permitted and minor discharges of pollutants be permitted subject to clear demonstration of assimilative capacity of the marine environment; and
- ❑ Major proposals for oceanic discharge should be subject to rigorous evaluation of impacts on nearshore environments, regional environment, role of oceanic exchange processes in control of carbon dioxides and sediment transport and stability of submarine pipelines.

The water supply and disposal options for the Kwinana site are discussed in Section 4.5.3 of the Kwinana SER document. No groundwater would be required and there is no proposal to dispose liquid effluent on site by infiltration. The preferred option is to recycle Cape Peron treated municipal effluent with reinjection back into the Cape

Peron pipeline. The Cape Peron pipeline discharges to the Sepia Depression south of Cockburn Sound.

The discharge of wastewater via the Cape Peron pipeline satisfies the waste management principles of water minimisation and recycling and reuse. This has been discussed previously to in response to **Issue 66 (Section 4.4.1.2)** and **Issue 67 (Section 4.4.2.2)**.

Social Environment

The Policy states that in assessing development applications for industry, impacts on the following should be specifically considered:

- ❑ Visibility of industry from residential areas, recreation areas and major thoroughfares;
- ❑ Any other impacts (e.g. light spill) on residential areas, recreation areas and major thoroughfares;
- ❑ Skill requirements of the industry and the potential for local employment; and
- ❑ The potential for multiplier impacts benefiting the local economy.

The impacts on visual amenity and recreation are discussed in Sections 9.5 and 9.6 of the Kwinana SER document in relation to the preferred site in the Kwinana Industrial Core. As the IP14 sites are nominated as fallback sites a detailed assessment of social impacts was not considered necessary. Should either Site 3 or 4 be selected as the most viable option, the Preferred Bidder would be required to undertake an assessment of potential social impacts as part of obtaining environmental approvals under Section 38 of the *Environmental Protection Act 1986*.

Through this assessment the Preferred Bidder would be in a position to highlight the potential benefits (in terms of employment and multiplier effects) and demonstrate that potential social impacts would be acceptable.

7.3.7 Issue 111

7.3.7.1 Question

Gas fired power stations should not be located on scarce heavy industrial land in Kwinana. Although Lot 15 may have cost advantages, no consideration has been given to the hidden 'opportunity cost' to the state of having to forego using Lot 15 for a large new export industry needing a port and a large buffer.

7.3.7.2 Response

Although the Kwinana SER document demonstrated that the power station could be implemented in an environmentally acceptable manner, the power station is an industrial facility and therefore the siting of it is an important consideration. The power station site requires appropriately zoned industrial land and a buffer zone to protect the community from potential noise and air quality impacts. The Kwinana Industrial Area is therefore suitable for the proposed power station as it offers industrial zoned land and is separated from the community by a formal buffer zone.

The Kwinana Industrial Area also offers the economic benefits of proximity to major infrastructure such as gas, water supply and to the customer load centres. A primary objective of the Power Procurement Process is to minimise the total delivered cost of

electricity to consumers. Therefore, by reducing these costs, the Preferred Bidder would be able to supply lower cost electricity to consumers.

The preferred power station site is located on the southern half of Lot 15 Mason Road. The Global Olivine Waste to Energy Plant has also identified Lot 15 Mason Road as their preferred site. Careful planning and detailed design of the site layout has been undertaken to ensure that the power station fits within the bottom half of the site, leaving the northern half for the Global Olivine proposal (refer to **Figure A-1** in **Appendix A**). This site is considered to be a suitable location for a power station development for various reasons, including:

- ☐ Provides a buffer zone to contain noise and air emissions;
- ☐ Is located adequate distance from nearest residences;
- ☐ Provides easy access to existing power and gas infrastructure (refer to **Table 7-1**);
and
- ☐ Maintains a seawater cooling option.



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8 Resources

8.1.1 Issue 112

8.1.1.1 Question

Recent studies in the US (Kalyoncu, RS, 2000; Coal Combustion Products; US Geological Survey. <http://minerals.usgs.gov/minerals/pubs/commodity/coal/874400.pdf>) indicate that much of the combustion products of coal burning can be used in a range of economically viable processes – has Western Power considered such uses?

8.1.1.2 Response

The above mentioned paper presents a review of the uses of coal combustion products (CCPs), that are produced in large quantities from electricity generation and focuses mainly on the United States. CCPs include fly ash, bottom ash, boiler slag and flue gas desulphurisation material. This paper reports that during 2000, approximately 98 million tonnes of CCPs were produced in the United States, of which approximately 30% was used, with the major proportion being fly ash used in structural applications.

The uses of CCPs depend on the chemical and physical properties of the product. Uses include cement and concrete, mine backfill, agriculture, blasting grit, roofing applications, waste stabilisation, road base/sub-base, and wallboard production (synthetic gypsum). Potential flue gas desulphurisation gypsum uses also include applications in subsidence and acid mine drainage control as fillers and extenders.

The value of these products is well established by research and commercial practice, particularly in the United States. However, the opportunities for reuse of these products in Western Australia is generally limited, as the existing market for these products is not set up to rely on power stations as a major source of the products or to accommodate additional material from a new source. In spite of this, Western Power has been undertaking ongoing research and investigations in the recycling of fly ash for a number of years (Western Power Corporation, *Fly Ash in Western Australia*, undated).

During the 2000/2001 financial year, Western Power reported the following activities in the area of ash recycling (Western Power Corporation, 2001):

- Continued investigations in association with the University of Western Australia into recycling of fly ash from the Kwinana Power Station for agricultural applications.
- Investigations into the use of fly ash from the Kwinana Power Station in the manufacture of clay bricks. Initial laboratory feasibility tests were positive and production evaluation trials were successful. The initial proposal was for 30,000 tonnes to be supplied over the 2001/2002 summer, increasing to 120,000 tonnes in total.
- Investigation of other commercial applications of fly ash resulted in 1,970 tonnes from Muja Power Station being recycled for the following projects:
 - Canning Dam refurbishment;
 - Harvey Dam spillway;
 - Kalgoorlie Hazardous Waste Co-disposal; and
 - Drainage pipes in the Kwinana Freeway upgrade.

- ❑ Recycling of 18,000 tonnes of bottom ash from Muja Power Station for use as base for the new water pipeline being constructed between the Harris River Dam and the new Harvey Dam.
- ❑ Sponsorship of research by Curtin University into engineering uses for industrial waste such as fly ash.

Western Power is currently in negotiations that will see all fly ash from the Muja and Collie Power Stations recycled. Western Power will encourage the Preferred Bidder to investigate options for recycling of fly ash.

8.1.2 Issue 113

8.1.2.1 Question

Gas will be seen as a replacement for vehicle fuel when oil reserves run out some time in the first half of this century therefore over reliance on gas is an unsound strategy and all power stations should be dual-fuelled with powdered coal as the primary fuel and petroleum gas as the reserve fuel.

8.1.2.2 Response

Western Power is unable to foresee what the fuel requirements for motor vehicles will be in the future as oil reserves become depleted. A range of options are being evaluated by car manufacturers and researchers according to the press. While natural gas is an option, there is no guarantee that it will be the favoured decision of the wider community.

Western Power has proposed five strategic power station sites to meet the foreseeable future electricity needs of the Southwest region of Western Australia. Of these, the Collie Power Station Expansion proposes coal as the primary fuel. Should this proposal be selected for the power procurement process, this will have some effect in prolonging the life expectancy of the Nation's gas reserves. The use of coal as a fuel at the other sites is not considered appropriate due to environmental factors associated with emissions from the power stations and the transport and crushing of the coal, duty cycle requirements and economic considerations.

Transport and crushing of coal presents a potential environmental risk. There would be requirements for either rail or road transport to deliver coal to the power stations. This increases the risk for an accident with potential for human and environmental harm. If the coal crushing to a powder as suggested was to occur at the mine site then there could be a significant dust problem from any accident. Alternatively if the crushing were to occur at the power stations then there is greater potential for dust emissions near residential areas.

The duty cycle requirement of the proposed power stations was a major factor in the choice of fuel. The Collie Power Station Expansion is the only station proposed as a base load facility from inception, and is well suited to coal firing. Coal firing is far less suitable for peak load and mid merit plant, as coal fired plant can not be readily adjusted to meet the varying demand for electricity.

A discussion of the different fuel options has been provided in Section 3.2 of each SER document and the reader is directed to these for more detail.

8.1.3 Issue 114**8.1.3.1 Question**

The potential for additional coal mining and its impacts is not sufficiently canvassed e.g. will mining be extended to the southern Collie basin and what impact will that have?

8.1.3.2 Response

As stated in Section 1.4 of the Collie SER document, the purpose of the document was to seek strategic advice and 'in principle approval' for a 300MW expansion of the existing Collie Power Station. The Collie SER document therefore only covered potential impacts relating to the construction and operation of the power station, the activities that would be under the direct control of the power station operator.

An independent party would supply coal to the power station under an arrangement with the Preferred Bidder. The coal supplier would be responsible for mining of the coal and management of any environmental impacts. It is beyond the scope of the Collie SER document to examine the requirements for additional coal mining, any potential impacts and environmental management strategies. Rather, this would be undertaken by the coal supplier and would be subject to separate environmental approvals.



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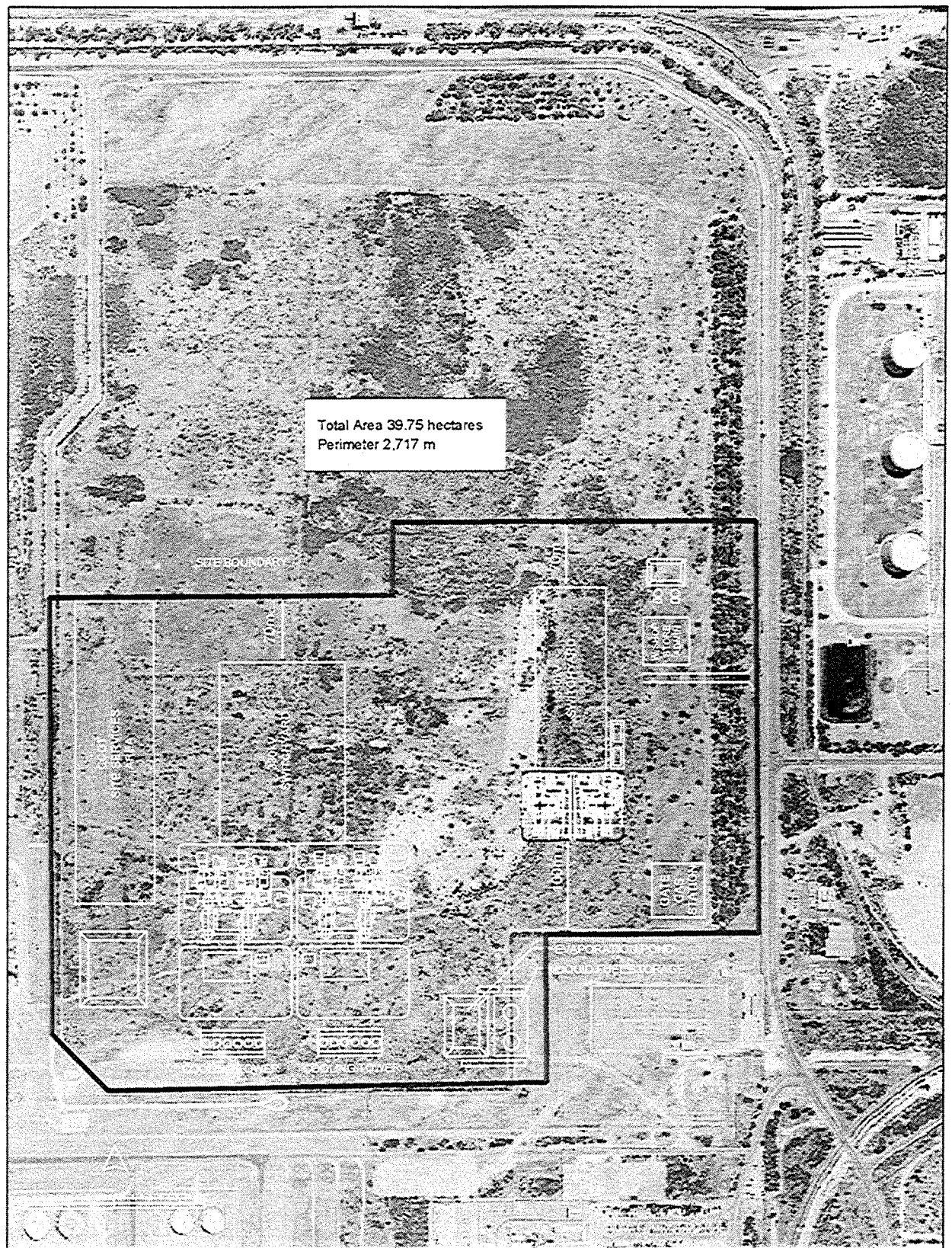
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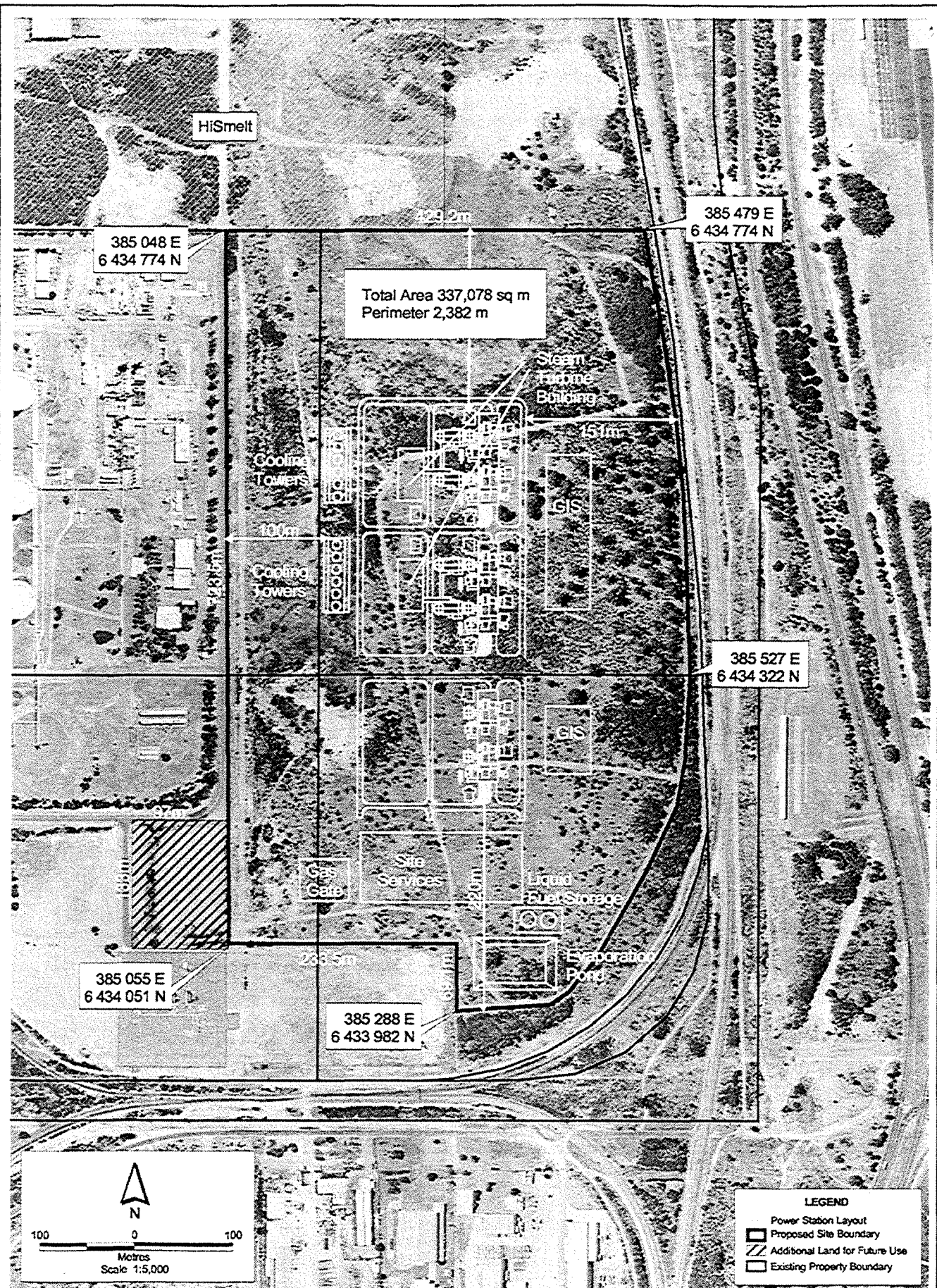
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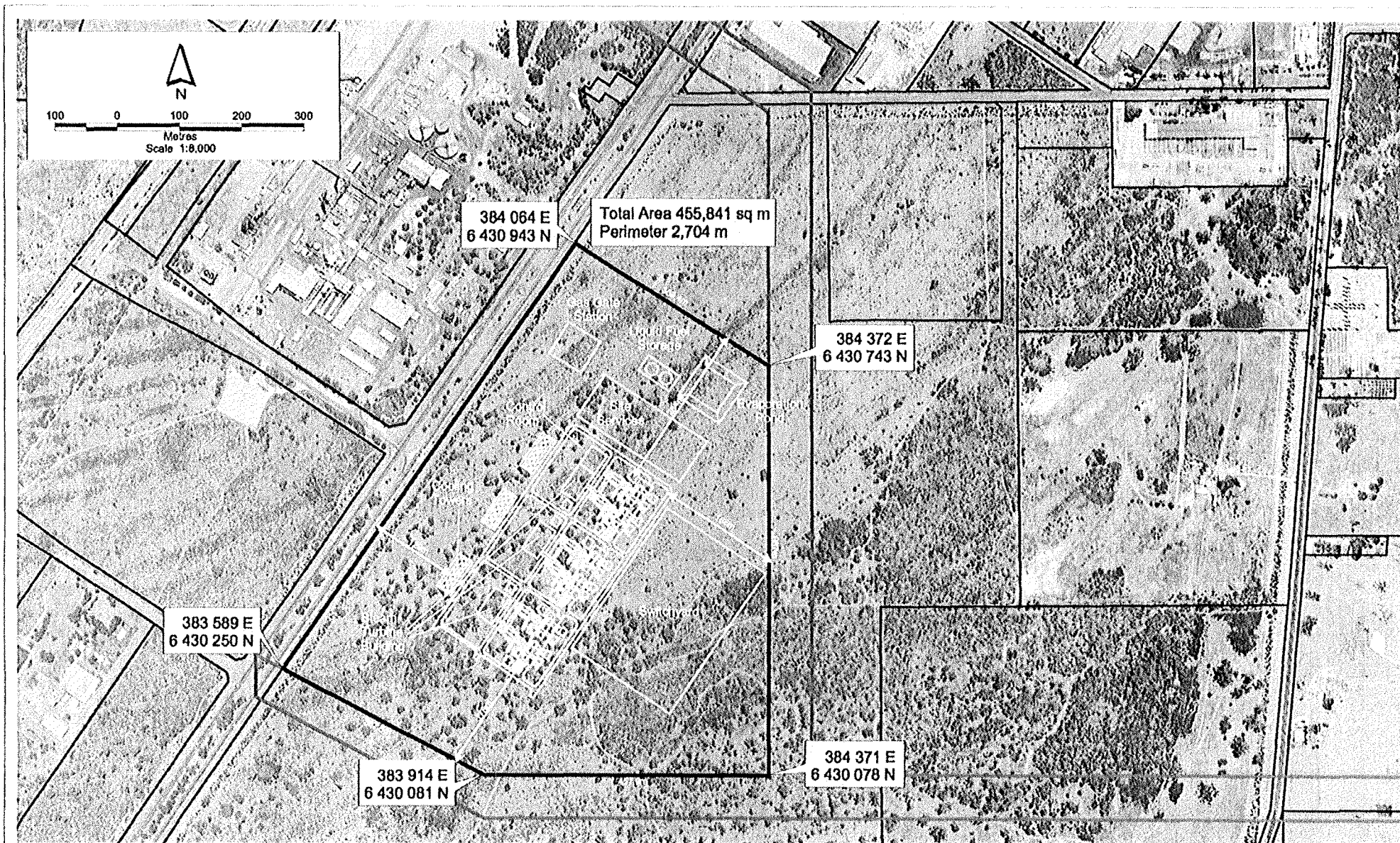
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Appendix A Revised Development Concepts for Kwinana/East Rockingham, Kemerton and Bunbury







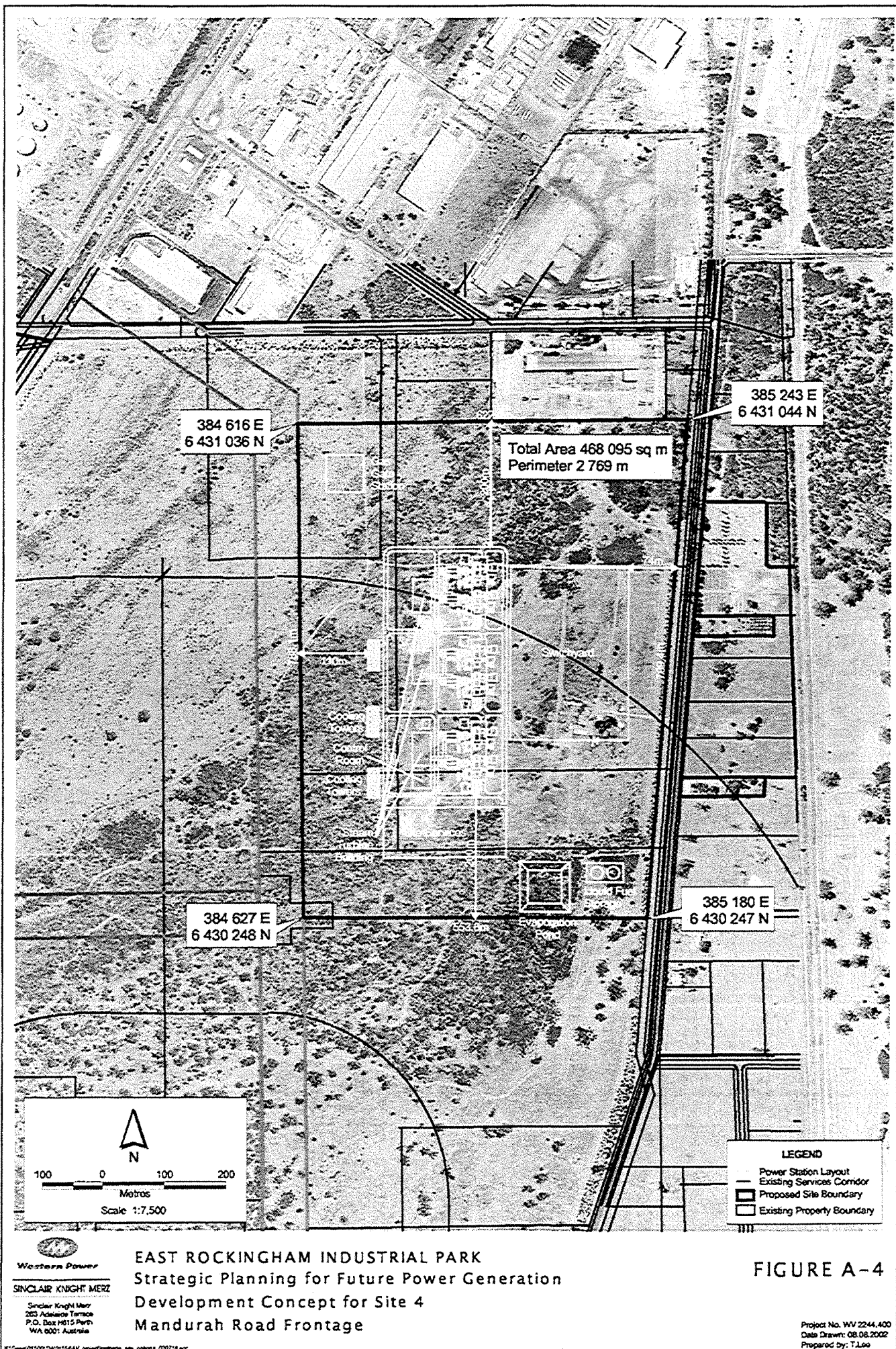

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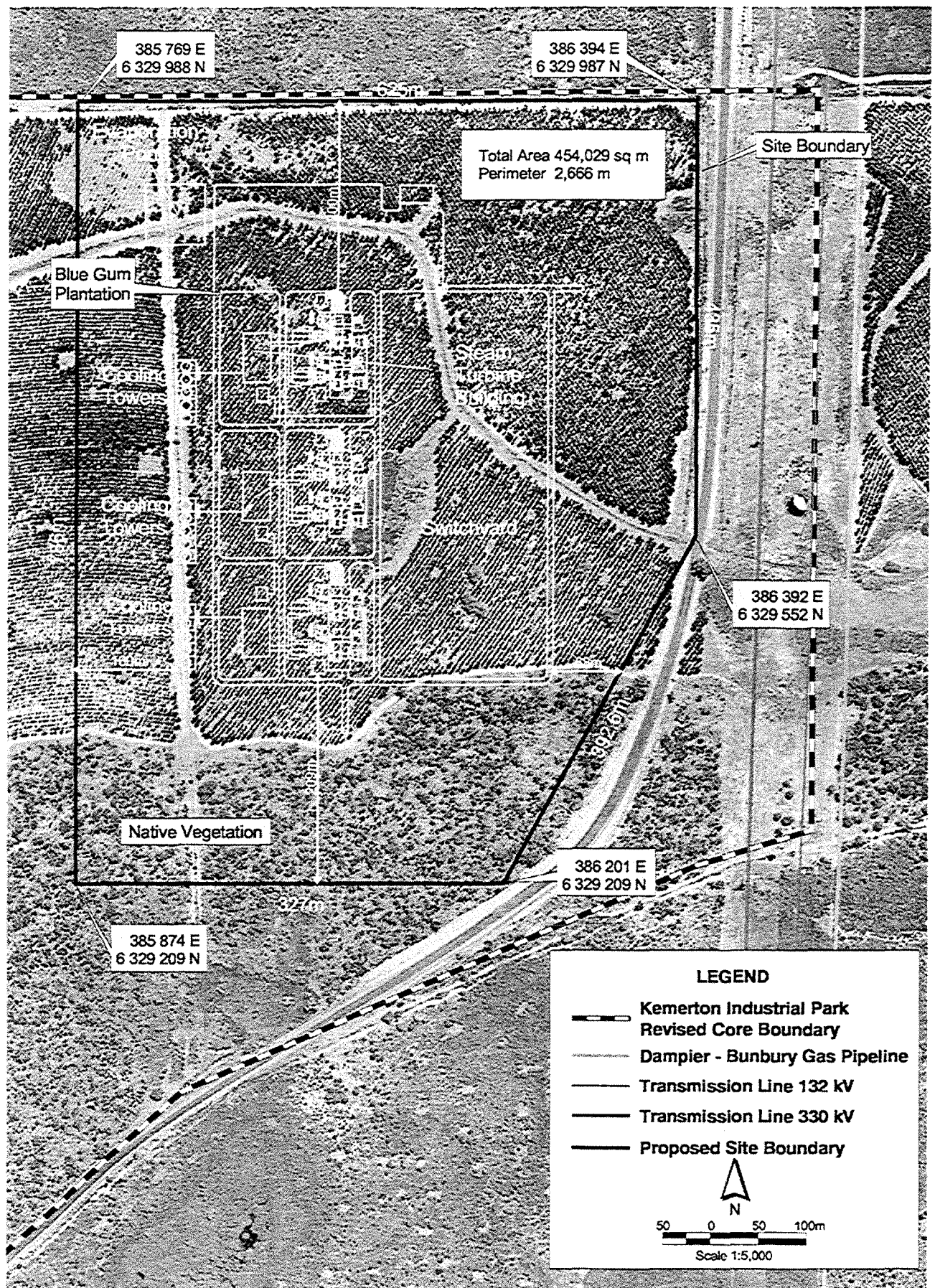
EAST ROCKINGHAM INDUSTRIAL PARK
Strategic Planning for Future Power Generation
Development Concept for Site 3
Patterson Road Frontage

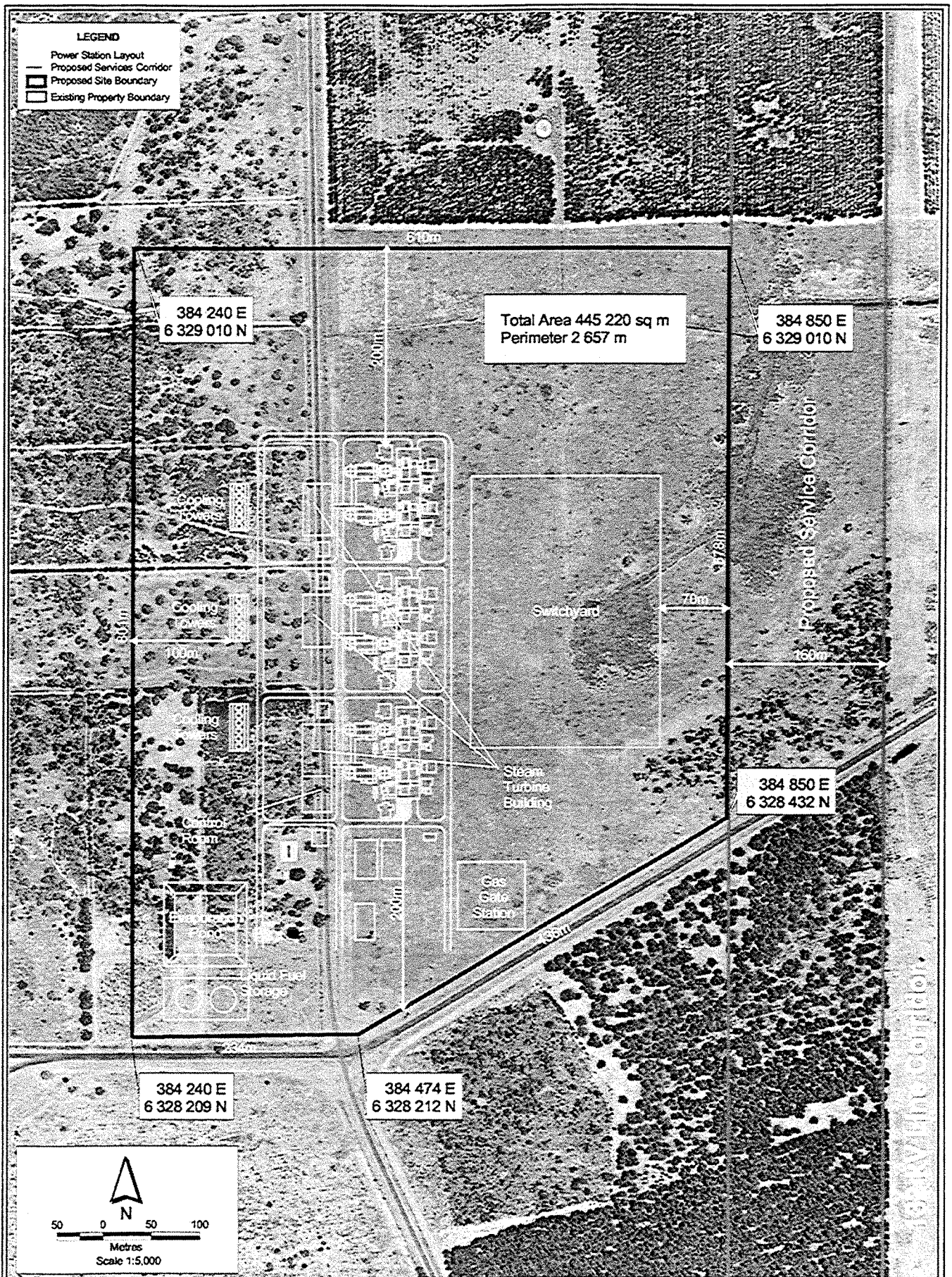
LEGEND
 Power Station Layout
 Proposed Site Boundary
 Proposed Services Corridor
 Existing Property Boundary

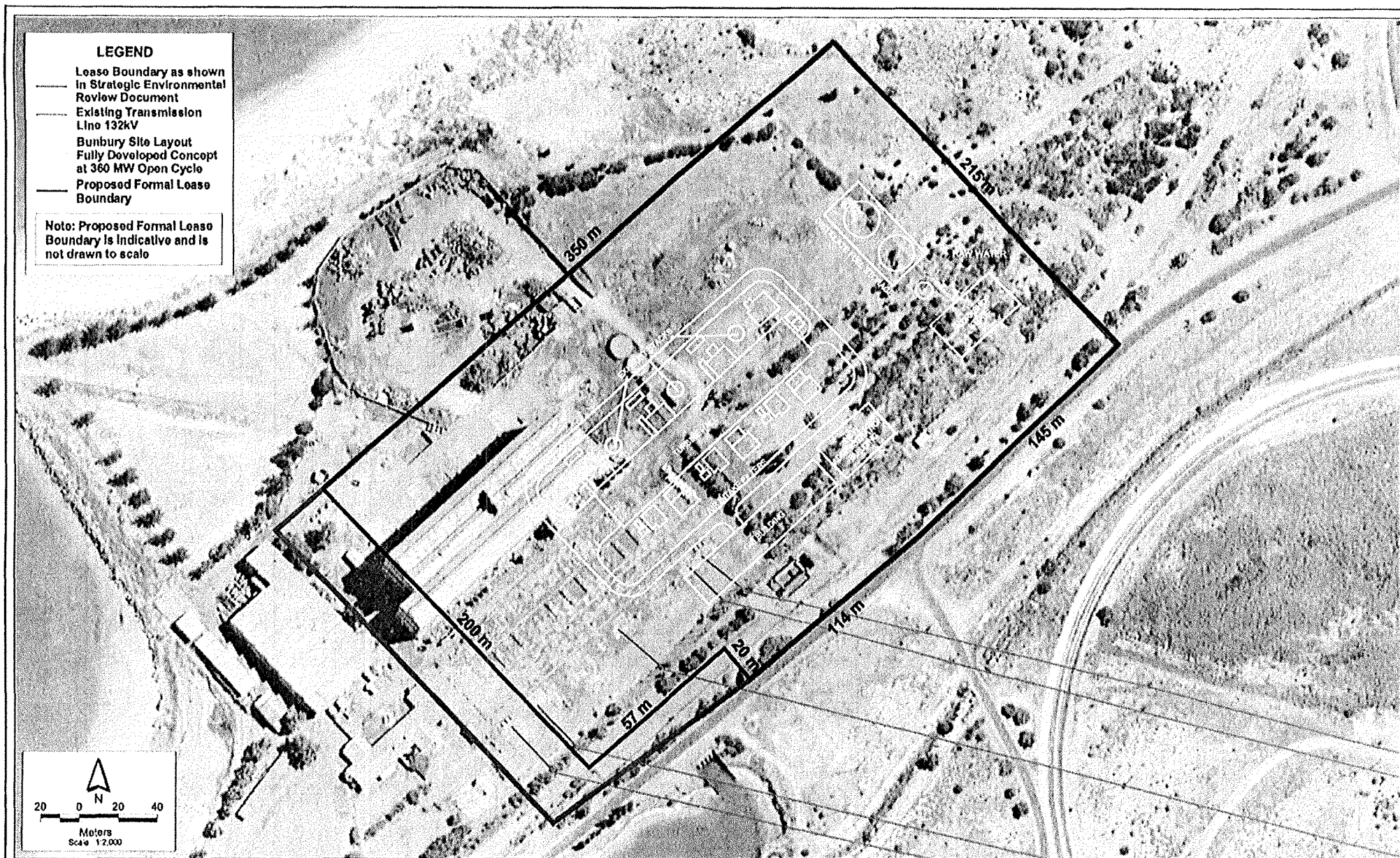
FIGURE A-3

Project No. WV02244.400
 Date Drawn: 08.08.2002
 Prepared by: T.Lee









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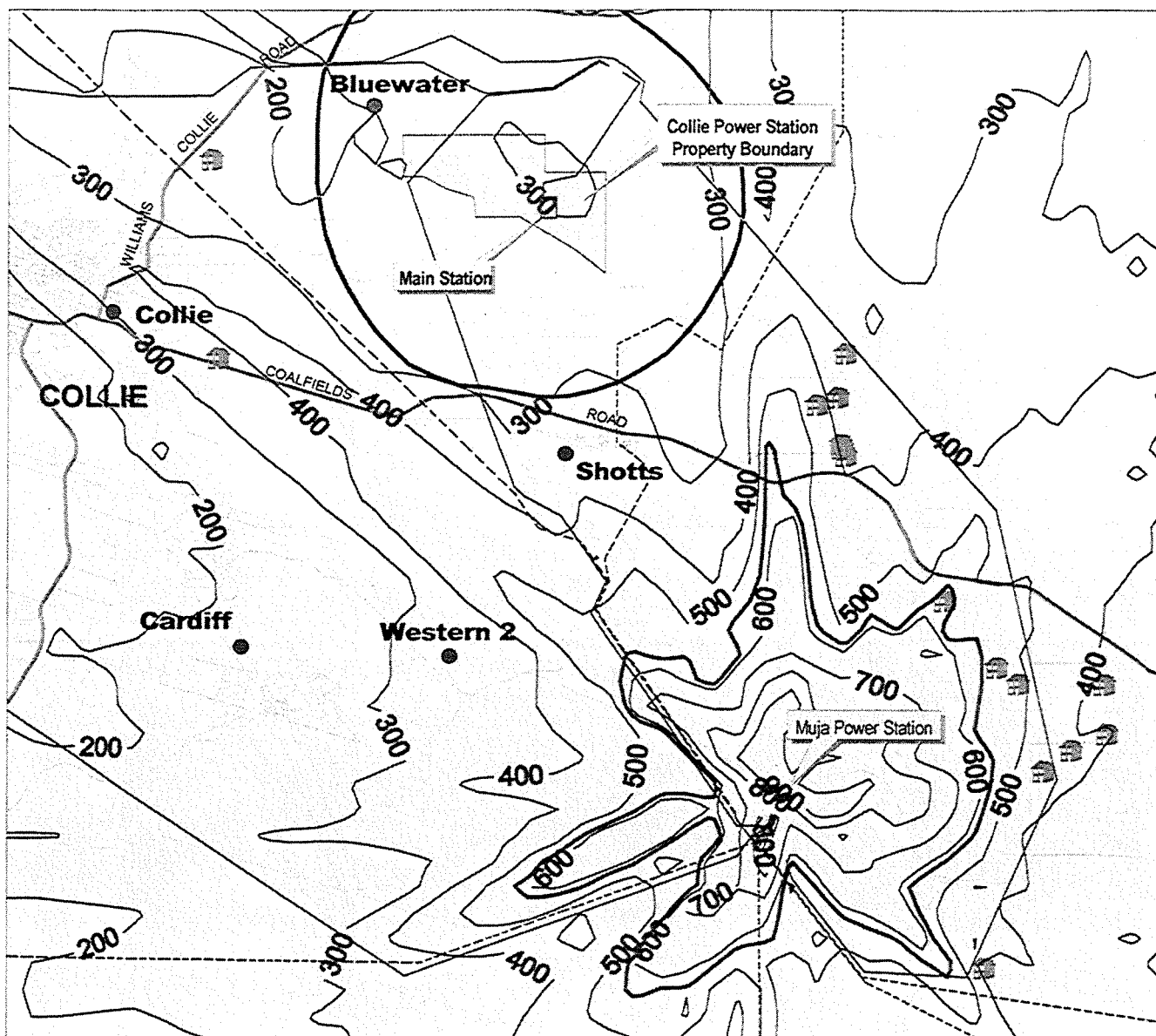
NEW BUNBURY POWER STATION
 Strategic Planning for Future Power Generation
 Development Concept for Bunbury Port Site

FIGURE A-7

Rev 1
 Project No. DF01833 200
 Date Drawn: 14/08/2001
 Prepared by: T Lee

Appendix B Noise Contours for Kwinana/East Rockingham Sites 3 and 4

Appendix C Collie Power Station Expansion Regional Air Quality Contours



LEGEND

- Houses
- Monitoring Sites
- Buffer
- 60 Contour in $\mu\text{g}/\text{m}^3$
- 570 $\mu\text{g}/\text{m}^3$ *

- 330kV Transmission Line
- 132kV Transmission Line
- Cadastral Boundary
- Main Road
- River

* The NEPM allows for the standard to be exceeded in residential areas for 1 day per year. Therefore, it is more appropriate to compare the NEPM criteria of $570\mu\text{g}/\text{m}^3$ to the second highest 1-hour average, rather than to the maximum 1-hour average.



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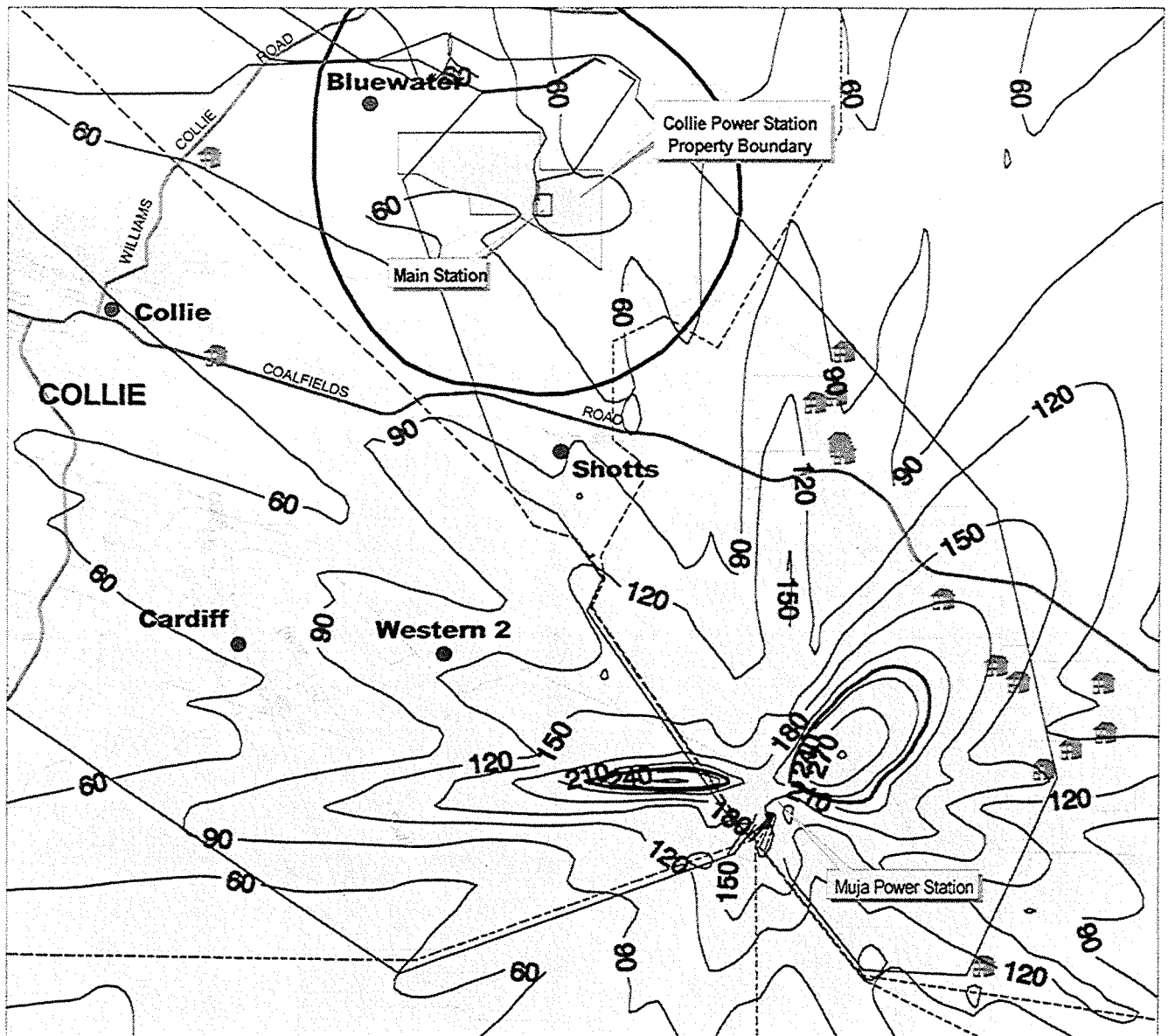
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Strategic Planning For Future Power Generation
Collie Regional Air Quality Assessment
Predicted second highest 1-hour ground level concentration
of sulphur dioxide ($\mu\text{g}/\text{m}^3$) for existing sources in 2001

FIGURE C-1

Project No.: WV02336
Figure Prepared by: A.Ho
Date Prepared: 06/08/02



LEGEND

- Houses
- Monitoring Sites
- Buffer
- 60
- Contour in $\mu\text{g}/\text{m}^3$
- 228 $\mu\text{g}/\text{m}^3$ *

- 330kV Transmission Line
- 132kV Transmission Line
- Cadastral Boundary
- Main Road
- River



2000 0 2000 4000 Metres

* The NEPM allows for the standard to be exceeded in residential areas for 1 day per year. Therefore, it is more appropriate to compare the NEPM criteria of $228\mu\text{g}/\text{m}^3$ to the second highest 24-hour average, rather than to the maximum 24-hour average.



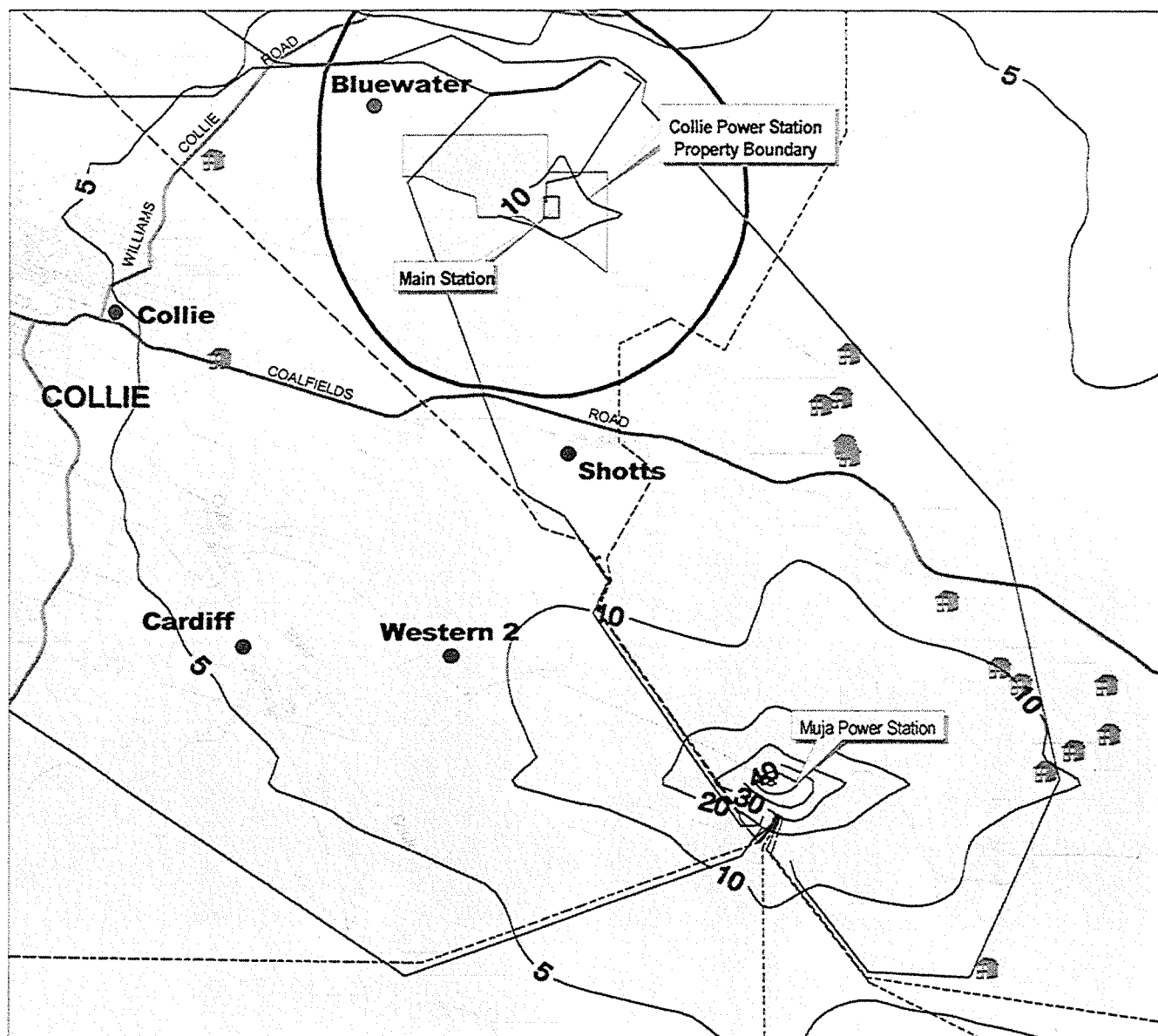
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of sulphur dioxide ($\mu\text{g}/\text{m}^3$) for existing sources in 2001

FIGURE C-2

Project No.: WV02336
Figure Prepared by: A.Ho
Date Prepared: 06/08/02

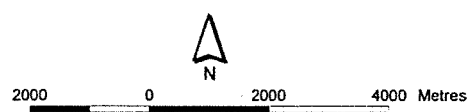


LEGEND

- Houses
- Monitoring Sites
- Buffer
- 10 Contour in $\mu\text{g}/\text{m}^3$
- 57 $\mu\text{g}/\text{m}^3$ *

- 330kV Transmission Line
- 132kV Transmission Line
- Cadastral Boundary
- Main Road
- River

* The NEPM does not allow for any exceedance of the annual average in residential areas. Therefore, these contours should be compared against the NEPM criteria of $57\mu\text{g}/\text{m}^3$.



Western Power

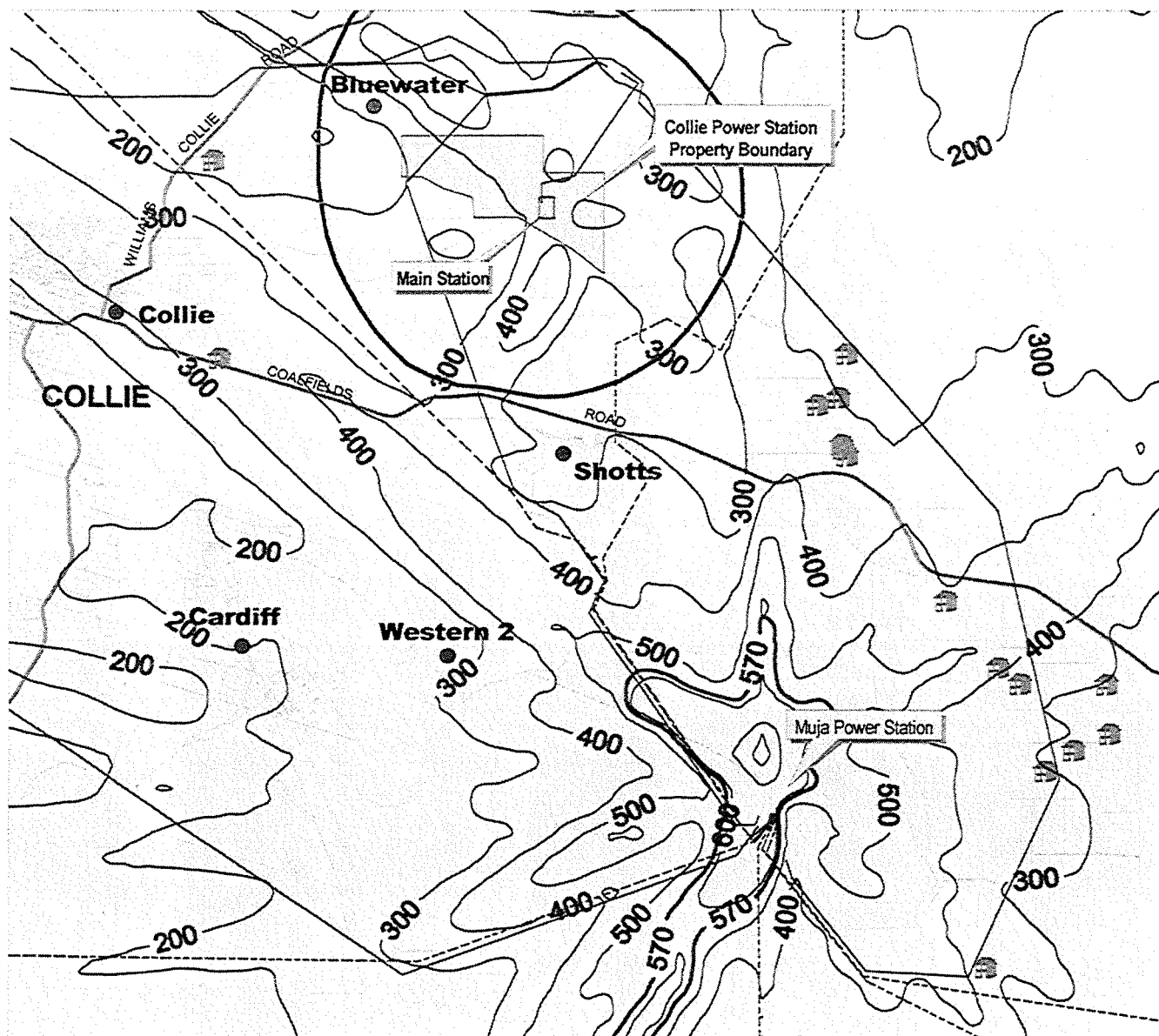
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Strategic Planning For Future Power Generation Collie Regional Air Quality Assessment Predicted annual average ground level concentration of sulphur dioxide ($\mu\text{g}/\text{m}^3$) for existing source in 2001

FIGURE C-3

Project No.: WV02336
Figure Prepared by: A. Ho
Date Prepared: 06/08/02



LEGEND

- Houses
- Monitoring Sites
- Buffer
- 60 Contour in $\mu\text{g}/\text{m}^3$
- 570 $\mu\text{g}/\text{m}^3$ *

- 330kV Transmission Line
- 132kV Transmission Line
- Cadastral Boundary
- Main Road
- River

* The NEPM allows for the standard to be exceeded in residential areas for 1 day per year. Therefore, it is more appropriate to compare the NEPM criteria of $570\mu\text{g}/\text{m}^3$ to the second highest 1-hour average, rather than to the maximum 1-hour average.



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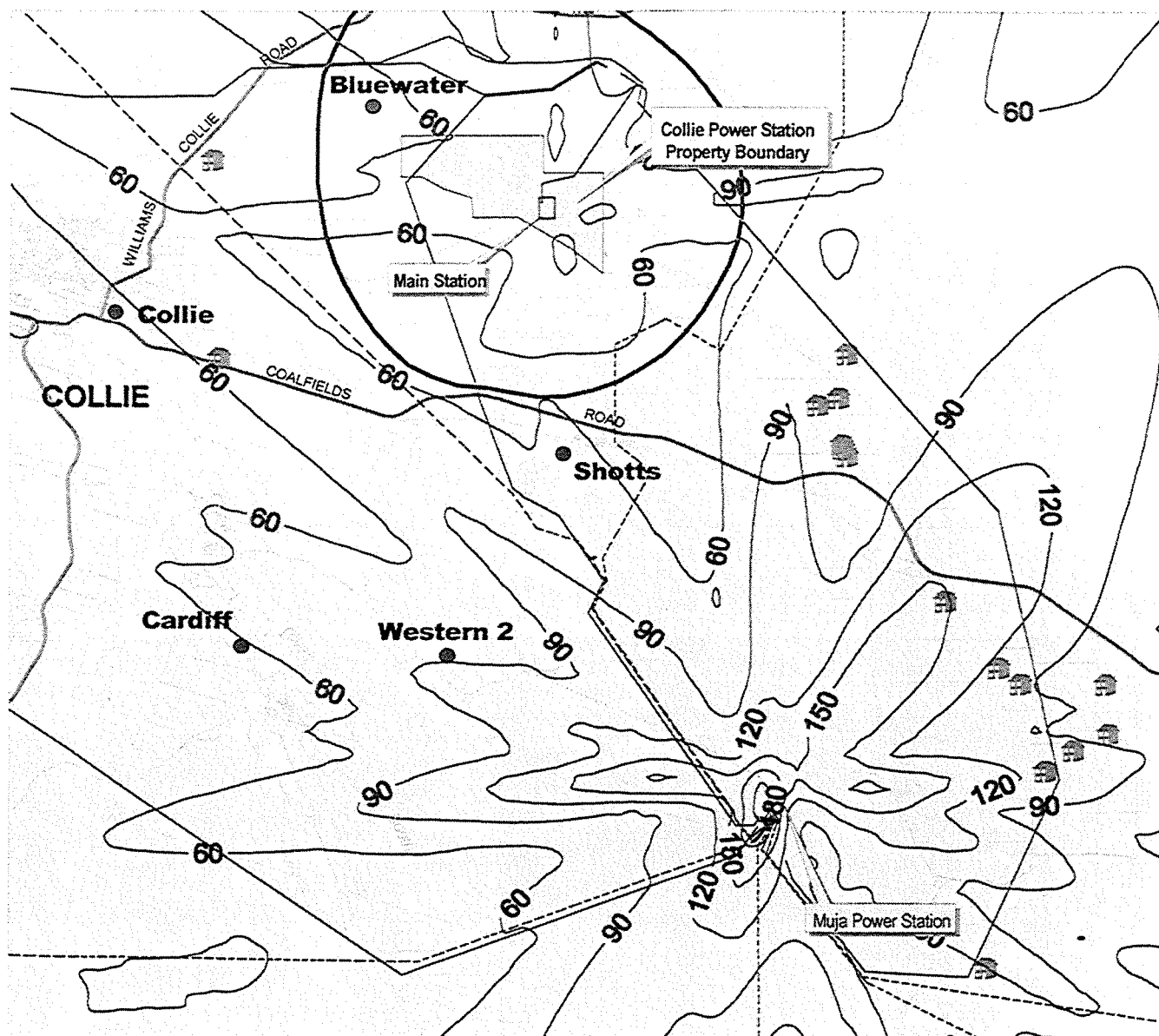
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Strategic Planning For Future Power Generation Collie Regional Air Quality Assessment

Predicted second highest 1-hour ground level concentration
of sulphur dioxide ($\mu\text{g}/\text{m}^3$) in 2008

FIGURE C-4

Project No.: WV02336
Figure Prepared by: A.Ho
Date Prepared: 06/08/02

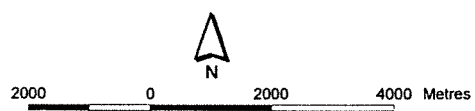


LEGEND

- Houses
- Monitoring Sites
- Buffer
- 60 Contour in $\mu\text{g}/\text{m}^3$
- 228 $\mu\text{g}/\text{m}^3$ *

- 330kV Transmission Line
- 132kV Transmission Line
- Cadastral Boundary
- Main Road
- River

* The NEPM allows for the standard to be exceeded in residential areas for 1 day per year. Therefore, it is more appropriate to compare the NEPM criteria of $228\mu\text{g}/\text{m}^3$ to the second highest 24-hour average, rather than to the maximum 24-hour average.



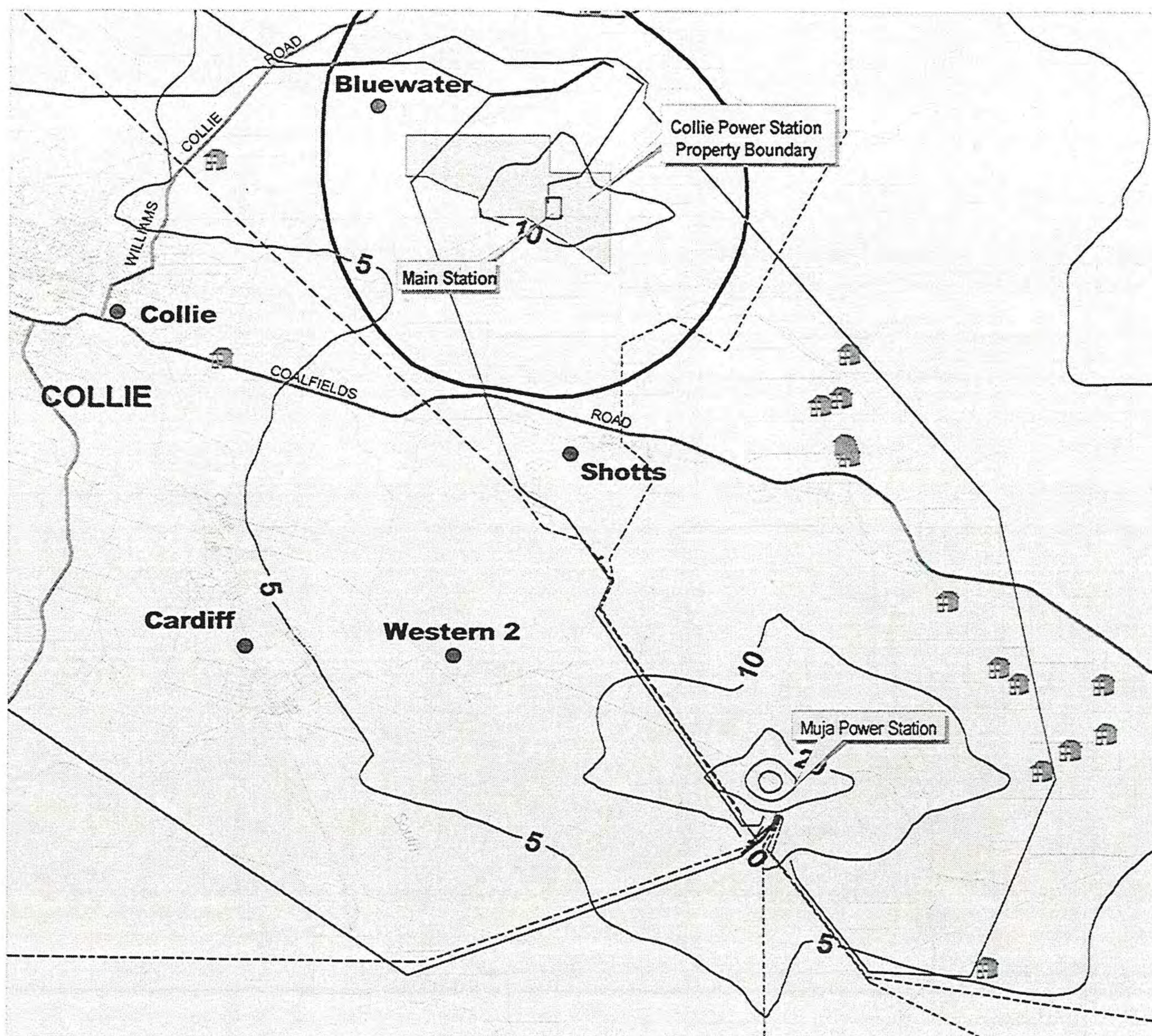
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Strategic Planning For Future Power Generation Collie Regional Air Quality Assessment Predicted maximum 24-hour ground level concentration of sulphur dioxide ($\mu\text{g}/\text{m}^3$) in 2008

FIGURE C-5

Project No.: WV02336
Figure Prepared by: A. Ho
Date Prepared: 06/08/02



LEGEND

- | | | | |
|--|-------------------------------------|--|-------------------------|
| | Houses | | 330kV Transmission Line |
| | Monitoring Sites | | 132kV Transmission Line |
| | Buffer | | Cadastral Boundary |
| | Contour in $\mu\text{g}/\text{m}^3$ | | Main Road |
| | 57 $\mu\text{g}/\text{m}^3$ * | | River |

* The NEPM does not allow for any exceedance of the annual average in residential areas. Therefore, these contours should be compared against the NEPM criteria of 57 $\mu\text{g}/\text{m}^3$.

