

Cockburn 2 Combined Cycle Gas Turbine

Western Power Corporation

**Report and recommendations
of the Environmental Protection Authority**

**Environmental Protection Authority
Perth, Western Australia
Bulletin 1086
January 2003**

ISBN. 0 7307 6724 8
ISSN. 1030-1020
Assessment No. 1465

Contents

| | Page |
|--|-------------|
| 1. Introduction and background | 1 |
| 2. The proposal | 1 |
| 3. Consultation | 7 |
| 4. Relevant environmental factors | 8 |
| 4.1 Nitrogen Oxides (NO _x) emissions | 8 |
| 4.2 Greenhouse gas emissions | 10 |
| 4.3 Noise | 13 |
| 4.4 Marine environment | 14 |
| 5. Conditions and Commitments | 16 |
| 5.1 Proponent's commitments | 16 |
| 6. Conclusions | 16 |
| 7. Recommendations | 18 |

Tables

| | |
|---|----|
| Table 1: Key proposal characteristics | 2 |
| Table 2: Modelled noise levels in Hope Valley | 13 |

Figures

1. Regional location plan
2. Location plan
3. Proposed power plant layout
4. Annual emissions of NO_x from KPS and Cockburn 1 & 2
5. Annual emissions of greenhouse gases from KPS and Cockburn 1 & 2

Appendices

1. References
2. Recommended Environmental Conditions and Proponent's Consolidated Commitments
3. Results of public consultation process

1. Introduction and background

This report provides the advice and recommendations of the Environmental Protection Authority (EPA) to the Minister for the Environment and Heritage on the environmental factors relevant to the proposal by Western Power Corporation (Western Power) to construct and operate a second 240MW combined cycle gas turbine (CCGT) unit (known as Cockburn 2) on its site located in Kwinana, Western Australia.

Western Power has commenced an asset replacement program to replace aging power generating units at Kwinana and Muja power stations with economical high efficiency gas fired units. Western Power was granted approval in August 2001 to construct a 240MW CCGT unit (known as Cockburn 1) at the south end of the Kwinana Power Station (KPS) site in Leath Road, Naval Base, to form part of Cockburn Power Station. KPS Stage B (two 120MW conventional steam turbine units) is expected to be retired in 2005 following the commissioning and proving of Cockburn 1. The utilisation of a combined cycle plant will allow the discontinuation of coal firing at KPS in 2004.

Based on the information provided in the referral document the EPA considered that, while the proposal has the potential to affect the environment, it could be readily managed to meet the EPA's environmental objectives. Consequently, it was notified in *The West Australian* newspaper on 20 January 2003 that the EPA intended to assess the proposal at the level of Assessment on Referral Information (ARI).

The proponent has submitted a referral document setting out the details of the proposal, potential environmental impacts and appropriate commitments to manage those impacts. The referral documentation can be viewed on the proponent's website www.westernpower.com.au. The EPA considers that the proposal as described can be managed in an acceptable manner, subject to these commitments and the EPA's recommended conditions being made legally binding.

The EPA has therefore determined under Section 40(1) of the Environmental Protection Act that the level of assessment for the proposal is Assessment on Referral Information, and this report provides the EPA advice and recommendations in accordance with Section 44(1).

2. The proposal

The proposal is to construct and operate a second 240 megawatt combined cycle gas turbine (Cockburn 2) unit adjacent to and to the south of Cockburn 1 which is currently under construction to form part of 'Cockburn Power Station'.

The construction of the Cockburn 2 plant is part of Western Power's asset replacement strategy which includes shutdown of the Kwinana Power Station Stage B, reduced usage of Stage A, shutdown of Stage A/B units at Muja Power Station in Collie by 2006, and the cessation of coal at Kwinana Power Station by 2004.

The main components of the Cockburn 2 CCGT power plant will be:

- one natural gas fired 160 megawatt generator unit;
- heat recovery steam generator;
- one 80 megawatt steam turbine and generator unit;
- water treatment plant to produce demineralised water;
- cooling water outfall with sub-sea diffuser;
- administration, control room and workshop buildings.

The main characteristics of the proposal are summarised in the Table 1 below.

Table 1: Key proposal characteristics

| Element | Description |
|---|---|
| Project purpose | To construct operate and maintain a natural gas fired combined cycle gas turbine plant of nominal 240 Megawatt capacity to supply electricity to customers on the South West Interconnected System grid. |
| Life of the Project | 25 years |
| Power Generating Capacity | 240 megawatt (nominal) |
| Facility footprint | 2 hectares |
| Site area | 9.4 hectares |
| Fuel | Natural gas |
| Natural gas supply: Source | Dampier to Bunbury Natural Gas Pipeline, via the Epic Energy gate station at the corner of Leath and Barter Roads, Naval Base. Cockburn 2 will utilise gas supply facilities constructed as part of the Cockburn 1 development. |
| Plant facilities: No. and size of gas turbines No. and size of steam turbines Heat Recovery Steam Generator(HRSG) No. of stacks Height of HRSG stack Height of bypass stack (optional) No. of cooling towers No. of liquid fuel tanks Sub sea diffuser and associated pipeline | 1 x Alstrom GT13E2 gas turbine unit of 160MW nominal generating capacity fitted with dry low NO _x burners. A gas bypass system and bypass stack may be fitted. 1 x Alstom single shaft, axial exhaust steam turbine of 80 MW nominal generating capacity Alstom dual pressure HRSG with horizontal gas path. One heat recovery steam generator stack and one bypass stack (optional). 60m 45m nil nil 1 of 180m length |
| Plant operation | Baseload/Mid Merit |
| Evaporation ponds | Excess waste-water that is not suitable for recycling will be discharged to the evaporation pond constructed as part of the Cockburn 1 development. |
| Construction period | 27 months |
| Operating Hours | 24 hours a day, 365 days a year. |
| INPUTS | |
| Natural gas | 39 Terajoules per day |
| Cooling water | Seawater (5 m ³ /s) |
| Process water | Groundwater from the Perron Quarry Ash Disposal Facility |

| Element | Description |
|--|--|
| OUTPUTS | |
| Wastewater | Cooling water – 5 m ³ /s Process waters – minimal to evaporation pond |
| Air emissions: Oxides of nitrogen (NO _x) Sulphur dioxide (SO ₂) Carbon dioxide (CO ₂)(equiv) Carbon monoxide (CO) Non-methane volatile organic compounds (NMVOCs) | 830 tpa, 26.5 (g/s) (<34 ppmv, dry, 15% O ₂) 2.1 tpa, 0.07 (g/s) 838 000 tpa (maximum at 100% load) 629 000 tpa (based on projected usage, at 75% load), 154.5 tpa 51 tpa |

Abbreviations for Table 1:

| | |
|--------------------|---|
| DBNGP | Dampier to Bunbury Natural Gas Pipeline |
| g/s | grams per second |
| L | litres |
| m | metres |
| m ³ /yr | cubic metres per year |
| mm | millimetres |
| MW | megawatts |
| ppmv | parts per million by volume |
| SWIS | South West Interconnected System |
| tpa | tonnes per annum |

The potential impacts of the proposal are discussed by the proponent in the referral document (Western Power, October 2002).

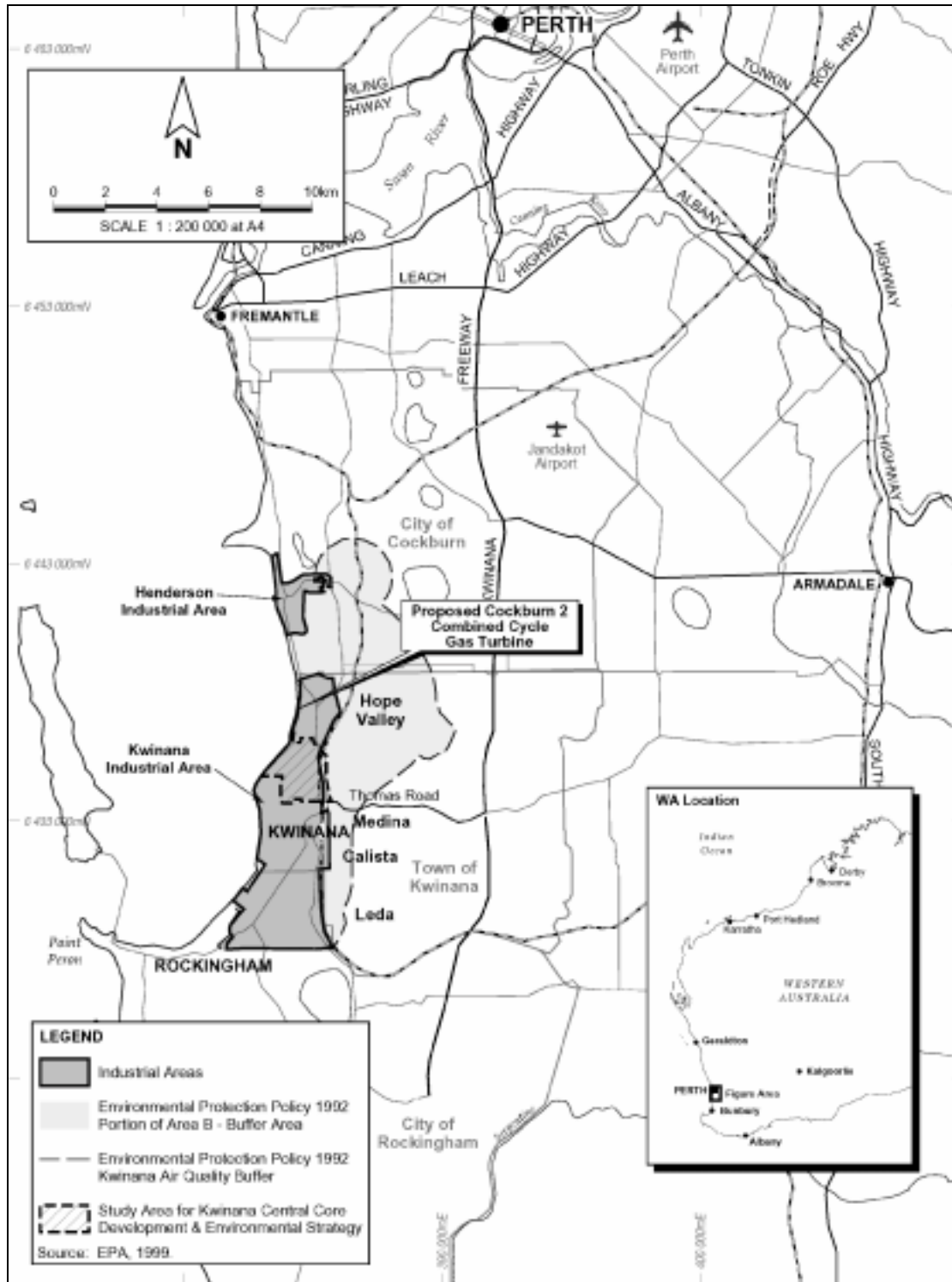


Figure 1: Regional location plan

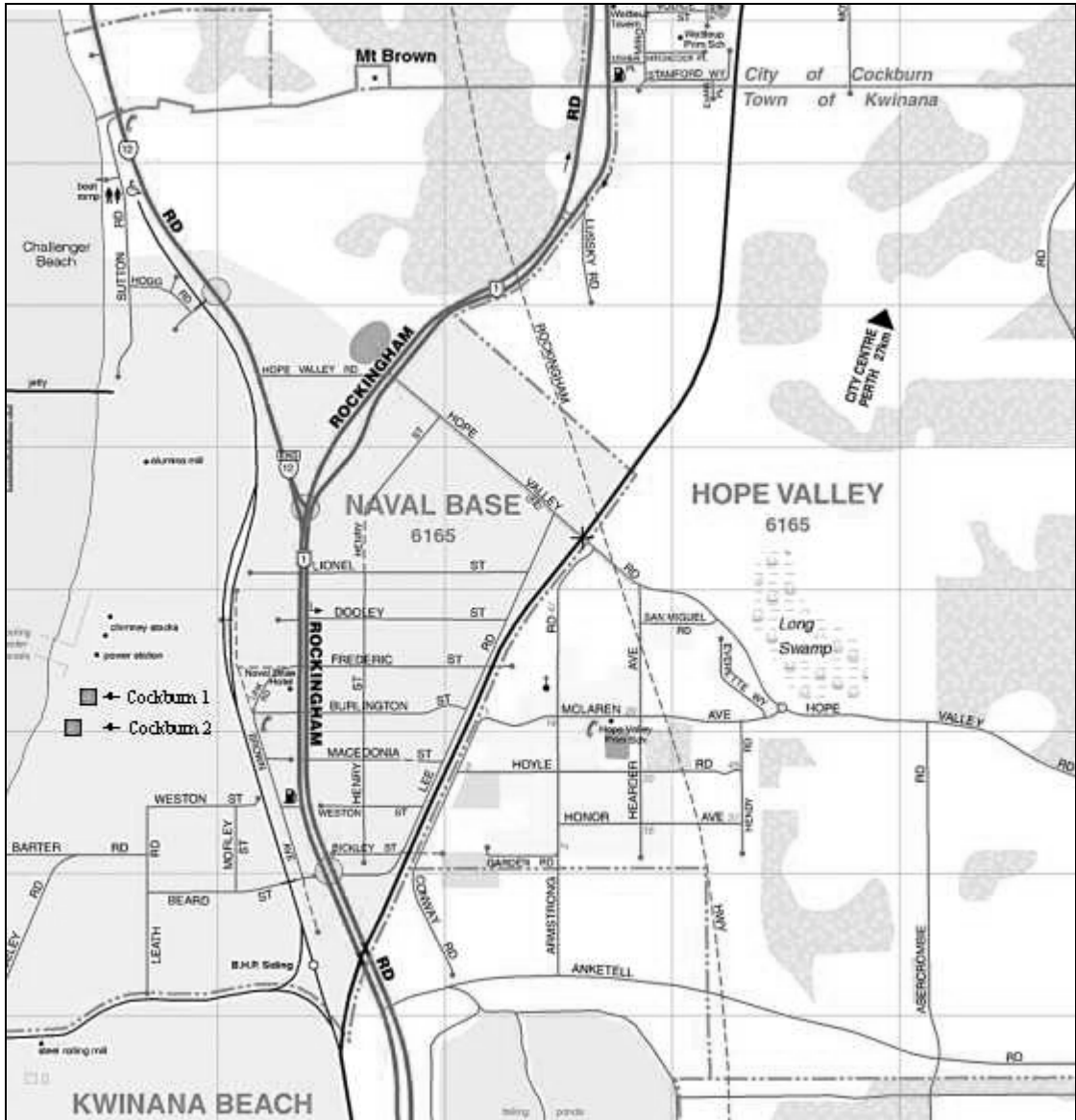


Figure 2: Location plan

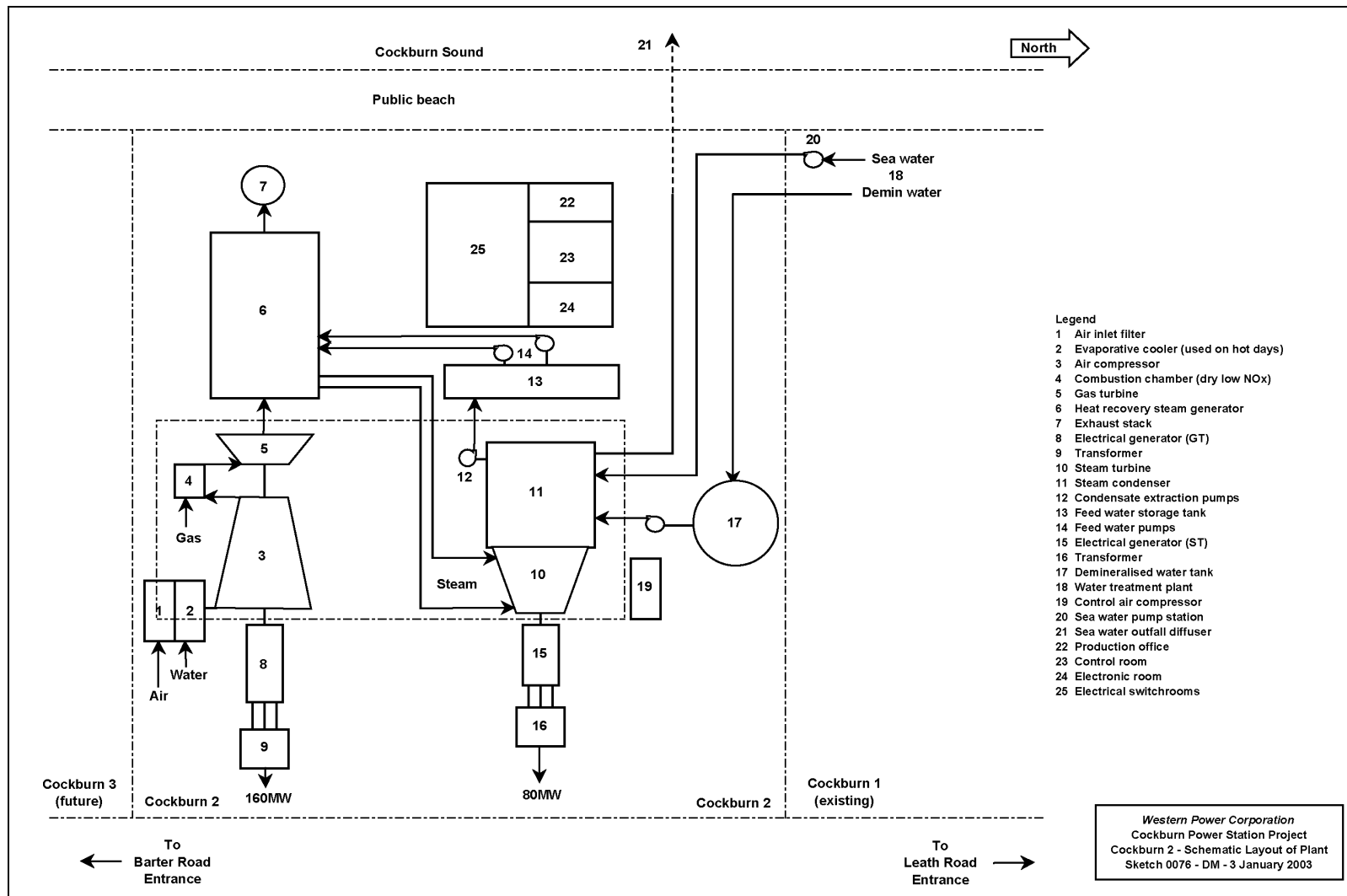


Figure 3: Proposed power plant layout

3. Consultation

Western Power has undertaken extensive consultation with the community and Government agencies, and has identified and addressed the environmental issues related to the project with all stakeholders. This process has allowed substantial involvement by key stakeholders and feedback at the earliest stage of project development.

The following stakeholders were identified by the proponent:

- Environmental Protection Authority;
- Department of Environmental Protection;
- Department of Mineral and Petroleum Resources (MPR);
- Local MLA's – Members for Rockingham, Cockburn and Peel;
- Cockburn Sound Management Council;
- Town of Kwinana, Cities of Rockingham and Cockburn;
- Conservation Council of WA;
- The community in the Kwinana area and surrounds, including community interest groups (Resident Action Group for the Environment; Comnet; Kwinana Watchdog Group; Hope Valley Progress Association; Cockburn Sound Conservation Committee; Community Consultative Group (IP 14), Casuarina/Wellard Progress Association, Wandi Progress Association and Kwinana Progress Association);
- Kwinana Industries Council.

The consultation process has included the following elements:

- Presentations on the Cockburn 2 development to stakeholder groups;
- Newspaper articles in the 'Sound Telegraph', the 'Weekend Courier' and the Fremantle Community Gazette outlining the project and providing contact details for further information;
- Mail out of information sheets on the project to stakeholders, with a contact name for further information and comment. This sheet was also distributed at presentation meetings;
- Access to information on the Western Power's website (www.westernpower.com.au), inviting comments.

A copy of the advertisements placed and articles written about the Cockburn 2 project is provided in Appendix C of the referral documentation. A full list of comments and questions received during the public consultation process and Western Power response and actions are given in Appendix 3 of this report.

4. Relevant environmental factors

Section 44 of the *Environmental Protection Act, 1986* requires the EPA to report to the Minister for the Environment and Heritage on the environmental factors relevant to the proposal and the conditions and procedures, if any, to which the proposal should be subject. In addition, the EPA may make recommendations as it sees fit.

It is the EPA's opinion that the following environmental factors relevant to the proposal require evaluation in this report:

- (a) Nitrogen Oxides (NO_x) emissions;
- (b) Greenhouse gas emissions;
- (c) Noise; and
- (d) Marine environment

Details on the relevant environmental factors and their assessment are contained in Sections 4.1 - 4.4. The description of each factor shows why it is relevant to the proposal and how it will be affected by the proposal. The assessment of each factor is where the EPA decides whether or not a proposal meets the environmental objective set for that factor.

4.1 Nitrogen Oxides (NO_x) emissions

The EPA's objectives for this factor is to ensure that emissions do not adversely affect environment values or the health, welfare and amenity of people and land uses by meeting statutory requirements and acceptable standards.

The combustion of natural gas in the Cockburn 2 plant will produce approximately 830 tonnes of NO_x per year.

The plant will utilise dry low NO_x (DLN) burners that are designed to minimise NO_x emissions to less than 34 ppmv (expressed at 0 °C, 101.325kPa, 15% O₂, dry) although it is expected to achieve 25ppm at full load.

The construction of the Cockburn Power Station (Cockburn 1 & 2 generating units) will enable the shutdown of Kwinana Power Station (KPS) Stage B and reduced usage of Stage A. The overall NO_x emissions from the Kwinana and Cockburn Power Stations is expected to decrease by approximately one third when compared to current levels, as shown in Figure 4.

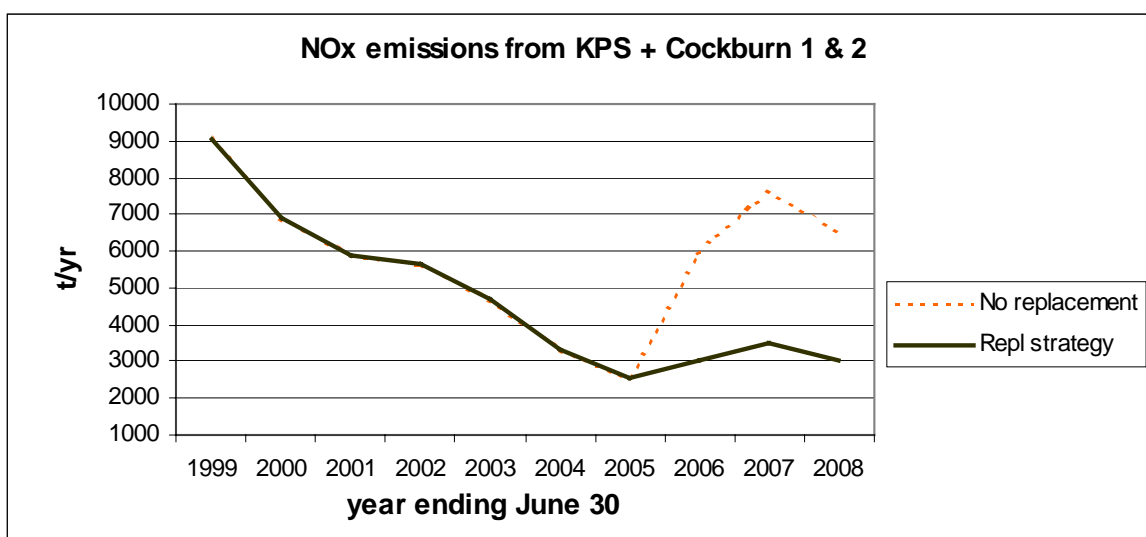


Figure 4: Annual emissions of NOx from KPS and Cockburn 1 & 2

The proposed Cockburn 2 plant will contribute a relatively minor amount to existing NO₂ levels in view of the results obtained from air dispersion modelling which indicate that the maximum 1-hour NO₂ concentration in the Kwinana area was predicted to be 17µg/m³ from Cockburn 2 (in isolation) operating at 100% load (i.e. 6.9% of the NEPM standard) and the annual average NO₂ maximum ground level concentration contribution will be 0.7 µg/m³ (ie. 1.13% of the NEPM standard) (URS, January 2001).

Modelling results show that a bypass stack height of 45 m would minimise the effects of the surrounding buildings on dispersion of the plume and would ensure that ground level concentrations are acceptable (Environ, September 2002).

The study also modelled the scenario of three CCGTs running at 100% load. In this case predicted maximum 1-hour NO₂ concentration in the Kwinana area would be 27 µg/m³ (ie. 10.5% of the NEPM standard). Additionally, the scenario with Cockburn 1 operating in combined cycle and Cockburn 2 operating in open cycle was modelled. The contribution from the power station predicted maximum 1-hour NO₂ concentration in the Kwinana area will be 18 µg/m³ (ie. 7% of the NEPM standard).

These levels are well below the Air Quality NEPM goal of 1 hour maximum of 257 µg/m³ standard that applies to the Kwinana area and surrounds. Over the past 5 years, the DEP monitoring stations at Hope Valley and Rockingham have recorded maximum 1-hour levels of NO₂ below 90 µg/m³. A conservative approach of adding the maximum modelled 1 hour NO₂ concentration of 17µg/m³ (giving 107µg/m³) shows an impact still very much below the Air Quality NEPM goal of 1 hour maximum of 257µg/m³.

The EPA notes that the reduction in NOx emissions shown in Figure 4 is primarily due to the removal of coal as a fuel source from Kwinana Power Station and that the use of this fuel source is to be discontinued by 30 June 2004, as committed by the

proponent. The EPA also notes that the decrease in NO_x emissions is also due to the operation of the Cockburn 2 unit in preference to the existing Kwinana Power Station units.

The EPA notes that Cockburn 2 will offset 2 x 120MW aging coal fired generating units at Muja Power Station. The proponent has committed to the shutdown of Muja Power Station Stage A/B by 30 June 2006.

The design and construction of the proposed Cockburn 2 power plant's gas turbine is consistent with the requirements of EPA *Guidance Statement for Emissions of Oxides of Nitrogen from Gas Turbines: No 15* (EPA, 2000). The EPA considers that the use of DLN burners demonstrates the implementation of best available technology by the proponent.

The EPA notes that stack monitoring of NO_x emissions will be undertaken as part of the post-commissioning performance testing to ensure that NO_x emission levels are below the environmentally acceptable limits and meets technical specifications. The proponent has committed to monitor NO_x emissions on a six monthly basis until performance is established, and then annually for the life of the project.

Having regard to the proposed design and construction of Cockburn 2, particularly in relation to the replacement of coal at KPS, the installation of DLN burners at the new plant and the monitoring program, it is the EPA's opinion that the proposal can be managed to meet the EPA's environmental objective for this factor.

4.2 Greenhouse gas emissions

The EPA's objective in regard to this environmental factor is to ensure that potential greenhouse gas emissions generated by the proposal are adequately addressed in the planning/design and operation stages of the proposal, and that:

- best practice is applied to maximise energy efficiency and minimise emissions;
- comprehensive analysis is undertaken to identify and implement appropriate offsets; and
- proponents undertake an on-going programme to monitor and report emissions and periodically assess opportunities to further reduce greenhouse gas emissions over time.

The Cockburn 2 unit operating continuously at 100% load has the potential to emit approximately 838 000 tpa of CO₂ equivalent greenhouse gases for its projected life of about 20 years. Based on projected usage of 75% load the Cockburn 2 unit it is likely to emit a total of 629 000 tpa of CO₂ equivalent gases.

The CO₂ emissions from the proposed Cockburn 2 plant would be well below that of a conventional steam cycle plant (coal or gas fuel). Table 11 in the referral document also indicates that the Cockburn 2 plant will have an average carbon intensity of 398 g of CO₂ per kWh compared to coal or gas steam cycle units of 965 and 533 g of CO₂ per kWh respectively.

Combined Cycle Gas Turbine plants are widely used throughout the world as a response to abate greenhouse gas production from power generation and are considered as the most greenhouse efficient gas fired power generation technology currently available. Gas fuel has the least carbon intensity of all the fossil fuels and the waste heat from the operation of the gas turbine can be used to raise steam and generate additional electricity from the same fuel energy input.

The operation of the Cockburn 2 unit will allow for the shutdown of less efficient coal fired units at Muja Power Station (A/B units). As part of Western Power’s Asset Replacement Strategy, coal will be removed from Kwinana. Western Power estimates that the consequent shift to gas will reduce Western Power’s CO₂ emissions in 2010 by around 15% from 2001 levels, in spite of an increase in generation, as shown in figure 4. This equates to savings of 1.6 million tonnes of CO₂ per annum against present production levels.

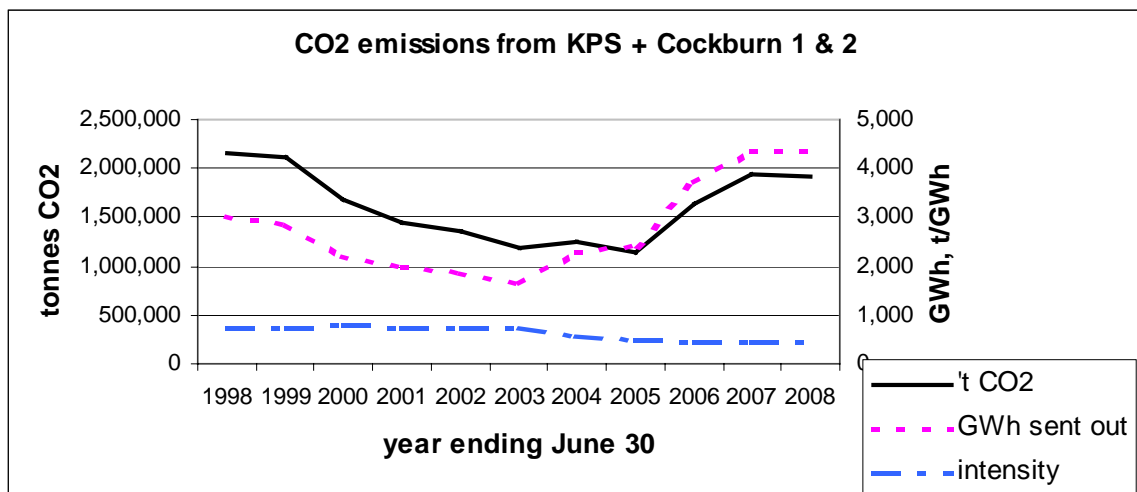


Figure 5: Annual emissions of greenhouse gases from KPS + Cockburn 1 & 2

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.

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 as wind and solar energy;
- Gas, including combined cycle, turbines;
- New technology coal plants;
- Old technology coal plants; and
- Petroleum fuel plants.

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 notes that Western Power is a participant in the Commonwealth Government's Greenhouse Challenge cooperative agreement program and reports annually to the Australian Greenhouse Office on its emissions and Greenhouse Challenge initiatives.

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.

This proposal will be a reasonably significant contributor to Western Australia's greenhouse gas emissions. However, the EPA notes that although the plant will contribute greenhouse gases, there will be an overall reduction in greenhouse gases because of shutdown of less efficient plants.

Having regard to the above discussion, and particularly the higher energy efficiency of the proposed Cockburn 2 power plant in comparison to the efficiency of the existing units to be decommissioned, it is the EPA's opinion that the proposal can be managed to meet the EPA's environmental objective for this factor provided that recommended environmental condition 7 is imposed on the proponent.

4.3 Noise

The EPA’s objective for this factor is to protect the amenity of nearby residents from noise impacts resulting from activities associated with the proposal by ensuring the noise levels meet statutory requirements and acceptable standards.

The proposed Cockburn 2 plant on the KPS site will be located more than 1 km from the nearest residences at Hope Valley (east of the site). The residential areas of Wattleup and Medina lie 2.4km to the northeast and 4km to the southeast respectively of the KPS site. The Navel Base Hotel is the closest commercial activity, and is the closest noise sensitive premise when the accommodation is in use, being approximately 200 metres from the KPS plant boundary.

Western Power’s Asset Replacement Strategy will progressively reduce noise impacts as the old plant is replaced by new plants. The reduction of noise impacts delivered by Cockburn 2, on top of Cockburn 1, is approximately 2dB. Cockburn 1 & 2 will result in a 3.5dB reduction when compared to the base scenario. This is shown in Table 2, where scenario 4 would be the most likely representation of likely night time (night time noise standards being the most stringent) operations once the Cockburn 2 unit comes into service.

Table 2: Modelled noise levels in Hope Valley

| Scenario | Kwinana Power Station | Cockburn Power Station | Noise levels in dB(A) (3 m/s & 2° C/100 m) |
|------------|-----------------------|------------------------|--|
| Scenario 0 | Stages A, B and C | | 46.8 |
| Scenario 1 | Stages A, B and C | 1 CCGT | 47.0 |
| Scenario 2 | Stages A, and C | 1 CCGT | 45.6 |
| Scenario 3 | Stages A, and C | 2 CCGT’s | 45.9 |
| Scenario 4 | Stage C | 2 CCGT’s | 43.3 |
| Scenario 5 | Stage C | 3 CCGT’s | 43.8 |
| Scenario 6 | | 3 CCGT’s | 38.9 |

However, in its ultimate configuration, with Cockburn 1 & 2, and a possible Cockburn 3, with the existing steam turbines decommissioned, the requirements of the Noise Regulations will be met at Hope Valley and at the Navel Base Hotel when its accommodation facilities are not in use, as shown in Table 2 above.

Western Power’s noise reduction programme suggests improvements will be made over time to comply with the regulations. This is consistent with an overall strategy by the Kwinana Industries Council to reduce cumulative noise emissions to the surrounding residential community over a period of years. This approach is supported by the DEP and the EPA.

The regulatory criteria will not be met at the Navel Base Hotel when its accommodation is in use, as it is a noise sensitive premise under the definition. Western Power has sought a Regulation 17 approval to the Minister for the Environment and Heritage for the KPS for its noise emissions at the Naval Base Hotel when the accommodation is in use. This will allow the noise emission to exceed or vary from the assigned level under these circumstances.

The EPA notes that the proponent has made commitments to prepare and implement both construction and operational noise management plans to ensure that noise emissions are acceptable.

In view of the above, the EPA considers that the Cockburn 2 will result in an improvement of noise emissions, and that the proposal can be managed to achieve an environmentally acceptable outcome to meet the EPA's objective.

4.4 Marine environment

The EPA's objectives for this factor are to:

- ensure that emissions do not adversely affect environment values or the health, welfare and amenity of people and marine uses by meeting statutory requirements and acceptable standards
- maintain the environmental values of the seabed and marine waters.

Thermal discharge from the condenser

The condenser system of the steam turbine requires cooling water to condense the steam and return the water to the heat recovery steam generator. Seawater will be used as cooling water in a once through mode of operation. Cockburn 2 will utilise the existing KPS seawater intake structures which extend offshore into Cockburn Sound.

Cooling water from Cockburn 2 will be discharged via a sub-sea diffuser located in approximately 10 metres of water about 200 metres south of the existing KPS Stage C cooling water discharge channel. The cooling water outfall will start with a concrete seal pit buried on the west side of Cockburn 2 and extend approximately 180 m offshore. The cooling water system will operate at a nominal flow of 5.0 m³/s with a maximum temperature rise of 9 degrees C above ambient seawater temperatures.

The element of most relevance to the proposed sub-sea diffuser relate to its effect on the combined thermal plume from the existing and proposed power station.

The State Government established the Cockburn Sound Management Council (CSMC) in August 2000 to co-ordinate the environmental planning and management of the waters and land catchments of Cockburn Sound. The CSMC along with the Environmental Protection Authority (EPA) are developing an Environmental Management Framework for Cockburn Sound incorporating an Environmental Protection Policy (EPP) and Environmental Management Plan (EMP) to protect the environmental and social values associated with the Sound.

The aims of the Draft EPP include the establishment of environmental values (EV), environmental quality objectives (EQO) and environmental quality criteria (EQC) for Cockburn Sound.

The level of protection assigned to each EQO is described by the Environmental Quality Criteria (EQC). The EQCs provide a quantitative benchmark for measuring success in achieving the EQOs. There are two types of criteria, Environmental Quality Guidelines (EQG) and Environmental Quality Standards (EQS) that prompt different management responses if exceeded. Additionally, the criteria for the EQO of ecosystem integrity have Guidelines and Standards corresponding to three levels of protection; high, moderate and low.

DAL Science & Engineering was commissioned to undertake modelling of the thermal discharge and assess whether the cumulative cooling water discharge, including from the Cockburn 2 proposal, meets the Environmental Quality Criteria for Cockburn Sound. Their report *Assessment of Environmental Impacts Of Cooling Water Discharge from The Cockburn 2 Power Plant*, (DALSE, September 2002) forms a subsidiary document to the referral. This modelling suggests that the EQG for temperature may not always be met.

The proponent has committed to undertake monitoring of the thermal discharge to Cockburn Sound as required. Monitoring results will be compared to the Cockburn Sound EPP Environmental Quality Guidelines and if required, investigations will be conducted against the Environmental Quality Standards. The proponent has also committed to prepare and implement a contingency plan if the EQS and therefore the EQO are not met.

Other marine impacts

In line with the current practice at KPS, the cooling water to be used for the Cockburn 2 plant will be treated with sodium hypochlorite to prevent marine growth in the condenser. This dosage will be controlled so that the residual exiting the condensers will be less than 0.5 ppm available chlorine.

The proponent has made a commitment to regularly monitor available chlorine levels in cooling water to ensure levels are at the minimum detectable before discharge.

The proponent has made a number of commitments in relation to the construction of the diffuser. Prior to construction the proponent will undertake a sediment sampling program to determine the quality of material to be excavated and will undertake geotechnical work to characterize the proposed pipeline route to determine the need for specialized dredging/blasting and develop management options if necessary. During construction the proponent has committed to monitor the plume rise from dredging actions on a daily basis and implement contingency measures to minimize emissions if necessary.

Taking into account the proponent commitments, the EPA considers that the proposal can be managed to achieve an environmentally acceptable outcome in relation to the EPA's objectives for marine discharges.

5. Conditions and Commitments

Section 44 of the *Environmental Protection Act, 1986* requires the EPA to report to the Minister for the Environment and Heritage on the environmental factors relevant to the proposal and on the conditions and procedures to which the proposal should be subject, if implemented. In addition, the EPA may make recommendations as it sees fit.

In developing recommended conditions for each project, the EPA's preferred course of action is to have the proponent provide an array of commitments to ameliorate the impacts of the proposal on the environment. The commitments are considered by the EPA as part of its assessment of the proposal and, following discussion with the proponent, the EPA may seek additional commitments.

The EPA recognises that not all of the commitments are written in a form which makes them readily enforceable, but they do provide a clear statement of the action to be taken as part of the proponent's responsibility for, and commitment to, continuous improvement in environmental performance. The commitments, modified if necessary to ensure enforceability, then form part of the conditions to which the proposal should be subject, if it is to be implemented.

5.1 Proponent's commitments

The proponent's commitments as set out in the referral document and subsequently modified, as shown in Appendix 2, should be made enforceable.

6. Conclusions

The EPA has considered the proposal by Western Power Ltd to construct and operate a 240MW combined cycle gas turbine (CCGT) power plant on its KPS site located in Kwinana, Western Australia.

Nitrogen oxides (NO_x)

Predicted ground level NO_x concentrations obtained from cumulative impact air quality modeling for the proposed Cockburn 2 plant are well below the relevant National Environmental Protection Measure (NEPM) standards. The EPA notes that Western Power will cease using coal at the Kwinana Power Station and that NO_x levels in the Kwinana area will decrease over time. Dry low NO_x (DLN) burners will be used in the proposed plant. The EPA concludes that the proposal can be managed to meet the EPA's environmental objective for this factor.

Greenhouse gas emissions

The Cockburn 2 Combined Cycle Gas Turbine plant will produce approximately 838 000 tpa of CO₂ equivalent greenhouse gases (at 100% load) and 629 000 tpa of CO₂ equivalent gases (at 75% load).

The plant will have an average carbon intensity of 398g of CO₂ per kWhr compared to coal or gas steam cycle units of 965 and 533 g of CO₂ per kWh respectively. As part of Western Power's Asset Replacement Strategy, coal will be removed from Kwinana, and the operation of the Cockburn 2 plant will allow for the shutdown of less efficient coal fired units at Muja Power Station (A/B units). Western Power estimates that the consequent shift to gas will reduce Western Power's CO₂ emissions in 2010 by around 15% from 2001 levels. This equates to savings of 1.6 million tonnes of CO₂ per annum against present production levels.

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.

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 as wind and solar energy;
- Gas, including combined cycle, turbines;
- New technology coal plants;
- Old technology coal plants; and
- Petroleum fuel plants.

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 notes that although the plant will contribute greenhouse gases, there will be an overall reduction in greenhouse gases because of shutdown of less efficient plants. The EPA concludes that the proposal can be managed to meet the EPA's environmental objective for this factor provided that ministerial condition 7 is imposed on the proponent.

Noise

The EPA considers that the Cockburn 2 will result in an improvement of noise emissions. The EPA considers that the implementation of the Asset Replacement Strategy, including decommissioning the old KPS plant and replacing with the CCGT's, will reduce noise emissions from the plant.

Western Power's noise reduction programme suggests improvements will be made over time to comply with the regulations.

However, the regulatory criteria will not be met at the Navel Base Hotel when its accommodation is in use, as it is a noise sensitive premise under the definition. Western Power have sought a Regulation 17 approval to the Minister for Environment and Heritage for the KPS for its noise emissions at the Navel Base Hotel when the accommodation is in use. This will allow the noise emission to exceed or vary from the assigned level under these circumstances.

The EPA notes that the proponent has made commitments to prepare and implement both construction and operational noise management plans to ensure that noise emissions are acceptable.

The EPA concludes that the proposal can be managed to meet the EPA's environmental objective for this factor.

Marine environment

Cooling water from Cockburn 2 will be discharged via a sub-sea diffuser located in approximately 10 metres of water about 200 metres south of the existing KPC Stage C. The effects of this discharge has been assessed on the basis of the cumulative thermal effects from all of Western Powers plants. Modelling of the thermal plume with Cockburn 1 and 2 at maximum power generating capacity and KPS at its peak operation capacity indicate that the discharge of the water is unlikely to not meet draft Environmental Quality Guidelines (EQG) during most of the year.

The proponent has committed to undertake monitoring of the thermal discharge to Cockburn Sound to ensure that the Cockburn Sound EPP Environmental Quality Objectives are met. The proponent has committed to prepare and implement a contingency plan should the EQO not be met.

Taking into account the proponent commitments, the EPA considers that the proposal can be managed to achieve an environmentally acceptable outcome in relation to thermal impacts to the marine environment.

7. Recommendations

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

1. That the Minister notes that the proposal being assessed is for the construction, operation, and maintenance of a 240MW combined cycle gas turbine (CCGT) (Cockburn 2) on a site located in Kwinana, Western Australia;
2. That the Minister considers the report on the relevant environmental factors as set out in Section 4;

3. That the Minister notes that the EPA has concluded that it is unlikely that the EPA's objectives would be compromised, provided there is satisfactory implementation by the proponent of the recommended conditions set out in Appendix 2, including the proponent's commitments; and
4. That the Minister imposes the conditions and procedures recommended in Appendix 2 of this report.

Appendix 1

References

Western Power (October 2002). Cockburn 2 Combined Cycle Gas Turbine – Project Referral to the Environmental Protection Authority.

DAL Science and Engineering (DALSE) Pty Ltd (September 2002). Cockburn Power Station Project – Assessment of Environmental Impacts of Cooling Water Discharge from the Cockburn 2 Power Plant.

SVT Engineering Consultants (October 2002). Environmental Noise Review of the proposed 2nd Kwinana Combined Cycle Plant for Western Power.

ENVIRON Australia Pty Ltd (September 2002). Air Dispersion Modelling – Cockburn Power Project Gas Turbine Bypass Stacks Proposal for Western Power Corporation.

Environmental Protection Authority (1990). Proposed Collie Power Station, Bulletin 472.

Environmental Protection Authority (2000). Guidance Statement for Emissions of Oxides of Nitrogen from Gas Turbines No. 15.

Environmental Protection Authority (2002). Guidance Statement for Minimising Greenhouse Gas Emissions No. 12.

National Environment Protection Council (1998). National Environmental Protection Measures for Ambient Air Quality.

URS (2001). Air Dispersion Modelling – Proposed Kwinana Power Station Gas Turbines for Western Power Corporation.

Alstom (2002). Overall Noise Protection Concept – Cockburn Power Station.

Appendix 2

Recommended Environmental Conditions and Proponent's Consolidated Commitments

RECOMMENDED CONDITIONS AND PROCEDURES

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

COCKBURN 2 COMBINED CYCLE POWER PLANT

Proposal: The construction, operation, and maintenance of a nominal 240 megawatt combined cycle gas turbine power plant on a site located in Kwinana. The proposal is documented in schedule 1 of this statement.

Proponent: Western Power Corporation

Proponent Address: Western Power Corporation
GPO Box L921
PERTH WA 6001

Assessment Number: 1465

Report of the Environmental Protection Authority: Bulletin 1086

The proposal referred to above may be implemented subject to the following conditions and procedures:

Procedural conditions

1 Implementation and Changes

- 1-1 The proponent shall implement the proposal as documented in schedule 1 of this statement subject to the conditions of this statement.
- 1-2 Where the proponent seeks to change any aspect of the proposal as documented in schedule 1 of this statement in any way that the Minister for the Environment and Heritage determines, on advice of the Environmental Protection Authority, is substantial, the proponent shall refer the matter to the Environmental Protection Authority.
- 1-3 Where the proponent seeks to change any aspect of the proposal as documented in schedule 1 of this statement in any way that the Minister for the Environment and Heritage determines, on advice of the Environmental Protection Authority, is not substantial, the proponent may implement those changes upon receipt of written advice.

2 Proponent Commitments

- 2-1 The proponent shall implement the environmental management commitments documented in schedule 2 of this statement.
- 2-2 The proponent shall implement subsequent environmental management commitments which the proponent makes as part of the fulfilment of the conditions in this statement.

3 Proponent Nomination and Contact Details

- 3-1 The proponent for the time being nominated by the Minister for the Environment and Heritage under section 38(6) or (7) of the *Environmental Protection Act, 1986* is responsible for the implementation of the proposal until such time as the Minister for the Environment and Heritage has exercised the Minister's power under section 38(7) of the Act to revoke the nomination of that proponent and nominate another person as the proponent for the proposal.
- 3-2 If the proponent wishes to relinquish the nomination, the proponent shall apply for the transfer of proponent and provide a letter with a copy of this statement endorsed by the proposed replacement proponent that the proposal will be carried out in accordance with this statement. Contact details and appropriate documentation on the capability of the proposed replacement proponent to carry out the proposal shall also be provided.
- 3-3 The nominated proponent shall notify the Department of Environmental Protection of any change of contact name and address within 60 days of such change.

4 Commencement and Time Limit of Approval

- 4-1 The proponent shall provide evidence to the Minister for the Environment and Heritage within five years of the date of this statement that the proposal has been substantially commenced or the approval granted in this statement shall lapse and be void.

Note: The Minister for the Environment and Heritage will determine any dispute as to whether the proposal has been substantially commenced.

- 4-2 The proponent shall make application for any extension of approval for the substantial commencement of the proposal beyond five years from the date of this statement to the Minister for the Environment and Heritage, prior to the expiration of the five-year period referred to in condition 4-1.

The application shall demonstrate that:

- the environmental factors of the proposal have not changed significantly;
- new, significant, environmental issues have not arisen; and
- all relevant government authorities have been consulted.

Note: The Minister for the Environment and Heritage may consider the grant of an extension of the time limit of approval not exceeding five years for the substantial commencement of the proposal.

Environmental conditions

5 Compliance Audit and Performance Review

5-1 The proponent shall prepare an audit program in consultation with and submit compliance reports to the Department of Environmental Protection which address:

- the implementation of the proposal as defined in schedule 1 of this statement;
- evidence of compliance with the conditions and commitments; and
- the performance of the environmental management plans and programs.

Note: Under sections 48(1) and 47(2) of the *Environmental Protection Act, 1986*, the Chief Executive Officer of the Department of Environmental Protection is empowered to audit the compliance of the proponent with the statement and should directly receive the compliance documentation, including environmental management plans, related to the conditions, procedures and commitments contained in this statement.

Usually, the Department of Environmental Protection prepares an audit table which can be utilised by the proponent, if required, to prepare an audit program to ensure that the proposal is implemented as required. The Chief Executive Officer is responsible for the preparation of written advice to the proponent, which is signed off by either the Minister or, under an endorsed condition clearance process, a delegate within the Environmental Protection Authority or the Department of Environmental Protection that the requirements have been met.

5-2 The proponent shall submit a performance review report every five years after the start of the operations phase to the requirements of the Minister for the Environment and Heritage on advice of the Environmental Protection Authority, which addresses:

- the major environmental issues associated with the project; the targets for those issues; the methodologies used to achieve these; and the key indicators of environmental performance measured against those targets;

- the level of progress in the achievement of sound environmental performance, including industry benchmarking, and the use of best available technology where practicable;
- significant improvements gained in environmental management, including the use of external peer reviews;
- stakeholder and community consultation about environmental performance and the outcomes of that consultation, including a report of any on-going concerns being expressed; and
- the proposed environmental targets over the next five years, including improvements in technology and management processes.

6 Decommissioning

- 6-1 Prior to construction, the proponent shall prepare, and subsequently implement, a Preliminary Decommissioning Plan, which provides the framework to ensure that the site is left in an environmentally acceptable condition to the requirements of the Minister for the Environment and Heritage on advice of the Environmental Protection Authority.

The Preliminary Commissioning Plan shall address:

- (1) rationale for the siting and design of plant and infrastructure as relevant to environmental protection, and conceptual plans for the removal or, if appropriate, retention of plant and infrastructure;
- (2) a conceptual rehabilitation plan for all disturbed areas and a description of a process to agree on the end land use(s) with all stakeholders;
- (3) a conceptual plan for a care and maintenance phase; and
- (4) management of noxious materials to avoid the creation of contaminated areas.

- 6-2 At least six months prior to the anticipated date of decommissioning, or at a time agreed with the Environmental Protection Authority, the proponent shall prepare a Final Decommissioning Plan designed to ensure that the site is left in an environmentally acceptable condition to the requirements of the Minister for the Environment and Heritage on advice of the Environmental Protection Authority.

The Final Decommissioning Plan shall address:

- (1) removal or, if appropriate, retention of plant and infrastructure in consultation with relevant stakeholders;

- (2) rehabilitation of all disturbed areas to a standard suitable for the agreed new land use(s); and
 - (3) identification of contaminated areas, including provision of evidence of notification and proposed management measures to relevant statutory authorities.
- 6-3 The proponent shall implement the Final Decommissioning Plan required by condition 6-2 until such time as the Minister for the Environment and Heritage determines, on advice of the Environmental Protection Authority, that the proponent's decommissioning responsibilities have been fulfilled.
- 6-4 The proponent shall make the Final Decommissioning Plan required by condition 6-2 publicly available, to the requirements of the Minister for the Environment and Heritage on advice of the Environmental Protection Authority.

7 Greenhouse Gas Emissions

- 7-1 Prior to commencement of construction of the power plant, the proponent shall prepare a Greenhouse Gas Emissions Management Plan to:
- ensure that “greenhouse gas” emissions from the project are adequately addressed and best available efficient technologies are used to minimise total net “greenhouse gas” emissions and/or “greenhouse gas” emissions per unit of product; and
 - mitigate “greenhouse gas” emissions in accordance with the Framework Convention on Climate Change 1992, and consistent with the National Greenhouse Strategy;

to the requirements of the Minister for the Environment and Heritage on advice of the Environmental Protection Authority.

This Plan shall include:

- (1) calculation of the “greenhouse gas” emissions associated with the proposal, as indicated in *Minimising Greenhouse Gas Emissions, Guidance for the Assessment of Environmental Factors, No. 12* published by the Environmental Protection Authority;
- (2) specific measures to minimise the total net “greenhouse gas” emissions and/or the “greenhouse gas” emissions per unit of product associated with the proposal;
- (3) monitoring of “greenhouse gas” emissions;

- (4) estimation of the “greenhouse gas” efficiency of the project (per unit of product and/or other agreed performance indicators) and comparison with the efficiencies of other comparable projects producing a similar product;
- (5) analysis of the extent to which the proposal meets the requirements of the National Greenhouse Strategy using a combination of:
 - “no regrets” measures;
 - “beyond no regrets” measures;
 - land use change or forestry offsets; and
 - international flexibility mechanisms.
- (6) a target set by the proponent for the reduction of total net “greenhouse gas” emissions and/or “greenhouse gas” emissions per unit of product over time, and annual reporting of progress made in achieving this target.

Note: In part 5 above, the following definitions apply:

- (1) “no regrets” measures are those that can be implemented by a proponent which are effectively cost-neutral and provide the proponent with returns in savings which offset the initial capital expenditure that may be incurred; and
 - (2) “beyond no regrets” measures are those that can be implemented by a proponent which involve some additional cost that is not expected to be recovered.
- 7-2 The proponent shall implement the Greenhouse Gas Emissions Management Plan required by condition 7-1 to the requirements of the Minister for the Environment on advice of the Environmental Protection Authority.
- 7-3 The proponent shall make the Greenhouse Gas Emissions Management Plan required by condition 7-1 publicly available, to the requirements of the Minister for the Environment and Heritage on advice of the Environmental Protection Authority.

Procedures

- 1 Where a condition states "to the requirements of the Minister for the Environment and Heritage on advice of the Environmental Protection Authority", the Chief Executive Officer of the Department of Environmental Protection will obtain that advice for the preparation of written advice to the proponent.
- 2 The Environmental Protection Authority may seek advice from other agencies, as required, in order to provide its advice to the Chief Executive Officer of the Department of Environmental Protection.

Notes

- 1 The Minister for the Environment and Heritage will determine any dispute between the proponent and the Environmental Protection Authority or the Department of Environmental Protection over the fulfilment of the requirements of the conditions.
- 2 The proponent is required to apply for a Works Approval and Licence for this project under the provisions of Part V of the *Environmental Protection Act, 1986*.

Schedule 1

The Proposal (Assessment No. 1465)

The proposal is to construct and operate a second 240 megawatt combined cycle gas turbine (Cockburn 2) unit adjacent to and to the south of Cockburn 1 which is currently under construction to form part of 'Cockburn Power Station'.

The construction of the Cockburn 2 plant is part of Western Power's asset replacement strategy which includes shutdown of the Kwinana Power Station Stage B, reduced usage of Stage A, shutdown of Stage A/B units at Muja Power Station in Collie by 2006, and the cessation of coal at Kwinana Power Station by 2004.

The main components of the Cockburn 2 CCGT power plant will be:

- one natural gas fired 160 megawatt generator unit;
- heat recovery steam generator;
- one 80 megawatt steam turbine and generator unit;
- water treatment plant to produce demineralised water;
- cooling water outfall with sub-sea diffuser;
- administration, control room and workshop buildings.

The main characteristics of the proposal are summarised in the Table 1 below.

Table 1: Key proposal characteristics

| Element | Description |
|---|---|
| Project purpose | To construct operate and maintain a natural gas fired combined cycle gas turbine plant of nominal 240 Megawatt capacity to supply electricity to customers on the South West Interconnected System grid. |
| Life of the Project | 25 years |
| Power Generating Capacity | 240 megawatt (nominal) |
| Facility footprint | 2 hectares |
| Site area | 9.4 hectares |
| Fuel | Natural gas |
| Natural gas supply: Source | Dampier to Bunbury Natural Gas Pipeline, via the Epic Energy gate station at the corner of Leath and Barter Roads, Naval Base. Cockburn 2 will utilise gas supply facilities constructed as part of the Cockburn 1 development. |
| Plant facilities: No. and size of gas turbines | 1 x Alstrom GT13E2 gas turbine unit of 160MW nominal generating capacity fitted with dry low NO _x burners. A gas bypass system and bypass stack may be fitted. |
| No. and size of steam turbines | 1 x Alstom single shaft, axial exhaust steam turbine of 80 MW nominal generating capacity |
| Heat Recovery Steam Generator (HRSG) | Alstom dual pressure HRSG with horizontal gas path. |
| No. of stacks | One heat recovery steam generator stack and one bypass stack (optional). |
| Height of HRSG stack | 60m |
| Height of bypass stack (optional) | 45m |
| No. of cooling towers | nil |

| Element | Description |
|---|---|
| No. of liquid fuel tanks | nil |
| Sub sea diffuser and associated pipeline | 1 of 180m length |
| Plant operation | Baseload/Mid Merit |
| Evaporation ponds | Excess waste-water that is not suitable for recycling will be discharged to the evaporation pond constructed as part of the Cockburn 1 development. |
| Construction period | 27 months |
| Operating Hours | 24 hours a day, 365 days a year. |
| INPUTS | |
| Natural gas | 39 Terajoules per day |
| Cooling water | Seawater (5 m ³ /s) |
| Process water | Groundwater from the Perron Quarry Ash Disposal Facility |
| OUTPUTS | |
| Wastewater | Cooling water – 5 m ³ /s Process waters – minimal to evaporation pond |
| Air emissions: | |
| Oxides of nitrogen (NO _x) | 830 tpa, 26.5 (g/s) (<34 ppmv, dry, 15% O ₂) |
| Sulphur dioxide (SO ₂) | 2.1 tpa, 0.07 (g/s) |
| Carbon dioxide (CO ₂)(equiv) | 838 000 tpa (maximum at 100% load) 629 000 tpa (based on projected usage, at 75% load) |
| Carbon monoxide (CO) | 154.5 tpa |
| Non-methane volatile organic compounds (NMVOCs) | 51 tpa |

Abbreviations for Table 1:

| | |
|--------------------|---|
| DBNGP | Dampier to Bunbury Natural Gas Pipeline |
| g/s | grams per second |
| L | litres |
| m | metres |
| m ³ /yr | cubic metres per year |
| mm | millimetres |
| MW | megawatts |
| ppmv | parts per million by volume |
| SWIS | South West Interconnected System |
| tpa | tonnes per annum |

Figures (attached)

Figure 1: Regional location

Figure 2: Location Plan

Figure 3: Proposed power plant layout

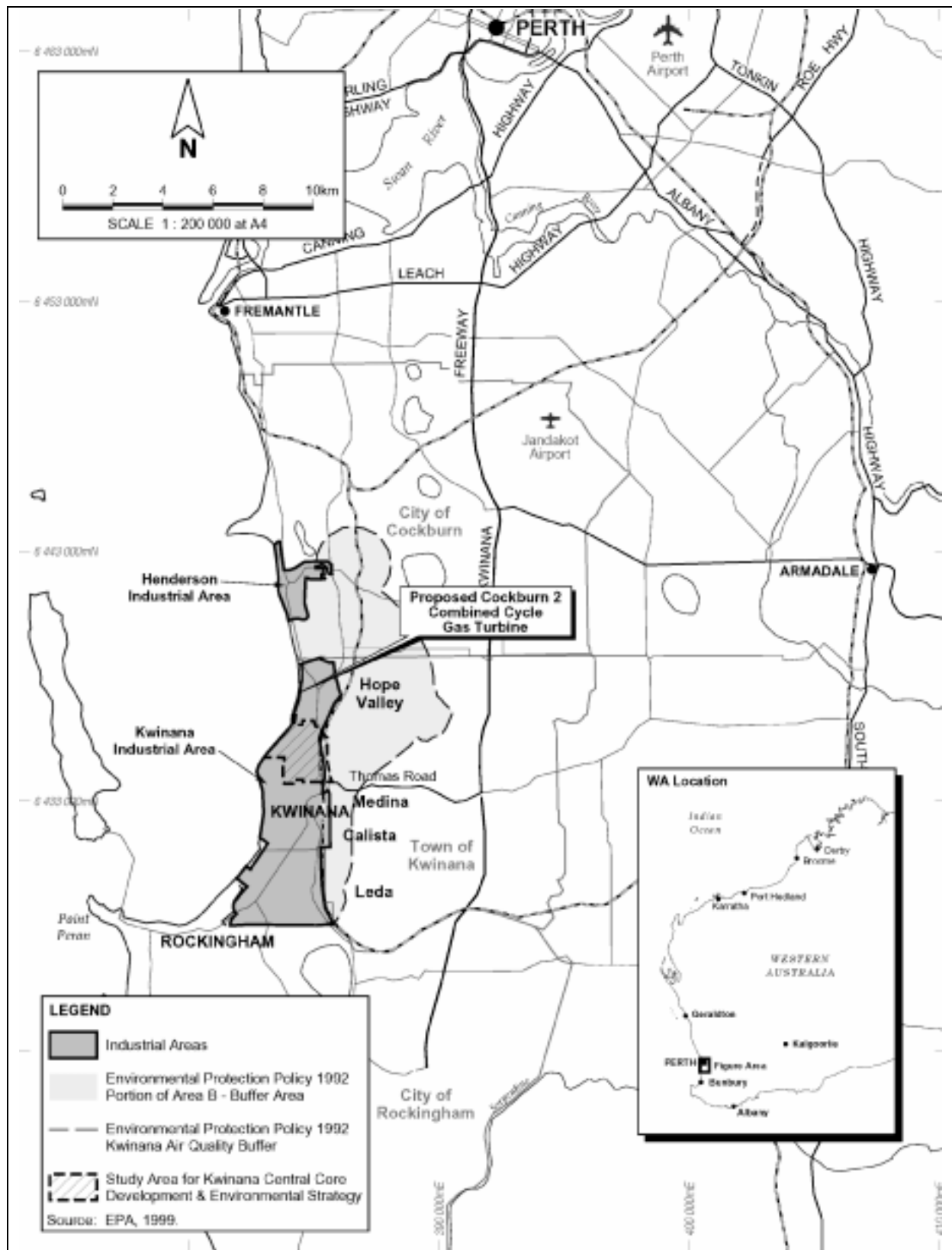


Figure 1: Regional location

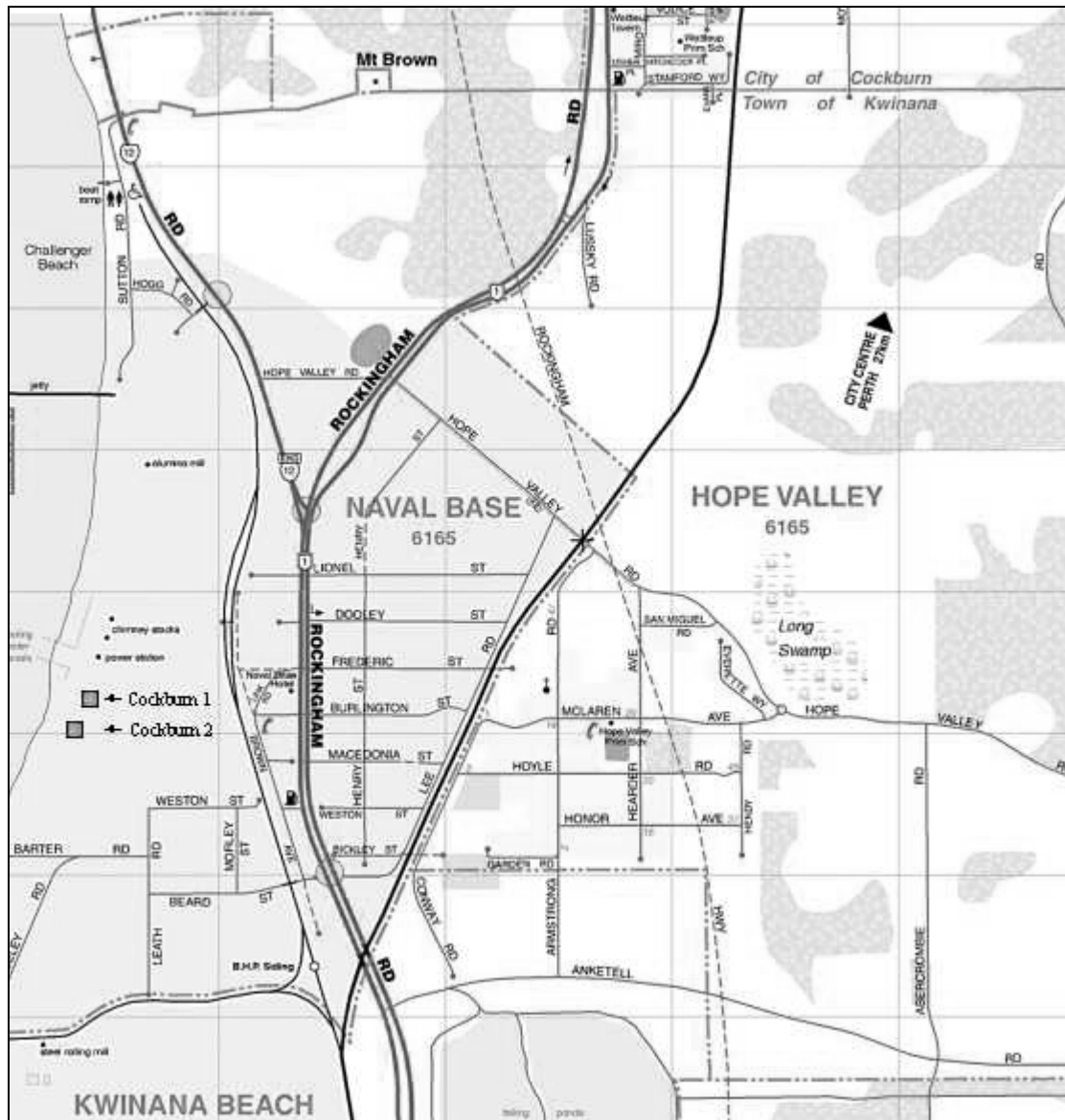


Figure 2: Location plan

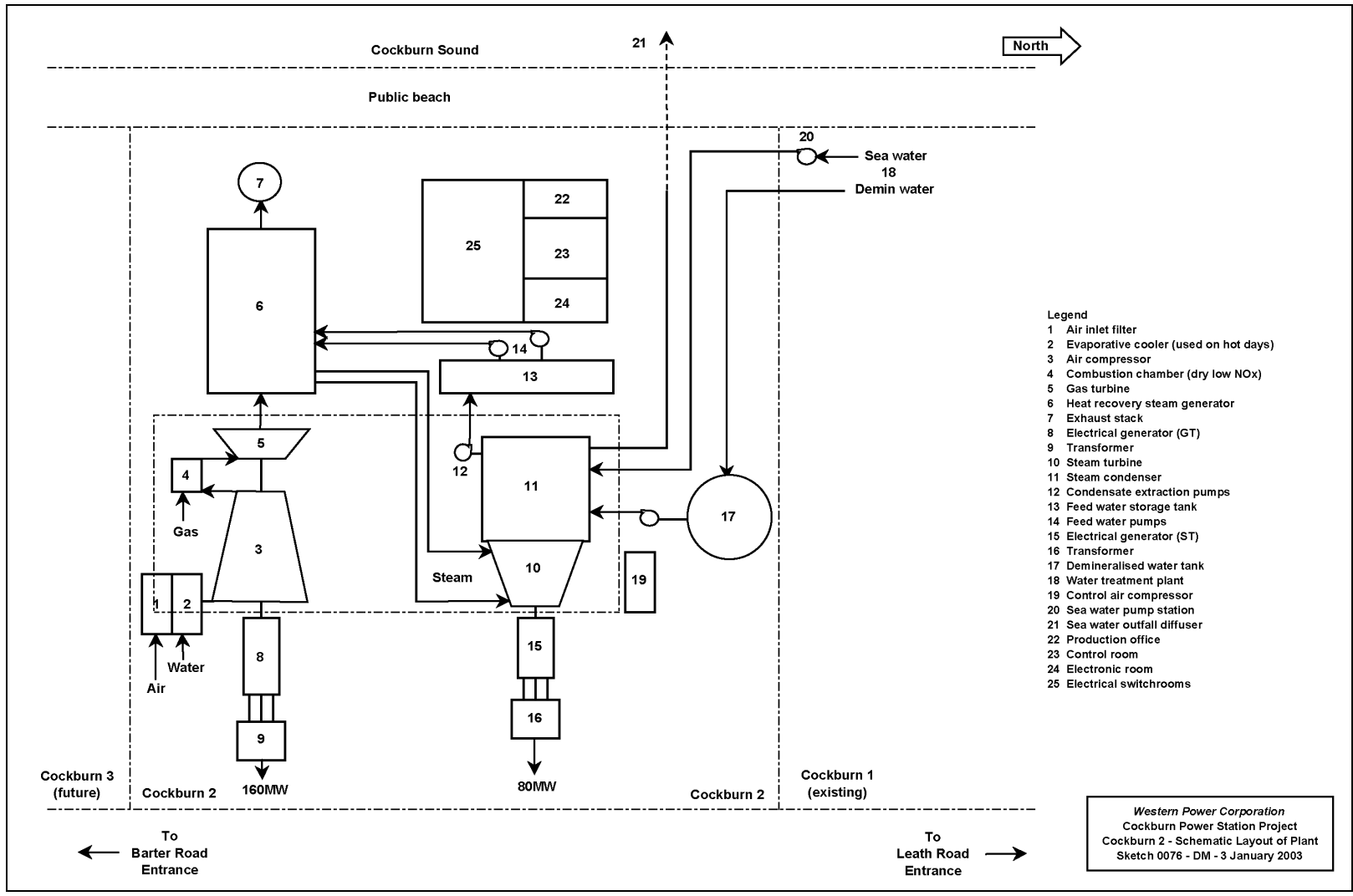


Figure 3: Proposed power plant layout

Proponent’s Consolidated Environmental Management Commitments – Cockburn 2 Combined Cycle Gas Turbine (Assessment No. 1465)

| Topic | Action | Objective | Timing | Advice |
|-----------------------------------|--|---|---|--|
| Environmental management approach | 1 Operate plant under existing Western Power Environmental Management System which meets the requirements of AS/NZS ISO 14001:1996. | To ensure construction, operation and decommissioning phases of the Project are managed to minimise environmental impacts. | 1 Design, operation and closure. | |
| Community consultation | 2 Continue with the Consultation Program. | Keep the local community and other interested stakeholders well informed of the development and operation of the Project. | 2 Throughout the life of the Project. | Relevant local authorities & community groups. |
| Decommissioning of existing Plant | 3 Cease using coal at Kwinana Power Station 4 Decommission Muja Power Station Stage A/B. | To reduce emissions to the environment from old inefficient plant | 3 30 June 2004 4 30 June 2006 | |
| Air emissions | 5 Incorporate dry low NO _x burners into the plant design which are capable of consistently achieving NO _x emission concentrations of 34 ppmv or below. 6 Sample, analyse and report on relevant stack emissions (including NO _x) on a six-monthly basis until performance is established and thereafter annually. | Ensure that air emissions (including NO _x) meet statutory requirements, and meet acceptable standards. | 5 Design. 6 During operations, 6 monthly and then annually thereafter. | |
| Water quality | 7 Prepare Water Management Plan to address: <ul style="list-style-type: none"> • stormwater management; • contaminated runoff from site; • groundwater monitoring program; and • emergency response for spillages. 8 Implement the Water Management Plan | To maintain the quality of surface and groundwater and the waters of Cockburn Sound so that existing and potential environmental values, including ecosystem maintenance, are protected. | 7 Design 8 Operation | WRC WRC |
| | 9 Prepare a Marine Protection Management Plan to address: <ul style="list-style-type: none"> • a program to monitor available chlorine levels • a program to monitor thermal discharge from the diffuser and the temperature elevation field in Cockburn Sound; and • contingency plans to address exceedences in Environmental Quality Objectives. 10 Implement the Marine Protection Management Plan. | To maintain the quality of the Cockburn Sound so that environmental values are protected. To ensure that the Environmental Quality Objectives of the Cockburn Sound Environmental Protection Policy are met. | 9 Prior to operation 10 Operation | |

Proponent’s Consolidated Environmental Management Commitments (Assessment No. 1465) [Continued]

| Topic | Action | Objective | Timing | Advice |
|--|--|---|---|---|
| Noise | <p>11 Prepare a Construction Noise Management Plan to address the requirements of the <i>Environmental (Noise) Regulations 1997</i> (Regulation 13).</p> <p>12 Implement Construction Noise Management Plan.</p> <p>13 Prepare an Operational Noise Management Plan to address:</p> <ul style="list-style-type: none"> • noise attenuation packages incorporated into the plant to ensure compliance with the SVT Engineering Consultants Environmental Noise Review (2002) and the Alstom Overall Noise Protection Concept (2002); • a noise monitoring program to verify compliance with noise control requirements for the plant equipment and buildings and to verify predictive modelling; • provision of noise modelling information to Kwinana Industries Council to update their cumulative noise model. <p>14 Implement the Operational Noise Management Plan.</p> | <p>To protect the amenity of nearby residents from noise impacts resulting from activities associated with the proposal by ensuring the noise levels meet the statutory requirements and acceptable standards.</p> | <p>11 Design.</p> <p>12 Construction.</p> <p>13 Design.</p> <p>14 Operation</p> | |
| Construction of the Cooling Water Discharge Pipeline | <p>15 Prepare a Pre-construction Management Plan to address:</p> <ul style="list-style-type: none"> • sediment sampling to include testing for organochlorine, pesticides and nutrient release potential; and • geotechnical characterisation to determine the need for specialised dredging/blasting. <p>16 Implement the Pre-construction Management Plan</p> <p>17 Prepare a Construction Management Plan to address:</p> <ul style="list-style-type: none"> • dredging plume monitoring; • dredging plume reporting; and • contingency plans for plume management and for specialised dredging or blasting if required. <p>18 Implement the Construction Management Plan.</p> | <p>To determine the quality of material to be excavated and to characterise the proposed pipeline route</p> <p>To ensure that site construction activities are undertaken in a manner that minimises or removes any environmental impact.</p> | <p>15 Design</p> <p>16 Design</p> <p>17 Design</p> <p>18 Construction</p> | |
| Risk and hazards | <p>19 Prepare a Site Safety Plan to address:</p> <ul style="list-style-type: none"> • emergency response procedures as part of the overall Emergency Response Plan. <p>20 Implement the Site Safety Management Plan</p> | <p>To ensure that at all stages of the plant’s life it is managed and operated to minimise risk.</p> | <p>19 Design</p> <p>20 Operation.</p> | <p>Fire and Emergency Services Authority of WA and the Kwinana Industries Mutual Aid Group.</p> |

RESULTS OF PUBLIC CONSULTATION PROCESS – COMMENTS RECEIVED

| ISSUE | COMMENT | WESTERN POWER RESPONSE/ACTION |
|--|---|--|
| <i>General</i> | Is the Cockburn Power Station site going to expand? (DMP) | The development of Cockburn Power Station has resulted from Western Power's asset replacement program. There is possibility for further replacement of existing plant after 2005, which may result in more CCGT units. However the physical size of the site will not increase. |
| | Why is the power station called Cockburn Power Station? (RCC, CCN) | The name of the power station was chosen in an internal competition. It is named after Cockburn Sound |
| | What Government approval has been given for Cockburn 2 and what are the construction and financing options.(IF) | The Cockburn 2 project is not conditional upon private sector financing. Western Power is examining financing options which include non-recourse debt as measures to not adversely affect the state's credit rating. |
| | Comment that use of gas fired CCGT was a significant step in the right direction to reduce CO2 emissions. (IF) | Thank you for comment and offer of further information if required. |
| | What is the capital cost of Cockburn 2 and what financial savings will result from switch from coal to gas. (IF) | Cockburn 2 will cost in the order \$300 million. The amount of savings from the switch from coal to gas is dependant on the relative prices of coal and gas, which is commercially sensitive information. |
| | General support for the project.(CC, DMP and RCC) | |
| <i>Fuel Supply</i> | Is Western Power's fuel strategy based around the shift from coal to gas? (DMP) | Western Power's fuel strategy is based around ensuring long term sustainability and lowering the total cost of generation. |
| | How secure is the gas supply? What strategies are in place to deal with gas supply interruptions?(CCN, CIF) | Western Power has sufficient fuel and generation diversity to cover short-term interruptions. Risk assessment and experience indicates that the gas supply infrastructure is highly reliable. |
| <i>Electricity generation & supply</i> | What effect will Cockburn 2 have on the development of renewable energy? (CC, RCC) What is WPC's target for renewables? (CSMC) | It is unlikely to have a significant effect as WPC has mandated renewable energy targets set under the Federal Renewable Energy Act that it must meet. |
| | Are their benefits regarding line losses with Perth based generation versus Collie based generation? (DMP) | There are benefits from a decrease in line losses resulting from the relatively small distance that the electricity needs to be transported from Cockburn Power Station to the Perth area when compared with generation options in the south west of the state. |
| | What is the relationship between the Asset Replacement Program and the Public Power Procurement? Are they connected? (RCC) | The power procurement process is designed to obtain generation capacity to meet growth in demand where the asset replacement program will see the replacement of ageing plant with economical high efficiency gas fired plant.. The PPP will run in parallel to the asset replacement program but will be entirely separate. |
| | Why does Western Power have a generation limit placed on it? Will it be allowed to build plant to meet generation growth in the future? (RCC, CSMC) | The PPP is designed to encourage new generators to enter the market and includes a restriction on Western Power bidding to supply new generation capacity. Future arrangements will be dictated by the energy reform process currently under way. |
| | What is Western Power doing in the field of renewable energy such as geothermal electricity generation? (RCC, CSMC) | Western Power has focussed its resources on the development of renewable energy in the fields of wind energy and bio energy through projects such as the Albany Wind Farm and Narrogin Integrated Wood Processing Plant. It retains a watching brief on other technologies such as geothermal energy. |

| | | |
|-------------------------|---|---|
| | Why are a number of generation projects being put forward at the moment? Will there be a reduction in less - environmentally friendly generation? (CCN) | With the deregulation of the electricity market there is greater opportunity for independent power producers to enter the market. The number of projects is a result of this process. Under the PPP, a competitive tender process will be instigated to source electricity generation to meet increase in demand. These projects will be assessed through the EPA's environmental impact assessment process |
| | Will the construction of Cockburn Power Station result in Kwinana Power Station being shut down? (CCN) | Construction of Cockburn 1 will lead to the shutdown of KPS Stage B. Construction of Cockburn 2 will result in the shut down of MPS Stages A and B. Further replacement is possible resulting in the closure of KPS Stage A. However there is no current plans to shut down KPS Stage C. |
| | Why are coal fired power stations used for base load? Can't it be used for peak load generation only? (CCN) | Due to the nature of coal fired steam cycle plant it is not suited to being regularly turned on and off, which is a requirement for peaking plant. Coal fired plant is best suited to continuous running at base load. |
| Plant technology | How old is the existing plant? (CC) | The existing plant at KPS was constructed during the 1970's. Muja Power Station Stages A and B was constructed during the early to mid 1960's. |
| | Where else in the world is the Alstom GT13E2 CCGT used? (CC) | Combined cycle gas turbine technology is widely used around the world in Europe, the Middle East, USA and Canada. There are approximately 50 GT13E2 units in service throughout the world. |
| | In which country was the Cockburn 2 plant designed and built? (CCN, CIF) | GT and ST are designed in Switzerland and France. HRSG was designed in Sydney. The gas turbine, controls, steam turbine and generators are manufactured in Europe and finned boiler tubing assemblies in Asia. Structural steelwork, transformers, switchgear, buildings and boiler drums, are manufactured in Australia. Alstom, the main contractor, has established relationships with a number of local suppliers and fabricators, who may be used for the Cockburn 2 project. |
| | How high is the Cockburn 2 exhaust stack? How does this compare to KPS? (CCN) | The main stack on Cockburn 2 will be 60 metres high. The bypass stack will be 45 metres high. This compares to the height of KPS Stage C stack, which is 189 metres high. |
| | Query re design of the HRSG and possible design options? (IF) | Western Power's design brief was for mature and proven technology. Western Power intends to use the same plant for Cockburn 1 & 2 and thus there is no opportunity for HRSG design modifications. |
| Plant operation | What quantity of waste will be discharged to the evaporation pond? (CC) | During commissioning the pond will be used extensively to store wastewater prior to disposal. During operation, flow will be approximately 2000 litres a day. |
| | How is the power station operated with such a small number of staff? How many people will be working per shift? (RCC, CCN) | The power station is designed with the latest technology and control systems so it can be run under the manning levels that are proposed for Cockburn Power Station. Up to 22 people will be required to operate the Cockburn 1 unit. When Cockburn 2 is commissioned, a further two people will be required. |
| | How does the electrodeionisation water treatment plant work? Why is less acid and caustic required? (RCC) | The EDI process uses conventional ion exchange resins. The key difference when compared to conventional mixed bed demineralisers is the use of electricity to regenerate the resins rather than chemicals. This is achieved by the use of an electric current to force a continuous migration of contaminant ions out of the feed water through the resin beds and into the reject stream. The electric current also splits the water molecules into hydrogen and hydroxyl ions resulting in the continuous regeneration of the resin. This results in a significant reduction in chemical use when compared to a conventional mixed bed demineraliser, as EDI does not require bulk acid or caustic soda for regeneration. |
| | Where are water treatment chemicals used at KPS discharged? (RCC) | They are neutralised and discharged to Cockburn Sound in accordance with the KPS operating licence. |

| | | |
|--------------------------------|---|---|
| | Will Cockburn 2 have provision for oil firing in case of problems with the supply of gas? Where will back up power come from in emergency situations? (CCN) | Cockburn 2 will not be able to use oil as a fuel. If gas supply to the unit is not available it will not be able to generate. Generation will be sourced from other generating units connected to the SWIS at Collie and Pinjar. |
| | Will the unit vibrate? (CCN, CIF) | No. The plant is designed and built to ensure that it doesn't vibrate as this would lead to operational problems. |
| | Are there any problems associated with operating in a salt air environment? (CCN) | Yes, corrosion problems. Measures to minimise this include protective coatings and regular cleaning and maintenance of the equipment |
| | What chemicals are used on site, such as in water treatment? (CCN, CSMC) | Corrosion control within the boiler will be achieved via a conventional phosphate treatment (PT) chemical regime. The chemical regime consists of ammonia for pH control of feedwater, hydrazine for dissolved oxygen during start up, mechanical de-aeration during operation and trisodium phosphate treatment for the HRSG circuits. |
| | Are chemicals added to the cooling water? (CCN) | In line with current practice at KPS, the cooling water will be treated with sodium hypochlorite to prevent marine growth in the condenser. The dosage rate will be controlled so that residual exiting the condenser will be approximately 0.5 ppm. Due to the short residence time of the hypochlorite it will dissipate rapidly. |
| | What is the source of process water for Cockburn 2? Will this be used for both Cockburn and Kwinana Power Station? (CCN) | The source of process water for Cockburn 2 will be from the existing reverse osmosis plant at KPS. This water is obtained from the groundwater recovery bore network located at the Perron quarry ash disposal facility. |
| | Is there an opportunity for WP to use water from the Water Corporation Waste Water Reuse project rather than existing sources? (CSMC) | The Wastewater Reuse project is designed to reduce industrial use of scheme water in the Kwinana Area. KPS does not use scheme water as a supply for cooling or process water supply. The amount of cooling water required for the Station is in excess of that can be provided reasonably by the wastewater project. The process water used at Cockburn Power Station is sourced from bores located at Perron Quarry ash disposal facility. Western Power is required to recover water from the borefield to ensure groundwater effects are minimised. |
| Site development | What is the planned shutdown date for KPS Stage A? (KIC) | There is no firm shutdown date for KPS Stage A. Usage of this unit will be dictated by system demands. Further asset replacement is possible resulting in the shut down of KPS Stage A. This may occur towards the end of this decade. |
| | When will KPS Stages A and B be demolished? Has a demolition plan been developed? (KIC, DMP, RCC, CSMC) | Stage B will shut down in 2005. There are no firm plans for Stage A. There are no current plans to demolish KPS Stages A and B once they have been shutdown. The demolition of this plant will be dictated by future possible uses for the site and when it can be completed safely and economically. |
| | Why are KPS and Cockburn Power Station separate? (DMP) | Cockburn and Kwinana Power Stations will be managed as separate entities. This will allow the introduction of modern work practices to Cockburn, ensuring greater efficiency and reduced electricity costs. |
| | What will happen to the KPS Stage A/B canal once operations cease? (CSMC) | There are no firm plans regarding the demolition of KPS Stages A and B and associated infrastructure. The demolition of this plant will be dictated by future possible uses for the site. |
| | Will beach access be maintained or improved as a result of Cockburn 2? (CSMC) | Access to the beach in front of KPS will be maintained. The Cockburn 2 cooling water outfall pipe is being buried to ensure beach access is maintained. |
| Construction activities | Will site transformers be bunded? (CCN) | Yes. Bunds will be provided for all equipment containing environmentally hazardous material. |
| | What site management will be undertaken during construction and operation phases? (CSMC) | Construction activities will be managed under a construction management plan similar to that used for Cockburn 1. Once operational, Cockburn 2 will operate under the Western Power Environmental Management System. |

| | | |
|------------------------------------|---|--|
| | What effect will Cockburn 2 have on coastal processes such as longshore movement of sand? (CSMC) | Cockburn 2 will have a negligible effect on the movement of sand as the cooling water pipe will be buried and will not present an obstacle to long-shore migration. |
| Emissions to air | What are the air emissions issues for Cockburn 2? (CC) | Due to the use of natural gas as a fuel for the Cockburn 2 unit, emissions of major pollutants such as sulphur dioxide and particulates from the Cockburn 2 unit will be virtually zero. The Cockburn 2 unit will be fitted with a dry low NO _x (DLN) burner system to control NO _x emissions. This will ensure that the emission limits outlined in the DEP Guideline on Emissions of Oxides of Nitrogen from Gas Turbines will be met. Western Power estimates that the asset replacement strategy and the consequent shift to gas will reduce Western Power's carbon dioxide emissions per annum in 2010 by around 15 % from 2001 levels. |
| | What amount of CO2 savings will result from the Cockburn Power Station development? (CC) | Western Power estimates that the asset replacement strategy and the consequent shift to gas will reduce Western Power's carbon dioxide emissions in 2010 by around 15 % from 2001 levels. This equates to savings of 1.6 million tonnes of CO ₂ per annum against current levels. |
| | Why do NOx emissions from the combined KPS and Cockburn PS go up slightly when Cockburn 2 begins generating? (RCC, CCN, CSMC) | Modelling based on forecasted electricity generation at the combined Kwinana and Cockburn Power Station site indicates that NOx emissions rise slightly then level off. This is due to the greater amount of electricity being generated from the combined site. However emissions are minimised as NOx concentrations in exhaust gases emitted from Cockburn Power Station are significantly lower than those from KPS. |
| | Will more gas-fired generation lead to a lessening in concern regarding the environmental impact of power generation? (CCN) | Gas firing is generally accepted as being the cleanest fossil fuel based alternative for power generation. |
| | How does Western Power establish greenhouse targets and initiatives? (RCC, CSMC) | Western Power was one of the first companies to enter into the Commonwealth Government's "Greenhouse Challenge" cooperative agreement program in 1996 and is still an active member of the program. Western Power develops targets and initiatives to meet the requirements of the Greenhouse Challenge. Currently Western Power is revising and updating action plans under the Agreement. |
| | What emissions control equipment will be used on Cockburn 2. (CCN) | The Cockburn 2 unit will be fitted with a dry low NOx burner for NOx emission control. Other minor emissions will be dispersed through a 60m stack. |
| Emissions to Cockburn Sound | How will the development meet the requirements of the Cockburn Sound EPP? (KIC) | Cooling water from the Cockburn 2 unit will be discharged to the Sound via a sub- sea diffuser. As well as reducing the thermal impact from Cockburn 2 to an insignificant level, the diffuser acts to mix the thermal plume from the two existing Kwinana Power Station channels thus reducing the size of the thermal plume from the existing operations. No potentially contaminated process waters will be emitted to the Sound. |
| | What is discharged to Cockburn Sound from Cockburn 2? (CCN) | The main emission to Cockburn Sound is heat from cooling water discharge. The elevated temperature in the ocean is short lived and confined to the surface 1-2m layer. The cooling water will be treated with sodium hypochlorite to prevent marine growth in the condenser. The dosage rate will be controlled so that residual exiting the condenser will be approximately 0.5 ppm. Due to the short residence time of the hypochlorite it will dissipate rapidly. |
| | How far offshore is the cooling water discharged? (CCN) | In about 10 metres of water approximately 180 metres offshore. |

| | | |
|------------------------|--|--|
| | Does algae build up in the existing cooling water discharge canals? (CCN) | Yes it does. |
| | Will the project have any effect on local fish stocks especially as dolphins are attracted to the area off KPS? What will be the impact on juvenile fish in intake pipe? (CSMC) | The heated water at the outfall attracts fish, which seem to enjoy basking in the warmth, which in turn attract predators such as dolphins. Construction of Cockburn 2 will have a slight effect on this situation as it will decrease the usage of the Kwinana units and slightly decrease the extent of the hot water plume from the Stage A and C due to better mixing of the water column brought about by use of the diffuser. The operation of the intake pipes will change only slightly with a slight increase the in maximum intake volume. This is unlikely to have any effect on juvenile fish that may be there. |
| <i>Noise emissions</i> | What noise standards must Cockburn 2 comply with? (CCN) | All operations at Cockburn and Kwinana Power Station must comply with the Western Australian Environmental Protection (Noise) Regulations. |
| | What noise attenuation measures will be installed on Cockburn 2? What noise reduction will result from the Cockburn 2 development compared to the current situation? (RCC, CCN, CIF, CSMC) | Western Power will construct the combined cycle plant with acoustic treatment so that when operated in isolation and in concert with future replacement plant, it will meet the requirements of the Western Australian Noise Regulations. The Alstom noise protection concept design included the construction of an acoustically treated building to house the Gas Turbine; steam turbine and condenser primarily to reduce noise levels. This will reduce noise levels at Hope Valley by about 3.5 dB compared to the current worst case situation. |
| <i>Social Issues</i> | Who is Western Power Consulting with as part of the Cockburn 2 development? How long is the consultation period? (CC, RCC, CSMC) | Western Power consulted widely including local councils, government departments and community groups. It is hoped that the referral to the EPA will be submitted by the end of October 2002. |
| | What is the feeling in Collie regarding Western Powers shift from coal to gas? (DMP) | Western Power will always maintain a mix of coal and gas as fuel for electricity generation. The proportion of each fuel used in electricity generation being adjusted to ensure reliability and the lowest cost of electricity. Western Power People in Collie have been kept informed of the future development options including the shut down of MPS Stages A and B. |
| | What effect will Cockburn 2 have on employment levels at KPS and MPS? (DMP, CCN, CIF, TDWA) | The changes to operations at these plants will lead to changes in manning and skill requirements. However, this change will be a gradual exercise happening over a six year period, providing an opportunity for gradual change to manning levels rather than a step-wise change, thus lessening the impact of the closure of these plant on the workforce |
| | Suggestion that a discussion on social impact be included in referral? (CIF, TDWA) | Agreed. Section added to referral document. |

Notes:

DMP : Department of Minerals & Petroleum Resources

RCC: Rockingham City Council

KIC: Kwinana Industries Council

CC: Conservation Council

CCN Community consultation night at Cockburn Power Station

CIF KIC Community Industry Forum

CSMC Cockburn Sound Management Council

TDWA Training Department of Western Australia

IF Feedback received via WPC internet site