Bluewaters Power Station Phase II

Griffin Power Pty Ltd

Report and recommendations
of the Environmental Protection Authority

Environmental Protection Authority
Perth, Western Australia
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Environmental Impact Assessment Process Timelines

Date	Progress stages	Time (weeks)
31/05/04	**Level of Assessment set (following any appeals upheld)**	**2**
10/01/05	**Proponent Document Released for Public Comment**	**32**
07/03/05	**Public Comment Period Closed**	**8**
10/05/05	**Final Proponent response to the issues raised**	**9**
13/06/05	**EPA report to the Minister for the Environment**	**6**

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Summary and recommendations

Griffin Power Pty Ltd proposes to construct and operate a 200 megawatt (MW) coal-fired power station known as the Bluewaters Power Station Phase II (i.e. Bluewaters II) adjacent to the proposed Bluewaters Power Station (i.e. Bluewaters I) on a site located approximately 4km north-east of Collie. This report provides the Environmental Protection Authority's (EPA's) advice and recommendations to the Minister for the Environment on the environmental factors relevant to the proposal.

Section 44 of the *Environmental Protection Act, 1986* requires the EPA to report to the Minister for the Environment 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.

Relevant environmental factors

The EPA decided that the following environmental factors relevant to the proposal required detailed evaluation in this report:

(a) Greenhouse gas emissions;

(b) Atmospheric emissions;

(c) Liquid and solid waste disposal;

(d) Surface water and groundwater; and

(e) Noise.

There were 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.

Conclusion

The EPA has considered the proposal by Griffin Power Pty Ltd to construct and operate a 200MW coal-fired power station known as the Bluewaters II Power Station (Bluewaters II) adjacent to the Bluewaters Power Station (Bluewaters I) on a site located approximately 4km north-east of Collie.

The EPA acknowledges that the demand for electricity in Western Australia will continue to grow. The rate of this growth can be reduced somewhat through demand management. However, there will be a continuing need for additional electricity generating facilities as the population grows and usage per person increases. Additional demand should be satisfied through electricity generating facilities which minimise environmental impacts including the production of greenhouse gases.

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

- conservation and energy 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 considers that combined cycle gas turbine (CCGT) generation represents best practicable technology for base-load power generation at this time. The proposed 200MW coal-fired plant will produce an extra 620,000 tonnes of carbon dioxide per year compared to a CCGT power station of equivalent capacity. The EPA has previously advised that it expects proponents to mitigate all or a significant part of the extra greenhouse gases produced.

The EPA notes that the proponent has investigated mitigation actions and that the apportioned quantity of greenhouse gases to be directly offset for the Bluewaters II Power Station is about 100,500 tonnes per annum. While the proponent has met the intent of the EPA's requirement to consider the issue of offsets, the apportioned direct offsets for Bluewater II Power Station still leaves an excess of about 519,500tpa of greenhouse gas emissions above a CCGT power station of equivalent capacity. The EPA notes that the level of greenhouse emissions is considerable and that the level of offsets is about one sixth of the excess.

If a decision is made that the proposal can be implemented, the EPA considers that the offsets offered by the proponent should be made legally enforceable and tied to this proposal for the life of the proposal. The EPA recognises that the issue of greenhouse gas management is a matter for judgment and that decisions about this proposal will include consideration of broader economic, regional development and strategic issues which are outside the scope of the EPA. From an environmental perspective, the EPA advises that a coal-fired power station without full greenhouse gas offsets and best practicable technology will not deliver the best environmental outcome.

The EPA welcomes and strongly supports recent announcements by Government of a Greenhouse and Energy Taskforce and a strategic air quality management framework for Collie to manage emissions from existing and proposed industries in the region. Air quality is an emerging issue in Collie. Sulphur dioxide levels may begin to approach ambient standards designed to protect human health with the current array of proposals and this issue deserves the close attention that a strategic management framework can provide.

In determining appeals on the EPA's report on the Bluewaters proposal (Bluewaters I) the Minister for the Environment determined that "it is considered appropriate that the development of emission limits for both the Bluewaters proposal and other existing and proposed power generation and industrial facilities within the Collie region occur as part of a strategic air quality management framework. Such an approach would not necessarily preclude the emission limits suggested by the EPA, or in fact other limits, being required at a later date."

It is evident that the proposed Bluewaters II Power Station does not employ world's best practice for SO_2 management. The EPA considers that European Directive 2001/80/EC represents best practice for SO_2 emission limits.

In considering Principle 5 "waste minimisation" of the *Environmental Protection Act, 1986*, the EPA believes that proponents should implement best practicable measures for the prevention or minimisation of environmental impacts. In view of the appeal decision on Bluewaters Power Station, this may require retrofitting of sulphur control equipment if the air quality management framework indicates that SO_2 is an issue.

Consistent with this, the EPA considers that the proposed strategic air quality management framework is an appropriate mechanism for determining emission limits for this and other power stations and other industries at Collie.

Overall, the EPA's assessment has concluded that the best environmental outcome would not be achieved for greenhouse gas management if full offsets are not implemented. Best practice SO_2 management would be achieved if European Directive 2001/80/EC were applied. The EPA has concluded that further work on a strategic air quality management framework for Collie is an appropriate mechanism for determining the limits required to manage emissions from both existing and proposed new plants such as Bluewaters II in an effective and equitable way.

A key issue is the effect of saline wastewater discharge on marine water quality and the potential impact on marine biota. It is desirable that the monitoring and management of marine water quality should be consistent with the Environmental Quality Management Framework described in the Government's *State Water Quality Management Strategy Report 6* that the EPA is applying to Western Australia's marine environment (EPA 2004a, EPA 2004b). This framework has been adopted since the existing outfall was assessed and licensed. Accordingly, any update of the pipeline licence which may be required as a result of a new discharge from the pipeline should recognise, protect and achieve the following environmental values and all their associated environmental quality objectives:

- ecosystem health;
- recreation and aesthetics;
- fishing and aquaculture; and
- industrial water supply.

It is the EPA's opinion that the proposal can be managed to meet the EPA's environmental objective for noise, provided that additional best practice noise attenuation measures are employed in the proposed power station such that its noise emissions meet a level that is consistent with cumulative noise emissions that comply with the night time L_{A10} assigned level under the noise regulations at all existing and potential future noise-sensitive areas.

For other environmental factors 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 their commitments and the recommended conditions set out in Appendix 4, and summarised in Section 4.

The EPA also wishes to draw attention to the advice provided in Section 5 of this report in relation to an industrial buffer, air quality, offsets and the equitable internalisation of full environmental costs when considering proposals of this nature.

Recommendations

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

1. That the Minister notes that the proposal being assessed is for construction and operation of a 200MW coal-fired power station known as the Bluewaters II Power Station adjacent to the proposed Bluewaters I Power Station on a site located approximately 4km north-east of Collie.
2. That the Minister considers the report on the relevant environmental factors as set out in Section 3.
3. That the Minister notes that the EPA has concluded that the best environmental outcome would not be achieved for greenhouse gas management if full offsets are not implemented.
4. That best practice SO_2 management would be achieved if European Directive 2001/80/EC were applied.
5. That further work on a strategic air quality management framework for Collie is an appropriate mechanism for determining the limits required to manage emissions from both existing and proposed new plants such as Bluewaters II in an effective and equitable way.
6. That for other environmental factors, it is unlikely that the EPA's objectives would be compromised, provided there is satisfactory implementation by the proponent of their commitments and the recommended conditions set out in Appendix 4, and summarised in Section 4.
7. That the Minister imposes the conditions and procedures recommended in Appendix 4 of this report.

Conditions

Having considered the proponent's commitments and information provided in this report, the EPA has developed a set of conditions that the EPA recommends be imposed if the proposal by Griffin Power Pty Ltd to construct and operate a 200MW coal-fired power station known as the Bluewaters II Power Station adjacent to the Bluewaters I Power Station on a site located approximately 4km north-east of Collie, is approved for implementation. These conditions are presented in Appendix 4. Matters addressed in the conditions include the following:

(a) that the proponent shall fulfil the commitments in the Consolidated Commitments statement set out as an attachment to the recommended conditions in Appendix 4;

(b) preparation and implementation of a greenhouse gas emissions management plan;

(c) preparation and implementation of a stack emissions management and ambient air quality monitoring plan;

(d) preparation and implementation of a saline water discharge quality plan that protects the environmental values identified by the EPA for the marine environment; and

(e) compliance audit and performance reviews and a decommissioning plan.

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1. Introduction and background

This report provides the advice and recommendations of the Environmental Protection Authority (EPA) to the Minister for the Environment on the environmental factors relevant to the proposal by Griffin Power Pty Ltd, to construct and operate a 200MW coal-fired power station known as the Bluewaters Power Station Phase II (Bluewaters II) adjacent to the proposed Bluewaters Power Station (Bluewaters I) on a site located approximately 4km north-east of Collie.

The proposal was referred to the EPA on 18 May 2004, and on 31 May 2004 the level of assessment was set at Public Environmental Review (PER) under Section 38 of the *Environmental Protection Act, 1986*. The PER document was made available for a public review period of 8 weeks commencing on 10 January 2005 and ending on 7 March 2005.

The EPA's decision to assess the proposal at the level of PER was based on five main factors, namely greenhouse gas emissions, atmospheric emissions, liquid and solid waste disposal, surface water and groundwater, and noise.

Further details of the proposal are presented in Section 2 of this report. Section 3 discusses the environmental factors relevant to the proposal. The Conditions and Commitments to which the proposal should be subject, if the Minister determines that it may be implemented, are set out in Section 4. Section 5 provides Other Advice by the EPA, Section 6 presents the EPA's Conclusions and Section 7, the EPA's Recommendations. Appendix 5 contains a summary of submissions and the proponent's response to submissions. It is included as a matter of information only and does not form part of the EPA's report and recommendations. Issues arising from this process, and which have been taken into account by the EPA, appear in the report itself.

2. The proposal

Griffin Power Pty Ltd, proposes to construct and operate a 200MW coal-fired power station known as the Bluewaters Power Station Phase II (Bluewaters II) adjacent to the proposed Bluewaters Power Station (Bluewaters I) on a site located approximately 4km north-east of Collie (Figure 1). It would be a subcritical coal-fired base-load generation facility with a nominal generating capacity of up to 200MW. The Bluewaters II Power Station would supplement the Bluewaters I Power Station and supply electricity for sale via the South West Interconnected System (SWIS). The EPA understands from the proponent's briefings that power from both power stations would be offered as an option for Western Power Corporation's Stage 2 Power Procurement Process (PPP) for the provision of an additional 300MW of base-load capacity.

The proposed Bluewaters II Power Station would comprise the following components:

- boiler and turbine power block;
- mechanical draft cooling tower;
- flue gas cleaning equipment; and
- generator transformer switchyard.

The following components would be used by the Bluewaters II Power Station. However, these components would be substantially in place to support the Bluewaters I Power Station:

- a 100m stack;
- ash and dust disposal plant;
- water treatment plant;
- transmission line connection to Western Power Corporation switchyard;
- buildings for administration, stores, water, sewage treatment, and chemical storage;
- liquid fuel storage facilities (typically for start-up purposes);
- communications and control systems;
- water supplies;
- electrical supplies;
- drainage systems;
- roads and fencing; and
- saline wastewater discharge via the existing Collie Power Station ocean outfall.

The plant layout of the Bluewaters II Power Station is shown in Figure 2. A diagram which illustrates the input and output flows for the Bluewaters II Power Station is shown in Figure 3. The main characteristics of the proposal are summarised in Table 1 below. A detailed description of the proposal is provided in Section 4 of the PER document (Griffin Energy Pty Ltd 2005a).

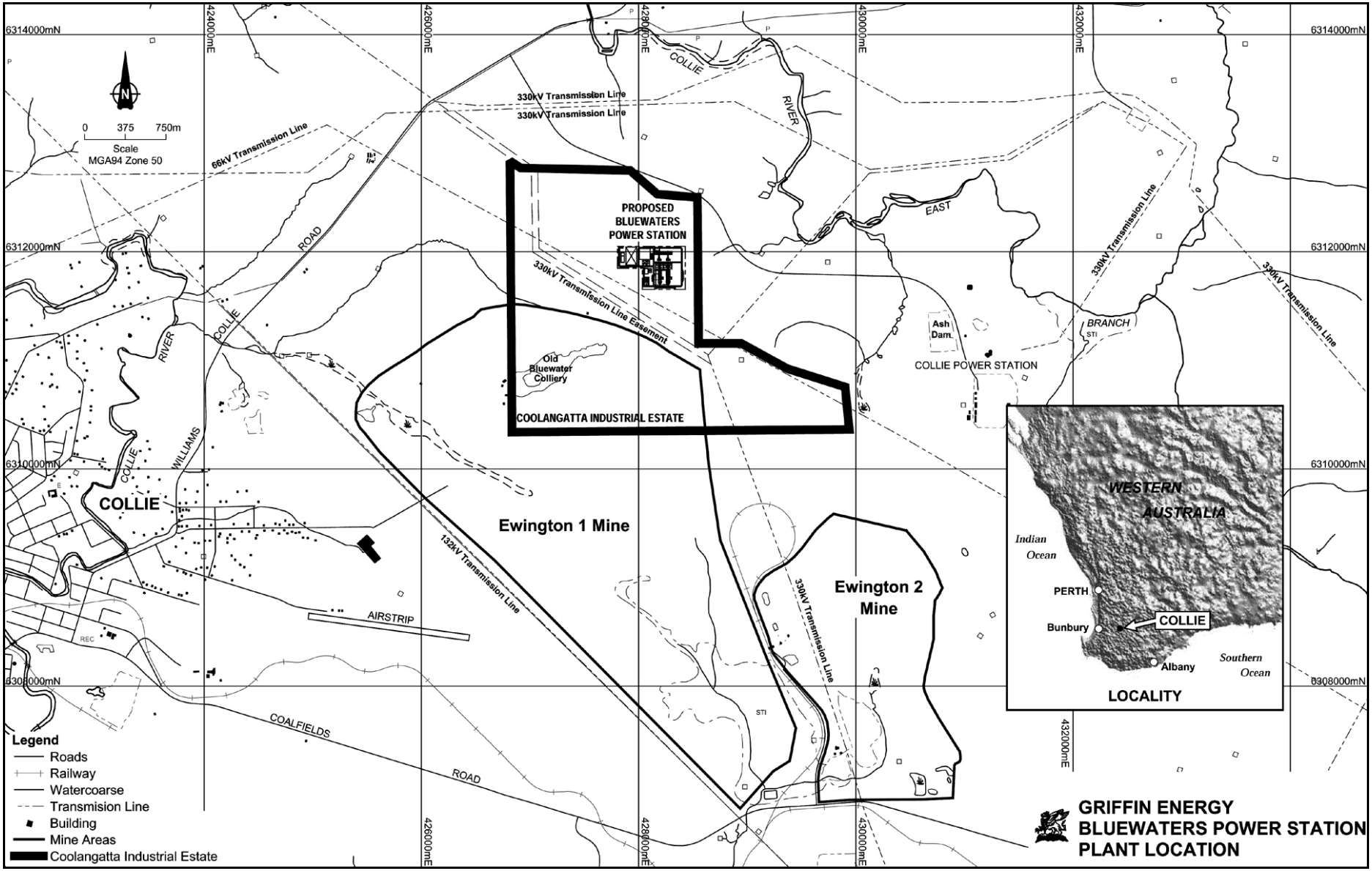

Figure 1: Regional location (Source: Figure 3 from Griffin Energy Pty Ltd 2005a)

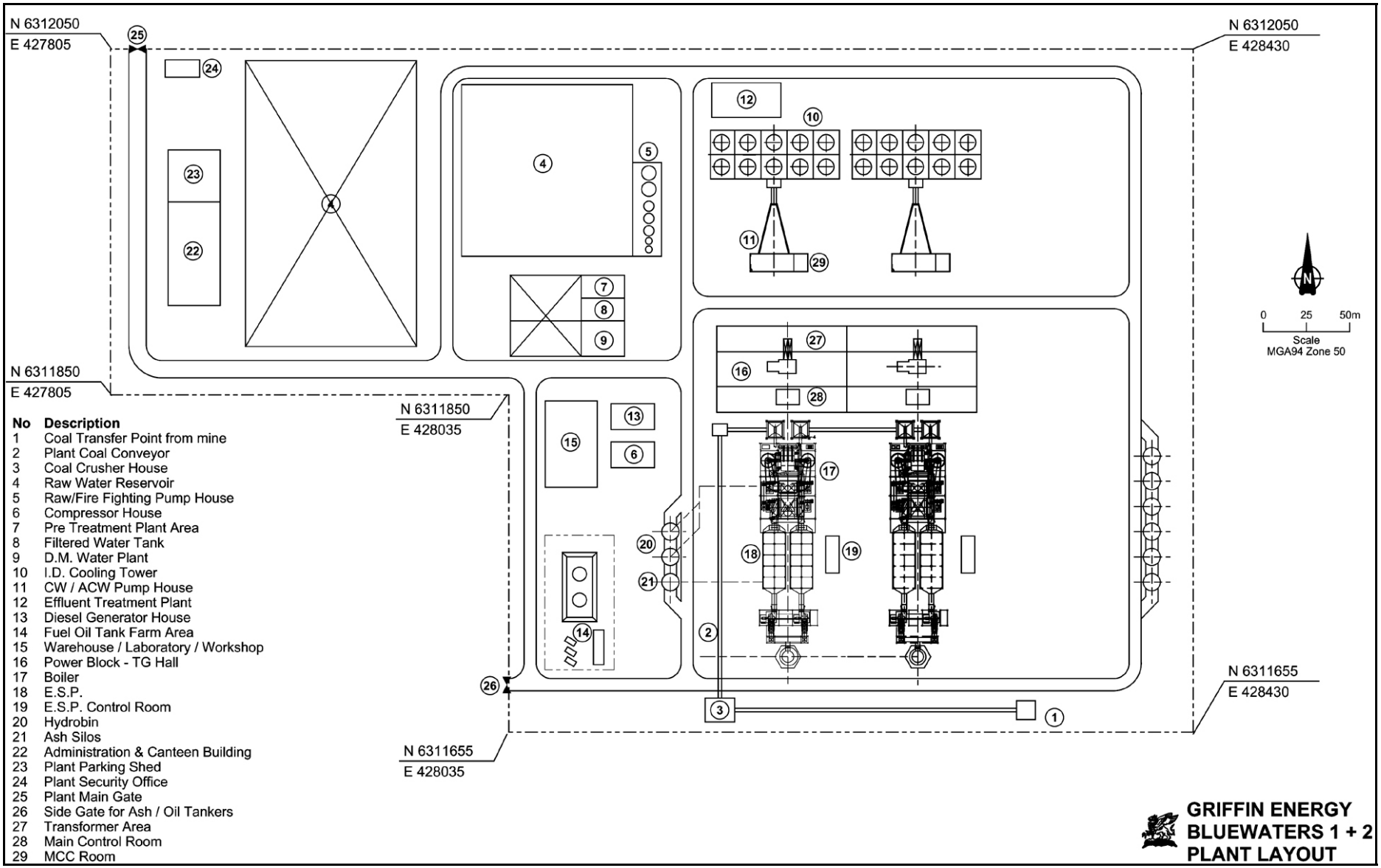

Figure 2: Plant layout (Source: Figure 4 from Griffin Energy Pty Ltd 2005a)

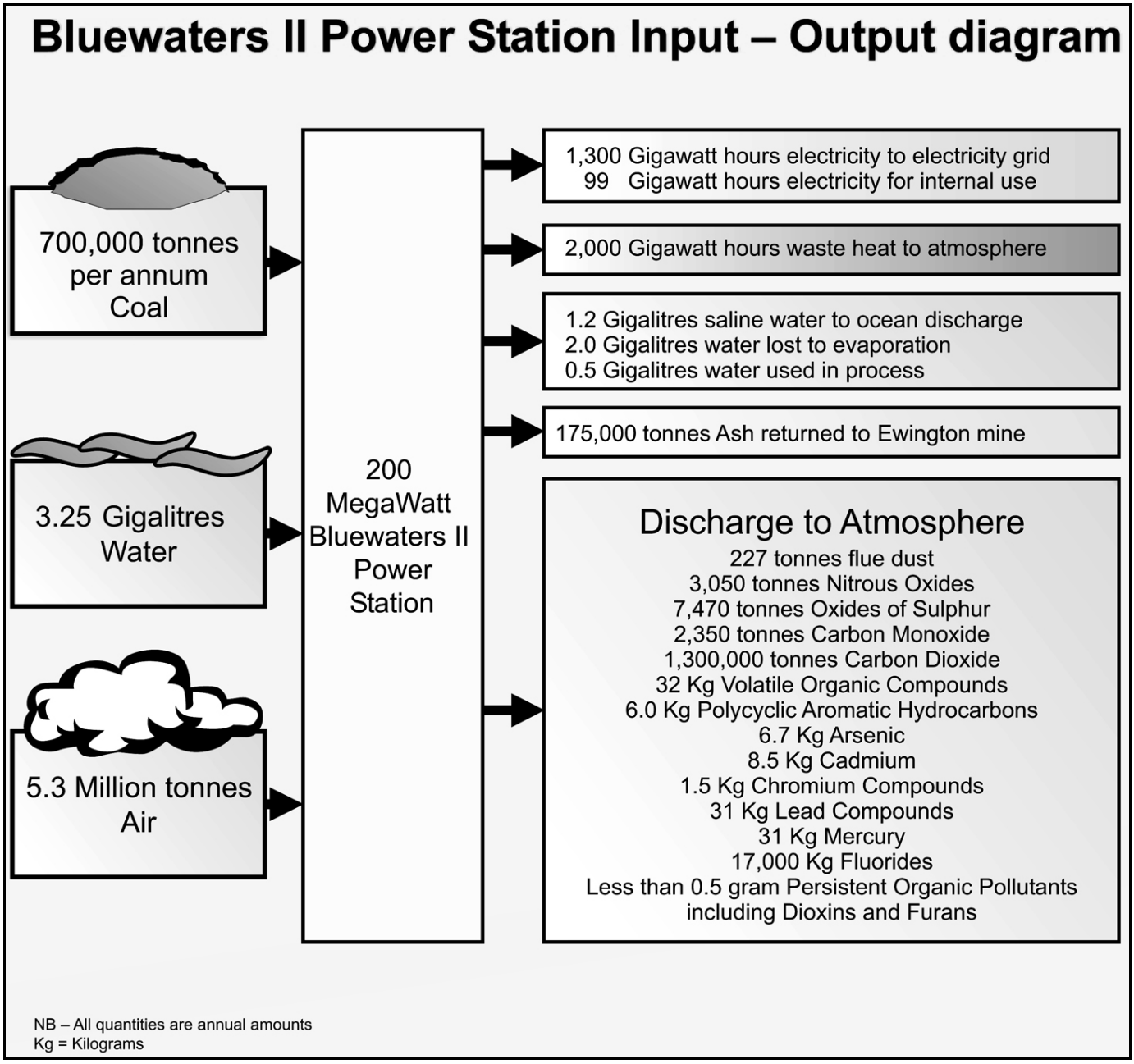

Figure 3: ***Input - output flow diagram (Source: Figure 6 from Griffin Energy Pty Ltd 2005a)***

Table 1: Summary of key proposal characteristics

ENT	DESCRIPTION
General	
• Project Purpose:	To produce electricity to supply to the SWIS grid or direct to customers
• Construction Period:	30 months to commercial operation
• Project Life:	30 years
• Project Value:	Approximately A$200 Million
• Power Plant Type:	Subcritical coal fired power station
• Power Generating Capacity:	Up to 200MW_e nominal, 202.3MW design
• Plant Thermal Efficiency:	HHV 36.4% - LHV 38.6%
• Plant Operation:	Base load operation 24 hours per day, 365 days per year
• Shutdown Time:	Plant maintenance shutdowns may be scheduled annually
• Maximum Facility Footprint:	350m x 150m area
• Maximum Total Area:	15 hectares
Plant Facilities	
• Stacks:	1
• Height of Stack:	100m
• Diameter of Stack:	4.13m
• Cooling Towers:	1 set
• Liquid Fuel Storage Tanks:	2 x 100,000 litres and 1 x 10,000 litres
• Boiler:	Balanced draft pulverised coal steam generator matched to steam turbine capacity
• Steam Turbine:	Tandem compound reheat steam turbine with synchronous alternator – 200MW_e
• Wastewater collection:	Package treatment plant
Utilities	
• Water Supply:	3.25GL/yr sourced from mine dewatering at Ewington 1
• Coal Supply:	0.7Mtpa via conveyor owned and operated by Griffin Coal Mining Company
• Transmission Line Length:	100m up to 3km depending on interconnection point as required by Western Power
Emissions	
• Noise:	Less than 60dB(A) at 150m from the plant. Less than 29dB(A) at nearest residence in Collie
• Flue Dust:	47mg/Nm^3 at 7% O_2 dry basis; 9g/s; 227tpa
• Nitrogen Oxides:	606mg/Nm^3 at 7% O_2 dry basis; 121g/s; 3050tpa
• Sulphur Oxides:	1490mg/Nm^3 at 7% O_2 dry basis; 296g/s; 7470tpa
• Greenhouse Gases:	1,300,000tpa CO_2 e
• Carbon Monoxide:	500mg/Nm^3 at 7% O_2 dry basis; 93g/s; 2350tpa
• Volatile Organic Compounds:	32kg/yr
• PAHs:	6.0kg/yr
• Arsenic:	6.7kg/yr
• Cadmium:	8.5kg/yr
• Chromium compounds:	1.5kg/yr
• Lead compounds:	31kg/yr
• Mercury:	31kg/yr
• Fluorides:	17,000kg/yr (instantaneous rate estimated to be less than 590mg/s)
• POPs inc. Dioxins and Furans:	Less than 0.5 grams per year
Waste	
• Ash:	175,000tpa disposed to the adjacent mine (Ewington 1)
• Septage:	Packaged treatment plant
• Saline Water:	1.2GL/yr
Workforce	
• Construction:	Approximately 150 personnel at the peak of construction
• Operations:	Up to 30 full time operations and maintenance personnel

Abbreviations

CO_2 e	carbon dioxide equivalents	mg/s	milligrams per second
dB(A)	decibels A weighted	Mtpa	million tonnes per annum
g/s	grams per second	MW	megawatts
GL/yr	gigalitres per year	MW_e	megawatts sent out
HHV	higher heating value	O_2	oxygen
inc.	including	pa	per annum
kg	kilograms	PAHs	polycyclic aromatic hydrocarbons
kg/yr	kilograms per year	POPs	persistent organic pollutants
LHV	lower heating value	SWIS	South West Interconnected System
m	metres	tpa	tonnes per annum
mg/Nm^3	milligrams per standard cubic metre	%	percent

Source: Modified version of Table 6 from Griffin Energy Pty Ltd 2005a

3. Relevant environmental factors and principles

Section 44 of the *Environmental Protection Act, 1986* requires the EPA to report to the Minister for the Environment 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.

The identification process for the relevant factors selected for detailed evaluation in this report is summarised in Appendix 3. The reader is referred to Appendix 3 for the evaluation of factors not discussed below. A number of these factors, such as terrestrial flora, terrestrial fauna, Aboriginal culture and heritage, and risk and hazards, are relevant to the proposal, but the EPA is of the view that the information set out in Appendix 3 provides sufficient evaluation.

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

(a) Greenhouse gas emissions;

(b) Atmospheric emissions;

(c) Liquid and solid waste disposal;

(d) Surface water and groundwater; and

(e) Noise.

The above relevant factors were identified from the EPA's consideration and review of all environmental factors generated from the PER document and the submissions received, in conjunction with the proposal characteristics.

Details on the relevant environmental factors and their assessment are contained in Sections 3.1 - 3.5. 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.

The EPA considered all of the principles listed in Section 4A of the *Environmental Protection Act, 1986*. The following principles were considered to be particularly relevant by the EPA in relation to this proposal:

(a) Principle 4b - The polluter pays principle - those who generate pollution and waste should bear the cost of containment, avoidance, and abatement; and

(b) Principle 5 - All reasonable and practicable measures should be taken to minimise the generation of waste and its discharge into the environment.

3.1 Greenhouse gas emissions

Description

Operation of the proposed Bluewaters II Power Station would generate a significant quantity of greenhouse gas emissions, predominantly in the form of 1,300,000 tonnes of carbon dioxide (CO_2) per annum.

Submissions

The main issues raised in the submissions in relation to greenhouse gas emissions included:

- the greenhouse emissions from the project are unacceptably high and no effective greenhouse reduction options are proposed;
- the proponent has not provided a comprehensive greenhouse gas emission management plan;
- the proponent has not provided sufficient information on the level of offsets that will be applied against the project;
- the subcritical technology to be used is "old technology" and less efficient than supercritical technology. As the proponent has stated that power from both Bluewaters I and Bluewaters II is an option for Western Power's Power Procurement Process, they should investigate the construction of a larger 400MW power station using more efficient supercritical technology, and justify why two 200MW power stations are proposed;
- there has been no assessment of the potential to apply Combined Heat and Power (CHP) options despite the fact that the proposed power station will be located within an industrial estate;
- it is difficult to see how the power station would significantly reduce the sent-out carbon intensity of electricity generation of the SWIS;
- the proponent should be required to offset 100% of the greenhouse gas emissions from the project;
- the inclusion of offsets should not be undertaken if they undermine the economic viability of the project, however, it should be possible for the proponent to investigate and invest in plantation forestry to offset some of their emissions;
- the proposed plant is not needed because the State's additional electricity requirement can be met through increased energy use efficiency and the use of renewable energy; and
- sustainable energy systems based on cogeneration, renewables and energy conservation should be considered.

Assessment

The EPA notes that operation of the proposed Bluewaters II Power Station would generate approximately 1,300,000 tonnes of CO_2 per annum which represents 0.3% of Australia's 1990 baseline level for greenhouse gases and 2.6% of Western Australia's

1995 emissions (Australian Greenhouse Office 1998). This amount is also well over the trigger level of 500,000 tonnes per annum (tpa) in EPA Guidance Statement No. 12 titled, "Guidance Statement for Minimising Greenhouse Gas Emissions" (EPA 2002a).

The EPA considers this proposal to be a significant contributor to Western Australia's greenhouse gas emissions. The EPA's objectives in regard to this environmental factor from both a global and Australian context, consistent with the State and National Greenhouse Strategies, are to:

- minimise greenhouse gas emissions in absolute terms and reduce emissions per unit of product to as low as reasonably practicable; and
- mitigate greenhouse gas emissions, mindful of relevant Commonwealth and State environmental policies, including EPA Guidance Statement No. 12.

The EPA is aware that the Australian Government has committed to limit Australia's increase in greenhouse emissions in 2008-2012 to no more than 8% above 1990 levels. Accordingly, the EPA considers it essential for greenhouse gas minimisation to be kept firmly in mind when considering new development proposals which are likely to significantly add to emissions.

To achieve this, the EPA expects that potential greenhouse gas emissions from proposed projects are adequately addressed in the planning, design and operation of projects, and that:

- best practicable measures are applied to maximise energy efficiency and minimise emissions;
- comprehensive analysis is undertaken, where residual impacts occur, 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 EPA acknowledges that the demand for electricity in Western Australia will continue to grow. The rate of this growth can be reduced somewhat through demand management. However, there will be a continuing need for additional electricity generating facilities as the population grows and usage per person increases. Additional demand should be satisfied through electricity generating facilities which minimise the production of greenhouse gases.

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

- conservation and energy 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 proposed power station would be a subcritical coal-fired generating facility with a nominal generating capacity of 200MW. The EPA notes that with respect to currently available and proven coal-fired power generation technologies in Australia, subcritical technology is considered to be best practice for coal-fired power stations with a generating capacity of less than 250MW according to the Australian Greenhouse Office's Generator Efficiency Standards (Australian Greenhouse Office 2001). However, the EPA is aware from the Generator Efficiency Standards that an emerging coal-fired technology known as integrated gasification combined cycle (IGCC) is significantly more thermally efficient than subcritical technology.

In relation to best practice, maximising energy efficiency and minimising greenhouse gas emissions, the EPA considers that, from an environmental perspective, combined cycle gas turbine (CCGT) generation represents best practicable technology for base-load power generation, and hence represents the benchmark against which other technologies should be compared from an environmental point of view.

The EPA notes that the proposed plant would result in greenhouse gas emissions of approximately 620,000tpa greater than a CCGT plant of similar capacity. This would amount to approximately 18.6 million tonnes of extra greenhouse gases over a nominal 30 year life for the proposed plant.

The EPA has provided strategic environmental advice (EPA 2003a) on its expectations for future power station proposals in relation to the mitigation of greenhouse gas emissions. The EPA indicated that if power stations are proposed which do not result in the least greenhouse gas intensity, the EPA expects that mitigation actions would be proposed and developed during the Section 38 environmental impact assessment process, and adopted as appropriate.

The EPA also indicated that specific measures relevant to the reduction and mitigation of greenhouse gas emissions could include:

- renewable energy generation (wind and biomass);
- advanced, high efficiency coal fired generation technology;
- sequestration via forestry; and
- desalination as part of a regional water management strategy.

The EPA also stated that it considered that such a package of mitigating measures presents a responsible way of addressing the environmental impacts associated with higher greenhouse gas emissions from coal fired power stations. In view of the above, the EPA considers that if coal is used for base-load power generation it requires greenhouse gas offset measures to be considered to account for the additional greenhouse gas emissions produced by the proposed coal fired power station in comparison to a CCGT base-load power station of equivalent nominal generating capacity.

The EPA notes that the proponent has made a commitment (Commitment No. 12 in Appendix 4) in regard to greenhouse gas emissions which includes direct greenhouse gas emission offsets of about 201,000tpa arising from tree planting activities on former mined areas and rural properties, and the proponent's 50% interest in an 80MW wind farm near Cervantes.

In addition to the above direct offsets, the proponent has also undertaken to provide support and access to Griffin owned land and facilities to enable the diversion by others of the East Collie River, to facilitate the diversion of first flush salt water away from Wellington Weir. The proponent anticipates that this project could lead to the return of 80GL of water in Wellington Weir to potable standard within a three year time frame. The proponent calculated a benefit of up to 480,000tpa of greenhouse gases avoided by not having to desalinate an equivalent volume of seawater.

The calculation above assumes Wellington Weir water can replace water that would otherwise be produced by desalination of seawater, using power from the state grid. The calculated benefit would be less if gas fired power were used, rather than power from the existing grid. This is in fact the likely scenario at Kwinana Power Station where coal firing is to be replaced with gas, which has less than 40% of the greenhouse intensity of current coal fired operations (EPA 2004a). The calculated benefit could thus be down to 151,000tpa if gas was used to provide electricity for seawater desalination at Kwinana. This is reduced to zero if renewable power, as committed to by the Water Corporation, is used.

The EPA notes that the proponent has made the above-mentioned commitment to partially offset the additional greenhouse gas emissions produced by the coal-fired Bluewaters II Power Station in comparison to the EPA's benchmark CCGT base-load power station of equivalent nominal generating capacity. The EPA also notes that the same package of offsets would apply to all three of the proponent's power station proposals in the Collie region. However, the EPA is aware that not all of the proposals may eventuate following the outcomes of Western Power Corporation's Stage 2 Power Procurement Process (PPP).

The EPA's position in relation to greenhouse gas emission offsets is consistent with the relevant Principles in Section 4 of the *Environmental Protection Act, 1986*. Principle 4 states in part that, "those who generate … waste should bear the cost of containment, avoidance or abatement", " environmental factors should be included in the valuation of assets and services", and "the users of goods and services should pay prices based on the full life cycle costs of providing goods and services, including the use of natural resources and assets and the ultimate disposal of any wastes". Principle 5 states in part that "all reasonable and practicable measures should be taken to minimise the generation of waste and its discharge into the environment".

The EPA's position is also consistent with EPA Guidance Statement No.55 titled, "Implementing Best Practice in Proposals Submitted to the Environmental Impact Assessment Process" (EPA 2003b), which indicates that "there is a responsibility for proponents not only to minimise adverse impacts, but also to consider improving the environment through rehabilitation and offsets where practicable". In view of the above, the EPA expects proponents of development proposals that generate a larger

quantity of waste (eg. CO_2) in comparison to other means of generating the same quantity of electrical power, to provide an appropriate package of offset measures.

The EPA notes that gas is becoming a premium fuel internationally because of its capacity to result in lower emissions, including greenhouse gases, per unit of energy produced. While some submitters stated that Collie coal was not preferred for electricity generation, others argued that one fuel (coal) should not be penalised with offsets that impose environmental management costs that another fuel (gas) does not incur. The EPA considers that projects should be subject to management that protects the environment to the same, consistent standards. In the EPA's view, there is inherent equity in internalising environmental costs. Coal, without greenhouse gas offsets, could be considered to have an unfair advantage if the additional environmental costs of greenhouse gas emissions were borne by the community and not internalised to the project.

During its assessment of the Bluewaters I proposal (EPA, 2005) the EPA previously considered the proponent's offer of support and access to land to facilitate improvements to the water quality of Wellington Dam. While the EPA supports proposals which assist such improvements in water quality, it formed the view that the actions and the resources to be committed by the proponent are currently insufficiently defined or quantified for the EPA to be able to clearly allocate offset credits for these particular actions.

The EPA notes that:

- while the proposed power station may be too small to use super-critical technology, it will be more efficient than older coal-fired power stations in Western Australia, although its contribution to improved efficiency across WA is likely to be about 1% or less;
- the proposal will generate about 620,000tpa more greenhouse gases than an equivalent CCGT power station;
- the proponent has offered to counter these extra emissions in part by direct offsets it can clearly control and account for, amounting to about 201,000tpa from its interest in a wind farm and tree planting;
- the same package of offsets will apply to all three of the proponent's power station proposals in the Collie region, although not all of the proposals may eventuate following the outcomes of Western Power Corporation's Stage 2 PPP;
- if the 201,000tpa of direct offsets offered is apportioned to likely scenarios for combinations of each of the proponent's power station proposals in the Collie region in terms of their respective nominal generating capacities, the apportioned offset for Bluewaters II Power Station would be 100,500tpa, which equates to about 16.2% of the additional emissions above the EPA's CCGT benchmark assuming that Bluewaters I and Bluewaters II are both built and Collie B Power Station is not; and
- the proponent has offered support for some other offsetting actions which are positive and potentially useful, but are considered by the EPA to be presently less tangible and quantifiable, and accordingly, have not been included in the calculations above.

The EPA considers that:

- whilst the proponent has met the intent of the EPA's requirement to consider the issue of offsets, the apportioned direct offsets for Bluewater II Power Station still leaves an excess of about 519,500tpa of greenhouse gas emissions above the CCGT benchmark should the combination of Bluewaters I Power Station and Bluewaters II Power Station be constructed; and
- the other offsets offered by the proponent may be positive and useful in the future but the EPA is unable to ascertain the extent of the proponent's direct interest in them at this point in time. However, the EPA is prepared to consider their contribution to offsetting additional emissions from the proponent's three power station proposals when the proponent's interest in them can be more clearly defined.

The EPA considers that the proponent's response to other matters raised in submissions in relation to this factor (Appendix 5) adequately addresses those matters.

Summary

Having particular regard to the:

(a) significant quantity of greenhouse gas emissions that will be produced by the proposed coal-fired power station;

(b) the commitments made by the proponent; and

(c) EPA's view above about greenhouse gas emission offsets;

it is the EPA's opinion that CCGT power stations represent best practicable technology for large scale base-load power generation, and hence represent the benchmark against which other base-load power generation technologies should be compared. While the objective of considering offsets has been met by the proponent, the apportioned direct offset for Bluewaters II Power Station still leaves a significant excess of emissions, and hence best environmental practice for limiting greenhouse gas emissions has not been met. If Government approves the proposal, the package of offsets should be made legally binding so that they can be implemented and bound to this proposal.

3.2 Atmospheric emissions

Description

Construction and operation of the proposed Bluewaters II Power Station would generate a variety of atmospheric emissions which have the potential to affect human health and the environment if not properly managed.

Submissions

The issues raised in the submissions in relation to atmospheric emissions were primarily related to:

- cumulative air quality impacts from both existing and proposed power station and mining developments in the Collie region;
- health impacts and health risk assessment;
- characterisation and analysis of the atmospheric emissions;
- the need for a gaseous emission buffer zone to be established around the proposed power station;
- the air quality modelling that was undertaken;
- the application of European Directive 2001/80/EC for SO_2 emissions;
- the development of an Environmental Protection Policy for SO_2 in Collie;
- the use of best practice/best available technology to minimise SO_2 emissions; and
- the proponent contributing to an air quality study for Collie and paying for the cost of an air quality management plan for the airshed which includes a network of monitoring stations.

Assessment

The area considered for assessment of this factor is the Bluewaters II Power Station site and surrounding areas, including residences in and around the town of Collie.

The EPA's environmental objective for this factor is to ensure that:

- atmospheric emissions do not adversely affect the environment or health, welfare and amenity of nearby land users by meeting statutory requirements (including Section 51 of the *Environmental Protection Act, 1986*) and acceptable standards;
- atmospheric emissions, both individually and cumulatively, meet appropriate criteria, do not cause environmental or human health impacts; and
- all reasonable and practicable measures are used to minimise the discharge of atmospheric emissions.

The EPA notes that the proposed Bluewaters II Power Station will emit a range of atmospheric emissions as set out in Table 1, which have the potential to affect human health and the environment if not properly managed.

The EPA considers that the main issues relate to sulphur dioxide (SO_2) and particulate (PM_{10} and $PM_{2.5}$) emissions.

Sulphur dioxide

The EPA notes from the air quality modelling report prepared for the proponent of the Bluewaters II Power Station proposal (Physik and Edwards 2004), that for the modelled scenario which includes emissions from the proposed Bluewaters I Power Station and the proposed Bluewaters II Power Station in isolation (Scenario 2) that the predicted:

- 1-hour SO_2 ground level concentration at a site located about 7km north-west of the proposed power station is 583µg/m^3 which is 102% of the National Environmental Protection Measure (NEPM) standard of 570µg/m^3;

- 1-hour SO_2 ground level concentration in Collie is 191µg/m^3 which is 33.5% of the NEPM standard of 570µg/m^3; and
- 10 minute SO_2 ground level concentrations equal or exceed the World Health Organisation (WHO) guideline of 500µg/m^3 at six residences in the Collie region, based on the predicted 1-hour SO_2 ground level concentrations (Figure A.2 in Physik and Edwards 2004).

A comparison of Scenario 2 with the modelled scenario which deals with the proposed Bluewaters I Power station in isolation (Scenario 1 and Figure A.1 in Physik and Edwards 2004) shows that the proposed Bluewaters II Power Station contributes to the WHO guideline being equaled or exceeded at 5 of the 6 residences, and further exacerbates the exceedance at one of the residences.

The EPA also notes that the air quality modelling report presents another scenario (Scenario 4) which includes emissions from Muja Power Station Stages A, B, C, and D, the upgraded Worsley Alumina Refinery, Collie A Power Station, the proposed Collie B Power Station, the proposed Bluewaters I Power Station, and the proposed Bluewaters II Power Station. The EPA acknowledges that Scenario 4 is conservative as it includes Muja Power Station Stages A & B which are scheduled to be decommissioned in 2007 and the Collie B Power Station which is unlikely to be built if the Bluewaters II Power Station is part of the successful PPP bid.

In Scenario 4 the predicted 1-hour SO_2 ground level concentration in Collie is 373µg/m^3 which is 65% of the NEPM standard of 570µg/m^3. The predicted 10 minute SO_2 ground level concentration in Collie is 764µg/m^3 which is 153% of the WHO guideline.

It has also been drawn to the EPA's attention that there is a caretaker's residence at the Collie Motorplex which is located about 6km west-north-west of the Muja Power Station. The EPA notes from Figure A.4 in the above-mentioned modelling report that for the conservative Scenario 4, the predicted 1-hour SO_2 ground level concentration at the caretaker's residence is about 640µg/m^3 which is 112% of the NEPM standard. The predicted 10 minute SO_2 ground level concentration at the caretaker's residence is about 1310µg/m^3 which is 262% of the WHO guideline.

The EPA notes that for Scenario 4 the predicted 24-hour PM_{10} ground level concentration in Collie is 21µg/m^3 which is 42% of the NEPM standard of 50µg/m^3. No information on predicted $PM_{2.5}$ ground level concentrations was provided in the PER document. However, the EPA is aware from other air quality modelling that has been undertaken in relation to new power stations in the Collie area (Sinclair Knight Merz 2005a) that annual $PM_{2.5}$ ground level concentrations in Collie currently exceed the NEPM standard, and noting that these concentrations are contributed by a number of sources, including power stations. The EPA understands that exceedances are predicted to occur with future power station development even with the closure of Muja Power Station Stages A and B.

The EPA also notes that for Scenario 4:

- predicted ground level concentrations of nitrogen oxides (NO_X), carbon monoxide (CO), and ozone (O_3) are all below NEPM standards; and

- predicted concentrations of polycyclic aromatic hydrocarbons (PAHs), mercury, and fluoride are all below relevant standards.

Nitrogen oxides, particulates and other air emissions

The EPA notes from the PER document that low NO_X burners will be installed in the proposed power station to minimise NO_X emissions, and that the proponent considers that the design of these burners will reflect the objectives of EPA Guidance Statement on Best Practice (EPA 2003b). The EPA also notes from the PER document that dust (particulate) emissions from the proposed power station will be controlled through the installation of either an electrostatic precipitator or a bag-house.

The EPA considers that the use of low NO_X burners and either an electrostatic precipitator or a bag-house in the proposed power station would adequately demonstrate the implementation of best practice technology by the proponent in relation to minimising NO_X and particulate emissions.

The EPA notes that the proponent has made a commitment (Commitment No. 11 in Appendix 4) in regard to managing atmospheric emissions from the proposed power station.

There is a requirement for additional data on ambient air quality to verify actual conditions in the Collie area. Accordingly, the EPA recommends that the proponent be required to undertake ongoing ambient air quality monitoring.

Health impact assessment

The EPA notes from the health impact assessment (HIA) report in the PER document that the results of the air quality modelling that was undertaken indicate that ground level concentrations of the emissions from Bluewaters I Power Station in isolation (Scenario 1), and Bluewaters Power Station and Bluewaters II Power Station together in isolation (Scenario 2) in Collie are well below national and international reference values for the protection of human health, including the most sensitive individuals in the community, such as asthmatics, the elderly, children, and people suffering from respiratory diseases.

The HIA report also indicated that adverse effects from combined emissions are unlikely, except for minor transient effects in some cases. The EPA notes from the HIA that exceedances of 10 minute SO_2 ground level concentration criteria in Collie are unlikely to impact adversely on public health, except for temporary, reversible discomfort or irritation in sensitive individuals. The EPA notes, however, that SO_2 is known to be associated with triggering and exacerbating breathing difficulties, and the modelled concentrations are considered potentially problematic.

However, given the significant number of predicted exceedances of 10 minute and 1-hour criteria for SO_2 ground level concentrations in Collie and at a number of residences in the Collie region, the potential exists for health impacts from SO_2 emissions to occur. The EPA understands that the Department of Health notes that the WHO 10 minute guideline for SO_2 of 500µg/m^3 is a more appropriate limit for vulnerable groups than the National Health and Medical Research Council (NHMRC) goal of 700µg/m^3 .

The EPA understands from the HIA that a telephone survey of 350 households in the Shire of Collie was undertaken in order to gauge community attitudes and beliefs in regard to the establishment of a new coal-fired power station in the Collie area. The EPA notes from the full copy of the survey that was provided (Sinclair Knight Merz 2005b) that, when questioned about their beliefs about the future health risks from a new power station in the Collie area, 32% of the respondents felt that there was a minor or slight health risk, and 4% felt that there was a high or moderate health risk.

It is evident that the proposed Bluewaters II Power Station does not employ world's best practice for SO_2 management. The EPA considers that European Directive 2001/80/EC represents best practice for SO_2 emission limits.

The EPA notes from the proponent's response to submissions that it does not support the application of European Directive 2001/80/EC for SO_2 emissions to the proposal as it will effectively require flue gas desulphurisation (FGD) technology to be used in the proposed power station.

The EPA has assessed additional information related to the effect of applying the European Directive to new coal-fired power stations at Bluewaters and Collie B (see Section 5.2). The EPA notes that modelling the effect of the European Directive 2001/80/EC limit on air quality (Sinclair Knight Merz 2005c) indicates improvements in SO_2 ground level concentrations at receptors close to the new plants if FGD is used at those plants to meet EC Directive limits of either 200 or 400mg/m^3. At the Collie township these improvements range from 45% for the 10 minute and 1-hour averaging periods to 18% for the 24-hour averaging period, and 26% for the annual average.

In considering Principle 5 "waste minimisation" of the *Environmental Protection Act, 1986*, the EPA believes that proponents should implement best practicable measures for the prevention or minimisation of environmental impacts.

Consistent with this, the EPA considers that the proposed strategic air quality management framework is an appropriate mechanism for determining emission limits for this and other power stations and other industries at Collie.

Summary

Having particular regard to the:

(a) level of air emissions from current and proposed future coal-fired power plants in the Collie area;

(b) the results of air emissions modelling undertaken for the PER document and the advice of the Department of Health on health effects;

(c) the significant improvement in SO_2 ground level concentrations that could be achieved through the incorporation of FGD into new coal-fired power stations in the Collie area; and

(d) commitments made by the proponent;

it is the EPA's opinion that the proposal should be included in the studies for a strategic air quality framework announced by Government, and subject to limits protective of the environment and public health determined from those studies.

3.3 Liquid and solid waste disposal

Description

Construction and operation of the proposed Bluewaters II Power Station would generate liquid and solid wastes that would require disposal.

Submissions

The issues raised in the submissions in relation to liquid and solid waste disposal were centred on the:

- proposed method of flyash disposal;
- composition of the flyash;
- need for groundwater/leachate monitoring to be undertaken in order to gauge the effect of disposing of flyash in Ewington mine;
- ability of the existing Collie Power Station saline wastewater pipeline and outfall system to accommodate additional saline wastewater from the Bluewaters II Power Station, other proposed power stations, and another industrial facility in the area;
- need for additional detail to be provided on alternative saline wastewater disposal systems such as evaporation ponds etc that could be used in the event that the existing pipeline and outfall system cannot be used; and
- characterisation of the saline wastewater and the existing marine environment around the ocean outfall diffuser.

Assessment

The area considered for assessment of this factor is the Bluewaters II Power Station site and surrounding areas, including the Ewington 1 Mine and the marine environment in the vicinity of the existing Collie Power Station saline wastewater pipeline ocean outfall.

The EPA's environmental objective for this factor is to ensure that:

- where possible, waste is minimised, reused or recycled to levels which are as low as reasonably practicable; and
- liquid and solid wastes do not affect surface water and groundwater quality, the marine environment, nor lead to soil contamination.

Saline wastewater

The EPA notes from the PER document that the proposed power station will generate about 1.2GL of saline wastewater per year and about 175,000 tonnes of ash per

annum during operation. The EPA also notes that the preferred method of saline wastewater disposal is through the existing Collie Power Station saline wastewater pipeline and ocean outfall system, and that the ash will be disposed of in the nearby Ewington 1 mine.

The pipeline is owned by Western Power Corporation. It has been previously assessed by the EPA and is subject to Ministerial and DoE license conditions. The EPA understands from the proponent's briefings that the pipeline currently operates considerably below capacity. The EPA also understands that any additional discharge through the pipeline will trigger a review of the DoE licence and its conditions.

The disposal of saline wastewater has the potential to impact on the marine environment if there is an increase beyond the current license limits in discharge volume, the mixing zone or the total load of contaminants released into the sea. The EPA understands that the saline wastewater is likely to contain biocides such as hypochlorite and hydrobromide, as well as corrosion and scale inhibitors.

The key issue is the effect of saline wastewater discharge on marine water quality and the potential impact on marine biota. It is desirable that the monitoring and management of marine water quality should be consistent with the Environmental Quality Management Framework described in the Government's *State Water Quality Management Strategy Report 6* that the EPA is applying to Western Australia's marine environment (EPA 2004a, EPA 2004b). This framework has been adopted since the existing outfall was assessed and licensed. Accordingly, any update of the pipeline licence which may be required as a result of a new discharge from the pipeline should recognise, protect and achieve the following environmental values and all their associated environmental quality objectives:

- ecosystem health;
- recreation and aesthetics;
- fishing and aquaculture; and
- industrial water supply.

The level of ecological protection to be achieved for maintaining ecosystem health in the vicinity of outfalls has previously been established by the EPA as 'high', requiring the 99% level of species protection guideline trigger values for toxicants in marine waters (ANZECC & ARMCANZ 2000) to be met outside the zone of initial dilution. A moderate level of ecological protection should be met within the zone of initial dilution unless the proponent can demonstrate that this level cannot be met and that a low level of protection is more appropriate.

The EPA considers that the quality of the saline water discharged into the pipeline should be controlled at the pipe inlet to ensure that compliance with the licence discharge conditions is maintained. The EPA recommends that a condition be set to ensure a plan to monitor and control saline water discharge quality will be implemented. The parameters of the plan should include monitoring of environmental contaminants and discharge temperature. If monitoring identifies unacceptable impacts, modifications would need to be made to address adverse effects.

While it is open to the existing pipeline licensee to enter into contractual arrangements with other users, the EPA expects that the licensee will retain responsibility for discharges from the pipeline to the ocean. Management of discharges from the Bluewaters proposal into the pipeline can be managed by a DoE discharge license on the Bluewaters operation. Such a license should ensure that the currently licensed discharge from the ocean outfall is either not exceeded or is subject to further appropriate assessment. Any such assessment should ensure that end of pipe combined effluent toxicant concentrations protect the identified environmental values and meet a moderate level of ecological protection, and a high level of ecological protection at the edge of the zone of initial dilution (except for cobalt, which should meet 95% species protection guidelines).

It would be advisable for the DoE license to require that whole of effluent toxicity testing be required annually for the combined effluent and that the combined effluent quality be consistent with the requirements of the Environmental Quality Criteria Reference Document for Cockburn Sound (EPA 2004b) for a moderate level of ecological protection. License conditions should ensure that 100 fold dilutions will be maintained to the edge of that zone.

The EPA notes that there are concerns that the capacity of the pipeline may not be able to accommodate all other inputs from proposed power stations and the existing users, particularly during periods of increased power production. Discharges to the existing pipeline will be required to meet the existing licence limits. If additional discharge means the licence limits need to be increased or another pipeline constructed then that proposal will require separate environmental assessment.

The EPA notes from the PER document that in the event that saline wastewater cannot be discharged via the Collie Power Station saline wastewater pipeline, it will be disposed of in an evaporation pond system.

The EPA notes from the proponent's response to submissions (see Appendix 5) that an evaporation pond option will be considered only if the existing Collie Power Station saline wastewater pipeline is not available. The EPA understands that the evaporation pond option will be built with volume reduction facilities upstream of the evaporation pond. Should the evaporation pond option be implemented, it is recommended that further advice be sought from the Land and Water Quality Branch of the Department of Environment. The EPA notes that if meteorological conditions make the evaporation pond option impractical, crystallisation of the brine slurry to solid brine salt will be considered.

Ash disposal

The EPA notes from the PER document that the co-disposal of ash and mine overburden into mine voids will have a significant dilution effect, and the clays in the overburden are expected to reduce the release of metals from the ash. The EPA understands that the use and disposal of fly ash in mine voids is common in coal mining areas in the Unites States, although there are strict controls on the manner in which the material is used. The EPA also notes from the PER document that this method of disposal is currently being used at the Bayswater Power Station in New South Wales. The EPA is aware that the disposal of ash into mine voids has the

potential to increase groundwater salinity, and may lead to the contamination of groundwater by some of the trace elements found in the ash.

The EPA notes that the proponent has made two commitments (Commitment Nos. 7 and 9 in Appendix 4) in regard to liquid and solid waste disposal.

The EPA notes from the PER document that fly ash management will be a component of the operational phase waste management plan referred to in Commitment No. 9. The EPA understands that the plan will include a groundwater monitoring program which will be agreed in consultation with the operator of the mine operator, the DoE, and other stakeholders. Nevertheless, the EPA recommends that the above-mentioned management plan should include details which indicate how surface water run-off and infiltration through the ash and overburden material will be managed to prevent groundwater contamination from occurring.

The EPA considers that the management measures described on pages 81 and 88 of the PER document to minimise potential impacts from liquid and solid waste disposal are environmentally acceptable. The EPA considers that the proponent's response to the above-mentioned submissions (Appendix 5) adequately addresses the concerns that were raised in relation to liquid and solid waste disposal.

The EPA considers that provisions for the monitoring of leachates from the discarded ash should be included in the appropriate DoE licence.

Summary

Having particular regard to the:

(a) necessity of the proposal to fit within the licensed capacity of the marine discharge pipeline;

(b) necessity of the quality of the discharge of saline water into the pipeline to be controlled from the pipe inlet to ensure that compliance with the licence is maintained;

(c) commitments made by the proponent; and

(d) management measures that will be used to minimise potential impacts from liquid and solid waste disposal;

it is the EPA's opinion that the proposal can be managed to meet the EPA's environmental objective for this factor.

3.4 Surface water and groundwater

Description

Construction and operation of the proposed Bluewaters II Power Station has the potential to affect surface water and groundwater quality.

Submissions

The main issues raised in the submissions in regard to surface water and groundwater included:

- there are potential water quality risks from hazardous material storage, washdown waters, fallout of air emissions to soil, saline wastewater leakage from storage ponds, and flyash disposal in mine overburden etc;
- a comprehensive surface water quality monitoring and audit program would be required in view of the potential for contaminants to enter waterways and Wellington Dam;
- development should be consistent with relevant Department of Environment Water Quality Protection Notes (WQPNs);
- additional information is required in relation to how construction activities may increase surface water and sediment run-off;
- given the difficulty in establishing the exact amount of water available from mine dewatering in the medium to long terms, the proponent should seek to source an alternative, secure long term supply;
- it is essential that the relevant licensing conditions clearly enunciate that all cooling water is to be sourced from Ewington I mine dewatering activities, and that they prohibit interference with groundwater supplies to adjacent private landowners; and
- more work needs to be done to address the concerns of landowners regarding both groundwater availability and contamination.

Assessment

The area considered for assessment of this factor is the Bluewaters II Power Station site and surrounding areas and the route of the saline wastewater discharge pipeline.

The EPA's environmental objectives for this factor are to maintain the quality of surface water and the quality, quantity and distribution of groundwater so that existing and potential uses, including ecosystem maintenance, are protected.

The EPA notes from the PER document that there are no major drainage channels located within the proposed power station site, and that potential impacts on surface hydrology are likely to be restricted to sheetflow movement. Construction and operation of the proposed power station has the potential to increase surface water and sediment run-off to nearby wetlands, and to affect the quality of regional surface water resources. The proponent advises that the power station will require 3.25GL of water per year which will be sourced from mine dewatering at the Ewington 1 Mine. The EPA understands that no additional groundwater or other water will be required to supplement the water obtained from dewatering.

The operation of the proposed power station has the potential to affect the quality of groundwater due to run-off from plant hard stand and storage areas, flyash disposal, saline wastewater leakage from storage ponds, and contamination from hydrocarbons and other chemicals used on site. The EPA considers that there is also the potential

for surface and ground water quality to be affected by leaks and/or ruptures in the saline wastewater discharge pipeline.

The EPA notes that the proponent has made two commitments (Commitment Nos. 4 and 5 in Appendix 4) in regard to surface water and groundwater.

The EPA considers that the management measures described on pages 71 and 81 of the PER document that will be used to minimise potential impacts on surface water and groundwater, are environmentally acceptable. The EPA considers that the proponent's response to the above-mentioned submissions (Appendix 5) adequately addresses the concerns that were raised in relation to surface water and groundwater.

Summary

Having particular regard to the:

(a) proponent's undertakings that no additional groundwater will be required to supplement the water obtained from dewatering at the Ewington 1 Mine;

(b) commitments made by the proponent; and

(c) management measures that will be used to minimise potential impacts on surface water and groundwater;

it is the EPA's opinion that the proposal can be managed to meet the EPA's environmental objective for this factor.

3.5 Noise

Description

Construction and operation of the proposed Bluewaters II Power Station has the potential to affect existing noise levels.

Submissions

The issues raised in the submissions in regard to noise included:

- concerns about the impact of cumulative noise emissions, including the potential to cause additional ill health;
- the three PER documents relating to proposed power stations in the Collie area have not provided standardised modelling for noise which makes it difficult to establish whether modelling will reflect actual impacts if they are constructed;
- additional cumulative noise modelling needs to be undertaken to include all existing and proposed power stations and existing and proposed industrial and mining developments in the area, and to clarify an apparent discrepancy between the different noise modelling programs that were used in the PER documents for the proposed power stations;
- the noise modelling contour lines for the power station are cut off to the south and east, and the noise maps do not factor in varying wind conditions; and

- we are already in the 40-45dB(A) area of exposure for Ewington I mine, and we are also in the 35-45dB(A) range for the proposed power stations.

Assessment

The area considered for assessment of this factor is the Bluewaters II Power Station site and surrounding areas, including residences in and around the town of Collie.

The EPA's environmental objective for this factor is to ensure that:

- noise levels from construction activities comply with the requirements of Australian Standard 2436-1981 "*Guide to Noise Control on Construction, Maintenance and Demolition Sites*"; and
- noise levels from the proposed power station comply with the *Environmental Protection (Noise) Regulations, 1997*.

In order to address the concerns that were raised in the submissions regarding cumulative noise emissions the Department of Environment (DoE) requested further noise modelling information for each proposed power station. Using this data and the information in the relevant PER documents, the DoE undertook an analysis to determine cumulative noise levels at four different receiving locations in the Collie area.

The DoE's analysis utilised currently available noise modelling related information pertaining to both existing and proposed power stations, mining operations, and notional industries within the proposed Coolangatta Industrial Estate in the Collie area. Table 2 below provides a summary of the outcomes of the DoE's analysis (Department of Environment 2005).

Table 2: Assessment of cumulative noise levels in the Collie area

	Estimated sound level - dB(A)			
	Receiving location 1 - North-east corner of Collie townsite	Receiving location 2 - Collie-Williams Rd, corner of Boys Home Rd	Receiving location 3 - Collie-Williams Rd, north of Bluewaters I & II	Receiving location 4 - Collie-Williams Rd, north of Collie A & B
Assigned $L_{A\ 10}$ night time noise level	35	35	35	35
Total estimated cumulative sound level range using SoundPlan and ENM models [1, 2]	42-45	39-42	37-40	36-39
Estimated sound level range due to Bluewaters II [2, 3]	24-27	30-33	24-27	22-25
Estimated sound level range due to Collie B [2]	22-25	24-27	24-27	28-31

Note 1: Includes noise emissions from Bluewaters I & II, Collie A & B, Ewington 1 mine, Ewington 2 mine, and Coolangatta Industrial Estate with 3 notional industries.

Note 2: The SoundPlan model produced the lower value in the range and the ENM model produced the higher value.

Note 3: Noise emissions from Bluewaters II assessed at correct current source location.

Source: Modified version of Table 5 from Department of Environment 2005.

The results in Table 2 indicate that the cumulative noise level from all sources is likely to exceed the night time $L_{A\ 10}$ assigned level at all four receiving locations under worst case meteorological conditions, using either the SoundPlan or ENM acoustic model. Under noise regulation 7(2), a noise emission is taken to "significantly contribute to" an exceedance of the assigned level if the noise emission exceeds a value which is 5dB below the assigned level at the point of reception, that is, 30dB(A).

The predicted noise emission level for the Bluewaters II Power Station alone would meet the "non-contributing" level of 30dB(A) at all four receiving locations under the SoundPlan model, while under the ENM model it would be above this level at 33dB(A) at one location (receiving location 2).

Given that the sound power levels are possibly conservative (leaving scope for some noise reduction), and that the proposal is "significantly contributing" under only one of the models (ENM), the noise emissions should be capable of complying with the noise regulations when taken in isolation, and using best practice noise control in the design stage.

However, the EPA notes that the requirement of noise regulation 7(2) for "non-contributing" noise is relevant for up to three noise sources, but fails to protect the overall noise level when there are more than three noise sources present. (This is because three sources, at 30dB(A), when added logarithmically, would total 35dB(A), while 10 sources at 30dB(A) would total 40dB(A)).

In the area of interest, there may be up to eight noise sources if three of Collie A and B and Bluewaters I and II Power Stations were developed, along with (say) three industries in the Coolangatta Industrial Estate and the Ewington I and II coal mines. If all these sources were to cumulatively meet 35dB(A), then each source would need to meet a level of 26dB(A), which is 4dB(A) more stringent than the 30dB(A) value required by noise regulation 7(2). (Some sources could be above 26dB(A) provided others were below this value).

The EPA views management of each source to 26dB(A) as a more comprehensive way of approaching the noise assessment, to be preferred over the approach of achieving only compliance with the 30dB(A) required under noise regulation 7(2).

Analysis of the noise reductions required for each noise source to achieve 26dB(A) show that the proposed Bluewaters II Power Station would need to achieve a noise reduction of 4-7dB(A) at receiving location 2, if the cumulative noise criterion is to be met (Department of Environment 2005). As the higher values in these ranges represent the ENM model, achieving these noise reductions would be significantly more difficult if this model is used as the assessment tool, when compared with SoundPlan. Achievement of either value will require best practice noise management at the design stage.

Of greater significance are the cumulative results for receiving locations 1 and 2. Receiving location 1 (north-eastern corner of Collie townsite) is likely to be substantially affected by mining noise when Ewington 1 commences. This project

was assessed by the EPA in 1994, against the (then) anticipated noise regulations, which included a night time assigned level of 40dB(A). While most of the other sources appear to be manageable from the point of view of the Collie townsite, it would appear that the noise emissions from Ewington 1 mine will require further consideration prior to commencement (Department of Environment 2005).

In relation to receiving location 2 (Collie-Williams Road, near Boys Home Road), the extent of noise reduction required to achieve the 35dB(A) cumulative total is significant for Bluewaters I and II, Coolangatta Industrial Estate and Ewington 1 mine. The EPA is concerned that this indicates that the buffer area on the western side of the Coolangatta Industrial Estate (incorporating the Bluewaters I and II site) is not sufficient to accommodate the range of possible activities envisaged for this area.

For the two residences to the north of the study area (receiving locations 3 and 4), the degree of noise reduction required is not as great, and there may be a range of options to achieve compliance with the 35dB(A) assigned level.

The proponent has made a commitment (Commitment No. 10 in Appendix 4) in regard to managing noise emissions from the proposed power station.

The EPA considers that approval of the proposal should require consideration during the DoE licensing process of cumulative issues beyond simple compliance with the noise regulations by requiring implementation of best practice noise reduction measures, with a view to achieving individual noise emission levels (for example 26dB(A)) that are consistent with the objective of cumulative noise emissions being in compliance with the night time $L_{A\ 10}$ assigned level at all existing and potential future noise-sensitive locations.

As noted above, it is evident from the results in Table 2 that the total estimated cumulative noise level ranges at all four receiving locations exceed the assigned $L_{A\ 10}$ night time noise level. The implications of this are that the establishment of other proposed power stations, mining operations and future industries in the Coolangatta Industrial Estate would be constrained unless best practice noise attenuation measures are employed in each case, and/or increased buffer zones are established.

It is the EPA's view that a process should be established to ensure that the noise emissions of this proposal are modelled, assessed and monitored in accordance with a standardised methodology with the objective of cumulative noise emissions being in compliance with the night time $L_{A\ 10}$ assigned level. This should be done as part of the Part V licensing process.

Summary

Having particular regard to the:

(a) results of noise modelling which indicate that the proposed plant should be able to comply with the requirements of the *Environmental Protection (Noise) Regulations, 1997*;

(b) results obtained from the cumulative noise analysis undertaken by the DoE; and

(c) commitments made by the proponent;

it is the EPA's opinion that the proposal can be managed to meet the EPA's environmental objective for this factor, provided that additional best practice noise attenuation measures are employed in the proposed power station such that its noise emissions meet a level that is consistent with cumulative noise emissions that comply with the night time $L_{A\ 10}$ assigned level under the noise regulations at all existing and potential future noise-sensitive areas.

3.6 Relevant environmental principles

In preparing this report and recommendations, the EPA has had regard for the object and principles contained in Section 4A of the *Environmental Protection Act, 1986.* Table 4 in Appendix 3 contains a summary of the EPA's consideration of the principles, particularly Principles 4b and 5 which are most relevant to this proposal.

4. Conditions and Commitments

Section 44 of the *Environmental Protection Act, 1986* requires the EPA to report to the Minister for the Environment 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.

4.1 Proponent's commitments

The proponent's commitments as set out in the PER and subsequently modified, as shown in Appendix 4, should, with the exception of Commitment No. 17 and Commitment No. 18, be made enforceable. These include commitments on:

1. Biodiversity;
2. Terrestrial Flora;
3. Terrestrial Fauna;
4. Surface Water Quality;
5. Groundwater Quality;
6. Water Supply;

7. Marine Water Quality;
8. Contamination (oil and chemical spills);
9. Solid and Liquid Wastes;
10. Noise and Vibration;
11. Air Emissions;
12. Greenhouse Gas Emissions;
13. Recreational Activity;
14. Visual Amenity;
15. Aboriginal Culture and Heritage;
16. Public Risk;
17. Sustainability; and
18. Other Greenhouse Gas Initiatives.

4.2 Recommended conditions

Having considered the proponent's commitments and the information provided in this report, the EPA has developed a set of conditions that the EPA recommends be imposed if the proposal by Griffin Power Pty Ltd to construct and operate the Bluewaters II Power Station, is approved for implementation.

These conditions are presented in Appendix 4. Matters addressed in the conditions include the following:

(a) that the proponent shall fulfil the commitments in the Consolidated Commitments statement set out as an attachment to the recommended conditions in Appendix 4;

(b) preparation and implementation of a greenhouse gas emissions management plan;

(c) preparation and implementation of a stack emissions management and ambient air quality monitoring plan;

(d) preparation and implementation of a saline water discharge quality plan that protects the environmental values identified by the EPA for the marine environment; and

(e) compliance audit and performance reviews and a decommissioning plan.

It should be noted that other regulatory mechanisms relevant to the proposal include:

- Department of Environment Works Approval and license.
- Department of Industry and Resources regulations.

5. Other Advice

5.1 Industrial buffer

The EPA considers that State government planning agencies and the Shire of Collie should coordinate the establishment of a suitable designated buffer zone around the proposed Bluewaters I and II Power Stations, as well as the development of appropriate measures to protect the buffer zone from the encroachment of incompatible land uses so that adequate separation distances are maintained.

The creation of such a buffer will be particularly valuable to controlling cumulative noise emissions from existing and future proposals in the area. It is the EPA's view that a procedure should be established to ensure that the noise emissions of all existing and future proposals are modelled, assessed and monitored with a standard methodology with the objective of cumulative noise emissions being in compliance with the night time $L_{A\ 10}$ assigned level. This will require a management framework involving the relevant stakeholders. A standard approach could be implemented through Part V licensing conditions on the relevant premises.

5.2 Air quality management in the Collie region

The Bluewaters I, Bluewaters II, and Collie B power station proposals are expected to emit about 7,000, 7,000, and from 9,000 to 15,000 tonnes of sulphur dioxide per annum respectively. Proper management of this level of emissions is an issue for the EPA to consider.

Cumulative air emissions modelling

The EPA is aware that additional modelling has been performed as part of the assessment of the coal fired power proposals now before it (Griffin Energy Pty Ltd 2005a, Strategen 2005, Sinclair Knight Merz 2005a).

The EPA understands that ground level concentrations of sulphur dioxide may be around 100% of the NEPM limit at a receptor at the Collie Motorplex with the likely combination of existing and proposed plants if the fourth grid level of modelling is considered. While some modellers consider the fourth grid to over-predict concentrations and the third grid provides a realistic representation of measured values in the area, other advice, including from the author of the TAPM model, indicates that justification for use of the third grid has not been verified. Ground level concentrations of sulphur dioxide could reach 68% of the NEPM value at Collie Motorplex and 60% of the NEPM in Collie using modelling of the third grid.

The EPA has assessed additional information related to the impact of closing Muja A and B and the effect of applying the European Directive to new coal-fired power stations at Bluewaters and Collie B.

Modelling of the effect that the 2001/80/EC limit would have on air quality (Sinclair Knight Merz 2005c) indicates improvements in SO_2 ground level concentrations at

receptors close to the new plants if FGD is used at those plants to meet EC Directive limits of either 200 or 400mg/m^3. At the Collie township these improvements range from 45% for the 10 minute and 1-hour averaging periods to 18% for the 24-hour averaging period, and 26% for the annual average.

Considerable discussion has focused on the air quality benefits that would accrue if Muja A and B power stations were closed. The effect on ambient SO_2 levels of closing Muja A and B can be assessed by examining the tables and contour maps in the Griffin Energy Pty Ltd Collie B Power Station PER document (Griffin Energy Pty Ltd 2005b) and a letter report to Western Power by Sinclair Knight Merz (Sinclair Knight Merz 2005c). The inclusion of a Scenario (5A), which assumes Muja A and B are retained in the longer term, provides valuable information, as discussed below.

Short-term (10 minute and 1-hour average) concentrations of SO_2 are the most significant with respect to potential health effects. Considering only 1-hour average concentrations of SO_2 for simplicity, the following information and conclusions can be drawn from the two reports.

Under all scenarios the most highly impacted receptor is receptor 22 (the Collie Motorplex which includes a caretaker's residence) to the north-west of Muja, with or without Muja A and B. The fact that 1-hour SO_2 concentrations at this receptor do not increase with the addition of other power stations in the Collie/Bluewaters area is to be expected due to the proximity of receptor 22 to the largest localised source, Muja, and the orientation of the Collie and Bluewaters sites with respect to this receptor. The wind would not blow towards this receptor from both Muja and Collie/Bluewaters at the same time. The effect on receptor 22 says nothing about the likelihood or significance of new power stations increasing the highest 1-hour SO_2 concentrations at other locations in the region.

Modelling of the existing situation (Scenario 1) shows that the highest 1-hour SO_2 concentration in Collie township due to existing sources is caused by Muja A, B, C, and D (273µg/m^3 from Table 8-4 in Griffin Energy Pty Ltd 2005b). Table 3 in Sinclair Knight Merz 2005c includes emissions from proposed power stations, with their emissions controlled by FGD to the European Directive limits. Table 3 shows that retiring Muja A and B reduces the highest 1-hour SO_2 concentration in Collie Township to 193µg/m^3. This level of impact is caused by the remaining Muja C and D power stations because the new stations are assumed to have their emissions controlled to the EC Directive limits of either 200 or 400mg/m^3. It is clear from that table that Muja C and D is the source of this reduced highest event because varying the EC limit on the proposed power stations does not vary the 193µg/m^3 value at all.

Table 8.4 in the Griffin Energy Pty Ltd Collie B Power Station PER document (Griffin Energy Pty Ltd 2005b) shows that for a realistic combination of existing and proposed plants (Scenario 5), without EC limits applied to proposed power stations, yields a highest 1-hour SO_2 concentration in Collie township of 348µg/m^3. Ignoring the background contribution of the Worsley expansion to this 1-hour concentration event, it is clear that the event was caused by plumes from the Collie/Bluewaters area with, presumably, extremely small if any background contribution from Muja C and D. If this were not the case then the 348µg/m^3 (or 347µg/m^3 from Scenario 4) SO_2 ground level concentration would not reduce dramatically (to 193µg/m^3 caused by

Muja C and D, or to 273µg/m^3 if Muja A and B were retained) due to the modelled application of EC limits on proposed power stations. It is therefore concluded that, if EC limits are not applied to proposed power stations, the highest 1-hour SO_2 concentrations in Collie will be dominated by power stations at the Collie/Bluewaters sites irrespective of whether Muja A and B are closed. This is consistent with conclusions in Sinclair Knight Merz 2005c which indicate that application of EC limits would reduce 1-hour SO_2 concentrations in Collie by 45%.

In support of the above conclusion, Sinclair Knight Merz has presented results for Scenario 5A (Table A-5 in Griffin Energy Pty Ltd 2005b) showing that retaining Muja A and B causes the highest 1-hour SO_2 concentration to change from 348 to 349µg/m^3. It follows (in support of the above presumption) that the contribution of Muja C and D would also be small. Without detailed model results it is not possible to see what caused this tiny change, however it is likely to be due to modelled recirculation of Muja emission from previous hours. However, the result is clear – retiring Muja A and B makes essentially no change to the highest 1-hour SO_2 concentration in Collie if the proposed power stations are built without applying EC limits.

Accepting that Muja A and B will be retired, the significant difference between 348µg/m^3, being the highest 1-hour SO_2 ground level concentration which could be caused by Collie/Bluewaters power stations with no EC limits, and 193µg/m^3, being the highest SO_2 ground level concentration which could be caused by Muja C and D under conducive meteorological conditions, suggests that the Collie/Bluewaters power stations, apart from being responsible for the highest 1-hour event, may also cause the highest several 1-hour events per year in the Collie Township (i.e. hours with concentrations in the range 193 to 348µg/m^3).

Taken together, the modelling now available indicates that there is likely to be an emerging air quality issue in Collie and surroundings if more power stations are built without flue gas desulphurisation to meet best practice European Commission limits. While NEPM standards may not be widely exceeded under currently modelled scenarios, three points are particularly relevant;

- action should be taken before NEPM levels are reached, particularly in light of Department of Health advice that lower WHO guidelines may be more relevant to sensitive groups;
- new plant without FGD to the north and east of Collie will increase sulphur dioxide concentrations in Collie significantly, independently of effect from Muja, because emissions from the new plants will affect Collie under different wind conditions than plants at Muja will; and
- closure of Muja A and B alone will not materially change the highest 1-hour SO_2 concentrations in Collie if new plants are built without FGD. Notwithstanding this point, closure of Muja A and B will improve air quality closer to Muja, especially with respect to particulates. Accordingly, the EPA reiterates that it supports the closure of Muja A and B.

Practicability of flue gas desulphurisation

Given concerns from appellants on the EPA's assessment report on the Bluewaters Power Station about the effectiveness and practicability of FGD, the EPA has considered further analyses which have examined the other environmental effects and practicability of using flue gas desulphurisation to reduce sulphur dioxide emissions, should tighter limits need to be met (Sinclair Knight Merz 2005d).

Table 3 below sets out estimates of the other environmental effects of implementing flue gas desulphurisation as a means of meeting tighter emission limits. These data indicate that there are increased, although not great, effects on some other aspects of the environment which occur together with the positive effects on air quality that accrue from implementing FGD.

Table 3: Other environmental effects of implementing FGD

Component	Annual change with FGD*
Water input	+ 0.6GL
Lime input	+ 14,000 to 53,000t
Lime trucks	+ 365 to 1420
Energy use	+ 5MW
Efficiency	- 0.5%
Gypsum by-product output	+ ~ 36,000t

*estimates ± 50%
Source: Sinclair Knight Merz 2005d

Figures from (Sinclair Knight Merz 2005d) assume capital costs of $86 million to $124 million and operating costs of $6.5 million to $8.7 million per year to implement FGD. Other advice to the EPA indicates capital costs of $30 million and operating costs of $1 million per year. It is clear that there is a wide range of possible costs for FGD.

These figures indicate the range of costs that would need to be internalised to the energy sale price to achieve the environmental improvements set out above if FGD were implemented.

The EPA recommends that, as part of the development of the strategic air quality management framework, further evaluation should be undertaken of the practicability of alternative technologies for reducing sulphur dioxide emissions, so that this can be taken into consideration when setting best practicable emission limits.

Proponents should be aware that any decision not to fit equipment for reducing SO_2 emissions up front may result in a need to retro-fit such equipment if the results of the strategic air quality framework determine that this is necessary.

Implications of cumulative air emissions and FGD

In its report and recommendations on the Bluewaters coal-fired power station proposal (EPA 2005), the EPA came to the conclusion that "on balance, action should be taken to ensure that new power stations meet world's best practice for air emissions management. Accordingly, the EPA recommends that the Department of

Environment (DoE) ensures that any Part V License for the proposal requires best practicable technology, consistent with current industry standards and considers the adoption of the limits in 2001/80/EC for "outer most regions", at least. The EPA also strongly supports the closure of the Muja A & B plants as soon as possible."

This recommendation was made based on air quality modelling available which at the time indicated no significant contribution to exceedances of the NEPM from the proposed 200MW Bluewaters I Power Station, despite this plant emitting about 7000tpa of sulphur dioxide. Taken together with emissions from existing and proposed plants, a significant fraction of the NEPM limit would be taken up by a realistic combination of Bluewaters and the other existing and future plants.

On the information available at the time, the EPA concluded that action should be taken to ensure that new power stations meet world's best practice and cited European Directive 2001/80/EC for outer regions as best practice.

The EPA is aware that the Minister for Environment has recently determined appeals on the EPA's report on the Bluewaters Power Station, concluding that "The EPA's assessment of the proposal has clearly identified the need for the development of a strategic air quality management framework for Collie given the range of potential power generation and industrial development scenarios for the region. Key elements of a framework would include additional air quality monitoring to better understand the air shed, determination of ambient air quality criteria, the development of a strategic regulatory approach to emissions management and air shed allocation and complementary land use planning controls."

The EPA welcomes and strongly supports the proposed development of a strategic air quality management framework for Collie that would manage emissions from both existing and proposed new plants in an effective and equitable way.

The Minister further determined that "it is considered appropriate that the development of emission limits for both the Bluewaters proposal and other existing and proposed power generation and industrial facilities within the Collie region occur as part of a strategic air quality management framework. Such an approach would not necessarily preclude the emission limits suggested by the EPA, or in fact other limits, being required at a later date."

Given the proposed development of a strategic air quality management framework, the EPA agrees that this should be used to develop appropriate emission limits for the power stations and any other large emitters in the region. Recognising that it will be about two to three years before new plants would come into operation, there is some time available to undertake the necessary studies to formulate a future air quality management framework.

As part of the strategic framework, the EPA advises that it would be appropriate for an examination of the implications of any proposed limits to be understood in the context of the Collie environment. Consideration of what fraction of the NEPM should constitute an investigation trigger level and what (higher) fraction should require action to be taken to ensure the NEPM limit is not breached will, in the EPA's

opinion, be an important aspect of work towards development of a strategic framework.

The EPA also notes advice from the Department of Health that the more conservative WHO limit may be more appropriate to protect sensitive groups in the community. This issue should also be considered when developing the strategic framework. The EPA welcomes the opportunity to contribute to this important work.

There are major existing and proposed industrial sources of air pollution in the Collie region, primarily related to coal-fired power generation. Other pollution sources include the use of solid fuel (coal and wood) for domestic heating, mining activities and bushfire/controlled burning.

The EPA recommends an Air Quality Management Plan be developed by the DoE for the region over the next two years to ensure that air quality is maintained at acceptable levels. The proposed approach is similar to the recent Pilbara Air Quality Study, which provides the knowledge base and assessment tools for sustainable industry development into the future.

It is recommended that the Air Quality Management Plan developed by the DoE include detailed planning for development of airshed management strategies.

5.3 Greenhouse gas differential between fuel sources

The EPA has become aware of a view that opposes the application of a penalty or offset for coal to bring its greenhouse gas emissions into line with other energy sources. While some may see this as an economic penalty which discriminates between fuel sources (particularly coal or oil and gas) this is clearly not the case from the environmental perspective. The EPA is required by Section 15 of the *Environmental Protection Act, 1986* to use its best endeavours to protect the environment. Section 4A of the *Environmental Protection Act, 1986* also requires regard to be paid to principles relating to improved valuation, pricing and incentive mechanisms to protect the environment.

Arguments have been put that any requirement to offset the greater greenhouse gas emissions of coal would distort the market between fuel sources. The EPA considers this argument ignores the full array of environmental costs (and their associated environmental effects) involved in power production and is not valid. Any suggestion that alternative means of producing the same product (electrical power) should not be subject to measures to ensure they are limited to the same level of emissions is clearly not based on the application of a level environmental playing field. Further, it assumes that some fuel sources (coal or oil) should be allowed to externalise their environmental costs, providing those sources with an unfair capacity to generate more emissions than other sources (gas or renewables) and shift the cost of those emissions to the community.

While an argument could be put that the benchmark for emissions should be set at the levels achievable by renewables, the EPA has previously accepted that issues of size, technical capability and strategic matters will need consideration (EPA 2002b). While the EPA encourages the use of renewables wherever possible (EPA 1990,

2002b) it accepts that they will need further encouragement, development and time to become practicable at the scale required to supply a major fraction of Western Australia's power needs. The EPA also accepts that there may be sound reasons for other decision makers to decide to diversify the fuel sources for electrical power generation in Western Australia. In fulfilling its environmental role, however, the EPA considers that a transparent approach requires that the full environmental consequences of alternatives be made clear.

Offsets are a flexible means for coal fired power stations to address the increased greenhouse gas emissions that they produce, now. If additional costs are incurred to provide these offsets, then an equitable approach is to ensure that those costs are internalised to ensure that coal does not generate higher environmental costs for the whole community. If users of coal fired electrical power paid the full cost of abating or offsetting the higher level of emissions, then coal would not be free riding by imposing its environmental costs on the wider community.

As an example of internalised costs, the EPA notes that retail users of power in remote parts of Western Australia are charged the same tariff as users on the South West Interconnected System, where economies of scale make power production costs lower. By spreading the cost to supply remote users across the whole community, disadvantageous costs are not imposed on one, remote sector of the community. The EPA considers that it would be equitable, defensible and environmentally sound to require that environmental costs were fully internalised during power production. Such costs could be spread across all users, as is the case with power generation costs for remote communities. The EPA does not support the view that environmental comparisons should not be made between fuels.

The EPA notes the recent announcement by Government of the formation of a Greenhouse and Energy Taskforce to build on the State's Greenhouse Strategy and develop a more detailed energy and greenhouse policy framework to reduce greenhouse gas emissions. The EPA welcomes and supports this initiative which will provide valuable support for a policy position across government.

Having a whole of government policy offers the prospect of adding considerably more weight to this important issue in support of the EPA's existing Guidance Statement No. 12.

6. Conclusions

The EPA has considered the proposal by Griffin Power Pty Ltd to construct and operate a 200MW coal-fired power station known as the Bluewaters II Power Station (Bluewaters II) adjacent to the Bluewaters Power Station (Bluewaters I) on a site located approximately 4km north-east of Collie.

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

Additional demand should be satisfied through electricity generating facilities which minimise environmental impacts including the production of greenhouse gases.

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

- conservation and energy 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 considers that combined cycle gas turbine (CCGT) generation represents best practicable technology for base-load power generation at this time. The proposed 200MW coal-fired plant will produce an extra 620,000 tonnes of carbon dioxide per year compared to a CCGT power station of equivalent capacity. The EPA has previously advised that it expects proponents to mitigate all or a significant part of the extra greenhouse gases produced.

The EPA notes that the proponent has investigated mitigation actions and that the apportioned quantity of greenhouse gases to be directly offset for the Bluewaters II Power Station is about 100,500 tonnes per annum. While the proponent has met the intent of the EPA's requirement to consider the issue of offsets, the apportioned direct offsets for Bluewater II Power Station still leaves an excess of about 519,500tpa of greenhouse gas emissions above a CCGT power station of equivalent capacity. The EPA notes that the level of greenhouse emissions is considerable and that the level of offsets is about one sixth of the excess.

If a decision is made that the proposal can be implemented, the EPA considers that the offsets offered by the proponent should be made legally enforceable and tied to this proposal for the life of the proposal. The EPA recognises that the issue of greenhouse gas management is a matter for judgment and that decisions about this proposal will include consideration of broader economic, regional development and strategic issues which are outside the scope of the EPA. From an environmental perspective, the EPA advises that a coal-fired power station without full greenhouse gas offsets and best practicable technology will not deliver the best environmental outcome.

The EPA welcomes and strongly supports recent announcements by Government of a Greenhouse and Energy Taskforce and a strategic air quality management framework for Collie to manage emissions from existing and proposed industries in the region. Air quality is an emerging issue in Collie. Sulphur dioxide levels may begin to approach ambient standards designed to protect human health with the current array of proposals and this issue deserves the close attention that a strategic management framework can provide.

In determining appeals on the EPA's report on the Bluewaters proposal (Bluewaters I) the Minister for the Environment determined that "it is considered appropriate that the development of emission limits for both the Bluewaters proposal and other existing and proposed power generation and industrial facilities within the Collie region occur as part of a strategic air quality management framework. Such an approach would not necessarily preclude the emission limits suggested by the EPA, or in fact other limits, being required at a later date."

It is evident that the proposed Bluewaters II Power Station does not employ world's best practice for SO_2 management. The EPA considers that European Directive 2001/80/EC represents best practice for SO_2 emission limits.

In considering Principle 5 "waste minimisation" of the *Environmental Protection Act, 1986*, the EPA believes that proponents should implement best practicable measures for the prevention or minimisation of environmental impacts. In view of the appeal decision on Bluewaters Power Station, this may require retrofitting of sulphur control equipment if the air quality management framework indicates that SO_2 is an issue.

Consistent with this, the EPA considers that the proposed strategic air quality management framework is an appropriate mechanism for determining emission limits for this and other power stations and other industries at Collie.

Overall, the EPA's assessment has concluded that the best environmental outcome would not be achieved for greenhouse gas management if full offsets are not implemented. Best practice SO_2 management would be achieved if European Directive 2001/80/EC were applied. The EPA has concluded that further work on a strategic air quality management framework for Collie is an appropriate mechanism for determining the limits required to manage emissions from both existing and proposed new plants such as Bluewaters II in an effective and equitable way.

A key issue is the effect of saline wastewater discharge on marine water quality and the potential impact on marine biota. It is desirable that the monitoring and management of marine water quality should be consistent with the Environmental Quality Management Framework described in the Government's *State Water Quality Management Strategy Report 6* that the EPA is applying to Western Australia's marine environment (EPA 2004a, EPA 2004b). This framework has been adopted since the existing outfall was assessed and licensed. Accordingly, any update of the pipeline licence which may be required as a result of a new discharge from the pipeline should recognise, protect and achieve the following environmental values and all their associated environmental quality objectives:

- ecosystem health;
- recreation and aesthetics;
- fishing and aquaculture; and
- industrial water supply.

It is the EPA's opinion that the proposal can be managed to meet the EPA's environmental objective for noise, provided that additional best practice noise attenuation measures are employed in the proposed power station such that its noise

emissions meet a level that is consistent with cumulative noise emissions that comply with the night time L_{A10} assigned level under the noise regulations at all existing and potential future noise-sensitive areas.

For other environmental factors 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 their commitments and the recommended conditions set out in Appendix 4, and summarised in Section 4.

The EPA also wishes to draw attention to the advice provided in Section 5 of this report in relation to an industrial buffer, air quality, offsets and the equitable internalisation of full environmental costs when considering proposals of this nature.

7. Recommendations

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

1. That the Minister notes that the proposal being assessed is for construction and operation of a 200MW coal-fired power station known as the Bluewaters II Power Station adjacent to the proposed Bluewaters I Power Station on a site located approximately 4km north-east of Collie.
2. That the Minister considers the report on the relevant environmental factors as set out in Section 3.
3. That the Minister notes that the EPA has concluded that the best environmental outcome would not be achieved for greenhouse gas management if full offsets are not implemented.
4. That best practice SO_2 management would be achieved if European Directive 2001/80/EC were applied.
5. That further work on a strategic air quality management framework for Collie is an appropriate mechanism for determining the limits required to manage emissions from both existing and proposed new plants such as Bluewaters II in an effective and equitable way.
6. That for other environmental factors, it is unlikely that the EPA's objectives would be compromised, provided there is satisfactory implementation by the proponent of their commitments and the recommended conditions set out in Appendix 4, and summarised in Section 4.
7. That the Minister imposes the conditions and procedures recommended in Appendix 4 of this report.

Appendix 1

List of submitters

Organisations:

1. Conservation Council of WA.
2. Denmark Environment Centre Inc.
3. Department of Conservation and Land Management.
4. Department of Environment.
5. Department of Health.
6. Department of Indigenous Affairs.
7. Department of Industry and Resources.
8. Joint submission from Conservation Council of WA, Australian Conservation Foundation, WWF Australia, and Climate Action Network Australia.
9. Pollution Action Network.
10. Shire of Collie.
11. Western Australian Sustainable Energy Association Inc.
12. Western Power Corporation.

Individuals:

1. CR & MA Tonkin.
2. Dr Mark Diesendorf.
3. E.D & J.S. Hoddell.
4. Glyn Yates.

Appendix 2

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Appendix 3

Summary of identification of relevant environmental factors and principles

Table 4: Identification of relevant environmental factors and principles

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Relevant Environmental Factors
BIOPHYSICAL			
Terrestrial flora	The site for the Bluewaters Power Station Phase II has already been largely cleared for grazing. It is likely that there will be minimal impact on terrestrial flora.	**Department of Conservation and Land Management** The likely downstream impacts of the proposal regarding the clearing of forest for mining and power transmission to support the project should be clearly identified. **Department of Environment** Can the proponent provide aerial photographs showing the boundaries of the development proposal and vegetation associations at an adequate scale (i.e. <25,000) to allow for interpretation of the area? The DoE currently only has black and white aerial imagery available making interpretation difficult. **Western Power Corporation** The statement "Monitoring undertaken by Western Power has indicated that effects from sulphur dioxide emissions from existing coal fired power plants at Collie are negligible and almost impossible to quantify (Morris 2004, pers comm..)" on page 27 of the PER has been taken out of context and appears to relate to the preceding discussion on regional emissions. The comment should have related to the program of vegetation monitoring Western Power undertook in the vicinity of Collie A between 1997 and 2000 to determine the effects of ambient sulphur dioxide on vegetation. The results of this program indicated that no statistically significant effects on vegetation were identified. **Member of the public** The flora report indicates that the Jarrah along with sheoak and banksias where affected by Jarrah Leaf Miner. In my 25-year career as a forester I have never seen sheoak and banksias affected by leaf miner.	The EPA considers that the concerns that were raised have been adequately addressed by the responses provided by the proponent. In view of the above, and given that the power station site has already been largely cleared, the EPA considers that this environmental factor does not require further evaluation.
Terrestrial fauna	The site for the Bluewaters Power Station Phase II has already been largely cleared for grazing. It is likely that there will be minimal impact on terrestrial fauna.	**Conservation Council of WA, Australian Conservation Foundation, WWF Australia, and Climate Action Network Australia** The statement in the PER that "Construction of the plant does not require disturbance to any ecosystems" contradicts the results of the flora and fauna survey, which refers to the potential impact on Baudin's Cockatoo and Red-Tailed Black Cockatoo. Both species are listed Threatened Species under the *Commonwealth Environmental Protection and Biodiversity Conservation (EPBC) Act, 1999*.	The EPA considers that the concern that was raised has been adequately addressed by the response provided by the proponent. In view of the above, and given that the power station site has already been largely cleared, the EPA considers that this environmental factor does not require further evaluation.
Wetlands	Construction and operation of the Bluewaters Power Station Phase II has the potential to affect nearby wetlands.	**Department of Environment** No information has been provided on wetland buffers, which are required to protect wetlands from potential adverse impacts and maintain ecological processes and functions. The description of 'seasonal sedge swamp' areas on page 63 of the PER suggest the presence of wetlands. If the delineation of the vegetation association MpB14 is interpreted as the wetland area, it appears that the buffer of 750 metres will be sufficient to reduce adverse potential impacts on the wetland.	The EPA considers that the concerns that were raised have been adequately addressed by the responses provided by the proponent. In view of the above, the EPA considers that this environmental factor does not require further evaluation.

Table 4: Identification of relevant environmental factors and principles

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Relevant Environmental Factors
BIOPHYSICAL			
Wetlands (Continued)	Construction and operation of the Bluewaters Power Station Phase II has the potential to affect nearby wetlands.	**Department of Environment** Page 70 in the PER states that "Construction activities may increase surface water and sediment run-off to nearby wetlands". However, there is no indication of where the wetlands referred to are situated, the type of geomorphic wetland or the wetland values that may be impacted. There are concerns regarding the impacts of groundwater drawdown on wetlands in the vicinity of the mine and power station. It is recommended that comprehensive wetland information is provided in the future management plans developed as management commitments outlined in the PER.	The EPA considers that the concerns raised have been adequately addressed by the responses provided by the proponent. In view of the above, the EPA considers that this environmental factor does not require further evaluation.
POLLUTION			
Greenhouse gas emissions	The Bluewaters Power Station Phase II will generate up to 1.3 million tonnes of CO_2 per year.	**Pollution Action Network** The Greenhouse emissions from this project are unacceptably high and no effective greenhouse reduction options are proposed. There is no evidence to suggest that the proponent has examined a range of lower emission technologies that could improve the environmental performance of the power station. The proponent also states that there are no specific offsets applied to this project. **Conservation Council of WA, Australian Conservation Foundation, WWF Australia, and Climate Action Network Australia** The Proponent has not provided a comprehensive Greenhouse Gas Emission Management Plan. The Proponent should provide evidence that a critical assessment of options and plant optimisation has been conducted prior to the selection of the fuel and final plant configuration. The PER does not assess the potential to apply Combined Heat and Power (CHP) options despite the fact that the proposed power station will be located within an Industrial Park. Assessment should have been undertaken regarding the possibility of building fewer, larger generators that could utilise best-practice, less greenhouse intensive technologies, such as CHP and super-critical boilers. The description of the proposed Bluewaters II technology provides no information regarding what Best Practice Standards exist worldwide for a generator of this size utilising coal with similar characteristics. As Australia has ratified the United Nations Framework Convention on Climate Change (UNFCCC) and it has come into force, Western Australia is arguably obliged under International Law to contribute towards the objective of the treaty. It is difficult to see how the plant would significantly reduce the sent-out carbon intensity of electricity generation of the SWIS.	In view of the significant quantity of greenhouse gas emissions that will be emitted by the proposed power station and the nature of the concerns raised in the comments that were received, the EPA considers that greenhouse gas emissions is a relevant environmental factor.

Table 4: Identification of relevant environmental factors and principles

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Relevant Environmental Factors
POLLUTION			
Greenhouse gas emissions (Continued)	The Bluewaters Power Station Phase II will generate up to 1.3 million tonnes of CO_2 per year.	**Conservation Council of WA, Australian Conservation Foundation, WWF Australia, and Climate Action Network Australia (Continued)** Australians have the highest level of greenhouse gas emissions in the world. Western Australia produces approximately 12% of the nations greenhouse gas emissions, despite having only 10% of the country's population. In 1997 Western Australians had the highest per capita greenhouse gas emissions of the states. The potential for building a bigger plant to take advantage of CHP or super-critical technologies should be examined. **Conservation Council of WA, the Australian Conservation Foundation, WWF Australia, Climate Action Network Australia, and Pollution Action Network** The PER did not fulfil the requirements of the Environmental Protection Authority (EPA) Guidance Statement for Minimising Greenhouse Gas Emissions (No. 12). **Conservation Council of WA, Australian Conservation Foundation, WWF Australia, Climate Action Network Australia, and a member of the public** Research shows that Western Australia's current additional energy needs – up to 500MW can be utilised using a mix of energy efficiency and renewable energy. Therefore, there is no justification for this project to proceed. **Conservation Council of WA, Australian Conservation Foundation, WWF Australia, Climate Action Network Australia, and members of the public** The proponent has not provided sufficient information on the level of offsets that will be applied against the project or on the planned Greenhouse Gas Management Plan for the project. **Conservation Council of WA, Australian Conservation Foundation, WWF Australia, Climate Action Network Australia, Department of Health, and a member of the public** The sub-critical technology proposed for the Bluewaters Power Station is "old technology" and is less efficient than super-critical technology. As Griffin Energy has stated that a 200MW station is too small to use super-critical technology and Bluewaters II in combination with Bluewaters I is an option for the 300MW Western Power, Power Procurement Process, then it should investigate the option of constructing a larger generator of 400MW that can utilise more efficient technology and justify why 2 X 200MW plants are proposed.	In view of the significant quantity of greenhouse gas emissions that will be emitted by the proposed power station and the nature of the concerns raised in the comments that were received, the EPA considers that greenhouse gas emissions is a relevant environmental factor.

Table 4: Identification of relevant environmental factors and principles

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Relevant Environmental Factors
POLLUTION			
Greenhouse gas emissions (Continued)	The Bluewaters Power Station Phase II will generate up to 1.3 million tonnes of CO_2 per year.	**Conservation Council of WA** The proponent should be required to offset 100% of the greenhouse emission from this project. The proponent must be required to source and co-locate a Combined Heat and Power (CHP) host within the Coolangatta Industrial Estate next to Bluewaters to utilise the waste heat from any power station that is constructed. **Pollution Action Network and Denmark Environment Centre** More acceptable options for power generation in the south-west are available. And sustainable energy systems based on cogeneration, renewables and energy conservation should be considered. **Members of the public** I do not think that the inclusion of offsets should be undertaken if they undermine the economic viability of the project. However it is worth noting that there are a number of significant publicly listed companies growing trees on a commercial basis. Therefore why could it not be possible for the proponent to investigate and invest in the establishment of plantation forestry to offset some of these emissions? Given that the proponent is proposing to burn coal to produce electricity instead of cleaner and more efficient natural gas, I thought that they would consider making a commitment to implement some form of greenhouse gas reduction strategy such as tree planting. The plant is not needed because: • the states electricity requirement can be met through increased energy use efficiency; • the majority of growth in demand over the next half decade in Western Australia will be in peak demand, and there will be little growth in base load demand; • bio-energy from crop residues will meet all of the medium term increase in demand for base load energy; and • wind power stations approximate base load power stations.	In view of the significant quantity of greenhouse gas emissions that will be emitted by the proposed power station and the nature of the concerns raised in the comments that were received, the EPA considers that greenhouse gas emissions is a relevant environmental factor.

Table 4: Identification of relevant environmental factors and principles

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Relevant Environmental Factors
POLLUTION			
Atmospheric emissions	The Bluewaters Power Station Phase II will emit the following estimated quantities of atmospheric emissions: • Nitrogen oxides (NO_X) - 3,050tpa; • Sulphur oxides (SO_X) - 7,470tpa; • Flue dust - 227tpa; • Carbon monoxide (CO) - 2,350tpa; • Fluorides - 17tpa; • Volatile organic compounds (VOCs) - 32kg/yr; • Polycyclic aromatic hydrocarbons (PAHs) - 6.0kg/yr; • Persistent organic pollutants (POPs), including dioxins and furans - less than 0.5g/yr; • Mercury - 31kg/yr; • Arsenic - 6.7kg/yr; • Cadmium - 8.5kg/yr; • Chromium compounds - 1.5kg/yr; and • Lead compounds - 31kg/yr.	**Department of Environment** It is difficult to fully assess the expected PM_{10} impacts because the contribution from mining operations in the region has not been addressed. Can the proponent provide further information on emissions from mining activities? The combination of increased SO_2 concentrations and inhalable particulate matter is of concern due to the possibility of synergistic health impacts. In view of the above, is the proponent willing to make a commitment to undertake air quality monitoring to determine public health impacts due to SO_2 and PM_{10} at locations determined in consultation with the DoE and the Department of Health? **Department of Industry and Resources** The nomination of the European Directive 2001/80/EC as the emission standard to be met for Bluewaters and hence the need for flue gas desulphurisation technology to be used in new coal-fired power stations is not supported. The EPA should consider development of an Environmental Protection Policy (SO_2) for Collie based on nationally endorsed NEPM ambient standards. **Conservation Council of WA and Pollution Action Network** The Bluewaters proposals have not adequately addressed the question of mercury pollution. There should be an inquiry into the level of mercury in the Collie air shed, its health impacts and the likely impacts of further coal fired power stations. Sulphur dioxide emissions from the two plants are very high. Considering the possible health impacts of SO_2, NO_X and particulates – we agree with the EPA Report and Recommendations on the Bluewaters I proposal that the proponents should meet European Commission limits as set in Directive 2001/80/EC rather than the NEPM standard. **Pollution Action Network** The proposal will be excessively polluting. This pollution will contribute to premature deaths, asthma attacks, learning disabilities, acid rain, global warming and toxic mercury pollution of streams and water bodies. Considering the seriousness of POPs and the UN Stockholm Convention on Persistent Organic Pollutants that came into force in May signed by Australia, we urge that these emissions are modelled, despite the small rates expected. **Department of Health** The cumulative risks that may be associated with exposure to multiple contaminants are not discussed. The potential health impacts that may arise from community exposure to the emission mixture (c.f. individual emission components) are yet to be considered.	In view of the significant quantity of atmospheric emissions that will be emitted by the proposed power station and the nature of the concerns raised in the comments that were received, the EPA considers that atmospheric emissions is a relevant environmental factor.

Table 4: Identification of relevant environmental factors and principles

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Relevant Environmental Factors
POLLUTION			
Atmospheric emissions (Continued)	The Bluewaters Power Station Phase II will emit the following estimated quantities of atmospheric emissions: • Nitrogen oxides (NO_X) - 3,050tpa; • Sulphur oxides (SO_X) - 7,470tpa; • Flue dust - 227tpa; • Carbon monoxide (CO) - 2,350tpa; • Fluorides - 17tpa; • Volatile organic compounds (VOCs) - 32kg/yr; • Polycyclic aromatic hydrocarbons (PAHs) - 6.0kg/yr; • Persistent organic pollutants (POPs), including dioxins and furans - less than 0.5g/yr; • Mercury - 31kg/yr; • Arsenic - 6.7kg/yr; • Cadmium - 8.5kg/yr; • Chromium compounds - 1.5kg/yr; and • Lead compounds - 31kg/yr.	**Department of Health (continued)** The estimations employed to provide the power station emission profile are not suitably discussed. It is understood that the estimations were based upon emissions data collected from Collie power stations and the National Pollutant Inventory (NPI), but details are lacking. Department of Health objections raised in the BWI response regarding the use of NPI data for modelling are not addressed. The use of NPI data only enables a broad estimate of emissions to be determined, which may not be accurate. Accurate characterisation of emission is necessary to provide confidence in modelling results. The report does not currently consider potential health impacts to workers. This is particularly pertinent for short term exposures to emission components such as SO_2 and PM_{10} that may exert significant acute effects. Modelling does not incorporate emissions from current or proposed mining sources, thereby creating uncertainty in the accuracy of subsequent exposure assessment. It is noted that surveys with residents have indicated that they suspect health impacts arising from exposure to mining related dusts. Given that Western Power have committed to the decommissioning of Muja power station stages A and B, it would have been useful to provide modelling scenarios reflective of potential emissions, i.e. current scenarios 3 & 4, minus Muja A & B. As previously noted in response to BWI, the WHO 10-minute guideline for SO_2 of 500µg/m^3 is considered more appropriate for assessment purposes than the NHMRC value (700µg/m^3). Modelling results indicate that the highest predicted concentrations of SO_2 (10-minute average) within the township of Collie exceed the guideline for Scenarios 3, 4 & 5, while predicted 3-minute averages approach or exceed the guideline for all scenarios. As scenarios 3 & 4 are most reflective of likely conditions should the project proceed, the modelling results indicate that 'best practice' SO_2 reduction measures should be employed. However, it is noted that modelling scenarios do not incorporate Muja A&B are likely to report significantly lower SO_2 ground level concentrations. Discussion should be provided regarding why the proposed adoption of 1000µg/m^3 as a compliance limit for dust control is considered appropriate. The health risk assessment is inconsistent in the provision of sample calculations. Those sample calculations that are provided are poorly presented and discussed. Justifications regarding calculation assumptions were typically absent and many calculated values could not be verified. Consistent with a holistic approach to health risk assessment, a synopsis of the major health issues identified as confronting future development in the Collie region is considered appropriate. The following key issues are identified by the Department of Health:	In view of the significant quantity of atmospheric emissions that will be emitted by the proposed power station and the nature of the concerns raised in the comments that were received, the EPA considers that atmospheric emissions is a relevant environmental factor.

Table 4: Identification of relevant environmental factors and principles

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Relevant Environmental Factors
POLLUTION			
Atmospheric emissions (Continued)	The Bluewaters Power Station Phase II will emit the following estimated quantities of atmospheric emissions: • Nitrogen oxides (NO_X) - 3,050tpa; • Sulphur oxides (SO_X) - 7,470tpa; • Flue dust - 227tpa; • Carbon monoxide (CO) - 2,350tpa; • Fluorides - 17tpa; • Volatile organic compounds (VOCs) - 32kg/yr; • Polycyclic aromatic hydrocarbons (PAHs) - 6.0kg/yr; • Persistent organic pollutants (POPs), including dioxins and furans - less than 0.5g/yr; • Mercury - 31kg/yr; • Arsenic - 6.7kg/yr; • Cadmium - 8.5kg/yr; • Chromium compounds - 1.5kg/yr; and • Lead compounds - 31kg/yr.	**Department of Health (continued)** 1. Recent air quality monitoring data and modelling results indicate that levels of sulphur dioxide and particulate matter in the Collie area are problematic. Relatively short-term inhalation exposure (<1hr) to either sulphur dioxide or particulate matter may result in a variety of adverse health effects, particularly lung irritation. Infrequent instances when the concentrations of these pollutants are significantly elevated are therefore likely to cause transitory respiratory effects in sensitive members of the Collie population. Consequently, any strategy that reduces community exposure to sulphur dioxide or particulate matter may provide measurable health benefits for the Collie region. 2. Although contributing sources may be readily identified, the nature of 'background' particulate matter in the Collie region is ill-defined. Health risk assessments undertaken by current development proposals are limited by various assumptions regarding the particulate matter that may have significant health implications. 3. Potentially significant sources of air emissions have not been acknowledged by current development proposals. While it is noted that modelling of all possible land uses is not feasible and that each candidate industry will be required to obtain environmental approvals, consideration of indicative emission scenarios is necessary to better characterise probable future health impacts. 4. Exposure assessments currently conducted for the Collie area are limited. Predicted exposures are reliant upon air quality methods that provide estimated contaminant distributions. However, such distributions are imprecise and cannot be verified without extensive monitoring. Health risk assessments typically fail to adequately discuss such uncertainty and the potential health implications. Furthermore, exposure assessment is restricted to existing populations. As industrial development is anticipated to encourage the economic growth of Collie, it is reasonable to expect associated population growth and the expansion of current residential areas. The limitations of exposure assessment must be acknowledged and taken into consideration during the development of the Collie area. **Conservation Council of WA, the Australian Conservation Foundation, WWF Australia, Climate Action Network Australia, and Pollution Action Network** The main air pollutants of concern to human and ecosystem health are SO_2, CO_2, CO, NO_X, dioxins and furans and particulates. Bluewaters II will contribute significantly to the emissions of all these pollutants into the Collie airshed. Exceedances of the NEPM are likely for SO_2, NO_X and possibly PM_{10} as a result of Bluewaters II. Information on $PM_{2.5}$ should be provided and we ask that the proponent consider $PM_{2.5}$ measurement and impacts, rather than simply PM_{10}.	In view of the significant quantity of atmospheric emissions that will be emitted by the proposed power station and the nature of the concerns raised in the comments that were received, the EPA considers that atmospheric emissions is a relevant environmental factor.

Table 4: Identification of relevant environmental factors and principles

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Relevant Environmental Factors
POLLUTION			
Atmospheric emissions (Continued)	The Bluewaters Power Station Phase II will emit the following estimated quantities of atmospheric emissions: • Nitrogen oxides (NO_X) - 3,050tpa; • Sulphur oxides (SO_X) - 7,470tpa; • Flue dust - 227tpa; • Carbon monoxide (CO) - 2,350tpa; • Fluorides - 17tpa; • Volatile organic compounds (VOCs) - 32kg/yr; • Polycyclic aromatic hydrocarbons (PAHs) - 6.0kg/yr; • Persistent organic pollutants (POPs), including dioxins and furans - less than 0.5g/yr; • Mercury - 31kg/yr; • Arsenic - 6.7kg/yr; • Cadmium - 8.5kg/yr; • Chromium compounds - 1.5kg/yr; and • Lead compounds - 31kg/yr.	**Conservation Council of WA, the Australian Conservation Foundation, WWF Australia, and Climate Action Network Australia** The proponent should be required to contribute to an air modelling study for Collie and pay for the cost of an air quality management plan for the airshed. This includes a network of monitoring stations. Research from overseas clearly indicates a link between coal-fired generation and increased occurrences of asthma and respiratory disease. It is clear from the results of the workshop process undertaken for the Bluewaters I project that the cumulative health impacts of the coal industry, with respect to both mining and power generation have been insufficiently investigated in the Collie region. Through the workshop process for Bluewaters I the community stated that they desired a far greater level of knowledge regarding the impacts of these industries and their associated pollutants. The health risks to the community must be assessed on a cumulative as well as incremental basis. **Conservation Council of WA, the Australian Conservation Foundation, WWF Australia, Climate Action Network Australia, and a member of the public** Although individual projects may not on their own contribute significantly to health risks, the cumulative impacts of the coal mining and power generation industry must be taken into account when assessing individual projects. **Conservation Council of WA** The proponent should be required to run a series of community workshops in Collie, addressing the impacts of mercury on health, both directly and in the food chain. **Members of the public** I am concerned about dust and gas emissions from the proposed powers stations and Coolangatta Industrial Estate. The developments are about three km and over the road from our property. Members of my family and I have had some serious health problems in recent years and we are concerned that the gas and dust may cause us additional ill health. In the Bulletin issued for Bluewaters I there was a reference to a European Standard regarding Sulphur Dioxide levels. This community does not want to European Standards implemented for impacts we haven't felt and don't see when it involves using an additional 3.5 Gigalitres of water and creates extra waste. This community sees water as a vital resource, which should not be wasted in such pursuits. The modelling for air emissions shows all aspects within acceptable limits. I am concerned that the emissions are only within acceptable limits if Muja A & B are decommissioned.	In view of the significant quantity of atmospheric emissions that will be emitted by the proposed power station and the nature of the concerns raised in the comments that were received, the EPA considers that atmospheric emissions is a relevant environmental factor.

Table 4: Identification of relevant environmental factors and principles

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Relevant Environmental Factors
POLLUTION			
Atmospheric emissions (Continued)	The Bluewaters Power Station Phase II will emit the following estimated quantities of atmospheric emissions: • Nitrogen oxides (NO_X) - 3,050tpa; • Sulphur oxides (SO_X) - 7,470tpa; • Flue dust - 227tpa; • Carbon monoxide (CO) - 2,350tpa; • Fluorides - 17tpa; • Volatile organic compounds (VOCs) - 32kg/yr; • Polycyclic aromatic hydrocarbons (PAHs) - 6.0kg/yr; • Persistent organic pollutants (POPs), including dioxins and furans - less than 0.5g/yr; • Mercury - 31kg/yr; • Arsenic - 6.7kg/yr; • Cadmium - 8.5kg/yr; • Chromium compounds - 1.5kg/yr; and • Lead compounds - 31kg/yr.	**Members of the public (Continued)** There needs to be a "gaseous emission buffer" established around Bluewaters the same as was set for Collie Power Station. Page 2 and page 5 of the Health Assessment of Emissions from the Proposed Power Stations at Bluewaters in the Collie Region document from BenchMark Toxicology Services appear to have two sets of conflicting demographic information. Which one is correct?	In view of the significant quantity of atmospheric emissions that will be emitted by the proposed power station and the nature of the concerns raised in the comments that were received, the EPA considers that atmospheric emissions is a relevant environmental factor.
Liquid and solid waste disposal	The Bluewaters Power Station Phase II will generate 1.2GL/yr of saline wastewater and 175,000tpa of ash during operation. The saline wastewater will be disposed of via the existing Collie Power Station saline wastewater pipeline and ocean outfall system. Ash will be disposed of in the nearby Ewington 1 mine.	**Department of Environment** Although the proponent states that the saline water discharge will be 1.2GL per annum, this does not match with the calculation for discharge in Section 6.3.3. The DoE notes the limitations that apply to the disposal of saline water through Western Power Corporation's existing Collie 'A' Power Station saline wastewater pipeline and ocean outfall system. The proponent states that if use of the WPC saline pipeline is not technically or economically feasible for disposal of waste from Bluewaters 2, then the alternative will be to dispose of into an evaporation pond system. Additional detail on alternative disposal systems is required.	In view of the significant quantity of liquid and solid wastes that will be generated by the proposed power station and the nature of the concerns raised in the comments that were received, the EPA considers that liquid and solid waste disposal is a relevant environmental factor.

Table 4: Identification of relevant environmental factors and principles

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Relevant Environmental Factors
POLLUTION			
Liquid and solid waste disposal (Continued)	The Bluewaters Power Station Phase II will generate 1.2GL/yr of saline wastewater and 175,000tpa of ash during operation. The saline wastewater will be disposed of via the existing Collie Power Station saline wastewater pipeline and ocean outfall system. Ash will be disposed of in the nearby Ewington 1 mine.	**Department of Environment (Continued)** The water supply source is based on the assumption that the mine dewatering yield will be sufficient. The assumption needs to be justified. 3.25GL of water per year will be sourced from mine dewatering activities. Saline water discharge will be 1.2GL per annum. Therefore, it is expected that contaminant concentrations in source water could be concentrated by a factor of about 2.7 (due to evaporation). In addition, there are pre-treatment chemicals. Taking the leachate results from Ewington 1(page 78) and multiplying these concentrations by a factor of 2.7 (to allow for evaporative losses) provides a way of estimating saline discharge concentrations. Doing this, it can be seen that the likely concentrations of Cd, Cr, Cu, Ni and Zn could exceed licence conditions. Can the proponent provide further clarification in regard to this matter? The PER does not supply an estimate of cumulative loads of contaminants discharged. The current licence conditions referred to on page 83 would allow a discharge of approximately 0.4 tonnes/day or 146 tonnes/annum of total suspended solids. Are there potentially toxic constituents of the TSS in the Bluewater effluent? What is known about sediment accumulation, modification or turbidity effects in the vicinity of the diffuser? The terms Limits of Reporting (LOR) and detection limits are used interchangeably in the PER [p84]. However, LOR refers to the lowest level of contaminant that can be estimated to a pre-defined accuracy. The limit of detection does not imply any particular accuracy on the concentration estimate. The EQO for maintenance of aquaculture has been excluded. Could this be justified? The 80% species protection EQO for the bioaccumulants Cd and Hg appear to be met at end of pipe. The 99% species protection EQO are generally met at the edge of the mixing zone (conservatively assuming 100 dilutions), with the following qualifications: • For copper, the predicted concentration is close to the EQO. It would be useful to determine the fraction of copper concentration that is bioavailable; and • There is uncertainty about the form of Chromium in the effluent. Also the state of knowledge on the speciation of Chromium in the marine environment is poor. The predicted concentration of chromium at the edge of the mixing zone is well below 99% species protection guideline for Cr(3) and is only marginally above the corresponding Cr(6) guideline. It is recommended that the speciation of chromium in the effluent be further investigated. Groundwater/leachate monitoring will be required in order to gauge the effect of disposing of fly ash by mixing it with overburden and returning it to the Ewington mine.	In view of the significant quantity of liquid and solid wastes that will be generated by the proposed power station and the nature of the concerns raised in the comments that were received, the EPA considers that liquid and solid waste disposal is a relevant environmental factor.

Table 4: Identification of relevant environmental factors and principles

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Relevant Environmental Factors
POLLUTION			
Liquid and solid waste disposal (Continued)	The Bluewaters Power Station Phase II will generate 1.2GL/yr of saline wastewater and 175,000tpa of ash during operation. The saline wastewater will be disposed of via the existing Collie Power Station saline wastewater pipeline and ocean outfall system. Ash will be disposed of in the nearby Ewington 1 mine.	**Department of Environment and Conservation Council of WA, the Australian Conservation Foundation, WWF Australia, and Climate Action Network Australia** A significant concern relates to the proposed method of disposal of fly ash. **Conservation Council of WA, the Australian Conservation Foundation, WWF Australia, and Climate Action Network Australia** More information must be provided about the composition of the saline effluent and if it exceeds EPS standards the proponent must be required to dilute it or treat it. There is no mention of the composition of the fly ash. Previous analysis of fly ash from Australian coal have shown a significant thorium and uranium content.	In view of the significant quantity of liquid and solid wastes that will be generated by the proposed power station and the nature of the concerns raised in the comments that were received, the EPA considers that liquid and solid waste disposal is a relevant environmental factor.
Surface water and groundwater	The Bluewaters Power Station Phase II will require about 3.25GL/yr of water which will be sourced from mine dewatering activities at Ewington 1 mine.	**Department of Environment** The proposed power station lies within the Wellington Dam Catchment Area. Wellington Dam is presently used for irrigation supplies. The potential for using the Dam as a public drinking supply is being investigated by Government. A Priority classification is currently not assigned to this area but the potential exists for it to be classified P3. Heavy or energy industries are not compatible in P3 areas according to the Land Use Classification Table. The PER does not take into account the proclaimed catchment area in the text. Could the proponent comment on this matter? Construction and operating staff at the Power Station should be made aware that they are within a PDWSA. How will the proponent address this matter? Wellington is CAWS Act clearing control area so any proposed clearing will need to be considered by the Department of Environment. The extent of any clearing must be determined and an application for a CAWSA Licence to Clear submitted to DoE. There are potential water quality risks from hazardous material storage, washdown waters, fallout of air emissions to soil, saline water leakage from storage ponds, fly ash disposal in mine overburden, spills and leakage from the packaged treatment plant. Can the proponent provide more information on these risks and how they will be minimised including a site plan showing where treatment plants, storage ponds etc will be located and how they will be constructed? The proponent should demonstrate that under both normal and potentially abnormal operating conditions water contaminants in use or produced at the power station are fully contained? IntraGIS suggest there is a stream running through the property, or near to it, and the proposed power station is about 1.3km south of the Collie River so there may be a fairly direct path for any contaminants to enter the waterways and into Wellington Dam. A comprehensive monitoring and audit program would be required.	In view of the significant quantity of groundwater that will be required by the proposed power station, and the potential for stored fuel and hazardous materials and plant construction and maintenance activities to impact upon surface water and groundwater quality, the EPA considers that surface water and groundwater is a relevant environmental factor.

Table 4: Identification of relevant environmental factors and principles

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Relevant Environmental Factors
POLLUTION			
Surface water and groundwater (Continued)	The Bluewaters Power Station Phase II will require about 3.25GL/yr of water which will be sourced from mine dewatering activities at Ewington 1 mine.	**Department of Environment** Contractor's construction site facilities need to be considered in terms of sewerage disposal, fuel and hazardous material storage, stormwater management etc. Development should be consistent with the following Water Quality Protection Notes (WQPNs): • Above ground chemical storage tanks in PDWS areas; • Groundwater monitoring bores; • Industrial sites near sensitive environments – establishment and operation; • Industrial sites near sensitive water bodies; • Soil liners to contain low-hazard waste; and • Toxic and hazardous substances. A map showing the location of surface drainage features and topography should be provided. The discussion on potential impacts on surface water features requires further development – in particular how construction activities may increase surface water and sediment runoff. An understanding of mechanisms for potential impacts is necessary for management of potential impacts. The DoE has concerns regarding the difficulty of establishing the exact amount of water available from dewatering in the medium and long terms and has advised proponents of potential coal-fired power stations that it would be prudent for them to develop an alternative water supply, rather than depend on dewatering water for a secure long-term supply. As the DoE has taken the position that it will not issue any new groundwater licences to Energy Groups for power station operations it is recommended that Griffin Energy seek to source an alternative, secure long-term water supply. **Shire Of Collie** It is not clear from the PER as to where Griffin will derive its potable water supply for Bluewaters – will this be piped in from the Harris Dam or will Griffin be treating water on site to make it potable? It is also not clear as to what quantities of potable water will be required. It is essential that licensing conditions for Bluewaters clearly enunciate that all cooling waters are to be sourced from Ewington I mine dewatering activities. It is essential that licensing conditions prohibit the interference of ground water supplies to adjacent private landowners.	In view of the significant quantity of groundwater that will be required by the proposed power station, and the potential for stored fuel and hazardous materials and plant construction and maintenance activities to impact upon surface water and groundwater quality, the EPA considers that surface water and groundwater is a relevant environmental factor.

Table 4: Identification of relevant environmental factors and principles

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Relevant Environmental Factors
POLLUTION			
Surface water and groundwater (Continued)	The Bluewaters Power Station Phase II will require about 3.25GL/yr of water which will be sourced from mine dewatering activities at Ewington 1 mine.	**Shire of Collie and members of the public** The proponents indicated that the development of Stage I of the Coolangatta Industrial Estate in which the Power Station would be located would not affect the adjoining landowners in terms of run-off. This is simply wrong with a contour plan showing surface watershed entering the neighbour's property creek system. More work needs to be done to address the concerns of the landowners regarding both ground water availability and contamination. **Members of the public** The Collie region like all of Western Australia has had a significant reduction in rainfall over recent years and this is clearly likely to continue based on modelling undertaken by the Water Corporation. The impact of mine dewatering and water use in industrial development needs to be carefully balanced with the other needs in our community.	In view of the significant quantity of groundwater that will be required by the proposed power station, and the potential for stored fuel and hazardous materials and plant construction and maintenance activities to impact upon surface water and groundwater quality, the EPA considers that surface water and groundwater is a relevant environmental factor.
Noise	Construction and operation of the Bluewaters Power Station Phase II has the potential to affect existing noise levels.	**Department of Environment** The DoE has concerns that the three PER documents in respect of coal-fired power station proposals are not providing standardised modelling information for noise. This makes it difficult to establish whether modelling will reflect actual impacts if constructed. In addition, the PER modelling does not appear to include any impacts from noise from existing and proposed Ewington mining operations. **Shire of Collie** Cumulative noise impacts are of concern. Bluewaters II by itself may present no more problem than does the existing Collie A power station. However it is the cumulative effect that may well indicate something different. The Council is concerned to know how any problems with respect to power stations and coal mining operations will be addressed in the future, bearing in mind that closure of operating power stations or coal mines could not possibly be a solution. **Members of the public** The noise modelling is inconsistent between PERs. I am concerned about noise emissions from the proposed powers stations and Coolangatta Industrial Estate. The developments are about three km and over the road from our property. Members of my family and I have had some serious health problems in recent years and we are concerned that the noise may cause us additional ill health.	The proponent has made a commitment to install appropriate noise abatement technology to ensure that the proposed power station meets relevant noise criteria. However, given the nature of the concerns that were raised in the comments that were received, the EPA considers that noise is a relevant environmental factor.

Table 4: Identification of relevant environmental factors and principles

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Relevant Environmental Factors
POLLUTION			
Noise	Construction and operation of the Bluewaters Power Station Phase II has the potential to affect existing noise levels.	**Members of the public (Continued)** The Power Station has been moved on a number of occasions to avoid the neighbours being affected by noise from the plant. The site is now the most eastern it can be without being situated over anticipated mining or on unsuitable land to the south east. What if the modelling is incorrect and the noise reduction by moving the plant can't be achieved will the power station be closed? More work clearly needs to be done particularly when considered in light of the conflicting noise modelling when compared with the Collie B PER's. The Noise emission maps do not factor in varying wind conditions. The information provided by the Industrial Estate consultants differs from that provided by both proponents for the Collie B proposals. The Noise maps are cut off to the south and west. We are already in the 40-45dB area of exposure for Ewington I. It would appear we are in the 35-45dB range for the proposed power stations. This is above the 30dB limit set for the Coolangatta Industrial Estate which was not to be exceeded.	The proponent has made a commitment to install appropriate noise abatement technology to ensure that the proposed power station meets relevant noise criteria. However, given the nature of the concerns that were raised in the comments that were received, the EPA considers that noise is a relevant environmental factor.
Light overspill	Operation of the Bluewaters Power Station Phase II has the potential to affect existing night time light levels.	**Member of the public** There is no reference in the PER in the light impact from the power station. The large number of industrial developments in the Collie region already ensures a number of glows which turn night into twilight.	The proponent's response to submissions document indicates that the light shed from the proposed power station will be limited to the extent possible, whilst ensuring safety standards are met. The document also indicates that appropriate Australian Standards will be used to provide guidance in the design of lighting for the power station. This environmental factor does not require further evaluation by the EPA.
SOCIAL SURROUNDINGS			
Risk and hazards	Operation of the Bluewaters Power Station Phase II will not lead to any significant increase in risk levels. Hazardous materials will be stored and handled according to Department of Industry and Resources (DoIR) regulations.	No specific concerns were raised in the submissions that were received.	In view of the very low increase in risk levels due to the operation of the proposed power station, and that hazardous materials will be stored and handled according to DoIR regulations, the EPA considers that this environmental factor does not require further evaluation.

Table 4: Identification of relevant environmental factors and principles

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Relevant Environmental Factors
SOCIAL SURROUNDINGS			
Aboriginal culture and heritage	Construction activities within the project area have the potential to disturb Aboriginal heritage sites. Aboriginal heritage surveys have been undertaken and the results indicate that it is unlikely that any Aboriginal sites are located within the project area.	**Department of Indigenous Affairs** The proponent should fully explore indigenous and archaeological issues associated with the development, and will be required to seek approval from the Minister for Indigenous Affairs should any aboriginal sites be discovered during construction.	The EPA considers that the concern that was raised has been adequately addressed by the response provided by the proponent. The proponent has made a commitment to submit an application to the Minister for Indigenous Affairs to clear under Section 18 of the *Aboriginal Heritage Act*, 1972 before disturbance, if sites of aboriginal significance are found during construction. This environmental factor does not require further evaluation by the EPA.
European heritage	There are no known European heritage sites located within the project area.	No specific concerns were raised in the submissions that were received.	This environmental factor does not require further evaluation by the EPA.
Visual amenity	The most significant visual impact from the Bluewaters Power Station Phase II will be its 100m tall stack. The surrounding land is used for coal mining operations. Collie is located about 4km to the south-west.	**Member of the public** The proponent has made no effort to address the visual impacts of the power station.	The proponent has made a commitment to minimise potential impacts on visual amenity through planning design and screening strategies (eg. natural barriers), and by developing appropriate vegetation management and landscape strategies. This environmental factor does not require further evaluation by the EPA.
Traffic	Existing traffic levels may be affected during the construction and operation of the Bluewaters Power Station Phase II.	**Shire of Collie** Council has previously raised concerns about traffic issues connected with proposed developments in the Collie coal basin. Whilst it is acknowledged that proposed traffic flows on existing public roads will not exceed standards and that an alternative access route would not become available until after the cessation of coal mining activity in the northern part of Ewington I it is appropriate to raise the point that future access into the Coolangatta area may well present traffic concerns.	The proponent's response to submissions document indicates that the proponent will consult with the Shire in producing a traffic Management Plan for the construction of the power station and nominates the Shire as the advising authority in the production of the Traffic Management Plan. The document also indicated that the proponent will maintain a continuing dialogue with the Shire on traffic management issues. This environmental factor does not require further evaluation by the EPA.

Table 4: Identification of relevant environmental factors and principles

PRINCIPLES		
Principle	**Relevant Yes/No**	**If yes, Consideration**
8. The precautionary principle *Where there are threats of serious or irreversible damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.* *In application of this precautionary principle, decisions should be guided by –* *a. careful evaluation to avoid, where practicable, serious or irreversible damage to the environment; and* *b. an assessment of the risk-weighted consequences of various options.*		
	No	
2. The principle of intergenerational equity *The present generation should ensure that the health, diversity and productivity of the environment is maintained and enhanced for the benefit of future generations.*		
	No	
3. The principle of the conservation of biological diversity and ecological integrity *Conservation of biological diversity and ecological integrity should be a fundamental consideration.*		
	No	
4. Principles relating to improved valuation, pricing and incentive mechanisms *b. Environmental factors should be included in the valuation of assets and services.* *c. The polluter pays principle – those who generate pollution and waste should bear the cost of containment, avoidance and abatement.* *d. The users of goods and services should pay prices based on the full life-cycle costs of providing goods and services, including the use of natural resources and assets and the ultimate disposal of any waste.* *e. Environmental goals, having been established, should be pursued in the most cost effective way, by establishing incentive structure, including market mechanisms, which enable those best placed to maximize benefits and/or minimize costs to develop their own solution and responses to environmental problems.*		
	Yes	Principle 4b was considered in assessing greenhouse gas emissions.
5. The principle of waste minimisation *All reasonable and practicable measures should be taken to minimise the generation of waste and its discharge into the environment.*		
	Yes	Principle 5 was considered in assessing greenhouse gas emissions and atmospheric emissions.

Appendix 4

Recommended environmental conditions and proponent's consolidated commitments

Statement No.

RECOMMENDED CONDITIONS AND PROCEDURES

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

BLUEWATERS POWER STATION PHASE II
SHIRE OF COLLIE

Proposal: The construction and operation of the Bluewaters Power Station Phase II, a sub-critical coal fired base load power generating facility with a nominal generating capacity of 200 megawatts adjacent to the Bluewaters I Power Station on a site located approximately four kilometers north-east of Collie, as documented in schedule 1 of this statement.

Proponent: Griffin Power Pty Ltd

Proponent Address: 15th Floor, 28 The Esplanade, PERTH WA 6000

Assessment Number: 1525

Report of the Environmental Protection Authority: Bulletin 1177

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

1 Implementation

1-1 The proponent shall implement the proposal as documented in schedule 1 of this statement subject to the conditions of this statement.

2 Proponent Commitments

2-1 The proponent shall implement the environmental management commitments documented in schedule 2 of this statement.

3 Proponent Nomination and Contact Details

3-1 The proponent for the time being nominated by the Minister for the Environment 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 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 Environment 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 substantially commence the proposal within five years of the date of this statement or the approval granted in this statement shall lapse and be void.

Note: The Minister for the Environment 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, prior to the expiration of the five-year period referred to in condition 4-1.

The application shall demonstrate that:

1. the environmental factors of the proposal have not changed significantly;

2. new, significant, environmental issues have not arisen; and

3. all relevant government authorities have been consulted.

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

5 Compliance Audit and Performance Review

5-1 The proponent shall prepare an audit program and submit compliance reports to the Department of Environment which address:

1. the status of implementation of the proposal as defined in schedule 1 of this statement;

2. evidence of compliance with the conditions and commitments; and

3. 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 Environment is

empowered to monitor 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.

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

1. 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;

2. the level of progress in the achievement of sound environmental performance, including industry benchmarking, and the use of best available technology where practicable;

3. significant improvements gained in environmental management, including the use of external peer reviews;

4. stakeholder and community consultation about environmental performance and the outcomes of that consultation, including a report of any on-going concerns being expressed; and

5. the proposed environmental targets over the next five years, including improvements in technology and management processes.

5-3 The proponent may submit a report prepared by an auditor approved by the Department of Environment under the "Compliance Auditor Accreditation Scheme" to the Chief Executive Office of the Department of Environment on each condition/commitment of this statement which requires the preparation of a management plan, programme, strategy or system, stating whether the requirements of each condition/commitment have been fulfilled within the timeframe stated within each condition/commitment.

6 Greenhouse Gas Emissions

6-1 Prior to commencement of construction, the proponent shall prepare a Greenhouse Gas Emissions Management Plan to:

- ensure that through the use of best practice, the total net "greenhouse gas" emissions and/or "greenhouse gas" emissions per unit of product from the project are minimised; and

- manage "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 on advice of the Environmental Protection Authority.

This Plan shall include:

1. calculation of the "greenhouse gas" emissions associated with the proposal, as advised by the Environmental Protection Authority;

   Note: The current requirements of the Environmental Protection Authority are set out in: *Minimising Greenhouse Gas Emissions, Guidance for the Assessment of Environmental Factors, No. 12* published by the Environmental Protection Authority (October 2002). This document may be updated or replaced from time to time.

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 using a combination of "no regrets" and "beyond no regrets" measures;

3. 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, both within Australia and overseas;

4. implementation of thermal efficiency guidelines and operating goals consistent with the Australian Greenhouse Office Technical Efficiency guidelines in design and operational management;

5. actions for the monitoring and annual reporting of "greenhouse gas" emissions and emission reduction strategies;

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 and as a percentage of total emissions over time, and annual reporting of progress made in achieving this target. Consideration should be given to the use of renewable energy sources such as solar, wind or hydro power; and

7. entry, whether on a project-specific basis, company-wide arrangement or within an industrial grouping, as appropriate, into the Commonwealth Government's "Greenhouse Challenge" voluntary cooperative agreement program. Components of the agreement program include:

   i. an inventory of emissions;
   ii. opportunities for abating "greenhouse gas" emissions in the organisation;
   iii. a "greenhouse gas" mitigation action plan;
   iv. regular monitoring and reporting of performance; and
   v. independent performance verification.

   Note: In (2) above, the following definitions apply:

1. “no regrets” measures are those which can be implemented by a proponent and which are effectively cost-neutral.

2. “beyond no regrets” measures are those which can be implemented by a proponent and which involve additional costs that are not expected to be recovered.

6-2 The proponent shall implement the Greenhouse Gas Emissions Management Plan required by condition 6-1.

6-3 Prior to the commencement of construction, the proponent shall make the Greenhouse Gas Emissions Management Plan required by condition 6-1 publicly available.

7 Stack Emissions and Ambient Air Quality Monitoring

7-1 Prior to commencement of construction, the proponent shall prepare a Stack Emissions Management and Ambient Air Quality Monitoring Plan, to the requirements of the Minister for the Environment on advice of the Environmental Protection Authority.

The objectives of the plan are:

- To ensure that best available practicable and efficient technologies are used to minimise total air emissions from the power station; and

- To ensure that high quality data are available to model and verify ambient air quality.

This Plan shall address:

1. specific measures to minimise total air emissions from the power station to meet emission limits consistent with best practicable technology, current industry standards, and ambient air quality standards;

2. monitoring of air emissions;

3. monitoring of ambient air quality; and

4. public reporting of air emissions and any complaints about air emissions.

7-2 The proponent shall implement the Stack Emissions Management Plan required by condition 7-1.

7-3 The proponent shall make the Stack Emissions Management Plan, required by condition 7-1 publicly available.

8 Saline Wastewater Discharge

8-1 The proponent shall not discharge saline wastewater from the power station into the existing Collie Power Station saline wastewater pipeline other than in accordance with a Saline Water Discharge Quality Plan prepared to the requirements of the Minister for the Environment on advice of the Environmental Protection Authority.

This Plan shall address the following:

1. Continuous on-line monitoring of flowrate, temperature, conductivity, and turbidity;

2. Appropriate additional monitoring, with adequate analytical limits of reporting, to control discharge levels of any process additives and other environmental contaminants necessary to:

    - protect the environmental values of ecosystem health, recreation and aesthetics, fishing and aquaculture, and industrial water supply;

    - protect a high level of ecological protection outside the zone of initial dilution for the marine outfall;

    - protect a low to moderate level of ecological protection inside the zone of initial dilution for the marine outfall;

    - meet the discharge licence for the pipeline into the marine environment.

3. The concentration of oxidising biocides and antiscalants in the brine discharge necessary to:

    - protect the established environmental values;

    - protect the established levels of ecological protection; and

    - meet the discharge licence for the pipeline into the marine environment.

8-2 The proponent shall implement the Saline Water discharge Quality Plan required by condition 8-1.

8-3 In the event that monitoring identifies unacceptable impacts, the proponent shall as soon as practicable undertake modifications to the method of saline wastewater discharge to mitigate these impacts.

8-4 The proponent shall make the Saline Water Discharge Quality Plan required by condition 8-1 publicly available.

9 Decommissioning Plans

9-1 Prior to commencement of construction, the proponent shall prepare 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 on advice of the Environmental Protection Authority.

The Preliminary Decommissioning Plan shall address:

1. the 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. the long-term management of ground and surface water systems affected by the power station, coal stockpiles, waste disposal areas and associated infrastructure;

3. 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;

4. a conceptual plan for a care and maintenance phase; and

5. management of potentially polluting materials to avoid the creation of contaminated areas.

9-2 At least 12 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 on advice of the Environmental Protection Authority.

The Final Decommissioning Plan shall address:

1. the removal or, if appropriate, retention of plant and infrastructure in consultation with relevant stakeholders;

2. the long-term management of ground and surface water systems affected by the power station, coal stockpiles, waste disposal areas and associated infrastructure;

3. rehabilitation of all disturbed areas to a standard suitable for the agreed new land use(s); and

4. identification of contaminated areas, including provision of evidence of notification and proposed management measures to relevant statutory authorities.

9-3 The proponent shall implement the Final Decommissioning Plan required by condition 9-2 until such time as the Minister for the Environment determines, on

advice of the Environmental Protection Authority, that the proponent's decommissioning responsibilities have been fulfilled.

9-4 The proponent shall make the Final Decommissioning Plan required by condition 9-2 publicly available.

Procedures

1 Where a condition states "to the requirements of the Minister for the Environment on advice of the Environmental Protection Authority", the Environmental Protection Authority will provide that advice to the Department of Environment for the preparation of written notice to the proponent.

2 The Environmental Protection Authority may seek advice from other agencies or organisations, as required, in order to provide its advice to the Department of Environment.

3 Where a condition lists advisory bodies, it is expected that the proponent will obtain the advice of those listed as part of its compliance reporting to the Department of Environment.

Notes

1 The Minister for the Environment will determine any dispute between the proponent and the Environmental Protection Authority or the Department of Environment over the fulfilment of the requirements of the conditions.

2 The proponent is required to apply for a Works Approval, Licence and Registration for this project under the provisions of Part V of the *Environmental Protection Act, 1986*.

3 Within this statement, to "have in place" means to "prepare, document, implement and maintain for the duration of the proposal".

Schedule 1

Bluewaters Power Station Phase II (Assessment No. 1525)

The proposal is to construct and operate a 200 megawatt power station known as the Bluewaters II Power Station adjacent to the proposed Bluewaters Power Station (i.e. Bluewaters I Power Station) on a site located approximately 4km north-east of Collie (Figure 1). It will be a subcritical coal-fired base-load generation facility with a nominal generating capacity of up to 200MW. The Bluewaters II Power Station will supplement the Bluewaters I Power Station and supply electricity for sale via the South West Interconnected System (SWIS). Power from both power stations would be offered as an option for Western Power Corporation's Stage 2 Power Procurement Process (PPP) for the provision of an additional 300MW of base-load capacity.

The power station will comprise the following components:

- boiler and turbine power block;
- mechanical draft cooling tower;
- flue gas cleaning equipment; and
- generator transformer switchyard.

The following components will be used by the Bluewaters II Power Station. However, these components will be substantially in place to support the Bluewaters I Power Station:

- a 100 metre stack;
- ash and dust disposal plant;
- water treatment plant;
- transmission line connection to Western Power Corporation switchyard;
- buildings for administration, stores, water, sewage treatment, and chemical storage;
- liquid fuel storage facilities (typically for start-up purposes);
- communications and control systems;
- water supplies;
- electrical supplies;
- drainage systems;
- roads and fencing; and
- saline wastewater discharge through the existing Collie Power Station ocean outfall.

The plant layout is shown in Figure 2. A diagram which illustrates the input and output flows for the power station is shown in Figure 3. The main characteristics of the proposal are summarised in Table 1 below.

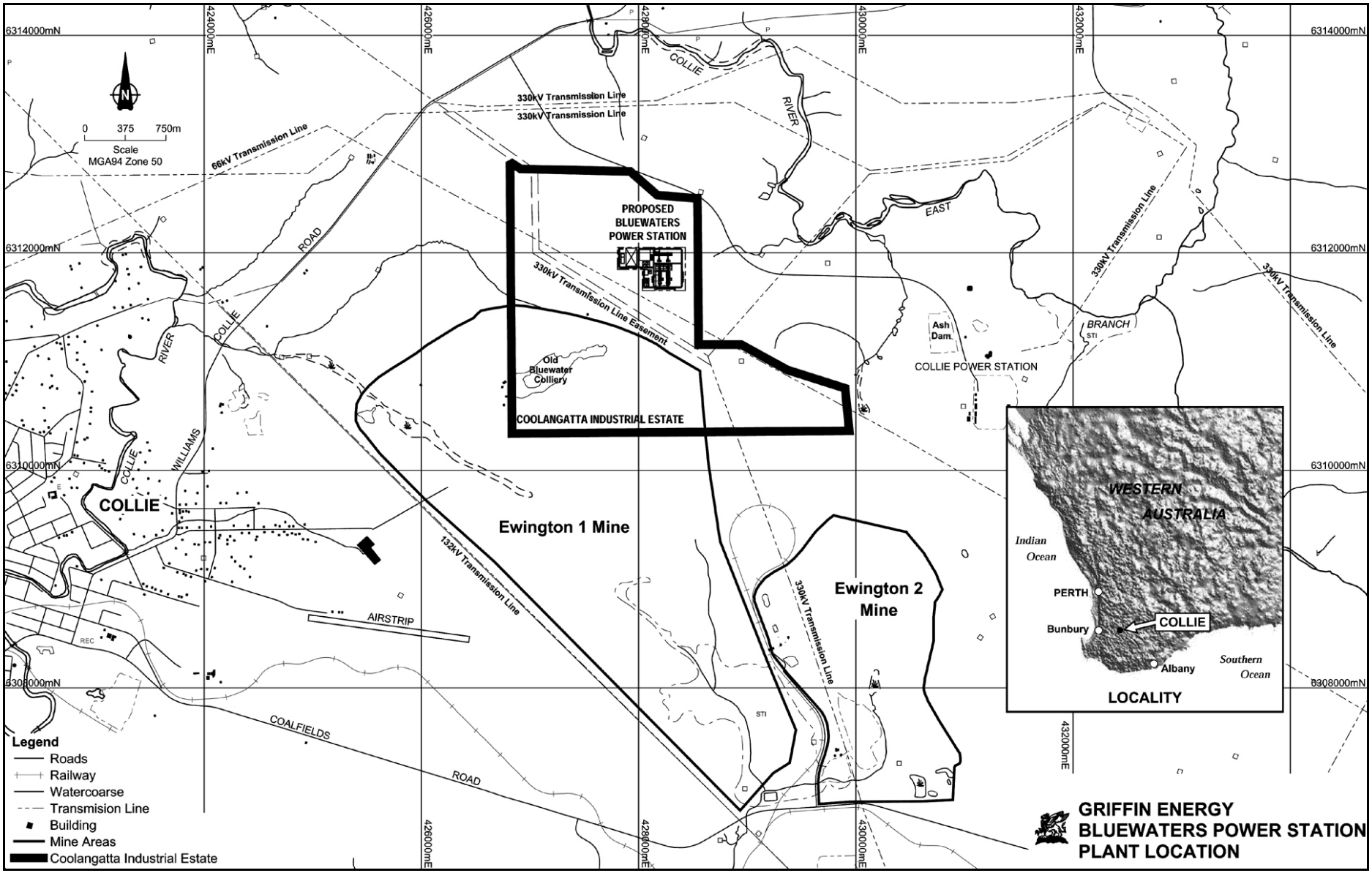

Figure 1: Regional location (Source: Figure 3 from Griffin Energy Pty Ltd 2005a)

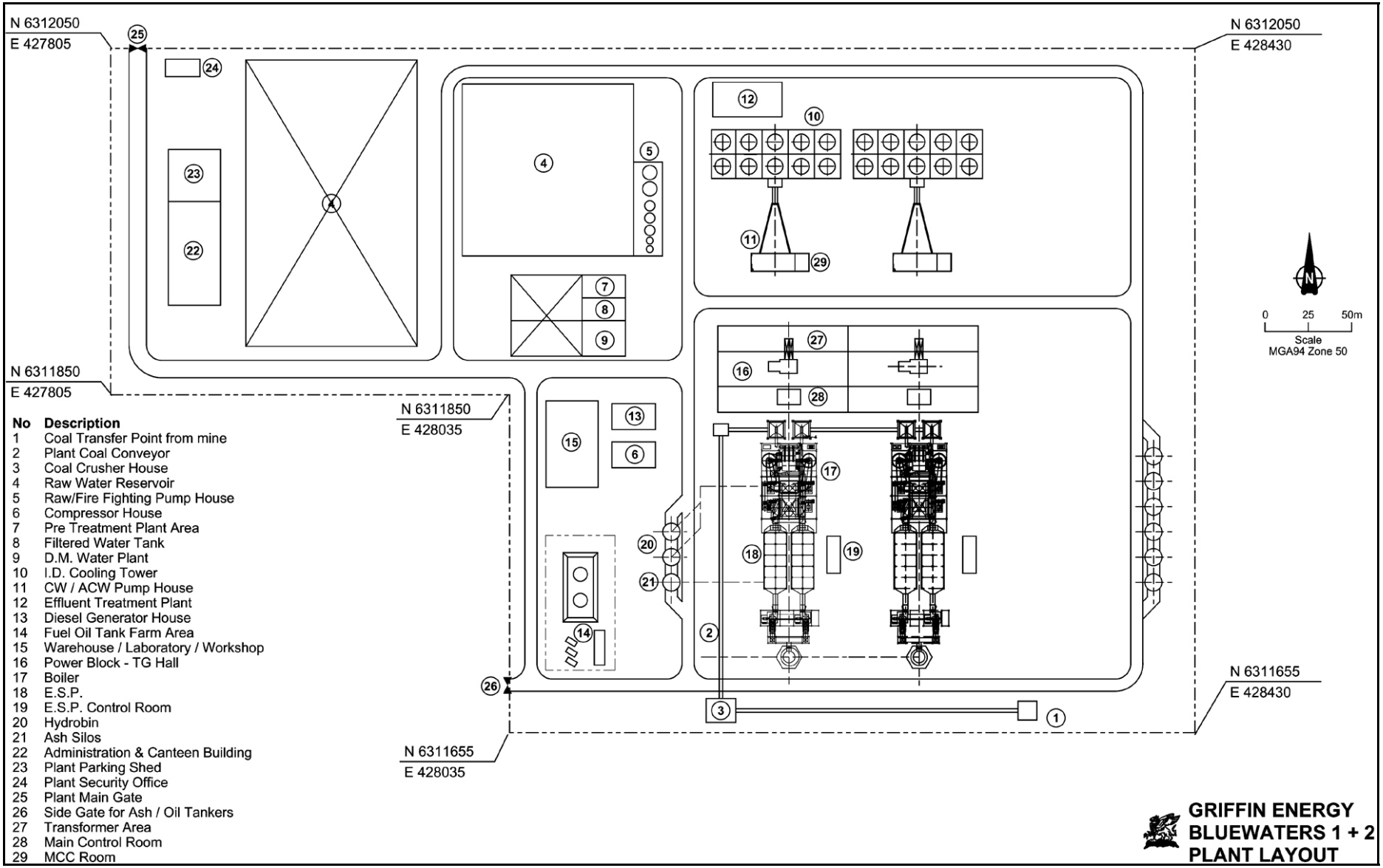

Figure 2: Plant layout (Source: Figure 4 from Griffin Energy Pty Ltd 2005a)

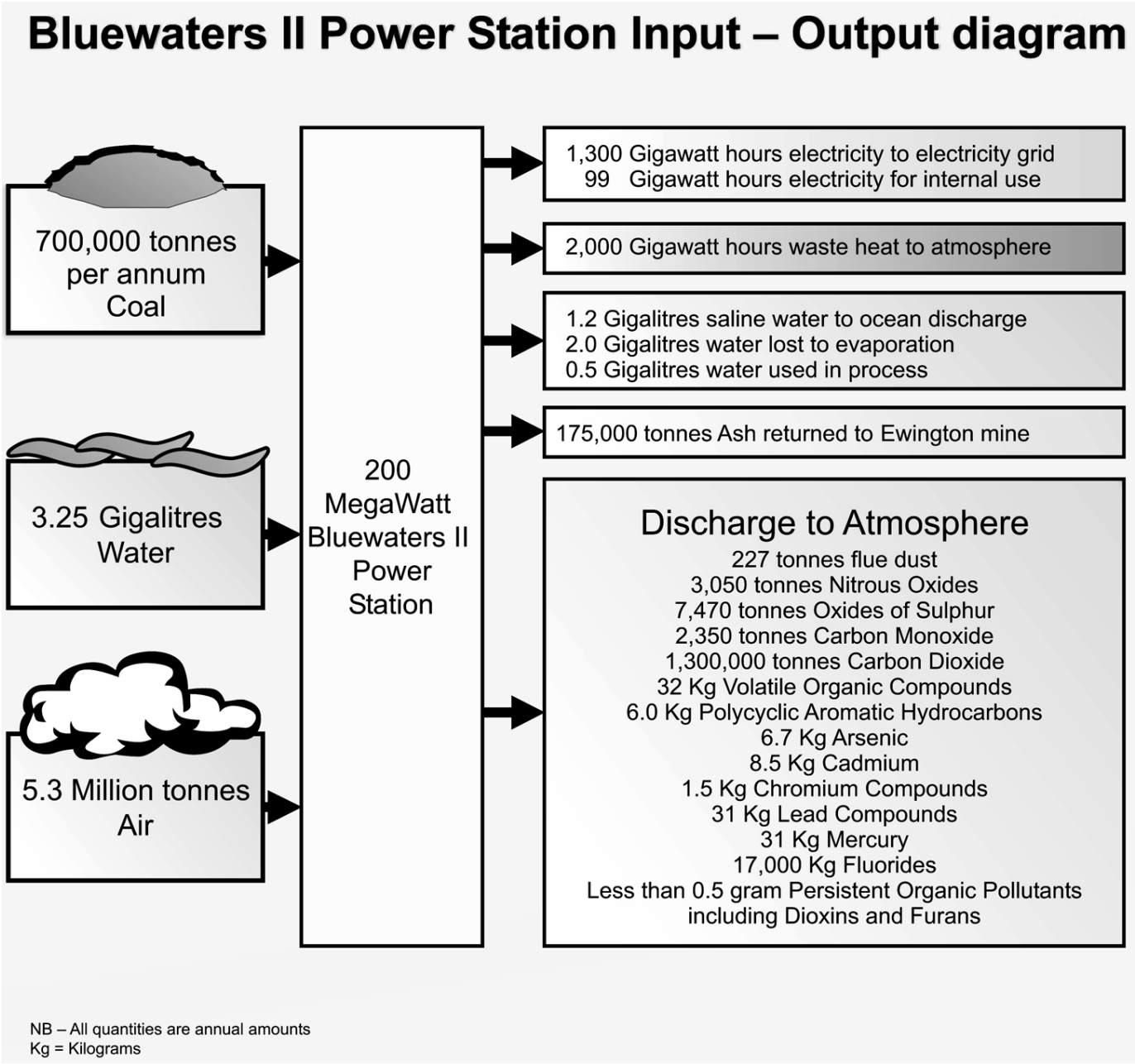

Figure 3: ***Input - output flow diagram (Source: Figure 6 from Griffin Energy Pty Ltd 2005a)***

Table 1: Summary of key proposal characteristics

ELEMENT	DESCRIPTION
General	
• Project Purpose:	To produce electricity to supply to the SWIS grid or direct to customers
• Construction Period:	30 months to commercial operation
• Project Life:	30 years
• Project Value:	Approximately A$200 Million
• Power Plant Type:	Subcritical coal fired power station
• Power Generating Capacity:	Up to 200MW_e nominal, 202.3MW design
• Plant Thermal Efficiency:	HHV 36.4% - LHV 38.6%
• Plant Operation:	Base load operation 24 hours per day, 365 days per year
• Shutdown Time:	Plant maintenance shutdowns may be scheduled annually
• Maximum Facility Footprint:	350m x 150m area
• Maximum Total Area:	15 hectares
Plant Facilities	
• Stacks:	1
• Height of Stack:	100m
• Diameter of Stack:	4.13m
• Cooling Towers:	1 set
• Liquid Fuel Storage Tanks:	2 x 100,000 litres and 1 x 10,000 litres
• Boiler:	Balanced draft pulverised coal steam generator matched to steam turbine capacity
• Steam Turbine:	Tandem compound reheat steam turbine with synchronous alternator – 200MW_e
• Wastewater collection:	Package treatment plant
Utilities	
• Water Supply:	3.25GL/yr sourced from mine dewatering at Ewington 1
• Coal Supply:	0.7Mtpa via conveyor owned and operated by Griffin Coal Mining Company
• Transmission Line Length:	100m up to 3km depending on interconnection point as required by Western Power
Emissions	
• Noise:	Less than 60dB(A) at 150m from the plant. Less than 29dB(A) at nearest residence in Collie
• Flue Dust:	47mg/Nm^3 at 7% O_2 dry basis; 9g/s; 227tpa
• Nitrogen Oxides:	606mg/Nm^3 at 7% O_2 dry basis; 121g/s; 3050tpa
• Sulphur Oxides:	1490mg/Nm^3 at 7% O_2 dry basis; 296g/s; 7470tpa
• Greenhouse Gases:	1,300,000tpa CO_2 e
• Carbon Monoxide:	500mg/Nm^3 at 7% O_2 dry basis; 93g/s; 2350tpa
• Volatile Organic Compounds:	32kg/yr
• PAHs:	6.0kg/yr
• Arsenic:	6.7kg/yr
• Cadmium:	8.5kg/yr
• Chromium compounds:	1.5kg/yr
• Lead compounds:	31kg/yr
• Mercury:	31kg/yr
• Fluorides:	17,000kg/yr (instantaneous rate estimated to be less than 590mg/s)
• POPs inc. Dioxins and Furans:	Less than 0.5 grams per year
Waste	
• Ash:	175,000tpa disposed to the adjacent mine (Ewington 1)
• Septage:	Packaged treatment plant
• Saline Water:	1.2GL/yr
Workforce	
• Construction:	Approximately 150 personnel at the peak of construction
• Operations:	Up to 30 full time operations and maintenance personnel

Abbreviations

CO_2 e	carbon dioxide equivalents	mg/s	milligrams per second
dB(A)	decibels A weighted	Mtpa	million tonnes per annum
g/s	grams per second	MW	megawatts
GL/yr	gigalitres per year	MW_e	megawatts sent out
HHV	higher heating value	O_2	oxygen
inc.	including	pa	per annum
kg	kilograms	PAHs	polycyclic aromatic hydrocarbons
kg/yr	kilograms per year	POPs	persistent organic pollutants
LHV	lower heating value	SWIS	South West Interconnected System
m	metres	tpa	tonnes per annum
mg/Nm^3	milligrams per standard cubic metre	%	percent

Source: Modified version of Table 6 from Griffin Energy Pty Ltd 2005a

Schedule 2

Proponent's Environmental Management Commitments

January 2005

BLUEWATERS POWER STATION PHASE II

(Assessment No. 1525)

Griffin Power Pty Ltd

Proponent's Environmental Management Commitments - January 2005

BLUEWATERS POWER STATION PHASE II (Assessment No. 1525)

Note: The term "commitment" as used in this schedule includes the entire row of the table and its six separate parts as follows:

- a commitment number;
- a commitment topic;
- the objective of the commitment;
- the 'action' to be undertaken by the proponent;
- the timing requirements of the commitment; and
- the body/agency to provide technical advice to the Department of Environment.

Consolidated Management Commitments

Commitment Number	Environmental Factor	Management Objective	Action	Timing	Advice From
One	Biodiversity	Minimise clearing to establish power station. Examine all environmental factors and implementation of mitigation plans and activities.	Develop and implement an EMS for Bluewaters that meets AS/NZS ISO 14001:1996. The EMS will cover all elements in the standard as a minimum as well as the action items listed in this table: 1.1 Develop and implement a construction phase EMP. 1.2 Develop and implement an operational phase EMP.	Prior to construction and ongoing. Prior to construction. Prior to commissioning and ongoing.	Various stakeholders as indicated below. Various stakeholders as indicated below. Various stakeholders as indicated below.
Two	**Terrestrial Flora:** • Vegetation Communities • Declared Rare Flora and Priority Flora • Flora of Conservation Significance	Removal of vegetation will be minimised where possible through appropriate location of the power station and associated infrastructure. The project will maximise the use of existing cleared land. Manage construction works to minimise disturbance to significant vegetation communities and priority flora. Maintain the abundance, species diversity, geographic distribution and productivity of vegetation communities.	2.1 Preparation and implementation of a Vegetation and Flora Management Plan addressing identification of areas not to be disturbed, site clearance procedures to manage construction works so as to avoid disturbance to native vegetation, and weed management practices. 2.2 If any clearing of native vegetation is determined to be required, the area will be surveyed and mapped prior to the commencement of construction, and the significance of impacted vegetation will be detailed.	Prior to construction. Prior to construction.	CALM. CALM.

Commitment Number	Environmental Factor	Management Objective	Action	Timing	Advice From
Three	**Terrestrial Fauna:** • All Fauna • Specially Protected (Threatened) Fauna	Maintain the abundance, species diversity, geographic distribution of terrestrial fauna. Protect Specially Protected (Threatened) Fauna, consistent with the provisions of the *Wildlife Conservation Act*.	3.1 Preparation and implementation of a Fauna Management Plan to ensure off-site and indirect fauna impacts are minimised. This may include: - ensuring physical disturbance is kept within designated areas, - establishment of procedures, monitoring requirements, workforce training and responsibilities to minimise disturbance of significant terrestrial fauna, - regular liaison with local CALM office to maintain acceptable management practices, - development and implementation of fire prevention and contingency measures.	Prior to construction.	CALM.
Four	**Surface Water Quality**	To minimise erosion and impacts on local surface water or downstream environments. •	4.1 Cooling water discharge will not be directed to the surface water system. 4.2 The plant will be designed to ensure that contaminants are not released to the environment. 4.3 Contamination of surface water will be minimised by methods such as: • suitably designed drainage areas and settling basins; • appropriate design of areas to contain hazardous material such as hydrocarbons; • washdown water will be collected in drains and passed through sediment traps and oil separation systems prior to transfer to settling ponds. 4.4 Develop and implement construction phase surface water management plan as part of construction phase EMP. 4.5 Develop and implement operational phase surface water management plan as part of operational phase EMP. 4.6 Document the existing surface water quality in the project area.	Prior to construction. Prior to commissioning and ongoing. Prior to construction. Prior to construction. Prior to commissioning Prior to construction.	DoE – Water & Rivers Commission. DoE – Water & Rivers Commission. DoE – Water & Rivers Commission. DoE – Water & Rivers Commission. DoE – Water & Rivers Commission. DoE – Water & Rivers Commission.
Five	**Groundwater Quality**	Maintain the quality of local and regional groundwater to ensure that existing and potential uses, including ecosystem maintenance, are protected.	5.1 The plant will be designed to ensure that contaminants are not released into the environment. 5.2 All potentially hazardous materials will be stored in accordance with relevant legislation and regulations. 5.3 Develop and implement construction phase groundwater management plan as part of construction phase EMP. 5.4 5.4 Develop and implement operational phase groundwater management plan as part of operational phase EMP.	Prior to construction. Prior to commissioning and ongoing. Prior to construction. Prior to commissioning	DoE – Water & Rivers Commission. DoE – Water & Rivers Commission. DoE – Water & Rivers Commission. DoE – Water & Rivers Commission.

Commitment Number	Environmental Factor	Management Objective	Action	Timing	Advice From
Six	**Water Supply**		6.1 Develop and implement an appropriate water supply and management strategy that will satisfy requirements during both the construction and operation phases of the project. 6.2 Develop and implement construction phase water management plan as part of Construction EMP. 6.3 Develop and implement operational phase water management plan as part of operational EMP.	Prior to construction Prior to construction. Prior to commissioning and ongoing .	DoE – Water & Rivers Commission. DoE – Water & Rivers Commission. DoE – Water & Rivers Commission.
Seven	**Marine Water Quality**	Maintain marine ecological integrity and biodiversity and ensure that any impacts on locally significant marine communities are avoided.	7.1 Cooperate with operator of Collie A disposal line to ensure that effluent water meets discharge license conditions prior to introduction into line. 7.2 Determine final details of the wastewater quality and quantity and conduct a detailed modelling assessment of the ocean outfall discharge (with the existing operator of Collie A) to demonstrate the dilution criteria that can be achieved with the additional saline water discharge. An assessment of the levels of other contaminants (such as biocides) discharged into the ocean will be included to ensure that they meet the ANZECC/ARMCANZ 2000 Water Quality Guidelines at the edge of the mixing zone. 7.3 Design and implement a Saline Water Management Plan incorporating a saline wastewater monitoring programme and wastewater management contingency plan, as part of the Operations EMP.	Prior to commissioning and ongoing. Prior to commissioning Prior to commissioning	DoE South West Region Office and operator of Collie A discharge line. DoE South West Region Office and operator of Collie A discharge line. DoE South West Region Office and operator of Collie A discharge line.
Eight	**Contamination** **(Oil and chemical spills)**	To minimise potential adverse effects, risk and liability associated with management of oils and chemicals.	8.1 During the construction phase, potentially contaminating materials and activities will be stored and managed in accordance with regulatory requirements and good practice. Containment of any spillages or leakage will be a priority. 8.2 The plant will be designed to ensure spillages of chemicals or hydrocarbons are contained and collected. 8.3 During operation of the plant, all potentially contaminating or hazardous materials will be stored in accordance with relevant legislation and regulations 8.4 Develop and implement construction phase contamination management (spills) plan as part of construction phase EMP. 8.5 Develop and implement operational phase contamination management (spills) plan as part of operational phase EMP.	Prior to construction. Prior to commissioning and ongoing. Ongoing Prior to construction. Prior to commissioning	DoE – Land and Water Quality Branch. DoE – Land and Water Quality Branch. DoE, DoIR DoE DoE

Commitment Number	Environmental Factor	Management Objective	Action		Timing	Advice From
Nine	**Solid and Liquid Wastes**	To minimise potential contamination to the receiving environment.	9.1	During both the construction and operation phases of the project, solid and liquid wastes will be minimised through resource recovery, reuse and recycling programmes.	Prior to construction and ongoing.	Shire of Collie.
			9.2	All materials requiring disposal will be managed in accordance with the requirements of the relevant authorities and regulations.	Prior to commissioning and ongoing.	Shire of Collie.
			9.3	Waste hydrocarbons will be contained, collected and disposed off-site by an approved method.	Prior to construction	DoE
			9.4	Domestic wastewater will be managed on site via a packaged treatment plant.	Prior to commissioning and ongoing	DoE
			9.5	Develop and implement a flyash management plan as part of the operational phase EMP.	Prior to commissioning and ongoing	DoE, CALM
			9.6	Cooling water discharge will be directed to Western Power's saline Water Pipeline Develop construction phase waste management plan as part of the construction phase EMP.	Prior to construction and ongoing	DoE
			9.7	Develop and implement construction phase waste management plan	Prior to construction	DoE
			9.8	Develop and implement operational phase waste management plan as part of the operational phase EMP.	Prior to commissioning	DoE

Commitment Number	Environmental Factor	Management Objective	Action	Timing	Advice From
Ten	**Noise and Vibration:** • Construction Phase • Operations Phase	To minimise noise emissions and comply with Noise Regulations during construction and operations.	10.1 Appropriate noise abatement technology will be installed to ensure the power station meets relevant noise criteria. 10.2 Develop and implement construction phase Noise management plan as part of the construction phase EMP. 10.3 Develop and implement operational phase Noise management plan as part of the operational phase EMP, including periodic monitoring to ensure compliance with Noise Regulations.	Prior to construction. Prior to construction Prior to commissioning and ongoing.	DoE – Noise Branch. DoE – Noise Branch . DoE – Noise Branch
Eleven	**Air Emissions:** • Construction Phase (Particulate / Dust) • Operations Phase (Particulate / Dust (PM_{10}), Oxides of Sulphur (SO_2), Oxides of Nitrogen (NO_X), VOC's, etc.)	To minimise environmental or human health effects or significantly impact on amenity.	11.1 Dust levels will be managed by minimising vegetation clearing, the use of dust suppression equipment and appropriate site management. 11.2 Best practice management will be used in the design and construction of coal handling. 11.3 Develop and implement construction phase dust management plan as part of construction phase EMP. 11.4 Develop and implement operational phase dust management plan as part of operational phase EMP. 11.5 Develop and implement an operational emissions monitoring and management plan. 11.6 Use EPA Guidance note Number 55 to assist design.	Prior to construction. Prior to commissioning and ongoing. Prior to construction Prior to commissioning and ongoing. Prior to commissioning and ongoing. Design phase.	Shire of Collie. DoE Shire of Collie. DoE DoE – South West Region office. DoE. DoE DoE

Commitment Number	Environmental Factor	Management Objective	Action	Timing	Advice From
Twelve	**Greenhouse Gas Emissions**	To minimise atmospheric emissions where practicable and comply with relevant guidelines.	12.1 Management of emissions will comply with the EPA guidance for the assessment of environmental factors No. 12, Minimising Greenhouse Gas Emissions.	Prior to construction and ongoing.	Australian Greenhouse Office. DoE
			12.2 Thermal efficiency design and operating goals will be implemented. Use AGO Technical Efficiency guidelines in design and operational management.	Prior to construction and ongoing.	Australian Greenhouse Office. DoE
			12.3 Sign on to the Greenhouse Challenge which will involve the following: ➢ provide an estimate of greenhouse gas emissions over the lifetime of the project, and using annual CO_2 equivalent quantities, provide a comparison with other electricity generation plants/technology in WA as required by the Greenhouse Challenge; ➢ provide information on mechanisms to reduce greenhouse gas emissions to best practicable levels in terms of energy efficiency and tonnes of greenhouse gas per unit of product during the design, construction and operation of the plant; and ➢ provide recommendations & suggestions on the implementation of measures to offset greenhouse gas emission.	Prior to commissioning	Australian Greenhouse Office, DoE
			12.4 Based on outcomes from the above, a framework for a greenhouse gas management plan for the proposed power station will be developed and agreed with the relevant regulatory authorities. Once agreement on this framework has been reached, the plan will be prepared and implemented as part of the operational phase EMP for the plant.	Prior to construction and ongoing.	Australian Greenhouse Office. DoE

Commitment Number	Environmental Factor	Management Objective	Action	Timing	Advice From
			12.5 Continued planting of eucalypt trees on former mined areas owned freehold by Griffin Coal and WRCA to sequester 1,000 tpa of GHG.	Commenced in 1999, with 5,000 tonnes sequestered to date. 10 hectare per year to be planted for next five years.	AGO. DoE
			12.6 Plant 2000 hectares of trees on rural properties owned by WRCA to sequester 90,000 tpa of GHG.	Three years commencing during construction of the power plant.	AGO. DoE
			12.7 Construct an 80MW wind farm (40MWnet interest) near Cevantes, resulting in GHG savings of 220,000 tpa across the SWIS.	2005.	AGO. DoE
			12.8 Contribute financial and in kind support valued at $140,000pa to the CRC for Coal in Sustainable Development for further investigation into clean coal technologies.	Ongoing.	CCSD.
			12.9 Initiation and development of other research and development projects to the point where they can be included as offsets in the GHG program.	Ongoing.	CSIRO, AGO, OOE, DoE, CALM, WA Department of Agriculture and other relevant stakeholders.
			12.10 Establish and implement an internal GHG trading system within the Griffin group of companies to maximise benefits from the Greenhouse Gas Management Program.	Upon signing the commitment to the Greenhouse Challenge.	AGO.

Commitment Number	Environmental Factor	Management Objective	Action	Timing	Advice From
Thirteen	**Recreational Activity**	Maintain recreational values for the local community as far as practicable.	13.1 Visual and noise impact will be minimised through planning design and screening strategies (eg. noise bunds and natural barriers). 13.2 Access to adjoining bush will not be affected. 13.3 Liaise with local community, produce and implement landscape and access management plan to reduce impact.	Prior to construction and ongoing. Prior to construction and ongoing Prior to construction and ongoing	Shire of Collie. Local community Shire of Collie. Local community Shire of Collie. Local community DoE
Fourteen	**Visual Amenity**	To maintain visual amenity	14.1 Potential impacts on visual amenity will be minimised through planning design and screening strategies (eg. natural barriers). 14.2 Vegetation management and landscape strategies will be developed as appropriate. 14.3	Prior to construction and ongoing. Prior to construction and ongoing. Prior to construction and ongoing.	Shire of Collie. Local community Shire of Collie. Local community Shire of Collie. Local community DoE
Fifteen	**Aboriginal Culture and Heritage**	To minimise disturbance to areas of Aboriginal and cultural significance.	15.1 Develop and implement Heritage and Culture awareness program for employees. 15.2 If sites of aboriginal significance are found during construction, application for clearance under Section 18 of the *Aboriginal Heritage Act* 1972 will be sought from the Minister for Indigenous Affairs before disturbance.	Prior to construction. During construction and ongoing	Local Indigenous community. DIA Shire of collie. Department of Indigenous Affairs.
Sixteen	**Public Risk**	To ensure that the risk to public safety is as low as reasonably practicable (ALARP) and to minimise the potential creation of hazardous working environments.	16.1 Develop and implement local community liaison program. 16.2 Hazardous materials will be stored and handled according to DoIR regulations. 16.3 Develop and implement hazardous materials management plan	Prior to construction. During construction and ongoing. Prior to construction.	Shire of Collie. Local community. DoIR DoIR DoE

Other Management Commitments – Internally Audited

Commitment Number	Environmental Factor	Management Objective	Action	Timing	Advice From
Seventeen	**Sustainability**	Integration of environmental management objectives within an overarching set of sustainable management objectives into project development objectives.	Develop a policy and strategic framework of sustainability management objectives and programs linked directly to Bluewaters.	Prior to construction and ongoing.	All stakeholders.
Eighteen	**Other GHG Initiatives**	Contribution to the overall reduction of GHG in the State and enhancement of Environmental values of the Collie River whilst assisting in the rehabilitation of the Wellington Weir water source.	In addition to those commitments outlined above (Commitment 13), Griffin will continue to support and provide access to Griffin owned land and facilities to enable the diversion of the East Collie River. This will facilitate the diversion of each season's first flush flows of salt water away from Wellington Weir. This project is anticipated to lead to the return of Wellington Weir to a potable condition within a three year time frame. The GHG credit from this project is calculated to be 480,000 tonnes per annum.	Ongoing	DoE – Water & Rivers Commission.

Appendix 5

This Appendix is on the CD pasted to the back page of this Bulletin

The attached CD contains the following information:

1) **Proponent's response to submissions document; and**
2) **Public Environmental Review document.**