Proposed Collie Power Station

State Energy Commission of Western Australia

and

Comment on Energy Issues for WA

Report and Recommendations of the
Environmental Protection Authority

Environmental Protection Authority
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Preface

In recent years, the State Energy Commission of Western Australia (SECWA) has been reviewing power supply options for the State to determine what technology is currently available and which option(s) would best suit the State's needs. Consequently, a great deal of public debate has occurred on the energy demand and supply issue. Much of this debate has focussed on whether a coal-fired or gas-fired base load power station should be built. This focus has, in part, been caused by the referral to the Environmental Protection Authority of two coal-fired base load power stations for environmental impact assessment.

One proposal involved a private coal-fired power station (The Hill River Project), 28 km north-east of Jurien. The other proposal came from the State Energy Commission of WA which proposes to develop a coal-fired power station in the State's south-west, 8 km east-north-east of Collie.

Both power stations could provide SECWA's forecast energy requirements beyond 1995. However, SECWA has decided that the Hill River Project option could not provide an economically competitive supply of power when compared with other alternatives at this time. Nonetheless, both proposals are being assessed by the Environmental Protection Authority under the provisions of the Environmental Protection Act, 1986.

These proposals have raised a number of environmental issues related to the State's energy supply and demand policies. These issues have been addressed in Part A of this Report. The Authority considers these issues to be of fundamental importance to the State's future energy planning policy.

The Authority has provided its advice on these issues prior to a Government decision on the form the State's next base load power station will take so that it is available for the Government's consideration when making its decision.
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Summary and recommendations

The State Energy Commission of WA (SECWA) has proposed to establish a second coal-fired base load power station 8km east north east of Collie (Figure 1). The proposal includes the construction of two 300 megawatt power generating units and associated infrastructure that will occupy 388 hectares of land. The proposed site is located on the edge of the Collie Coal Basin (Figure 2) which is an area that contains the mineable coal reserves in the Collie region.

The Environmental Protection Authority determined that this proposal would have significant environmental implications and that an Environmental Review and Management Programme would be required. As part of the Authority's environmental assessment process the ERMP was made available for a 10 week public comment and review period during April and May 1990.

An integral part of the environmental impact assessment process includes the need to consider all facets of the proposal that may have, cause or lead to a significant environmental impact. These proposals have raised a number of environmental issues related to the State's energy supply and demand policies which have been addressed in Part A of this Report.

The Authority has provided its advice on these issues prior to a Government decision on the form the State's next base load power station will take so that it is available for the Government's consideration before making its decision.

Part A Energy issues for Western Australia

The Environmental Protection Authority considers it essential that the Government should be guided in its choice of options for meeting the State's demand for power by the relative environmental acceptability of those options.

General Recommendation 1

The Environmental Protection Authority recommends that in making decisions about how to meet the State's demand for power the Government should give the greater weight to the options which are environmentally preferable. In declining order of environmental preference the Authority ranks the major options as follows:

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

The Authority considers that conservation and efficiency improvements with regard to demand management strategies have the potential to significantly retard the growth in demand for energy if given sufficient priority. The Authority endorses and supports SECWA's initiative in establishing a Demand Management Committee.

General Recommendation 2

The Environmental Protection Authority recommends that the Demand Management Committee established by SECWA should be given sufficient resources and independence to accomplish its objectives and that it should report its progress and findings directly to the Government, and the reports made public.

Furthermore, the Authority makes specific recommendations on the two high priority alternatives from general recommendation 1 to ensure that they are kept at the forefront of public and Government agency decision making processes.
General Recommendation 3
The Environmental Protection Authority recommends that SECWA prepares, with public review, and subsequently implements a Demand Management Programme. The Programme should include targets and timetables, for power conservation and efficiency options within Western Australia and be provided to Government by the end of 1991.

General Recommendation 4
The Environmental Protection Authority recommends that SECWA prepares, with public review, and subsequently implements a Renewable Energy Development Programme within Western Australia. The programme should include specific targets and timetables and be provided to Government by the end of 1991.

The next environmentally preferable option considered in general recommendation 1 is gas. The Authority has made two Recommendations. The first identifies a clear strategy for the use of gas within the State and the second is an endorsement of the Harman Committee’s findings.

General Recommendation 5
The Environmental Protection Authority recommends that, subject to availability, gas should be used in order of preference, first for direct delivery to users, second for power generation in more densely populated areas, and third for power generation in other parts of the State.

General Recommendation 6
The Environmental Protection Authority recommends that if the State Government decides that a new base load power station is needed then a combined cycle gas turbine power station is preferable on environmental grounds.

Finally, the Authority recommends that if the Government should approve a new base load power station, then it should only approve a 300MW plant.

The Authority considers that the implementation of demand management strategies should provide significant reductions in energy demand, below current estimates, and secondly that newer, more environmentally friendly power generating options could more realistically be considered if the State does not commit to develop a short to medium term excess of generating capacity.

General Recommendation 7
The Environmental Protection Authority recommends that if a decision is taken to proceed with a new base load power station then its capacity should not be more than 300 megawatts.
Figure 1: Regional map identifying the preferred site (Courtesy of SECWA's ERMP).
Figure 2: The Collie coal basin (Courtesy of SECMAs EMP).
Part B The proposed Collie power station

In Part A of this Report the Authority concludes that a coal-fired power station is one of the least preferable options from an environmental viewpoint. The Authority also notes that if a base load power station were required then a combined cycle gas turbine power station with a maximum 300MW capacity would be the appropriate choice from an environmental viewpoint.

However, the Authority still has an obligation to assess SECWA's proposal for a 600MW coal-fired power station and has provided that assessment as Part B of this Report.

The Authority considers that it is important to note that the conclusions and recommendations in Part B, which would be equally relevant to a 300MW coal-fired plant, should not be read so as to detract from the general recommendations in Part A.

Part B of the Authority's Report presents the Authority's assessment of the Collie power station proposal. Nine recommendations are included in the Authority's assessment of local and regional potential environmental impacts of the power station proposal (Section 5).

The Authority concludes that if the Government were to approve a coal-fired base load power station at Collie, the proposal would need to include a number of stringent environmental conditions in order to minimise local and regional environmental impacts.

Recommendation 1

The Environmental Protection Authority has concluded in Part A of this Report that a coal-fired power station is one of the least environmentally acceptable options for meeting the State's future energy needs. However, the Authority has an obligation to assess the proposal as referred by the State Energy Commission of WA which is for a 600MW coal-fired power station at Collie. Accordingly, should the Government approve a coal-fired power station at Collie up to a maximum capacity of 600MW, then the Authority recommends that in order to minimise local and regional potential environmental impacts, the proposal should only proceed in a manner consistent with the ERMP and subject to the proponent's consolidated list of commitments, responses to issues raised during the public review period and the Authority's Recommendations in Part B of this Report.

SECWA has covered most of the potential air emission issues with management commitments which the Authority considers, if implemented, should ensure no significant local or regional environmental impacts occur. However, in relation to sulphur dioxide emissions the Authority has recommended that SECWA determine an appropriate buffer zone to guard against inappropriate developments within areas near the power station that are subject to sulphur dioxide emission levels unacceptable for residential purposes. SECWA has purchased land for this purpose. The Authority recommends that appropriate planning mechanisms should be put in place to control development on that land to ensure its effectiveness as a buffer.

Recommendation 2

The Environmental Protection Authority recommends that prior to any residential, commercial or industrial developments progressing on the 1500ha of land owned by the State Energy Commission of Western Australia adjacent to the proposed power station, the proponent should liaise with relevant planning authorities to establish a buffer zone adequate to maintain appropriate air quality objectives to the satisfaction of the Environmental Protection Authority.

The Authority's third recommendation relates to potential noise impacts. The recommendation identifies noise emission levels below which no unacceptable environmental impacts are expected to occur, and recommends that a noise monitoring programme be set up to ensure on-going compliance with the specified levels.
Recommendation 3
The Environmental Protection Authority recommends that the maximum noise levels at residential premises surrounding the proposed power station should not exceed:

- 50dB(A) from 7am-7pm, Monday to Saturday
- 45dB(A) from 7am-7pm, Sunday
- 45dB(A) from 7pm-10pm, every day; and
- 40dB(A) from 10pm-7am, every day.

Recommendation 4
The Environmental Protection Authority recommends that within 36 months of any approval granted by the Minister for the Environment permitting the implementation of a coal-fired power station at Collie, the State Energy Commission of Western Australia prepare, submit and subsequently implement proposals for monitoring and managing noise impacts as part of the Environmental Management Programme (Recommendation 9), to the satisfaction of the Minister for the Environment on advice from the EPA.

In order to ensure that any unacceptable environmental impacts on the local vegetation are identified and mitigated, SECWA has committed to develop a vegetation monitoring programme to monitor the effects of air emissions on the local vegetation. The Authority supports this commitment, but in view of the cumulative environmental impacts that may eventuate from the close proximity of two operational base load power stations and a need to ensure corrective actions are taken if unacceptable impacts are detected, recommends that the programme should be prepared to the satisfaction of the Minister for the Environment on advice from the EPA.

Recommendation 5
The Environmental Protection Authority recommends that within 36 months of any approval granted by the Minister for the Environment permitting the implementation of a coal-fired power station at Collie, the State Energy Commission of Western Australia prepare, submit and subsequently implement a vegetation monitoring and management proposal as part of the Environmental Management Programme (Recommendation 9), to monitor the effects of air emissions and ensure appropriate management responses, to the satisfaction of the Minister for the Environment on advice from the EPA.

SECWA has identified two water supply sources that have already proved acceptable for the Muja power station. These sources are associated with mine dewatering and groundwater abstraction activities. The Authority recommends that SECWA should prepare a power station water resource(s) management proposal, as part of its Environmental Management Programme, to ensure that any environmental consequence of extracting large volumes of groundwater is readily detected and to ensure that appropriate management plans are developed and implemented as required.

Recommendation 6
The Environmental Protection Authority recommends that within 36 months of any approval granted by the Minister for the Environment, permitting the implementation of a coal-fired power station at Collie, the State Energy Commission of Western Australia should prepare, submit and subsequently implement a power station water resource(s) management proposal as part its Environmental Management Programme (Recommendation 9), to the satisfaction of the Minister for the Environment on advice from the EPA and the Water Authority of WA.

The major solid and liquid waste discharges associated with the power station are from its flyash and wastewater treatment and disposal activities. However, the Authority has been prevented from assessing the potential environmental impacts associated with these activities because SECWA is still deciding which waste treatment options to employ. Nevertheless, SECWA has provided sufficient information for the Authority to be assured that an environmentally acceptable alternative is achievable.
Accordingly the Authority has included the following recommendation in order to complete its assessment of this proposal.

**Recommendation 7**

The Environmental Protection Authority recommends that prior to the clearing of land and any siteworks directly associated with flyash and wastewater treatment and disposal activities, the State Energy Commission of Western Australia refers its final flyash and wastewater treatment and disposal proposals to the Environmental Protection Authority for separate and additional environmental impact assessment.

Another outstanding issue in the ERMP relates to SECWA's proposal to clear a large tract of jarrah/marri forest and seasonally inundated wetlands. The Authority is not convinced that SECWA has fully established the environmental value of these areas and recommends the following.

**Recommendation 8**

The Environmental Protection Authority recommends that prior to the commencement of siteworks associated with the site layout plans, the State Energy Commission of Western Australia should:

(a) undertake a wetland survey to identify the environmental significance of the 13ha of seasonal wetlands and to develop alternative wetland habitats to replace their lost values;

(b) consult with the Department of Conservation and Land Management to minimise both the area and potential impacts associated with clearing the proposed 60ha of forest; and

then re-assess the site layout plans to reflect the information provided by (a) and (b) above to the satisfaction of the Minister for the Environment on advice from the EPA.

The Authority has concluded its assessment of SECWA's proposal by recommending that an Environmental Management Programme is prepared by SECWA to ensure the co-ordination of environmental monitoring, management and auditing activities.

**Recommendation 9**

The Environmental Protection Authority recommends that prior to commissioning of the power station the SECWA prepares, submits and subsequently implements an Environmental Management Programme (EMP) that addresses, where appropriate, the monitoring, management and auditing requirements of the following issues:

- Atmospheric emissions;
- Noise emissions;
- Vegetation protection;
- Water supply;
- Social amenity;
- Greenhouse gases; and
- Solid and liquid waste discharges,

to the satisfaction of the Minister for the Environment on advice from the EPA.

Furthermore, upon commissioning of the power station, this EMP should be revised and updated on a yearly basis to the satisfaction of the Environmental Protection Authority.

The Authority has concluded that a conventional coal-fired power station is one of the least acceptable options from the environmental viewpoint. It has also identified its support for the Harman Committee's recommendation that a combined cycle gas turbine power station should be developed as the State's next base load power plant. Furthermore, irrespective of which fuel is employed, the Authority has recommended that the State's next base load power station, to meet its short to medium term energy demand requirements, should not exceed 300MW capacity thus allowing greater flexibility in energy planning.
However, if for reasons other than environmental the Government approves a coal-fired power station then the Authority considers Collie to be an appropriate location and has assessed SECWA's proposal for a 600MW plant in Part B of this Report and made recommendations to minimise local and regional environmental impacts. These recommendations would be equally applicable if only one of the two 300MW units were installed.
Part A

Energy issues for WA
Energy issues

The Government of Western Australia (SECWA) is currently considering what form the next base load power station should take to supply the State's power requirements into the 1990s. A number of alternatives have been proposed. However, only coal fuelled options have so far been referred to the Environmental Protection Authority.

In parallel with its assessment of individual proposals, the Authority identified several matters of broad principle requiring consideration because of their environmental significance. These matters relate to the Greenhouse Effect, the place of demand management and the alternative strategies available for meeting the State's need for electricity.

The Greenhouse Effect

The Greenhouse Effect is caused by the selective retention of heat by gases in the earth's atmosphere. While the Greenhouse Effect is a natural phenomenon, which allows life to flourish on earth, it has been enhanced since the Industrial Revolution by the increasing release of Greenhouse gases as a consequence of human activity. Greenhouse gases include carbon dioxide, methane, oxides of nitrogen and chlorofluorocarbons. Power generation by fossil fuel burning adds to the Greenhouse Effect by releasing some of these gases, principally carbon dioxide (SECWA's activities currently contribute some 20% of the State's total carbon dioxide emission levels, SECWA Report, BD 90/12 Table 4.5).

The United Nations Organisation established an Intergovernmental Panel on Climate Change (IPCC) in 1988 to review the "enhanced", or human-induced, Greenhouse Effect and to report on the level of scientific understanding of it, its likely impacts and the action nations should take to manage it. The issue was further considered at the Second World Climate Conference in Geneva in November 1990.

The IPCC predicted that the global mean surface temperature could rise during the next century by about 0.3°C per decade (IPCC, Sundsvall, Sweden,1990). The panel said this warming would cause changes to the global climate, but was uncertain as to how significantly local regions would be affected. The IPCC then commented that "human-induced climate change due to continued uncontrolled emissions will accentuate (damaging) impacts".

The Panel went on to say that climate change would not be steady and surprises could not be ruled out. These changes could include an alteration in the frequency and intensity of floods, drought, cyclones, storms and heatwaves. Clearly such outcomes would impact on the environment, the economy and our lifestyles.

A representative of the Environmental Protection Authority chairs the State's Greenhouse Effects Committee which has the function of ensuring that Western Australian State and relevant Federal Government agencies represented in Western Australia coordinate their understanding and responses to the Greenhouse Effect. Through the Committee, the Environmental Protection Authority has contracted the CSIRO Division of Atmospheric Research to report upon the prospects of a changing climate in this State.

In 1988 a number of developed nations, including Australia, participated in establishing a notional target, known as the Toronto Goal, which called for a 20% reduction in national carbon dioxide emissions by the year 2005.

The Federal Government has recently adopted as an interim planning target the stabilization of the emission of Greenhouse gases (including carbon dioxide, methane and nitrous oxide, but not including chlorofluorocarbons) at 1988 levels by the year 2000. Additionally the Policy seeks to reduce these emissions by 20% on 1988 levels by the year 2005.

In light of this information the Environmental Protection Authority considers it would be complacent to plan for the future in the hope that the potential impacts of Greenhouse induced climate change will be insignificant. Accordingly, it is prudent to plan ways to reduce the build-up of Greenhouse gases in order to ameliorate any undesirable changes. This position is strengthened by the associated environmental benefits which would flow from reduced emissions, such as reduced output of other air pollutants, and the encouragement of renewable power generation options.
Greenhouse objectives for Western Australia

The Environmental Protection Authority has been instrumental in identifying the need to understand and respond to Greenhouse-induced climate change and its likely impacts upon Western Australia.

The Authority has done this in a number of ways, principally by co-hosting the 1988 Greenhouse Conference, and assisting in other information-generating seminars and meetings. In addition the Authority has set a policy requiring that all proposals for major developments which are likely to emit gases into the environment, should include a Greenhouse gas audit.

The role of a Greenhouse gas audit is to compare the emissions of today with those likely in the future and to identify ways in which gas emissions can be reduced. The audit identifies both the type and quantity of Greenhouse gas emissions by either direct measurement or calculation. In this context the Environmental Protection Authority has supported the establishment of the Greenhouse Coordination Council which has already published (November 1989) both a Discussion Paper on the Greenhouse Effect, and a Greenhouse Gas Audit for this State.

In December 1988, the Western Australian Government adopted a policy position on Greenhouse gas emissions targeting a 20% reduction in overall emissions by the year 2000. The Greenhouse Gas Audit indicates the ways that this can be achieved, particularly through the abandonment of chlorofluorocarbons and the tapping of methane from land fills. Methane recovery is already taking place at one industrial site and the State Energy Commission is exploring land fill methane as a primary gas source.

The Greenhouse Coordination Council is shortly to publish its Greenhouse Strategy for Western Australia, and this report is consistent with the thrust of the Strategy.

The Strategy will address the twin objectives of:

- reducing the State's contribution to the Greenhouse Effect by controlling our emissions of Greenhouse gases; and
- planning how to minimise the effects of climate change, and to change any problems into opportunities.

Choosing alternatives

Given the far reaching implications of Greenhouse policies, decisions about major proposals that have the potential to increase the Greenhouse Effect are properly made by the State Government. Since a new power station has significant Greenhouse implications, the Authority has provided this report to Government to enable it to give due consideration to the implications for human-induced climate change when decisions are made about future power supplies.

Historically the energy planning approach used to forecast the State's energy requirement has used supply-side management as its fundamental foundation. The forecasts have been based on econometric models that consider population growth, economic growth, the cost of fuel and the amount of energy traditionally consumed by various customer groups. This energy supply approach has resulted in a large capital investment in power generating plant. However, recent analysis of demand management strategies both overseas and by the Federal Government has demonstrated that energy conservation is the most cost effective form of supply (e.g. $5.00 invested in improving efficiency avoids the need for spending $15.00 on new supplies, Deni Greene Consulting Services, February 1990).

Coal-fired power stations represent one of a number of ways in which power needs can be met in the medium term. It is also one of the least acceptable options environmentally.

To assist the Government in its decision making process the Authority has ranked the major power alternatives in order of environmental preference, in General Recommendation 1 below. This ranking is based on a number of environmental criteria including the potential disturbance or destruction of valuable ecosystems associated with developing large fuel resources and the discharge of gaseous, liquid and solid wastes such as sulphur dioxide, oxides of nitrogen, Greenhouse gases, wastewater and flyash.
General Recommendation 1

The Environmental Protection Authority recommends that in making decisions about how to meet the State's demand for power the Government should give the greater weight to the options which are environmentally preferable. In declining order of environmental preference the Authority ranks the major options as follows:

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

Demand management

The State's current energy planning initiatives include demand management strategies (Energy Policy and Planning Bureau, 1990). Instead of always planning to meet demand with increases in supply, demand management implies that steps will be taken to actually reduce or at least slow the growth of demand. Such a strategy defers the need for capital investment in new plant, effectively "supplying" power availability for new consumers at the marginal cost of maintaining existing equipment. Indeed "one potential benefit of energy demand management is savings in interest if SECWA's capital program for a base load coal-fired power station could be postponed. These savings are potentially many millions of dollars" (Energy Policy and Planning Bureau, 1989). The Commission has recently stated that "SECWA recognises that demand management techniques offer a significant opportunity to defer new plant construction, improve overall efficiency and meet increasing environmental responsibilities" (SECWA, pers comm).

The Authority considers that active incorporation by SECWA of demand management in all of its policy and development decisions should be supported. In recognition of the importance of this issue, the Authority will ensure that when it assesses major proposals that have large power demands, the proponent will be required to demonstrate that demand management has been incorporated in the design and alternative power supply methods have been evaluated.

The Authority notes that SECWA has recently established a Committee to investigate and implement demand management strategies. The Authority fully supports this initiative.

General Recommendation 2

The Environmental Protection Authority recommends that the Demand Management Committee established by SECWA should be given sufficient resources and independence to accomplish its objectives and that it should report its progress and findings directly to the Government, and the reports made public.

To successfully promote demand management strategies SECWA must gain the understanding and support of the general public.

Part of the process of establishing public support includes the development of an on-going and credible demand management programme.

Part of this programme should address the historical energy planning approach employed by SECWA, any problems with it, proposed solutions and new initiatives.

The Environmental Protection Authority considers that SECWA should provide the opportunity for public input to the development of its demand management programme. Given the importance of this new initiative, the Authority considers that the proposed demand management strategies should be made available for public comment and review within the next 12 months.

General Recommendation 3

The Environmental Protection Authority recommends that SECWA prepares, with public review, and subsequently implements a Demand Management Programme. The Programme should include targets and timetables, for power conservation and efficiency options within Western Australia and be provided to Government by the end of 1991.
Renewable energy options

The Authority considers that the Government should also ensure strong support is provided to develop renewable energy technologies, through fiscal and economic incentives, since these technologies have the greatest potential to offer significant long term reductions in Greenhouse gas emissions.

International experience suggests that renewable energy technologies can provide considerable economic benefits through increased employment and revenue, with only small cost increases to consumers. The Authority therefore makes the following recommendation.

General Recommendation 4

The Environmental Protection Authority recommends that SECWA prepares, with public review, and subsequently implements a Renewable Energy Development Programme within Western Australia. The programme should include specific targets and timetables and be provided to Government by the end of 1991.

Alternative fuels

On the issue of the use of alternative fossil fuels for electricity generation, the following advice is offered.

As an integral part of SECWA’s energy allocation strategies the Authority considers that the Commission should:

- favour the most efficient use of gas by direct supply to houses and industry;
- locate gas fired plant rather than coal fired plant in or near more densely populated regions to reduce the potential additive impacts on regional air quality; and
- subject to availability, use gas in preference to coal for power generation in other parts of the State to reduce Greenhouse gas emissions.

General Recommendation 5

The Environmental Protection Authority recommends that, subject to availability, gas should be used in order of preference, first for direct delivery to users, second for power generation in more densely populated areas, and third for power generation in other parts of the State.

The next power increment

The Environmental Protection Authority has considered the environmental impacts of the impending decision about the next increment of base load power generating capacity to be constructed in Western Australia and makes the recommendations below.

The Authority notes that the Harman Committee found that combined-cycle gas turbines have environmental advantages and improved efficiencies over coal-fired plant. Accordingly, the Authority believes that, if the State Government approves the development of a new base load power station now, combined cycle gas turbine technology would be preferable environmentally.

General Recommendation 6

The Environmental Protection Authority recommends that if the State Government decides that a new base load power station is needed then a combined cycle gas turbine power station is preferable on environmental grounds.

The Authority considers that demand management strategies could significantly reduce actual energy demand below present estimates. Consequently, the Authority considers that SECWA should receive support for a review of its energy demand forecasts, and should review the current proposals for the simultaneous installation of two 300 MW power generating units, taking into account any reduction in demand likely once demand management becomes effective.
The Authority considers that the installation of both 300 MW units may well work against the successful implementation of SECWA's demand management strategies and pre-empt other options, such as gas or developing new technologies, for base load power supply. Consequently, should the Government decide to proceed with a base load power station, it should not approve the second 300 MW unit until a need for it can be demonstrated in the context of implemented demand management strategies and the best use of available gas and other technologies.

**General Recommendation 7**
The Environmental Protection Authority recommends that if a decision is taken to proceed with a new base load power station then its capacity should not be more than 300 megawatts.

**Conclusion**
The Environmental Protection Authority considers that the Western Australian Government is poised to make a significant decision that will influence the State's overall effectiveness in managing the Greenhouse Effect. Initiatives for the conservation of energy, which will help to manage the Greenhouse Effect, will also be beneficial in their own right.

The Environmental Protection Authority believes that programmes for the development of renewable energy sources and demand management should be put in place at the same time as a decision is taken on whether coal or gas will be used to fuel the next base load power station.

If after considering the alternative power options available to the State, the Government decides that further base load generating plant is required, the Authority considers that a combined cycle gas turbine power station would be environmentally preferable to a coal fired station. The Authority notes further that irrespective of fuel source, not more than 300 MW of capacity should be installed now to avoid pre-empting the ongoing development of other environmentally preferable alternatives.
Part B

Proposed Collie Power Station
1. Introduction

The State Energy Commission of Western Australia (SECWA) proposes to construct a conventional coal-fired base load power station 8 kilometres east north east of Collie and located on the northern edge of the Collie Coal Basin (Figures 1 & 2).

The proposed power station site covers 388ha and consists of 315ha of cleared land under pasture, 58ha of jarrah-marri forest and 13ha of seasonally inundated wetlands. SECWA also owns 1500ha of land adjacent to the site which has the potential to provide a buffer area around the power station.

In 1987 the WA Government endorsed a report by the Collie Land-Use Working Group which recommended that:

"As a general principle in land use planning in the Collie Coal Basin, mining is recognised as the primary land use;...".

The Environmental Review and Management Programme (ERMP) prepared by the SECWA was released for public review and comment starting 30th April 1990 and ending 6th July 1990. Twenty seven submissions were received during this period (Appendix 4). Some of these submission suggested that the ERMP was incomplete and should not have been approved for release. The Authority approved the ERMP for release at this time to ensure its review coincided with the review period of the Hill River project which also included a coal-fired power station component and raised the same energy supply and demand issues.

The Authority has already indicated in Part A above that a conventional technology coal-fired power station is one of the least environmentally preferred options for meeting the State’s energy needs and that the choice of other options is recommended.

Nonetheless, should the State Government approve the Collie power station proposal then this assessment will ensure that its local and regional environmental impacts are properly managed notwithstanding other broader implications.

2. The Proposal

2.1 General Description

The proposed coal fired power station at Collie would consist of two generating units, each 300MW and having a combined capacity of 600MW. The potential to expand this site to accommodate 1000-1200MW of generating capacity was identified by SECWA should the State require it. The following facilities would be required for the proposed 600MW plant:

- two power generating units, comprising boilers and turbo-generators, each with a capacity of 300MW;
- on-site coal receival, crushing, storage and handling facilities;
- off-site water supply and water storage facilities;
- cooling water system;
- ash handling, storage, transport and disposal systems;
- power substation;
- wastewater management system(s); and
- ancillary facilities (water treatment plant, workshops, roads, car park and offices).

2.2 The Collie coal basin

The Collie Coal Basin (Figure 1) is recognised as a significant Western Australian coal reserve. However, its low specific energy value renders it unsuitable for export. Nonetheless, the coal is usable for local base load power generating plant with the added advantages of low average sulphur (0.7% by weight) and ash (10% by weight) contents.
For many years Collie coal was transported by rail to other parts of the State for power generation, but in 1971, to make better use of the significant coal reserves in the Basin, the WA Government constructed the Muja coal-fired base load power Station.

In August 1983, Government approved the establishment of a Collie Land-Use Working Group whose tasks included preparing overall land-use plans for Collie and designating land use priorities. The working group presented a Report to Government in June 1987 which was subsequently adopted, with minor amendments, in November 1988.

The Report included a number of significant recommendations. The most relevant recommendation identified coal mining as the primary land use within the Basin. The basin covers 226km², contains 482 million tonnes of demonstrated extractable coal and has an expected field life of over 100 years. The priority of this land-use was considered to be conditional upon the coal reserves being used for domestic electricity generation and that if this changed then the land-use should be reassessed.

Following this decision, Government established the Collie Basin Management and Planning Group to ensure the co-ordinated management and planning of the area throughout the life of the coal field. This Group released a draft Structure Plan for the Collie Coal Basin Area in December 1989.

The Environmental Protection Authority provided its advice on the Structure Plan, raising concerns regarding two Heavy Industry Sites proposed for the area, the number of new service corridors proposed in the area, and underground mining activities proposed between Collie and Allanson which may adversely impact on the Westralia block (System 6 Recommendation C88). A revised Structure Plan is still being prepared.

The Collie coal basin is currently a primary source of coal for the State’s power generating requirements. Therefore, the Authority’s attention in assessing proposals to mine coal within the Basin is properly directed towards ensuring coal mining operations are carried out in an environmentally acceptable manner. Any new coal mine proposals directly associated with the proposed power station will therefore be assessed, under the provisions of the Environmental Protection Act 1986, in this context.

2.3 The preferred site

SECWA states that the proximity to the fuel source was an important factor in determining the preferred site since it would have significant cost advantages compared with one at some distance. Furthermore Collie is surrounded by existing mining and support infrastructure.

SECWA’s final studies concluded that the siting of a new base load power station at Collie was preferable due to the following factors:

- It is consistent with the Government’s energy policy to locate new thermal power stations so as to deliver the lowest cost electricity; and
- It would be preferable on environmental grounds to site a new base load power station in the Collie area due to its location remote from major population centres and the availability of sites free from insurmountable environmental constraints.

Based on economic, environmental, geotechnical and land use factors several specific sites around the Collie Coal Basin were assessed. The selection of the final site (Figure 2) was based on its proximity to the prospective coal mining areas, availability of suitable flyash disposal areas, accessibility, topography and surrounding land use.
3. Environmental impacts identified by the proponent and their proposed management methods

Potential environmental impacts were identified by the proponent in the ERMP for both the construction phase and operational phase of this proposal. The proponent's commitments for the management of impacts are listed in Appendix 1.

3.1 Construction phase environmental impacts

The construction phase includes site preparation and plant construction activities. It includes the clearing of land for the power station and associated facilities. Other areas will also be cleared for construction activities and to minimise the risk of bushfire damage to installations. This phase is expected to take 5 years to complete.

The erection of major equipment will commence following the completion of the appropriate siteworks and the installation of concrete foundations. Once the equipment is on site, erection of this equipment is estimated to take 3 years.

a) Site clearing activities

Initially, site preparation activities will have the greatest impact on the proposed site, affecting some 200ha, and continuing for about 24 months. This area includes the ash and water storage areas, coal receival/stockpile area and an allowance for access roads within the site area.

About 129ha of this area is already cleared and pastured, but 58ha of jarrah marri forest and 13ha of wetland vegetation are also to be cleared.

Surveys for the proposed site have identified no rare or endangered flora or fauna species. Consequently, SECWA contends that:

"whilst loss of habitat, and death or displacement of some of the fauna from within the site will unavoidably result from site preparation, these are clearly negligible effects on a regional scale."

The Authority is not convinced that the environmental values of the wetland and forest areas have been fully considered and this issue is addressed in Section 5.5 of this Report.

Additional comments made by SECWA suggest that the clearing of 60ha of forest may act to increase the recharge of sedimentary aquifers within the Basin given that none will be lost by the forest's natural transpiration processes. SECWA also suggests that because the majority of the site is already cleared, the additional clearing is not expected to impact upon the runoff water quality.

Although the Authority agrees that there may be a net increase in the Basin's groundwater recharge value, it is not convinced by the assertion that there will be no appreciable impact on the runoff water quality. Since the runoff water quality has the potential to impact on the Wellington Dam Catchment, the Authority considers that this aspect of the proposal should be further considered by the Environmental Protection Authority on advice from the Water Authority of WA.

b) Dust emission and soil erosion

SECWA proposes to manage dust emission and soil erosion issues with conventional dust control measures (watering of dry areas) and drainage control measures respectively. Also a number of commitments (numbers 10, 11 & 12 in Appendix 1) address these issues. The Authority considers that the implementation of these measures should ensure no unacceptable environmental impacts occur.

c) Jarrah dieback disease

SECWA has identified that stringent forest hygiene procedures will need to be implemented in accordance with the Department of Conservation and Land Management's requirements to minimise the potential to spread jarrah dieback disease. The proponent's commitment number 15 should be adequate to address this issue.
3.2 Operational phase environmental impacts

SECWA has identified a number of issues with the potential to cause unacceptable environmental impacts once the plant is commissioned. These issues are discussed separately below with their proposed management methods.

a) Air emissions

A coal-fired power station will release gases and particulates into the atmosphere through its waste gas stack as a result of its fossil fuel combustion processes.

SECWA undertook ambient air quality computer modelling for sulphur dioxide, nitrogen oxides and particulate matter emissions both in isolation and in combination with other regional sources. The modelling results presented in the ERMP indicated that the maximum predicted sulphur dioxide ground level concentrations within the periphery of the power station would be 382 micrograms per cubic metre for a one hour averaging period when considered in isolation, and 408 micrograms per cubic metre for a one hour averaging period when modelled with other discharge sources including Muja power station. The predicted ground level concentrations of nitrogen oxides and particulates were also presented in the ERMP and have been assessed by the Authority and are considered to be acceptable.

In response to environmental concerns associated with these local emissions, SECWA has addressed sulphur dioxide, nitrogen oxides and particulate emissions with specific management commitments (numbers 1, 2, 3 & 16).

The Authority has reviewed the above commitments and considers them sufficient, if implemented, to prevent unacceptable environmental impacts from occurring. The Authority has further considered the global issue of sulphur dioxide emissions which are of particular concern in Europe and North America in respect of acid rain. However, there is no evidence to hand that similar problems are an issue in Australia and it is also unclear as to whether southern hemisphere emissions contribute to northern hemisphere levels. Consequently there is no scientific knowledge available upon which the Authority could base a recommendation at this time.

The wider considerations related to greenhouse gas emissions are addressed in Part A of this Bulletin. SECWA will also be required to include a Greenhouse gas audit with its on-going environmental management programme.

The proponent has addressed the issue of dust control during the operational phase with appropriate management commitments (numbered 10 & 12 in Appendix 1), however the Authority has concluded that the noise emission issue should be considered further and has addressed this issue in Section 5.1 of this Report.

b) Water supply

SECWA has identified two sources for its water supply requirements: mine water from the dewatering of an operating coal mine and groundwater from deep aquifers within the Collie Coal Basin.

The abstraction of groundwater has the potential to lead to groundwater drawdown effects. To minimise the potential drawdown impacts SECWA has undertaken to use coal mine water in preference to groundwater abstraction providing it can meet certain water quality requirements. In making this commitment SECWA will minimise any potential for additional environmental impacts other than those already associated with the existing coal mine activities. Recently, Muja power station has been able to use mine water to supply some 70 percent of its water requirements.

The Authority considers that this undertaking together with the proponent's environmental management commitments on this issue (numbers 18 & 19) provide a level of environmental protection. However in order to achieve a sufficient level of environmental protection from potential drawdown impacts especially outside the Basin, the Authority has addressed this issue further in Section 5.2 of this Report.
c) Flyash disposal

SECWA has not finally decided on its preferred flyash disposal method. Two methods are currently being investigated and each involves the deposition of the ash within a storage impoundment designed to contain surface and sub-surface water movements.

The Authority considers that the flyash disposal methods being investigated must ensure that leachate migration into underlying soils and groundwater, and particulate loading of surface waters is prevented both during and after commissioning.

SECWA has also identified that the requirements of the Water Authority of WA, which relate to its strategy to significantly improve the quality of water stored within Wellington Dam, restrict any water discharge from the power station site unless that discharge is of a potable standard or better.

SECWA proposes to meet these requirements partly by reducing the quantity of potentially contaminated water produced by flyash disposal activities. This is to be achieved by the construction of bypass drains around the disposal site to isolate stormwater runoff from deposited flyash, construction of a containment pond to store stormwater runoff or excess water and to enable evaporation to dryness of the collected water, and the progressive rehabilitation of the landfill surface.

In order for the assessment of this proposal to be completed, the Authority has addressed this issue further in Section 5.3 of this Report with an appropriate recommendation.

d) Waste-water disposal

SECWA has not finally decided on its preferred wastewater disposal method. Two methods are currently being investigated and either is likely to be environmentally acceptable.

These alternatives are briefly discussed later. However, as with the flyash disposal technique in order for the Authority to finalise its assessment Report an appropriate recommendation has been included in Section 5.3 of this Report.

e) Electric and Magnetic fields

The transmission of electric current through a linear conductor generates both electric and magnetic fields in the space surrounding the conductor. In recent years the possibility that electro-magnetic fields may have definable ill effects on human health has received considerable research attention. The location of residential dwellings in close proximity to high voltage transmission lines, and associated facilities, has been one area of concern.

SECWA considers that the location of such transmission lines in a 60 metre wide standard easement within which no dwellings or prolonged human activity will be permitted is an appropriate level of management. The Environmental Protection Authority considers that these measures are adequate.

4. Public and Government agency submissions

The ERMP was released for a 10 week public review and comment period commencing 30th April 1990 and ending 6 July 1990. The Authority has included a matrix of issues raised versus major submission groups (general public, conservation groups, and Government agencies) in Appendix 3 of this Report. Twenty seven submissions were received in the review period and three after the close of submissions (Appendix 4).

As part of its assessment of the proposal the Environmental Protection Authority wrote to SECWA during the review period on a number of issues that were not fully explained in the ERMP. SECWA's responses were received after the public review period had ended. These responses are available to read in the Authority’s Reading Room, Environment House 1 Mount Street, Perth as attachments to the Authority’s library copies of the ERMP.
ensure that future residential developments are not allowed to proceed in areas that may be subject to air emission levels unacceptable for residential areas. This action should ensure that future developments are not adversely impacted upon by the operations of the power stations. Accordingly, the Authority recommends the following:

Recommendation 2
The Environmental Protection Authority recommends that prior to any residential, commercial or industrial developments progressing on the 1500ha of land owned by the State Energy Commission of Western Australia adjacent to the proposed power station, the proponent should liaise with relevant planning authorities to establish a buffer zone adequate to maintain appropriate air quality objectives to the satisfaction of the Environmental Protection Authority.

b) Noise emissions
SECWA’s predicted noise emission and noise propagation levels were made using computerised mathematical modelling techniques for the dispersion of sound.

The results of that work indicated a worst-case noise level of 40.4dB(A) at a point 2.2km south-east of the proposed site. The Environmental Protection Authority considers that the following levels will ensure no unacceptable environmental impact occurs at the closest existing residence.

Recommendation 3
The Environmental Protection Authority recommends that the maximum noise levels at residential premises surrounding the proposed power station should not exceed:

- 50dB(A) from 7am-7pm, Monday to Saturday
- 45dB(A) from 7am-7pm, Sunday
- 45dB(A) from 7pm-10pm, every day; and
- 40dB(A) from 10pm-7am, every day.

The Authority recognises that SECWA has purchased land to provide an effective noise buffer area around the power station in the hope that it may not need to implement costly noise attenuation measures at the plant.

However, the land purchased may prove to be inadequate for its intended purpose and given that there are no planning controls proposed in the ERMP to cover the use of SECWA’s 1500ha of land, the Authority considers that in order to prevent inappropriate developments being approved within areas that could be subject to unacceptable noise emission impacts, a specific recommendation is necessary.

Accordingly, the Authority considers that SECWA should comply with the above noise level requirements, and that a regular monitoring programme should be implemented to supplement SECWA’s commitments which are limited in their scope.

Recommendation 4
The Environmental Protection Authority recommends that within 36 months of any approval granted by the Minister for the Environment permitting the implementation of a coal-fired power station at Collie, the State Energy Commission of Western Australia prepare, submit and subsequently implement proposals for monitoring and managing noise impacts as part of the Environmental Management Programme (Recommendation 9), to the satisfaction of the Minister for the Environment on advice from the EPA.

c) Dust emissions
In response to the dust emission issue associated with the proposed power station, the Authority considers that the commitments numbered 10, 12 and 21 in Appendix 1, will ensure dust emission levels are adequately managed. Consequently, no recommendation is considered necessary to cover this issue.
4.1 Issues raised in public submissions and the proponent's response

The main issues raised in submissions were the Greenhouse Effect, demand management strategies, alternative energy options, and potential water supply and air emission impacts.

Other issues raised in the submissions included:
- coal mining impacts;
- solid and liquid waste management impacts;
- SECWA demand forecasting methods;
- transport route impacts;
- the use of old coal technology for a modern plant;
- flora and fauna studies; and
- jarrah dieback disease.

The Authority reviewed these submissions and formulated a list of questions to reflect the environmental issues expressed. This list of questions and the proponents responses have been included in Appendix 2 of this Report which is divided into two sections (Section 1 - The biophysical environment and Section 2 - The social environment).

5. Environmental Protection Authority's review of potential environmental impacts

In Part A of this Report the Authority's position is clearly stated and concludes that a coal-fired power station is one of the least preferable options from an environmental viewpoint. The Authority has also noted that if a base load power station were required then a combined cycle gas turbine power station and a maximum 300MW capacity would be the appropriate choice from an environmental viewpoint.

However, as noted previously, the Authority still has an obligation to assess SECWA's proposal for a 600MW coal-fired power station and has provided that assessment as Part B of this Report.

The Authority considers that it is important to note that the conclusions and recommendations in Part B, which would be equally relevant to a 300MW coal-fired plant, should not be read so as to detract from the general recommendations in Part A.

5.1 Proposed Collie power station

The Authority considers that Collie has considerable advantages over other more environmentally sensitive locations. These include the regional community's acceptance of both coal mining and power station activities, the distance to densely populated areas, and that the region's existing environment is not presently suffering any major unacceptable environmental impacts from power generation.

The Environmental Protection Authority notes that some aspects of the proposal have not yet been finalised and some aspects of environmental management are still to be addressed. Nevertheless, the Authority considers that the proposal has developed to a stage that allows the Authority to progress its assessment of the proposal. The proponent's Environmental Review and Management Programme has addressed many of the potential environmental impacts by providing management commitments.

Further to the Authority's conclusions in Part A of this Report, the Authority considers that the following aspects of this proposal have the greatest potential to cause unacceptable local and regional environmental impacts:
- air emission impacts from sulphur dioxide, nitrogen oxides, particulates, and noise;
- water supply impacts from the drawdown effect of groundwater abstraction;
- impacts from various solid and liquid waste discharges e.g. flyash and wastewater; and
- the disturbance or destruction of wetland and forest areas associated with the proposed plant's coal stockpile, water storage and waste disposal areas.
The Authority has considered the ERMP based on its own investigations, the proponent's responses to issues raised in submissions and other information provided by the proponent and in the submissions.

Recommendation 1

The Environmental Protection Authority has concluded in Part A of this Report that a coal-fired power station is one of the least environmentally acceptable options for meeting the State's future energy needs. However, the Authority has an obligation to assess the proposal as referred by the State Energy Commission of WA which is for a 600MW coal-fired power station at Collie. Accordingly, should the Government approve a coal-fired power station at Collie up to a maximum capacity of 600MW, then the Authority recommends that in order to minimise local and regional potential environmental impacts, the proposal should only proceed in a manner consistent with the ERMP and subject to the proponent’s consolidated list of commitments, responses to issues raised during the public review period and the Authority’s Recommendations in Part B of this Report.

The Authority considers that if this proposal has not been substantially commenced within five years of the date of this Report, then any environmental approval should lapse. After that time, further consideration of the proposal should only occur following a new referral to the Authority.

Furthermore, the Authority considers that subsequent statutory approvals for this proposal should make provision for minor and non-substantial changes, where it can be shown that the changes are not likely to have an unacceptable environmental impact.

5.2 Atmospheric emissions

The Authority has considered a range of air emissions in its assessment of this proposal. These emissions were identified by the proponent and comparable with all stations that employ this type of fossil fuel combustion process.

a) gaseous and particulate emissions

The combustion of coal produces gaseous and particulate emissions which, under certain conditions, can be harmful to human health and/or the environment.

Three principle emissions, sulphur dioxide, nitrogen oxides and particulates, are routinely considered in assessing the potential environmental impacts of atmospheric emissions from coal-fired power stations.

In determining the likely impacts of these emissions, mathematical atmospheric dispersion models were employed to help predict the extent to which the emissions may spread around the project area.

The Authority has reviewed the modelling work carried out by the proponent and, based on the assessment of the data provided by SECWA, concluded that the emission levels of sulphur dioxide, nitrogen oxides and particulates are unlikely to cause a significant environmental impact either in isolation or in combination with other regional emission sources, e.g. Muja Power Station.

The Authority has considered the above computer modelling and SECWA’s management commitments (numbered 1, 2, 3 & 16 in Appendix 1) and considers that, if they are implemented, they should be adequate to manage the air emission issues, subject to Recommendation 2 below.

In respect of sulphur dioxide emissions the most recent data available indicates that peak ground level concentrations of sulphur dioxide greater than 500 micrograms per cubic metre could occur within about 3km of the station. These emission levels were modelled on a stack height of 130 metres and the Authority will be reviewing the adequacy of the stack height and design parameters at the Works Approval and Licensing stage of this proposal.

In view of the Authority's air quality objectives for residential areas contained in its draft Environmental Protection Policy for Kwinana, and the fact that the ERMP does not identify any planning constraints for SECWA's 1500ha of property. The Authority considers a specific recommendation is necessary to
d) Impacts on vegetation

SECWA has committed to develop a vegetation monitoring programme to measure the effects of atmospheric emissions. The Authority considers that such a programme could significantly increase the State’s understanding of these effects. Consequently, the following recommendation is proposed to supplement SECWA’s commitment in order to ensure that both monitoring and management components are integral parts of the programme.

Recommendation 5
The Environmental Protection Authority recommends that within 36 months of any approval granted by the Minister for the Environment permitting the implementation of a coal-fired power station at Collie, the State Energy Commission of Western Australia prepare, submit and subsequently implement a vegetation monitoring and management proposal as part of the Environmental Management Programme (Recommendation 9), to monitor the effects of air emissions and ensure appropriate management responses, to the satisfaction of the Minister for the Environment on advice from the EPA.

5.3 Groundwater abstraction

If the drawdown effect from groundwater abstraction is greater than recharge, there could be significant environmental impacts on the existing local environment.

The Authority requested more information on this issue during the public submission period of the ERMP. The information supplied showed, among other things, that SECWA’s groundwater consultants have been investigating the Collie Coal Basin’s groundwater resource for more than 12 years and consequently have an experienced working knowledge of the area.

The hydrology of the Collie Basin is highly complex as the following extract from a report prepared for SECWA in 1985 shows. "The conclusion from the above observations is that there is not generally a direct hydraulic interconnection between the surficial aquifers and wetlands on the one hand, and deeper aquifers within the basin on the other. Although undoubtedly such connection does exist in some areas, albeit an indirect connection, it cannot be assumed that wherever the deeper Permian aquifers sub-crop beneath a wetland, that such interconnection will exist. Consequently, the areas where drawdown will occur as a result of pumping, and also the magnitude of any drawdowns, cannot be predicted for specific sites."

SECWA proposes to use mine dewatering water whenever possible and has committed to install observation bores which will be used to monitor groundwater levels and act as an early warning system for any potential environmental impact from groundwater abstraction practices.

In view of these commitments the Authority considers that the issue of groundwater abstraction impacts has now been adequately addressed and potential environmental impacts can either be managed or have been demonstrated, from experience, to be within acceptable limits subject to the following recommendation.

Recommendation 6
The Environmental Protection Authority recommends that within 36 months of any approval granted by the Minister for the Environment, permitting the implementation of a coal-fired power station at Collie, the State Energy Commission of Western Australia should prepare, submit and subsequently implement a power station water resource(s) management proposal as part its Environmental Management Programme (Recommendation 9), to the satisfaction of the Minister for the Environment on advice from the EPA and the Water Authority of WA.

5.4 Flyash and wastewater disposal

Currently in Western Australia power generating utilities dispose of their fossil fuel combustion waste (flyash) in secure landfills as is the common practice around the world. This type of waste disposal site is regularly monitored to ensure that it does not contaminate the environment through the leaching of potentially harmful chemical elements.
SECWA has proposed two possible flyash disposal options, dry and wet slurry disposal of the flyash waste. This does not exclude other options being investigated (e.g. return of the flyash material to the overburden dumps at the coal mine).

The Authority understands that SECWA is still considering its options on this issue and that a final decision will be based on the results of continuing investigations.

To assist SECWA in this decision the Authority advises that the selected flyash waste disposal option needs to be environmentally as good or better than the secure landfill option (i.e. a landfill with an impermeable liner, divided into a number of separate cells, and incorporating a leachate collection and recycling system) and provide a walk away solution to the problems associated with flyash disposal techniques at the end of the station's life.

SECWA has similarly not determined its preferred option for its wastewater treatment activities.

One option being considered is for ocean pipeline disposal. The Authority agrees with SECWA in that the most significant potential environmental impacts of this option would be associated with the clearing of vegetation to provide an open corridor to the sea, and the effects the wastewater may have on the receiving ocean water quality.

The second option includes a sidestream softener/brine concentrator. SECWA considers that seepage from the saline concentrate evaporation pond presents this option's greatest potential to cause a significant environmental impact.

The Authority considers that either option could be environmentally acceptable. However, this will need to be subject to a more detailed assessment by the EPA once SECWA selects its preferred option.

Recommendation 7

The Environmental Protection Authority recommends that prior to the clearing of land and any siteworks directly associated with flyash and wastewater treatment and disposal activities, the State Energy Commission of Western Australia refers its final flyash and wastewater treatment and disposal proposals to the Environmental Protection Authority for separate and additional environmental impact assessment.

5.5 Proposed plant layout

The proposed plant layout has been designed to allow for the potential to double the plant's power generating capacity at a latter date if required.

The Authority would expect, subject to the caveat of 5 years associated with this assessment, that any expansion of the power stations capacity, beyond that approved by the WA Government or in excess of the capacity reviewed in this assessment Report, would be referred to it under the provisions of the Environmental Protection Act, 1986.

The Authority is presently concerned about provisions in the current site layout plans (Figure 3), to clear 58ha of jarrah-marri forest and, 13ha of seasonal wetland the significance of which has not been assessed.

Therefore, the Authority considers that before the final plant layout or site boundaries are determined SECWA should determine the environmental values of these areas.

Recommendation 8

The Environmental Protection Authority recommends that prior to the commencement of siteworks associated with the site layout plans, the State Energy Commission of Western Australia should:

(a) undertake a wetland survey to identify the environmental significance of the 13ha of seasonal wetlands and to develop alternative wetland habitats to replace their lost values;

(b) consult with the Department of Conservation and Land Management to minimise both the area and potential impacts associated with clearing the proposed 60ha of forest: and

then re-assess the site layout plans to reflect the information provided by (a) and (b) above to the satisfaction of the Minister for the Environment on advice from the EPA.
Figure 3: Site layout plan (courtesy of SECWA's ERMP).
6. Social impacts

6.1 Construction Phase

The construction period will last six years and the peak construction workforce is estimated at 820. The non local construction workforce, which is estimated to be 330, is to be accommodated in construction camps (70%) and in temporary accommodation in the area (30%). The use of temporary accommodation for construction workers will maintain the current high utilisation rate of "tourism" accommodation by Collie workers. Should an unacceptable conflict with tourism accommodation occur, SECWA has undertaken to consider the provision of extra construction camp accommodation.

The construction workforce will, during its peak, have an impact on local services and facilities in the Collie area. However, services and facilities in the area have historically been accustomed to fluctuating levels of population and are unlikely to be viewed by the local community as being seriously affected.

Estimates by SECWA on the impact on local housing, services and facilities are based on the premise that no other proposals involving significant workforces will commence during the construction period of the power station. Should other projects go ahead there would be a cumulative impact on housing, services and facilities which may present problems. SECWA is committed to monitoring the situation and supporting the implementation of corrective action where necessary (see section on Environmental Monitoring Programme).

6.2 Operational Phase

The operational workforce is estimated at 150. The total increase in population in the local area will be about 250. SECWA has undertaken to review the availability of SECWA sponsored land and housing in the area to accommodate this increase in population.

Concrete plans for housing the operational workforce are limited and this area will require careful management. It is considered inappropriate for any of the operational workforce to be accommodated in temporary (ie. tourism) accommodation. This should be avoided through ongoing monitoring and management of the housing situation in the local Collie area, and in the wider Preston subdivision.

6.3 Impacts on Nearest Neighbours

SECWA has purchased 1900 ha of land for the proposed Collie power station. Some 1500 ha will form a buffer zone around the power station site. This large buffer zone should ensure that neighbouring properties do not suffer devaluation due to the proposal and that neighbours are protected from nuisance effects (dust, noise etc).

6.4 Transport

SECWA has cited a preferred transport route for traffic to and from the power station. Impacts on residents along that route and users of the route will be satisfactorily mitigated by road upgrades, speed limits and planting of vegetation along the route where necessary.

There was some public concern shown regarding the preferred route. Further public consultation during the final planning of the route is recommended to ensure that the characteristics of the transport route meet local requirements.

6.5 Community Acceptance

The local community, in recognition of the importance of mining and power related industry to the local area, has shown a high level of acceptance for the project and has actively lobbied to support the project.
6.6 Social monitoring

SECWA has suggested that monitoring of social impacts through the construction period be carried out by the formation of a local group. The group would have local representation and provide the mechanism to identify concerns and propose solutions to problems.

SECWA has recognised the potential for cumulative impacts and the shared responsibility for those impacts. In response to this, SECWA has undertaken to invite the proponents of other proposals to be involved in the monitoring exercise.

The Environmental Protection Authority endorses SECWA's commitment to undertake social monitoring and recommends that its results are included in SECWA's periodic monitoring reports to the Authority.

7. Environmental management programme

To ensure the ongoing environmental monitoring, management and auditing of this proposal, the Authority makes the following recommendation.

Recommendation 9

The Environmental Protection Authority recommends that prior to commissioning of the power station the SECWA prepares, submits and subsequently implements an Environmental Management Programme (EMP) that addresses, where appropriate, the monitoring, management and auditing requirements of the following issues:

- Atmospheric emissions;
- Noise emissions;
- Vegetation protection;
- Water supply;
- Social amenity;
- Greenhouse gases; and
- Solid and liquid waste discharges,

to the satisfaction of the Minister for the Environment on advice from the EPA.

Furthermore, upon commissioning of the power station, this EMP should be revised and updated on a yearly basis to the satisfaction of the Environmental Protection Authority.