Perth Metropolitan Desalination Proposal, Amendment of Implementation Conditions by Inquiry

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Water Corporation of Western Australia

Section 46 Report and Recommendations of the Environmental Protection Authority

Environmental Protection Authority
Perth, Western Australia
Bulletin 1137
May 2004

Environmental Impact Assessment Process Timelines

Date	Progress stages	Time (weeks)
18 February 2004	**Level of Assessment set (following any appeals upheld)**	**-**
23 February 2004	**Proponent Document Released for Public Comment**	**1**
23 March 2004	**Public Comment Period Closed**	**4**
26 April 2004	**Final Proponent response to the issues raised**	**4**
31 May 2004	**EPA report to the Minister for the Environment**	**5**

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Summary and recommendations

Water Corporation is proposing to upgrade the capacity of the Perth Metropolitan Desalination Proposal, from the originally approved 30 gigalitres (GL) per year to 45 GL per year. The proposed changes include increasing the production of potable water, use of seawater, and discharge of concentrated seawater and further options for combining intake seawater with cooling water discharged from Western Power's Kwinana Power Station (KPS).

The proposed changes do not relate to development of the plant at the East Rockingham site, which is an alternative site for the approved project.

Section 46(6) of the *Environmental Protection Act 1986* requires the EPA to report to the Minister for the Environment on whether or not the proposed changes to conditions and procedures should be allowed. In addition, the EPA may make recommendations as it sees fit.

This report provides the EPA's advice and recommendations to the Minister for the Environment on the environmental factors, conditions and procedures relevant to the proposal.

Relevant environmental factors

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

(a) Marine Water Quality and Biota; and,

(b) Atmospheric Emissions (Greenhouse Gases).

Conclusion

The EPA has considered the proposal by the Water Corporation of Western Australia to upgrade the capacity of the Perth Metropolitan Desalination Proposal and has concluded that it can be managed to meet the EPA's objectives for the relevant environmental factors.

The EPA considers that the changes to the desalination proposal will not cause adverse impacts on the marine water quality and biota of Cockburn Sound and has the potential to reduce the amount of greenhouse gases generated by the proposal indirectly through the provision of gas-fired electricity.

Recommendations

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

1. That the Minister notes that this report is pursuant to Section 46(6) of the *Environmental Protection Act 1986* and thus is limited to consideration of proposed changes to the original conditions.
2. The Minister notes that the proposed change is to upgrade the capacity of the Perth Metropolitan Desalination Proposal.
3. The EPA recommends that the Minister considers the report on the relevant environmental factors as set out in Section 3.
4. That the Minister notes that the EPA has concluded that the modified proposal can be managed to meet the EPA's objectives, and thus not impose an unacceptable impact on

the environment provided there is satisfactory implementation by the proponent of the amended conditions, including the proponent's commitments, as set out in Section 4.

5. The Minister imposes the amended conditions, commitments and procedures recommended in Appendix 4 of this report.

Conditions

The EPA recommends that the following conditions, which are set out in detail in Appendix 4, be imposed if the proposal by the Water Corporation of Western Australia is approved for implementation:

1 The existing Environmental Conditions applied to the project (Ministerial Statement 626 published on 26 May 2003), be subject to modifications necessary to:

- Upgrade the capacity of the Perth Metropolitan Desalination Plant from 30GL per year to 45GL per year for the Kwinana Power Station site only. The proposed changes include increasing the use of seawater to 300ML per day average, production of potable water to greater than 150ML per day and discharge of concentrated seawater to 180ML per day (weekly average). The proposal also includes the option for combining intake seawater with cooling water discharged from Western Power's Kwinana Power Station.

Contents

1. Introduction and background

The Minister for the Environment has requested the Environmental Protection Authority (EPA) to consider and provide advice under Section 46(1) of the *Environmental Protection Act 1986* on a proposal by the Water Corporation of Western Australia to upgrade the capacity of the Perth Metropolitan Desalination Proposal from the originally approved 30 GL per year to 45 GL per year.

On 26 May 2003, the Minister for the Environment issued approval of the proposed 30GL per year seawater desalination plant at a site in East Rockingham or Kwinana. The proposal involved seawater intake and concentrated seawater discharge pipelines and a product pipeline to the Tamworth or Thompson Reservoir. Power for the Kwinana Power Station site was proposed to be drawn from the Western Power Grid while the East Rockingham site would require a dedicated 20 MW gas-fired power station.

On 11 September 2003, Water Corporation advised the EPA of its proposal to amend the conditions and procedures of Ministerial Statement 626 to enable the increase in plant capacity to 45 GL per year.

Further details of the proposal are presented in Section 2 of this Report. Section 3 discusses environmental factors relevant to the proposal. The conditions and procedures to which the proposal should be subject, if the Minister determines that it may be implemented, are set out in Section 4. Section 5 presents the EPA's conclusions and Section 6, the EPA's Recommendations.

A list of people and organisations that made submissions is included in Appendix 1 and References are listed in Appendix 2. Ministerial Statement 626 is presented in Appendix 3. The recommended conditions and procedures and proponent's commitments are provided in Appendix 4.

Appendix 5 contains a summary of the public submissions and the proponent's response. The summary of public submissions and the proponent's response is included as a matter of information only and do not form part of the EPA's report and recommendations. The EPA has considered issues arising from this process relating to identifying and assessing relevant environmental factors.

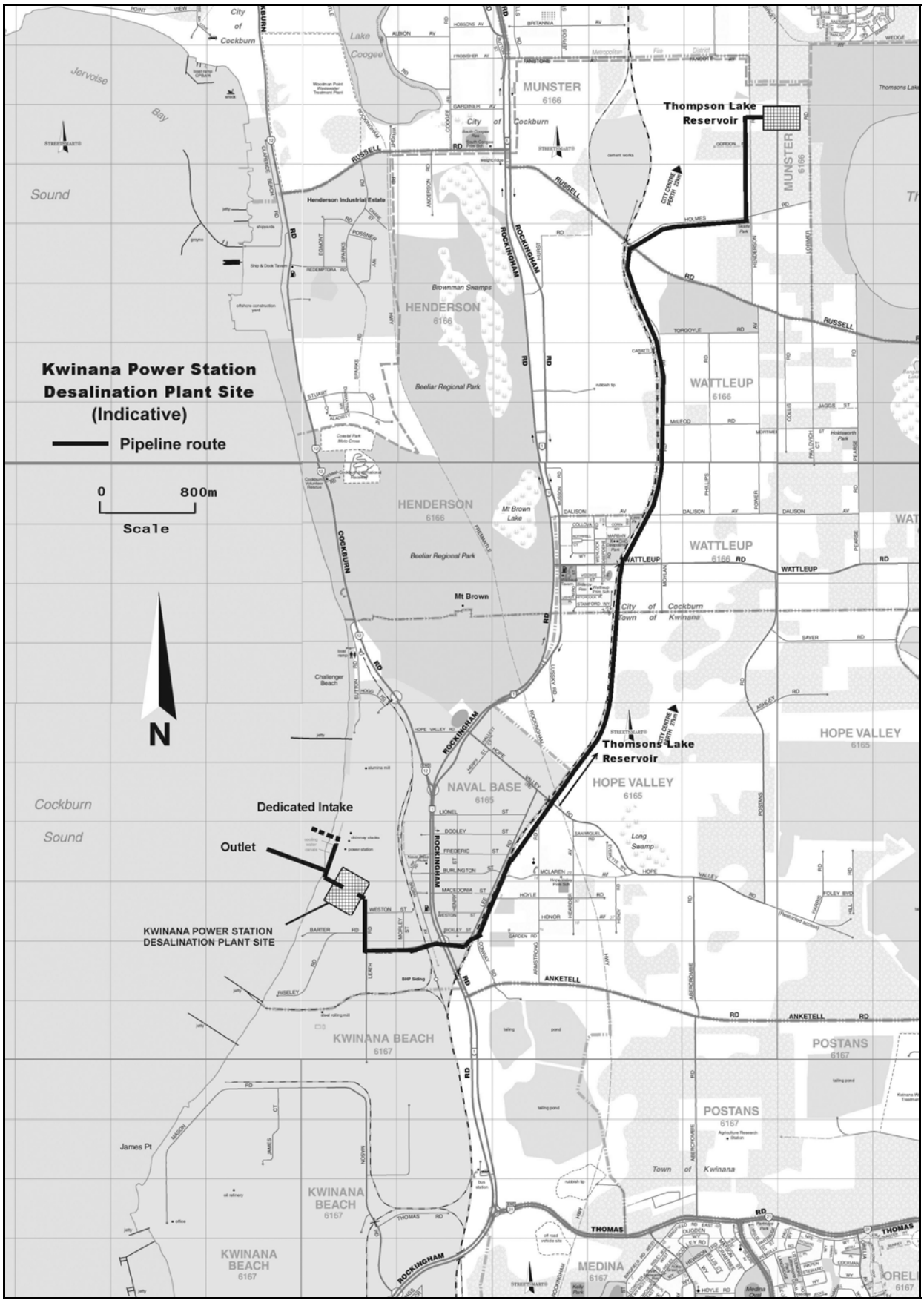

Figure 1: Location of desalination plant and infrastructure at the KPS site

2. The proposal

Water Corporation proposes to upgrade the capacity of the Perth Metropolitan Desalination Proposal from the originally approved 30 GL per year to 45 GL per year for the Kwinana Power Station (KPS) site only (Figure 1). The proposed changes include increasing the use of seawater (from 220ML per day average to 300ML per day average), production of potable water (from greater than 100ML per day to greater than 150ML per day) and discharge of concentrated seawater (from 120ML to 180ML per day (weekly average)). The proposal also includes further options for combining intake seawater with cooling water discharged from Western Power's Kwinana Power Station. The proposed changes do not relate to development of the plant at the East Rockingham site, which is an alternative site for the approved 30 GL per year project.

The Reverse Osmosis (RO) process involves the intake of seawater from Cockburn Sound, possible pre-treatment to remove solids and suspended particles, and then pressurising the seawater over a membrane so that freshwater is driven through the membrane and higher salinity seawater is left behind. The concentrated seawater and backwash from the pre-treatment process will then be discharged back to Cockburn Sound. Maintenance of the pre-treatment system, membranes and seawater intake and outlet pipes may require Water Corporation to use several, or a combination of, biocides and anti-scalants.

As part of the testing required prior to the design of the proposal, Water Corporation will commission two pilot plants of approximately 1ML combined flow rate. This pilot testing is necessary for the Water Corporation to determine what pre-treatment, if any, is required in the operation of the full scale desalination plant. Pre-treatment may involve the addition of flocculants, liquid chlorine (Cl_2), sulphuric acid (H_2SO_4), iron chloride ($FeCl_3$) and anti-scalant.

Table 1 summarises the key project characteristics of the approved project and proposed capacity upgrade. A detailed description of the proposal is provided in Section 1.4 of the Environmental Review Document (Water Corporation, 2004).

Table 1: Summary of changes to Kwinana Power Station site

Project characteristic	Current approved project	Proposed capacity upgrade
Location	Kwinana Power Station site	No change
Capacity	30 GL per year	45 GL per year
Power requirement	20 MW	24.1 MW average demand
Greenhouse gas emissions (tpa CO_2-equivalent)	180,000 state grid power	85,000 gas fired power 231,000 state grid power
Clearing of vegetation required	Likely to be 2-3 hectares of mostly completely degraded vegetation	No change
Seawater intake	220 ML/d (average)	300 ML/d (weekly average)

Project characteristic	Current approved project	Proposed capacity upgrade
Seawater intake pipelines		
Location (indicative).	See Figure 1.	No change for dedicated intake Option for combined intake with Western Power facilities
Length (indicative)	0.8 km	No change
Number	1	No change
Diameter	1400 mm	1500 mm
Concentrated seawater discharge		
Volume	120 ML/day	180 ML/d (weekly average)
Salinity	65,000 mg/L	No change
Temperature	Less than 2ºC above ambient.	No change if the dedicated intake is used. Use of Kwinana Power Station cooling water gives up to 13ºC above ambient (less than 0.3ºC after initial mixing)
Location of outlet	In 8m depth of water offshore from Kwinana Power Station	In 10m depth of water approximately 300 m offshore from Kwinana Power Station
Diffuser design	160 m long, risers at 10m spacings at 60° from horizontal, riser ports 200 mm in diameter	Around 80 – 180 m long. Design to be based upon an average initial dilution of 45
Product water pipeline		
Location (indicative)	See Figure 1	No change
Capacity	>100 ML/day	>150 ML/day
Length (indicative)	10 km	No change
Number	1	No change
Diameter	900 mm	1000 mm
Destination	Thompson reservoir	No change

3. Relevant environmental factors

Section 46(6) of the *Environmental Protection Act 1986* requires the EPA to report to the Minister for the Environment on whether or not the proposed changes to conditions or procedures should be allowed. In addition, the EPA may make recommendations as it sees fit.

Noise and vegetation were relevant environmental factors in the EPA's assessment of the original proposal. As this capacity upgrade is not expected to cause a significant change to the noise emissions from the proposal or impacts to vegetation, the EPA will not report further on these factors.

Having considered appropriate references, public and government submissions and the proponent's response to submissions, it is the EPA's opinion that its inquiry into the proposed

capacity upgrade of the Perth Metropolitan Desalination Proposal should address the following relevant factors:

(a) Marine Water Quality and Biota; and,

(b) Atmospheric Emissions (Greenhouse Gases).

The above relevant factors were identified from the EPA's consideration and review of Water Corporation's Section 46 Review document and the submissions received, in conjunction with the proposal characteristics (including significance of the potential impacts), and the adequacy of the proponent's response and commitments.

The environmental significance of the above issues and their assessment are discussed in Sections 3.1 and 3.2 of this report. The description of each issue shows how it relates to the project. The assessment of each issue, combined with the consideration of the environmental factors relevant to it, is where the EPA considers if the proposal can be managed to meet its environmental objectives.

3.1 Marine Water Quality and Biota

The potential impacts on marine water quality and biota from the upgraded desalination plant are comparable to those described in the EPA's previous report and recommendations on the 30GL per year plant (EPA Bulletin 1070). Therefore, the EPA will report only on those factors that have changed due to the capacity upgrade proposal.

Additional Nitrogen

Under the worst-case scenario for the capacity upgrade, an additional 5.8 tonnes of nitrogen per year will be discharged to Cockburn Sound. This is in addition to the 11.5 tonnes per year that will be discharged as part of the approved 30 GL per year plant. The source of nitrogen in the discharge will mostly come from the use of biocides, acid detergents and polyelectrolytes. Polyelectrolytes, representing approximately 95% of the nitrogen released, may be required in the pre-treatment of seawater to reduce the suspended sediment in water sent to the reverse osmosis membranes.

Water Corporation has committed to develop a management plan to ensure the upgraded desalination plant is nitrogen neutral relative to the previously approved 30GL per year plant. The objective of this commitment is to ensure there is no net increase in nitrogen added to Cockburn Sound from the upgrade proposal. Water Corporation has also committed to using nitrogen-free alternatives where appropriate and practicable.

Diffusion of concentrated seawater

The highly saline water from the RO process will be discharged to Cockburn Sound via an outlet pipe and diffuser. Water Corporation has committed to design and locate the ocean outlet diffuser system to ensure the discharge complies with the requirements of the *Cockburn Sound Environmental Protection Policy* and the *Revised Environmental Quality Criteria Reference Document (Cockburn Sound)*. The optimised design of the diffuser is to be certified by an expert, to the requirements of the EPA, prior to construction.

During operation of the plant, Water Corporation has also committed to a monitoring programme to ensure that the diffuser is performing to specifications and is achieving the required level of dilution.

Effects of Stratification in Cockburn Sound

The potential for the discharge of highly saline, dense water to exacerbate prolonged periods of vertical density stratification near the seabed in Cockburn Sound, especially during Autumn, has been raised as a concern by the Department of Conservation and Land Management (CALM), the Department of Environment (DoE) and other groups in public submissions for the proposal.

The concern primarily relates to the potential for a reduction of dissolved oxygen levels in the lower water column and underlying sediment pore waters to cause changes in biogeochemical and ecological processes. Low dissolved oxygen levels may cause the release of nutrients from sediments in a bioavailable form which may lead to excessive algal growth, poorer water quality and may alter the composition and abundance of benthic fauna communities in Cockburn Sound.

Modelling undertaken by Water Corporation predicts that the discharge water will move from the diffuser to the deeper shipping channels in the eastern margins of Cockburn Sound within 2 days. The dense plume is then predicted to plunge into the deep central basin, in the process mixing with surrounding water to the extent that its density becomes very close to the density of surrounding water.

Prior to the construction of the upgraded desalination plant, Water Corporation will obtain an expert assessment of the likelihood of stratification and its effects on dissolved oxygen levels in the deeper area of Cockburn Sound. This information is to be used in the design and placement of the diffusion system.

During operation of the plant, Water Corporation will also conduct monitoring of salinity, temperature and dissolved oxygen of water surrounding the discharge site, a reference site, and in the deeper waters of Cockburn Sound and will also monitor sediment habitat before and after commissioning of the plant.

Testing of Treatment Chemicals in Discharge Water

Water Corporation has committed to undertaking Whole Effluent Toxicity Testing to demonstrate that the discharge is environmentally safe. This testing will be done before construction and 12 months after commissioning of the plant.

Temperature of Discharge Water

The proposed capacity upgrade includes the option of using cooling water from Western Power's KPS. Should Water Corporation choose to use cooling water from the KPS, the concentrated seawater discharged will be, at most, $13^{o}C$ above the ambient temperature of the water in Cockburn Sound. To ensure this discharge water does cause unacceptable impacts on Cockburn Sound, Water Corporation will design and install the diffuser to mix the discharge with the surrounding water ensuring that the temperature difference is no more than $0.3^{o}C$ after initial dilution.

Agency and public comments

Public submissions for this factor focused on impacts from the discharge of highly saline water and the addition of nutrients to Cockburn Sound. Vertical stratification from the discharge water, the uptake of juvenile marine fauna and phytoplankton through the intake

pipe and the cumulative impact of developments along the eastern foreshore of Cockburn Sound were other issues raised.

Assessment

The area considered for assessment of this factor is Cockburn Sound as shown in Figure 1.

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

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

The EPA considers that, any additional nitrogen released from this capacity upgrade should be offset against other inputs of nitrogen into Cockburn Sound. To meet this expectation, Water Corporation has committed to develop a management plan to ensure the upgraded desalination plant is nitrogen neutral relative to the previously approved 30GL per year plant.

The EPA is satisfied that the ocean outlet diffusion system can be designed and located to avoid unacceptable impacts from the discharge of concentrated seawater, the build up of density stratification near the seabed and the effects of releasing water up to 13^{o}C above the ambient water temperature. Water Corporation has committed to conducting the necessary tests and monitoring to ensure the EPA's objectives can be met.

Summary

Having particular regard to the commitments made by Water Corporation to:

(a) a develop a management plan to ensure the upgraded desalination plant is nitrogen neutral and to use nitrogen-free alternatives where appropriate and practicable

(b) ensure the discharge of highly saline water complies with the requirements of the *Revised Draft Environmental Protection (Cockburn Sound) Policy 2002*

(c) obtain an expert assessment of the likelihood of stratification and its effects on dissolved oxygen levels in the deeper areas of Cockburn Sound; and

(d) conduct eco-toxicity testing and whole effluent toxicity testing of the discharge

it is the EPA's opinion that the proposal can be managed to meet the EPA's environmental objective for Marine Water Quality and Biota.

3.2 Atmospheric Emissions (Greenhouse Gases)

Description

The original proposal for a 30GL desalination plant was predicted to emit 180,000 tonnes per annum (tpa) CO_2 equivalent (CO_2-e) for the Kwinana Power Station option based on sourcing 20MW of electricity from the state grid (EPA 2002).

Since this approval, Western Power has received environmental approval to construct and operate a second 240MW combined cycle gas turbine unit on the Kwinana Power Station site. This approval will allow the discontinuation of coal firing at Kwinana in 2004 and will decrease the emission factor for power sourced directly from gas-fired generation facilities at the Kwinana Power Station from 1,032 kg CO_2-e/MWh to 398 kg CO_2-e/MWh. The total greenhouse gas emissions for the upgraded desalination plant, using gas-fired power is predicted to be approximately 85,000 tpa CO_2-e.

Water Corporation has advised the EPA that it is seeking a contract for gas-fired electricity but should it be unable to obtain such a contract it will use electricity from the state grid. Water Corporation's commitment to use gas-fired power is such that it shall obtain the contract "if practicable". Water Corporation has defined if practicable to include at a reasonable/sensible cost and where a suitable power supplier is willing to issue such a contract.

For the use of electricity from the state grid the greenhouse gas emissions for the upgraded plant are predicted to be approximately 231,000 tpa CO_2-e. Water Corporation has informed the EPA that although the plant's capacity will be upgraded by approximately 50%, power demand will only increase by 28% due to increased improvements in plant efficiency since the original 30GL plant was approved.

Agency and public comments

Public comments for this factor included statements that the proposal will generate a significant amount of greenhouse gas emissions. Other submissions included comments that the proposal should use renewable energy and questions about how Water Corporation will ensure the proposal uses only gas-fuelled electricity.

Assessment

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

- ensure that potential greenhouse gas emissions generated by the proposal are adequately addressed in the planning/ design and operation of projects and that
    - best practice is applied to maximise energy efficiency and minimise emissions;
    - comprehensive analysis is undertaken to identify and implement appropriate offsets; and
    - proponents undertake an ongoing program to monitor and report emissions and periodically assess opportunities to further reduce greenhouse gas emissions over time;
- and ensure that emissions do not adversely affect environment values or the health, welfare and amenity of people and land uses by meeting statutory requirements and acceptable standards.

The maximum greenhouse gases emitted by the upgraded desalination plant are not large and Water Corporation has adopted an approach to further minimise these emissions by making commitments to seek a contract for gas-fired electricity and a Greenhouse Gas Management Plan.

The EPA considers that the proposal can be managed to meet the environmental objectives for Atmospheric Emissions (Greenhouse Gases), subject to the satisfactory implementation of the proponent's commitments.

Summary

Having particular regard to the Water Corporation's commitment to:

(a) seek a contract for gas-fired electricity; and

(b) implement a Greenhouse Gas Management Plan;

it is the EPA's opinion that the proposal can be managed to meet the EPA's environmental objective for Atmospheric Emissions (Greenhouse Gases).

4. Conditions and commitments

Section 46(6) of the *Environmental Protection Act 1986* requires the EPA to report to the Minister for the Environment on whether or not the proposed changes to conditions or procedures should be allowed. 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.

4.1 Recommended commitments

Water Corporation has made changes to commitments to reflect discussions with the EPA during the assessment process. The proponent's commitments as set out in the Environmental Review Document (Water Corporation, 2004) and subsequently modified, as shown below (Table 2), should be made enforceable conditions.

Table 2: Summary of proponent's commitments

Commitment (Who/ What)	Objective (Why)	Action (How/ where)	Timing (When)	Whose Advice	Measure-ment Compliance Criteria
Consultative Environmental Management Plan (CEMP)	To minimise environmental impacts from implementation of the proposal.	Prepare a CEMP that will include the following; • Water Quality Management Plan (see commitment 2). • Flora and Fauna Management Plan (see commitment 3). • Greenhouse Gas Management Plan (see commitment 4). • Noise Management Plan (see commitment 6). • Hazardous Materials Management Plan (see commitment 7). • Cooling Water Monitoring Programme (see commitment 2).	Within four months following a decision to construct	DoE, CALM	CEMP

Commitment (Who/ What)	Objective (Why)	Action (How/ where)	Timing (When)	Whose Advice	Measure-ment Compliance Criteria
Water Quality Management Plan	To ensure protection of the water quality of Cockburn Sound.	1. Prepare a Water Quality Management Plan that will include the following: • Procedures to mitigate potential impacts of construction of the discharge pipeline and intake. • A monitoring program for TDS (salinity), temperature and DO (dissolved oxygen) of water surrounding the discharge site, a nearby reference site, and a site in the deeper waters of Cockburn Sound. • A monitoring programme to ensure that the diffuser is performing to specifications and achieving the required level of dilution. • Monitoring of sediment habitat pre and post commissioning. • A contingency plan that examines the risk of contamination and procedures to mitigate any unanticipated impacts. • Whole of effluent testing methodology and protocols. • A monitoring programme for Kwinana Power Station cooling water, if used as input water, will be conducted. Analysis shall be of sufficient accuracy and precision to enable comparison with appropriate standards and criteria for Cockburn Sound. • An annual inspection programme to check the physical integrity of the outlet pipe and diffuser. 2. Implement the approved Water Quality Management Plan described in commitment 2.1 above.	Within four months following a decision to construct Construction and Operation, as appropriate	DoE (Marine Branch)	Water Quality Management Plan and regular auditing of implementation

Commitment (Who/ What)	Objective (Why)	Action (How/ where)	Timing (When)	Whose Advice	Measure-ment Compliance Criteria
Flora and Fauna Management Plan	To ensure protection of flora and fauna.	1. Prepare a Flora and Fauna Management Plan that will include the following: • Locating the plant and pipelines to minimise clearing and effects on conservation values. • Mitigating impacts on Priority Flora. • Dieback management measures. • Weed control measures. 2. Implement the approved Flora and Fauna Management Plan described in commitment 3.1 above.	Within four months following a decision to construct Construction and Operation, as appropriate	DoE (Terrestrial Section), CALM	Flora and Fauna Management Plan and regular auditing of implementation
Greenhouse Gas Management Plan	To minimise the generation of greenhouse gases.	1. Prepare a Greenhouse Gas Management Plan that will include: • Use of sources of renewable energy as far as is practicable. • Calculation of the greenhouse gas emissions associated with the proposal, as indicated in "Minimising Greenhouse Gas Emissions, Guidance for the Assessment of Environmental Factors, No 12" published the Environmental Protection Authority. • Specific measures to minimise the greenhouse gas emissions associated with the proposal. • Monitoring of greenhouse gas emissions. • Estimation of the greenhouse gas efficiency of the proposal in comparison with the efficiencies of other comparable projects producing a similar product. • An analysis of the extent to which the proposal meets the requirements of the National Strategy using a combination of: o "no regrets" measures, o "beyond no regrets" measures, o land use change or forestry offsets, and o international flexibility mechanisms. 2. Implement the approved Greenhouse Gas Management Plan described in commitment 4.1 above.	Within four months following a decision to construct Operation	DoE (Air Quality Management Branch)	Greenhouse Gas Management Plan Management Plan and regular auditing of implementation

Commitment (Who/ What)	Objective (Why)	Action (How/ where)	Timing (When)	Whose Advice	Measure-ment Compliance Criteria
Greenhouse Gases	To minimise the generation of greenhouse gases	If practicable, the Water Corporation shall obtain an electricity contract for the plant which shall specify that the electricity will be sourced from gas-fired generating units at least 95% of the time.	Operation	DoE	Evidence of contract for gas fired sourced electricity
Noise Management Plan	To minimise noise impacts from implementation of the proposal.	1. Prepare a Noise Management Plan that includes detailed modelling of noise emissions and cumulative affect of emissions. 2. Implement the Noise Management Plan described in commitment 6.1 above, where appropriate.	Within four months following a decision to construct) Construction and Operation, where appropriate	DoE (Noise Management Branch).	Noise Management Plan and regular auditing of implementation
Hazardous Materials Management Plan	To minimise public risk from materials associated with the plant.	1. Prepare a Hazardous Materials Management Plan. 2. Implement the Hazardous Materials Management Plan described in commitment 7.1 above, where appropriate.	Within four months following a decision to construct Construction and Operation, where appropriate	DoIR	Hazardous Materials Management Plan and regular auditing of implementation
Ocean outlet for seawater return	Achieve compliance with Cockburn Sound EPP and associated criteria.	Design the ocean outlet diffuser system and locate it to ensure the discharge complies with the requirements of the Cockburn Sound Environmental Protection Policy and the Revised Environmental Quality Criteria Reference Document (Cockburn Sound). The design is to be certified by an expert as soon as the optimised design of the diffuser is available.	Prior to construction and Construction	DoE	Certification of design and location of diffuser by expert
Seawater return	To ensure the concentrated seawater released by the project does not cause stratification in the far field.	Obtain an expert assessment of the likely stratification build up and any subsequent dissolved oxygen effects in the deeper area of Cockburn Sound.	Within 3 months of approval	DoE	Certification of design and location of diffuser by expert

Whole Effluent Toxicity (WET) testing	To ensure that the discharge complies with the requirements of the Cockburn Sound Environmental Protection Policy and the Revised Environmental Quality Criteria Reference Document (Cockburn Sound).	1. Conduct WET testing of the high salinity seawater discharge including added chemicals (anti-scalants and biocides) as soon as the chemicals to be used and their likely dosing rates are known to a reasonable level of certainty. Conduct the testing following the principles contained in the USEPA, APHA and ASTM protocols at a NATA accredited laboratory in accordance with the protocols set out in ANZECC/ARMCANZ (2000) whole effluent toxicity protocols, at various concentration levels as stated in the Water Quality Management Plan. 2. Report the results of WET testing as described in commitment 10.1 to the DoE.	As soon as is practicable before construction	DoE	WET Testing Report 1
		3. Conduct WET testing of the high salinity seawater discharge as described in commitment 10.1 above 12 months after commissioning. 4. Report the results of WET testing as described in commitment 10.3 to the DoE.	Operation (12 months after commissioning).	DoE	WET Testing Report 2
Vegetation, Declared Rare and Priority Flora and Fauna Habitat	Protect vegetation, Declared Rare and Priority Flora and Fauna.	1. Conduct a survey of product pipeline routes to determine final alignments to avoid areas identified by CALM or DoE. 2. Conduct detailed survey for Rare and Priority Flora, to contribute to the Flora and Fauna Management Plan.	Design (Spring season)	DoE, CALM	Survey report of product pipeline routes and Flora and Fauna survey Report
Nitrogen loading to Cockburn Sound	To ensure there is no net increase in nitrogen added to Cockburn Sound from the upgrade proposal.	Develop a management plan to ensure that the upgraded desalination plant is nitrogen neutral relative to the previously approved 30 GL/a desalination plant. The management plan will be developed in consultation with the Cockburn Sound Management Council and will be submitted to the EPA for approval.	Prior to operation	DoE, CSMC	Nitrogen Neutral Management Plan
Nitrogen loading to Cockburn Sound	To minimise the amount of nitrogen added to Cockburn Sound from the upgrade proposal.	Nitrogen free alternatives will be used for process chemicals, where appropriate and practicable.	Operation	DoE, CSMC	Report of nitrogen free alternatives used

4.2 Recommended conditions

Having considered the proponent's commitments and the information provided in this report, the EPA recommends that the following conditions be imposed if the proposal by Water Corporation is approved for implementation:

(a) The existing Ministerial Conditions applied to the project (Ministerial Statement 626 published on 26 May 2003), be subject to modifications necessary to:
- to upgrade the capacity of the Perth Metropolitan Desalination Proposal, from the originally approved 30 GL per year to 45 GL per year.
- reflect the revised commitments made by Water Corporation.

The amended conditions and amended Consolidated Commitments statement are presented in Appendix 4.

5. Conclusions

The EPA has considered the proposal by the Water Corporation of Western Australia to upgrade the capacity of the Perth Metropolitan Desalination Proposal and has concluded that it can be managed to meet the EPA's objectives for the relevant environmental factors.

The EPA considers that the changes to the desalination proposal will not cause adverse impacts on the marine water quality and biota of Cockburn Sound and has the potential to reduce the amount of greenhouse gases generated by the proposal indirectly through the provision of gas-fired electricity.

6. Recommendations

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

1. That the Minister notes that this report is pursuant to Section 46(6) of the *Environmental Protection Act 1986* and thus is limited to consideration of proposed changes to the original conditions.
2. The Minister notes that the proposed change is to upgrade the capacity of the Perth Metropolitan Desalination Proposal.
3. The EPA recommends that the Minister considers the report on the relevant environmental factors as set out in Section 3.
4. That the Minister notes that the EPA has concluded that the modified proposal can be managed to meet the EPA's objectives, and thus not impose an unacceptable impact on the environment provided there is satisfactory implementation by the proponent of the amended conditions, including the proponent's commitments, as set out in Section 4.
5. The Minister imposes the amended conditions, commitments and procedures recommended in Appendix 4 of this report.

Appendix 1
List of Submitters

State/Local Government

- Department of Industry and Resources
- Fremantle Ports
- Cockburn Sound Management Council
- Town of Kwinana
- City of Rockingham
- Department of Planning and Infrastructure
- Department of Conservation and Land Management

Organisations

- Pollution Action Network

Individuals

- David Brady
- Warwick Hughes
- Mr DF Young

Appendix 2
References

1. Water Corporation 2004. *Metropolitan Desalination Proposal – Section 46 Review*. *Prepared for Water Corporation by Strategen, February 2004*.

2. Water Corporation 2002. *Perth Metropolitan Desalination Proposal. Environmental Protection Statement. Prepared for Water Corporation by Welker Environmental Consultancy, October 2002*.

3. Environmental Protection Authority 2002. *Perth Metropolitan Desalination Proposal – Report and Recommendations of the Environmental Protection Authority (Bulletin 1070).* Environmental Protection Authority. Perth, Western Australia.

3. Water Corporation 2004. Letter to Dr Walter Cox, Chairman EPA. *Perth Desalination Proposal – Section 46 Review – Revised Proponent commitments.* Water Corporation 19 May 2004.

Appendix 3
Statement of Environmental Conditions of Approval No. 626
(26 May 2003)

9.4.

MINISTER FOR THE ENVIRONMENT AND HERITAGE

Statement No. 000626

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

PERTH METROPOLITAN DESALINATION PROPOSAL

Proposal: The construction and operation of a seawater desalination plant at a site in the Kwinana / East Rockingham area, and associated seawater intake, concentrated seawater discharge pipelines, and product pipeline to Tamworth Hill or Thomson's Lake Reservoir, as documented in schedule 1 of this statement.

Proponent: Water Corporation

Proponent Address: 629 Newcastle Street, LEEDERVILLE WA 6007

Assessment Number: 1454

Report of the Environmental Protection Authority: Bulletin 1070

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

Procedural conditions

1 Implementation and Changes

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

1-2 Where the proponent seeks to change any aspect of the proposal as documented in schedule 1 of this statement in any way that the Minister for the Environment and Heritage determines, on advice of the Environmental Protection Authority, is substantial, the proponent shall refer the matter to the Environmental Protection Authority.

Published on

26 MAY 2003

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

2 Proponent Commitments

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

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

3 Proponent Nomination and Contact Details

3-1 The proponent for the time being nominated by the Minister for the Environment and Heritage under section 38(6) or (7) of the *Environmental Protection Act 1986* is responsible for the implementation of the proposal until such time as the Minister for the Environment and Heritage has exercised the Minister's power under section 38(7) of the Act to revoke the nomination of that proponent and nominate another person as the proponent for the proposal.

3-2 If the proponent wishes to relinquish the nomination, the proponent shall apply for the transfer of proponent and provide a letter with a copy of this statement endorsed by the proposed replacement proponent that the proposal will be carried out in accordance with this statement. Contact details and appropriate documentation on the capability of the proposed replacement proponent to carry out the proposal shall also be provided.

3-3 The nominated proponent shall notify the Department of Environmental Protection of any change of contact name and address within 60 days of such change.

4 Commencement and Time Limit of Approval

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

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

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

The application shall demonstrate that:

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

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

Environmental conditions

5 Compliance Audit and Performance Review

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

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

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

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

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

- the major environmental issues associated with the project; the targets for those issues; the methodologies used to achieve these; and the key indicators of environmental performance measured against those targets;
- the level of progress in the achievement of sound environmental performance, including industry benchmarking, and the use of best available technology where practicable;
- significant improvements gained in environmental management, including the use of external peer reviews;

- stakeholder and community consultation about environmental performance and the outcomes of that consultation, including a report of any on-going concerns being expressed; and
- the proposed environmental targets over the next five years, including improvements in technology and management processes.

6 Decommissioning Plans

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

The Preliminary Decommissioning Plan shall address:

1 rationale for the siting and design of plant and infrastructure as relevant to environmental protection, and conceptual plans for the removal or, if appropriate, retention of plant and infrastructure;

2 a conceptual rehabilitation plan for all disturbed areas and a description of a process to agree on the end land use(s) with all stakeholders;

3 a conceptual plan for a care and maintenance phase; and

4 management of noxious materials to avoid the creation of contaminated areas.

6-2 At least 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 and Heritage on advice of the Environmental Protection Authority.

The Final Decommissioning Plan shall address:

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

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

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

6-3 The proponent shall implement the Final Decommissioning Plan required by condition 6-2 until such time as the Minister for the Environment and Heritage determines, on advice of the Environmental Protection Authority, that the proponent's decommissioning responsibilities have been fulfilled.

6-4 The proponent shall make the Final Decommissioning Plan required by condition 6-2 publicly available, to the requirements of the Minister for the Environment and Heritage on advice of the Environmental Protection Authority.

Procedures

1 Where a condition states "to the requirements of the Minister for the Environment and Heritage on advice of the Environmental Protection Authority", the Chief Executive Officer of the Department of Environmental Protection will obtain that advice for the preparation of written advice to the proponent.

2 The Environmental Protection Authority may seek advice from other agencies, as required, in order to provide its advice to the Chief Executive Officer of the Department of Environmental Protection.

Notes

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

2 The proponent is required to comply with the provisions of Part V of the *Environmental Protection Act 1986*.

Dr Judy Edwards MLA
MINISTER FOR THE ENVIRONMENT AND HERITAGE

26 MAY 2003

Schedule 1

The Proposal (Assessment No. 1454)

The construction and operation of a seawater desalination plant at a site in the Kwinana/East Rockingham area, and associated seawater intake, concentrated seawater discharge pipelines, and product pipeline to Tamworth Hill or Thomson's Lake Reservoir, as specified in the key characteristics tables below (See Tables 1 and 2).

The location of the plant and indicative product water pipeline alignments are shown in Figures 1 and 2, respectively (attached).

Table 1 - Key Proposal Characteristics – Desalination Plant

Characteristic	East Rockingham site	Kwinana Power Station site
Location	Corner Office and Patterson Roads	Kwinana Power Station
Capacity	30 GL/yr	30 GL/yr
Power requirement	20 MW	20 MW
Power Source	Possible 20MW Gas Turbine or Gas Engine Power Station or Western Power Grid	Western Power Grid
Clearing of vegetation required	2 to 3 ha of degraded vegetation	Likely to be 2 to 3 ha of mostly completely degraded vegetation
Seawater intake	220 ML/d (average)	220 ML/d (average)
Seawater intake pipelines		
Location (indicative)	See Figure 1	See Figure 2
Length (indicative)	3.1 km	0.8 km[1]
Number	1	1
Diameter	1400 mm	1400 mm
Concentrated seawater discharge		
volume	120 ML/day	120 ML/day
Salinity and temperature	65,000 mg/L, less than 2°C above ambient	65,000 mg/L, less than 2°C above ambient
Location of outlet	In 8 metre depth of water offshore from CBH Grains terminal	In 8 metre depth of water offshore from Kwinana Power Station
Diffuser design	160 metre long, risers at 10 metre spacings at 60° from horizontal, riser ports 200 mm in diameter	160 metre long, risers at 10 metre spacings at 60° from horizontal, riser ports 200 mm in diameter
Product water pipeline		
Location (indicative)	See Figure 1	See Figure 2
Capacity	Greater than 100 ML/day	Greater than 100 ML/day
Length (indicative)	10 km	10 km
Number	1	1
Diameter	900 mm	900 mm
Destination	Tamworth Hill reservoir	Thomson's Lake reservoir

[1] Potential for shared intake with power station

Table 2 - Key Proposal Characteristics - Power Station at the East Rockingham Site

Characteristic	Gas turbine PS	Gas engine PS
Capacity	20 MW	20 MW
Fuel	Natural Gas	Natural gas
Cooling water	Seawater	Seawater
Plant	Two gas turbines	Five high efficiency reciprocating internal combustion engines
	One steam turbine	-
Air emissions		
Nitrogen oxides	4.56 g/s at 12.53% O_2	6.56 g/s at 10.6% O_2
Greenhouse gases (CO_2)	Approximately 117 524 tonnes per year at normal operating load	Approximately 78 650 tonnes per year at normal operating load
Vegetation clearing required	0.5 ha degraded vegetation	0.5 ha degraded vegetation

Abbreviations:

GL/yr	gigalitres per year
g/s	grams per second
ha	hectare
km	kilometre
mg/L	milligram per litre
mm	millimetre
ML/d	Megalitres per day
MW	megawatt
PS	Power Station

Figures (attached)

Figure 1 - Perth Metropolitan Desalination Proposal Locations – East Rockingham
Figure 2 - Perth Metropolitan Desalination Proposal Locations – Kwinana Power Station

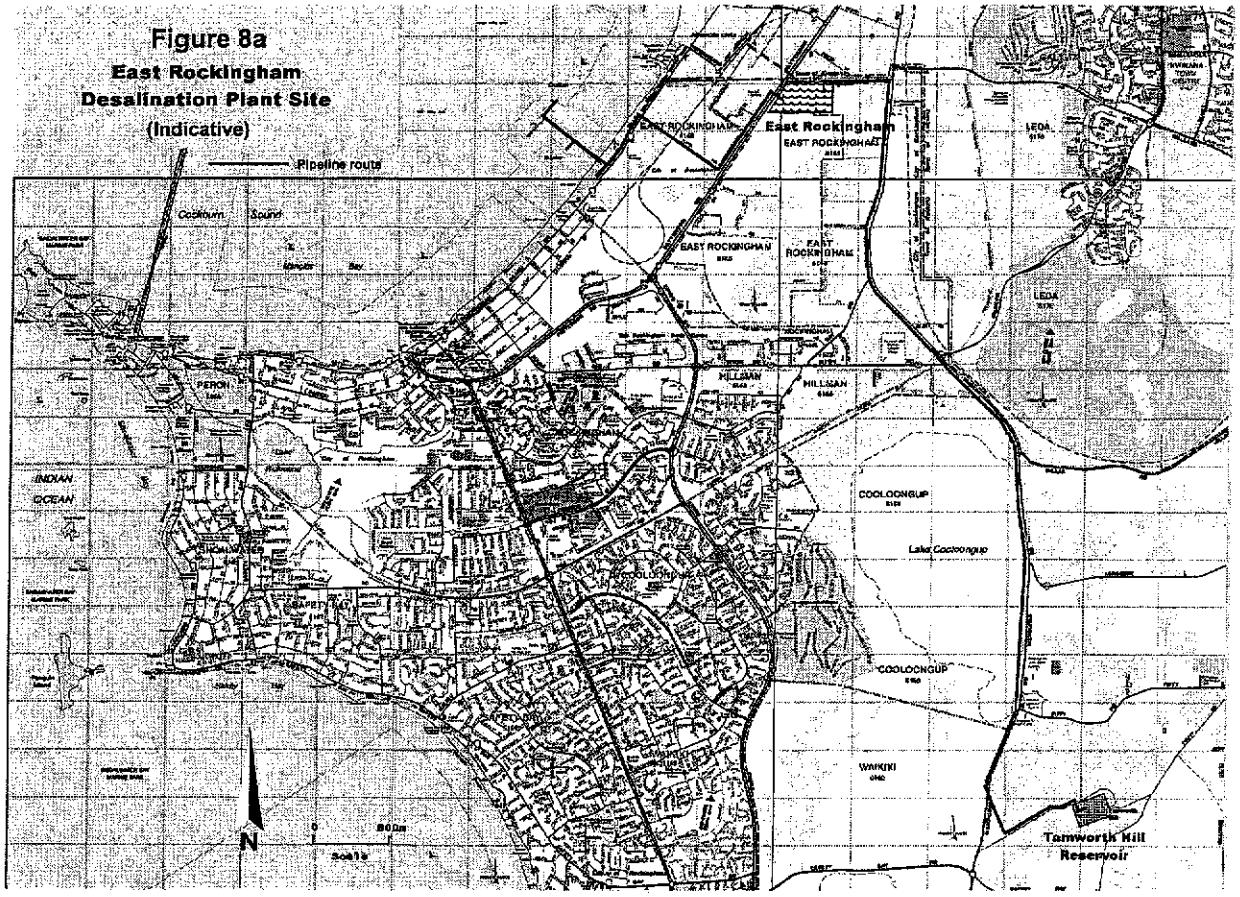

Figure 1 Perth Metropolitan Desalination Proposal Locations – East Rockingham

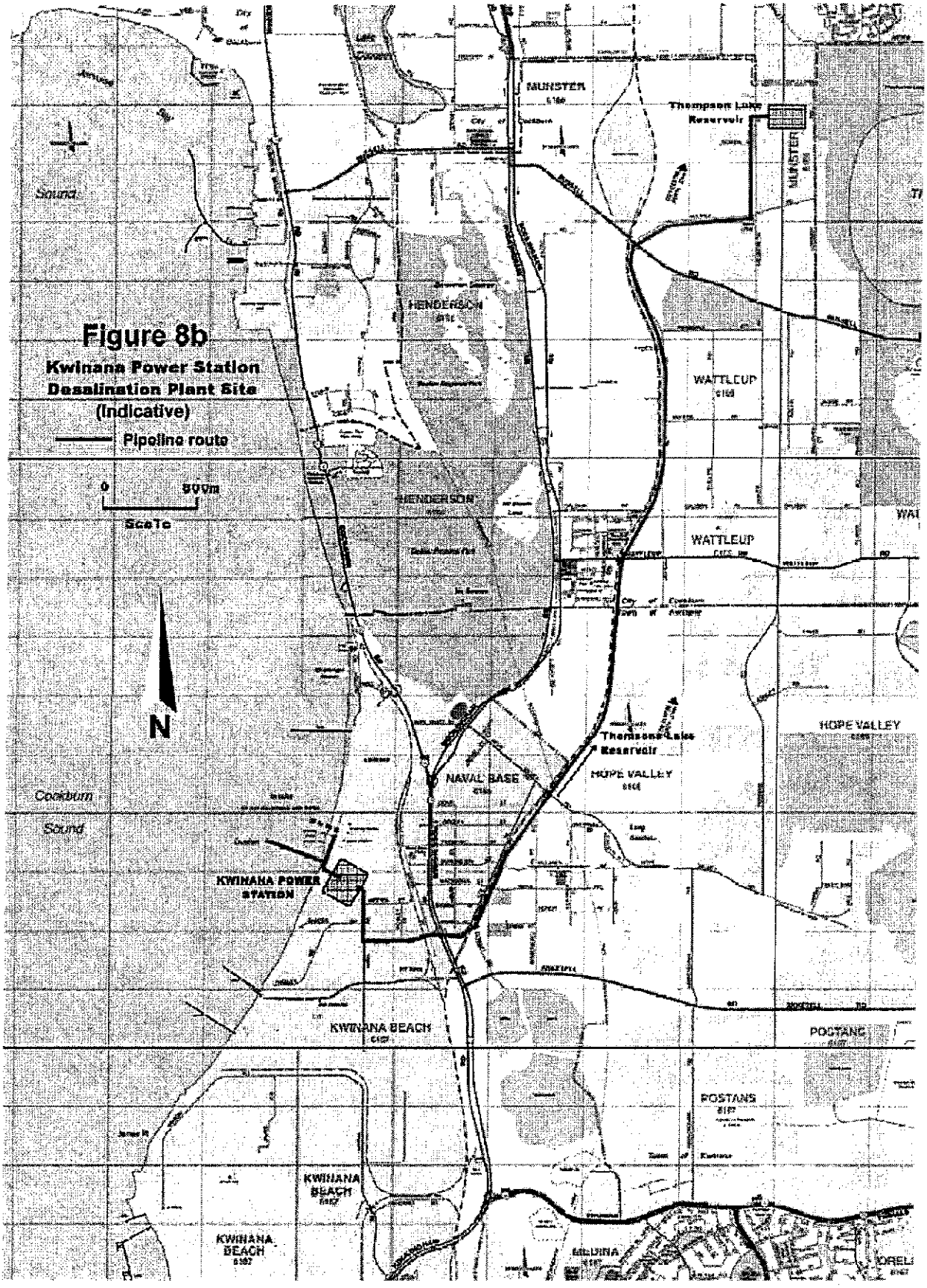

Figure 2 Perth Metropolitan Desalination Proposal Locations – Kwinana Power Station

Schedule 2

Proponent's Environmental Management Commitments

May 2003

PERTH METROPOLITAN DESALINATION PROPOSAL

(Assessment No. 1454)

Water Corporation

Schedule 2

Proponent's Environmental Management Commitments - Perth Metropolitan Desalination Proposal (Assessment No. 1454)

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 Environmental Protection.

No.	Topic	Objective	Action	Timing	Advice
1	Consultative Environmental Management Plan (CEMP)	To minimise environmental impacts from implementation of the proposal	Prepare a CEMP which addresses the following; 1. Water Quality Management Plan to include: • procedures to mitigate potential impacts of construction of the discharge pipeline; • a monitoring program for TDS and temperature of water returned to the ocean; • a contingency plan which examines the risk of contamination and procedures to mitigate any unanticipated impacts; and • eco-toxicity testing of added chemicals in the high salinity seawater discharge (anti-scalants and biocides). 2. Flora and Fauna Management Plan to include: • locating the plant and pipelines to minimise clearing and effects on conservation values; • mitigating impacts on Priority Flora; • Dieback management measures; and • weed control measures. 3. Greenhouse gas management plan as part of CEMP that will include: • use of renewable energy as far as is practicable; • calculation of the greenhouse gas emissions; • specific measures to minimise the greenhouse gas emissions; • monitoring of greenhouse gas emissions; • estimation of the greenhouse gas efficiency in comparison with the efficiencies of other comparable projects producing a similar product; and • an analysis of the extent to which the proposal meets the requirements of the National Strategy using a combination of: – "no regrets" measures,	Prior to construction.	CALM, Western Power, DIA

No.	Topic	Objective	Action	Timing	Advice
			– "beyond no regrets" measures, – land use change or forestry offsets, and – international flexibility mechanisms. 4. Demonstration that Nitrogen Oxides emissions from a dedicated power plant at East Rockingham will comply with EPA Guidance 15 and the relevant NEPM. 5. Noise Management Plan which includes: • detailed modelling of noise emissions; • cumulative affect of emissions; • consultation with potentially affected residents; and • development of complaints procedures to respond to concerns of nearby residents. 6. Hazardous Materials Management Plan to minimise public risk from materials associated with the plant. 7. A contingency that includes an archaeological monitoring program in case Aboriginal heritage sites are discovered during construction.		City of Rock-ingham, Town of Kwinana
2	Ocean outlet for seawater return	Achieve compliance with Cockburn Sound EPP	Locate and design the ocean outlet diffuser to ensure the discharge complies with the requirements of the Cockburn Sound Environmental Protection Policy.	Prior to construction	
3	Consultative Environmental Management Plan (CEMP)	Achieve objectives of commitment 1	Implement CEMP.	Before, during and following construction	WRC, CALM, Western Power, DIA
4	Vegetation, Declared Rare and Priority Flora and Fauna Habitat	Protect vegetation, Declared Rare and Priority Flora and Fauna	Conduct a survey of product pipeline routes to determine final alignments to avoid areas identified by CALM or Department of Environmental Protection. Conduct detailed survey for Rare and Priority Flora, to contribute to the Flora and Fauna Management Plan.	Spring season before construction commences	CALM
5	Aboriginal heritage	Address heritage issues	Consult with regional and local Aboriginal organisations and conduct site inspections to determine issues.	Before and during construction	DIA
6	Aboriginal heritage	Address impact issues	Submit a section 18 application to develop into Cockburn Sound to the Aboriginal Cultural Materials Committee.	Before construction	DIA

Abbreviations:

CALM Department of Conservation & Land Management
DIA Department of Indigenous Affairs
EPP Environmental Protection Policy
NEPM National Environmental Protection Measure
WRC Water & Rivers Commission

Appendix 4
Recommended Environmental Conditions and Proponent's Consolidated Commitments

Statement No.

RECOMMENDED CONDITIONS AND PROCEDURES

STATEMENT TO AMEND CONDITIONS APPLYING TO A PROPOSAL (PURSUANT TO THE PROVISIONS OF SECTION 46 OF THE ENVIRONMENTAL PROTECTION ACT 1986)

PERTH METROPOLITAN DESALINATION PROPOSAL

Proposal: Upgrading of the capacity of the plant to 45 GL per year which will include increasing the production of potable water, use of seawater, and discharge of concentrated seawater and further options for combining intake seawater with cooling water discharged from Western Power's Kwinana Power Station, as documented in schedule 1 of this statement. This proposal does not relate to the plant at the alternative East Rockingham site.

Proponent: Water Corporation of Western Australia

Proponent Address: 629 Newcastle Street LEEDERVILLE WA 6007

Assessment Number: 1512

Previous Assessment Number: 1454

Previous Statement Number: 626 (published on 26 May 2003)

Report of the Environmental Protection Authority: Bulletin 1137

Previous Report of the Environmental Protection Authority: Bulletin 1070

The implementation of the proposal to which the above reports of the Environmental Protection Authority relate is subject to the following conditions and procedures, which replace all previous conditions and procedures:

Published on

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 Environmental Protection of any change of contact name and address within 60 days of such change.

4 Commencement and Time Limit of Approval

4-1 The proponent shall substantially commence the proposal within five years of the date of this statement provide evidence to the Minister for the Environment that the proposal has been or the approval granted in the statement of … 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 Environmental Protection 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 Environmental Protection is empowered to audit the compliance of the proponent with the statement and should directly receive the compliance documentation, including environmental management plans, related to the conditions, procedures and commitments contained in this statement.

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.

6 Decommissioning Plans

6-1 Prior to 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 rationale for the siting and design of plant and infrastructure as relevant to environmental protection, and conceptual plans for the removal or, if appropriate, retention of plant and infrastructure;

2 a conceptual rehabilitation plan for all disturbed areas and a description of a process to agree on the end land uses(s) with all stakeholders;

3 A conceptual plan for care and maintenance phase; and

4 management of noxious materials to avoid the creation of contaminated areas.

6-2 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 removal or, if appropriate, retention of plant and infrastructure in consultation with relevant stakeholders;

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

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

6-3 The proponent shall implement the Final Decommissioning Plan required by condition 6-2 until such time as the Minister for the Environment determines, on advice of the Environmental Protection Authority, that the proponent’s decommissioning responsibilities have been fulfilled.

6-4 The proponent shall make the Final Decommissioning Plan required by condition 6-2 publicly available, to the requirements of the Minister for the Environment on advice of the Environmental Protection Authority.

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 the Department of Environmental Protection 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 Environmental Protection.

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 Environmental Protection.

Notes

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

Schedule 1

The Proposal (Assessment No. 1512)

Upgrading of the capacity of the plant 30 GL per year to 45 GL per year. This includes increasing the production of potable water, use of seawater, and discharge of concentrated seawater and further options for combining intake seawater with cooling water discharged from the Kwinana Power Station, as specified in the key characteristics table below. This does not relate to the plant at the alternative East Rockingham site.

The location of the plant is shown in Figure 1 (attached).

Table 1 – Key Proposal Characteristics

Project characteristic	**Quantities/Description**
Location	Kwinana Power Station site
Capacity	45 GL per year
Power requirement	24.1 MW average demand
Greenhouse gas emissions (tpa CO_2-equivalent)	85,000 gas fired power 231,000 state grid power
Clearing of vegetation required	Likely to be 2-3 ha of mostly completely degraded vegetation
Seawater intake	300 ML/day (weekly average)
Seawater intake pipelines	
Location (indicative).	See Figure 1. Option for combined intake with Western Power facilities
Length (indicative)	0.8 km
Number	1
Diameter	1500 mm
Concentrated seawater discharge	
Volume	180 ML/day (weekly average)
Salinity	65,000 mg/L
Temperature	Use of KPS cooling water. If the dedicated intake is used gives up to 13ºC above ambient (less than 0.3ºC after initial mixing)
Location of outlet	In 10m depth of water around 300 m offshore from KPS
Diffuser design	Around 80 – 180 m long Design to be based upon an average initial dilution of 45
Product water pipeline	
Location (indicative)	See Figure 1

Capacity	>150 ML/day
Length (indicative)	10 km
Number	1
Diameter	1000 mm
Destination	Thompson Reservoir

Abbreviations

GL	gigalitres
ML	megalitres
km	kilometres
mm	millimetres
mg/L	milligrams per litre
ha	hectares
MW	megawatt
tpa CO_2-e	tonnes per annum CO_2 equivalent
KPS	Kwinana Power Station

Figure.

Figure 1: Location of desalination plant and infrastructure at the KPS site

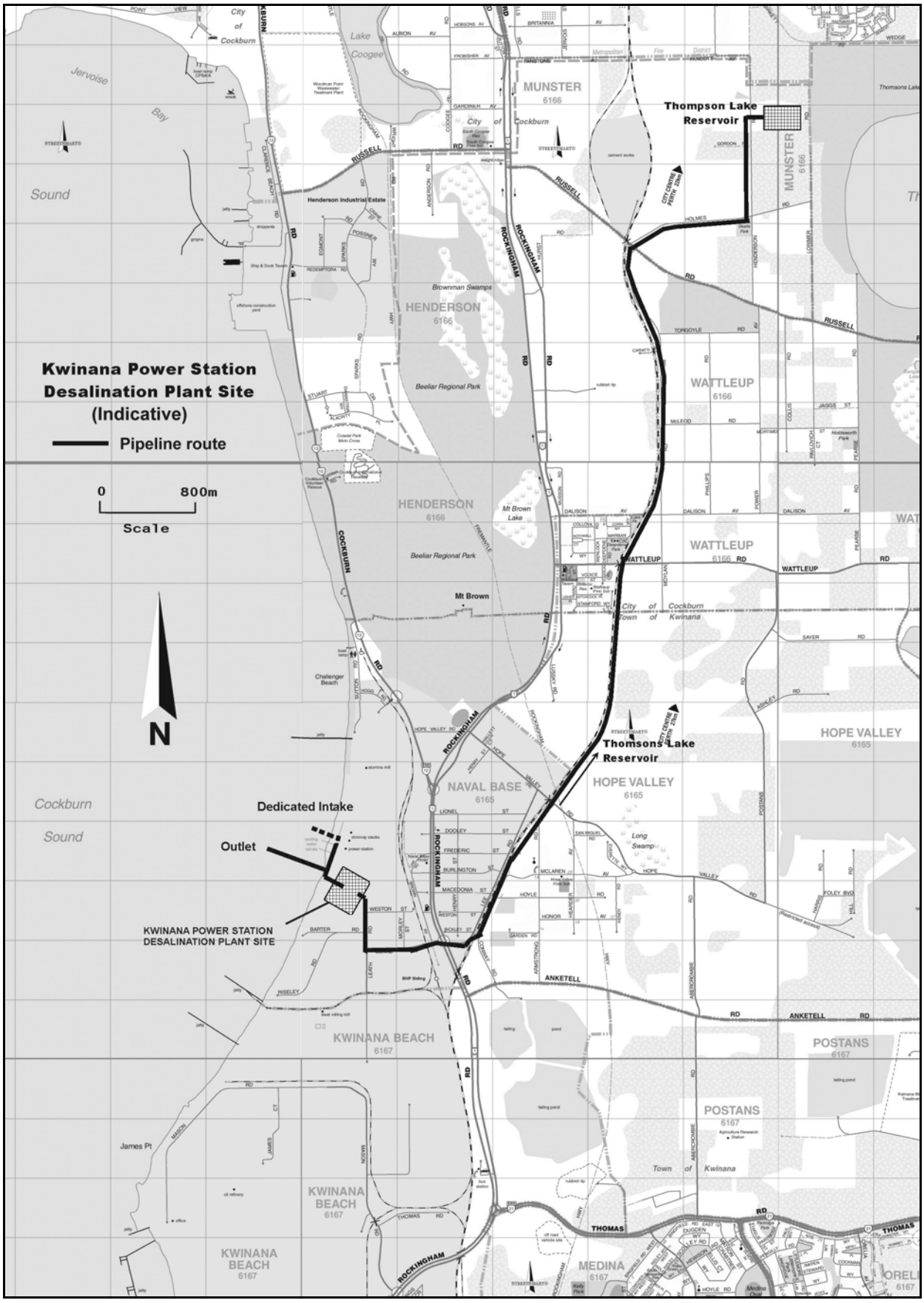

Figure 1: Location of desalination plant and infrastructure at the KPS site

Schedule 2

Proponent's Environmental Management Commitments

19 May 2004

Perth Metropolitan Desalination Proposal

(Assessment No. 1512)

Water Corporation of Western Australia

PERTH METROPOLITAN DESALINATION PROPOSAL (Assessment No. 1512)

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 Environmental Protection.

No	Commitment	Objective	Action	Timing	Advice
1	Consultative Environmental Management Plan (CEMP)	To minimise environmental impacts from implementation of the proposal.	Prepare a CEMP that will include the following; • Water Quality Management Plan (see commitment 2). • Flora and Fauna Management Plan (see commitment 3). • Greenhouse Gas Management Plan (see commitment 4). • Noise Management Plan (see commitment 6). • Hazardous Materials Management Plan (see commitment 7). • Cooling Water Monitoring Programme (see commitment 2).	Within four months following a decision to construct	DEP, CALM

2	Water Quality Management Plan	To ensure protection of the water quality of Cockburn Sound.	1. Prepare a Water Quality Management Plan that will include the following: • Procedures to mitigate potential impacts of construction of the discharge pipeline and intake. • A monitoring program for TDS (salinity), temperature and DO (dissolved oxygen) of water surrounding the discharge site, a nearby reference site, and a site in the deeper waters of Cockburn Sound. • A monitoring programme to ensure that the diffuser is performing to specifications and achieving the required level of dilution. • Monitoring of sediment habitat pre and post commissioning. • A contingency plan that examines the risk of contamination and procedures to mitigate any unanticipated impacts. • Whole of effluent testing methodology and protocols. • A monitoring programme for Kwinana Power Station cooling water, if used as input water, will be conducted. Analysis shall be of sufficient accuracy and precision to enable comparison with appropriate standards and criteria for Cockburn Sound. • An annual inspection programme to check the physical integrity of the outlet pipe and diffuser. 2. Implement the Water Quality Management Plan described in commitment 2.1 above.	Within four months following a decision to construct Construction and Operation, as appropriate	DEP (Marine Branch)
3	Flora and Fauna Management Plan	To ensure protection of flora and fauna.	1. Prepare a Flora and Fauna Management Plan that will include the following: • Locating the plant and pipelines to minimise clearing and effects on conservation values. • Mitigating impacts on Priority Flora. • Dieback management measures. • Weed control measures. 2. Implement the Flora and Fauna Management Plan described in commitment 3.1 above.	Within four months following a decision to construct Construction and Operation, as appropriate	DEP (Terrestrial Section), CALM

4	Greenhouse Gas Management Plan	To minimise the generation of greenhouse gases.	1. Prepare a Greenhouse Gas Management Plan that will include: • Use of sources of renewable energy as far as is practicable. • Calculation of the greenhouse gas emissions associated with the proposal, as indicated in "Minimising Greenhouse Gas Emissions, Guidance for the Assessment of Environmental Factors, No 12" published the Environmental Protection Authority. • Specific measures to minimise the greenhouse gas emissions associated with the proposal. • Monitoring of greenhouse gas emissions. • Estimation of the greenhouse gas efficiency of the proposal in comparison with the efficiencies of other comparable projects producing a similar product. • An analysis of the extent to which the proposal meets the requirements of the National Strategy using a combination of: o "no regrets" measures, o "beyond no regrets" measures, o land use change or forestry offsets, and o international flexibility mechanisms. 2. Implement the Greenhouse Gas Management Plan described in commitment 4.1 above.	Within four months following a decision to construct Operation	DEP (Air Quality Management Branch)
5	Greenhouse Gases	To minimise the generation of greenhouse gases	If practicable, the Water Corporation will obtain an electricity contract for the plant which will specify that the electricity will be sourced from gas-fired generating units at least 95% of the time.	Operation	DEP
6	Noise Management Plan	To minimise noise impacts from implementation of the proposal.	1. Prepare a Noise Management Plan that includes detailed modelling of noise emissions and cumulative affect of emissions. 2. Implement the Noise Management Plan described in commitment 6.1 above, where appropriate.	Within four months following a decision to construct Construction and Operation, where appropriate	DEP (Noise Management Branch).

7	Hazardous Materials Management Plan	To minimise public risk from materials associated with the plant.	1. Prepare a Hazardous Materials Management Plan. 2. Implement the Hazardous Materials Management Plan described in commitment 7.1 above, where appropriate.	Within four months following a decision to construct Construction and Operation, where appropriate	DoIR
8	Ocean outlet for seawater return	Achieve compliance with Cockburn Sound EPP and associated criteria.	Design the ocean outlet diffuser system and locate it to ensure the discharge complies with the requirements of the *Revised Draft Cockburn Sound Environmental Protection Policy 2002* and the *Revised Environmental Quality Criteria Reference Document (Cockburn* Sound). The design is to be certified by an expert as soon as the optimised design of the diffuser is available.	Prior to construction and Construction	DEP
9	Seawater return	To ensure the concentrated seawater released by the plant does not cause stratification in the far field.	Obtain an expert assessment of the likely stratification build up and any subsequent dissolved oxygen effects in the deeper area of Cockburn Sound.	Within 3 months of approval	DEP
10	Whole Effluent Toxicity (WET) testing	To ensure that the discharge complies with the requirements of the Cockburn Sound Environmental Protection Policy and the Revised Environmental	1. Conduct WET testing of the high salinity seawater discharge including added chemicals (anti-scalants and biocides) as soon as the chemicals to be used and their likely dosing rates are known to a reasonable level of certainty. Conduct the testing following the principles contained in the USEPA, APHA and ASTM protocols at a NATA accredited laboratory in accordance with the protocols set out in ANZECC/ARMCANZ (2000) whole effluent toxicity protocols, at various concentration levels as stated in the Water Quality Management Plan. 2. Report the results of WET testing as described in commitment 11.1 to the DoE.	As soon as is practicable before construction	DEP

		Quality Criteria Reference Document (Cockburn Sound).	1. Conduct WET testing of the high salinity seawater discharge as described in commitment 11.1 above 12 months after commissioning. 2. Report the results of WET testing as described in commitment 11.3 to the DoE.	Operation (12 months after commissioning).	
11	Vegetation, Declared Rare and Priority Flora and Fauna Habitat	Protect vegetation, Declared Rare and Priority Flora and Fauna.	1. Conduct a survey of product pipeline routes to determine final alignments to avoid areas identified by CALM or DEP. 2. Conduct detailed survey for Rare and Priority Flora, to contribute to the Flora and Fauna Management Plan.	Spring season	DEP, CALM
12	Nitrogen loading to Cockburn Sound	To ensure there is no net increase in nitrogen added to Cockburn Sound.	Prepare a management plan to ensure that the upgraded desalination plant is nitrogen neutral relative to the 30 GL/a desalination plant. The management plan will be developed in consultation with the Cockburn Sound Management Council and will be submitted to the EPA for approval.	Prior to operation	DEP, CSMC
13	Nitrogen loading to Cockburn Sound	To minimise the amount of nitrogen added to Cockburn Sound.	Nitrogen-free alternatives will be used for process chemicals where appropriate and practicable.	Operation	DEP, CSMC

Abbreviations
DEP – Department of Environmental Protection
CALM - Department of Conservation and Land Management
DoIR – Department of industry and Resources
CSMC - Cockburn Sound Management Council

Appendix 5
Summary of Public Submissions and Proponent's Response

1. Perth Metropolitan Desalination Proposal s46 - Summary of Submissions and Water Corporation Responses

1. Consideration of alternatives

There are a number of options to balance water supply and demand for Perth. Could the Water Corporation please respond to the following:

- Rainfall hasn't decreased much, so why can't the existing water supply system meet demand?

A population growth of approximately 1 percent per annum along with industrial expansion means even with reducing per capita water usage, there is the need for more water sources (water demand is currently growing at 3 percent per annum). This is further compounded by reductions in catchment rainfall and in particular runoff (i.e. the amount of water entering dams is reduced).

More specifically, a 10 to 15 percent reduction in catchment rainfall which commenced around 1975 has resulted in a disproportionately larger (50 percent) decrease in run-off into dams. Although Perth rainfall in the wet season months (May to October) has not shown any significant trends over the last 29 years, the inflow to our dams show an additional decreasing trend over the most recent 7 years (see Figure 1). The Indian Ocean Climate Initiative 2002 report noted that recent early winter (May – July) rainfall decreased while the late winter (August – October) rainfall has increased. This change in seasonal rainfall distribution also has some bearing in decreasing the run-off into our dams.

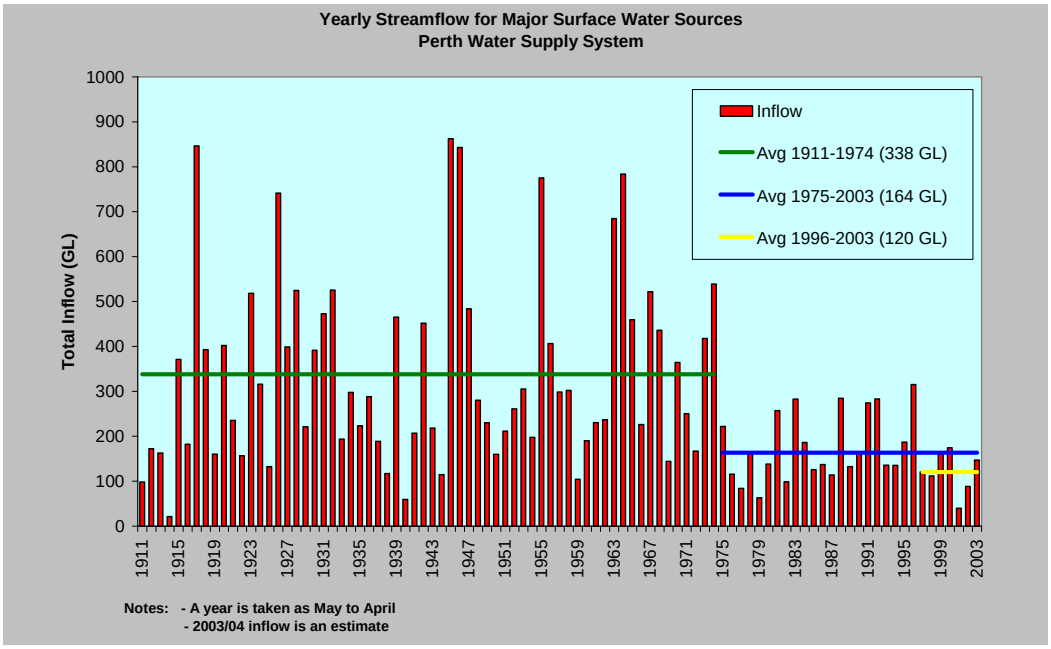

Figure 1 Historical record of catchment runoff

The Water Corporation responded to the drying climate of the last decades by implementing a range of complementary demand management and supply augmentation programmes. A $665 million source development programme that doubled the supply capacity of the Integrated Water Supply Scheme (IWSS) in a decade has been implemented in the form of an accelerated source development programme to restore supply reliability as quickly as possible.

However, poor and extremely low inflow events in 2001 and 2002 and significantly lower average stream flows over the last 7 years have been observed. The Corporation has concluded that a continuation of this low inflow sequence would compromise the supply security of the Integrated Water Supply Scheme. Gaining environmental approval for the upgrade of the desalination plant from 30 to 45 GL/year is one of the measures the Water Corporation is undertaking as part of its planning response to this situation.

- Has a wide range of alternatives been considered including demand management?

Alternatives

The Water Corporation undertakes detailed medium and long-term planning to ensure that the water demands of Perth are serviced in a timely manner. Many combinations of resources are considered and economic, environmental and social factors are evaluated as part of this planning (i.e. alternatives are compared in all possible ways).

As stated in its Annual Report, the Water Corporation's objectives include efficient and sustainable use of resources. As part of this the Water Corporation is actively pursuing wastewater reuse (including reuse by industry) and water demand management.

The Water Corporation's source development plan indicates that a large (45 GL) source is needed in the short term. The only viable options for obtaining this water in the necessary time frame are desalination of seawater and the South West Yarragadee aquifer (the sustainable yield for the SW Yarragadee aquifer is still being investigated/proved).

The Water Corporation's preferred option for the next substantial resource, provided that it is proven to be sustainable, is the SW Yarragadee aquifer. Note that a scheme using the SW Yarragadee aquifer will be cheaper and have lower energy consumption that a desalination plant supplying the same volume of water.

Desalination has the advantage of being independent of rainfall, and with predictions of a drying climate in the south-west will become an increasing priority for development. Also, a major drought independent of general climatic trends may trigger the implementation of this resource.

Demand Management

The Government's State Water Strategy has set a target of reducing per capita water consumption in Perth to 155 kilolitres per year by 2012. Per capita consumption in

2002/2003 was 150 kilolitres. However, this figure would have been higher if water restrictions were not in place because of the drought. A summary of Water Corporation demand management activities follows.

Since the late 1980's the Water Corporation has embraced the concept of managing water demand, giving prominence to communications and marketing programs and by planning and licensing of water sources and implementation of an appropriate pricing structure. In demand management communication programs and water use efficiency stakeholder programs, the Water Corporation spent an average $800,000 per year in the three years prior to the current drought.

The Water Corporation has developed considerable water end use knowledge through the 1998-2001 Domestic Water Use Study and ongoing market research and customer surveys. It continues to provide support and leadership to National initiatives related to water efficiency ratings and recognition schemes as well as conducting research into water use efficiency especially in relation to domestic gardens and lawns.

In 2003 the Water Corporation launched a suite of Waterwise initiatives focused on efficiency measures for residential customers. These programs are built on industry partnerships with plumbers, garden centres, developers, builders and domestic irrigators. In addition, the Water Corporation's customer relationship staff continue to work closely with major non-residential consumers to achieve improved water use efficiency in the industrial/commercial sector.

Meeting its obligations to the water efficiency and water recycling objectives of the State Water Strategy remains a high priority for the Corporation.

- Does this proposal have less environmental impact than other proposals being considered (e.g. the South West Yarragadee aquifer option)?

Seawater desalination has a higher energy usage, and so higher greenhouse gas emissions, than the South West Yarragadee source, but has less potential for effects associated with the use of inland water sources. It is not possible to say which water source projects have the least environmental impact as the nature of the impacts are quite different as are the environments that they will affect. Different people will have different opinions as to which would be considered the better option in this respect. However, the Water Corporation would like to point out that there is a stringent independent environmental regulatory process that applies to the assessment of all of the Water Corporation's proposed significant source development projects.

- Why doesn't the Water Corporation consider reducing the choking of our catchments by scrub and regrowth (catchment thinning) to increase runoff rather than building a desalination plant?

The Water Corporation is considering catchment thinning (see below), but this is a longer term option that cannot provide the supply reliability of the seawater desalination or South West Yarragadee source options. If the lower rainfall since 1997 continues, the Water Corporation has to develop a large water source within 2 years in order to provide reliable water services.

The Water Corporation is preparing a proposal in consultation with many stakeholders for a 12-year sustainable catchment management trial in the Wungong Catchment. This trial was a recommendation of the State Water Strategy released by the Premier in January 2003. It is the first step in a staged approach for developing catchment management in other Integrated Water Supply Scheme catchments. The management approach would improve the yield of existing water sources. In the longer term this could amount to an additional 40 GL (40 million kilolitres) of stream flow annually at less than $0.25/kL.

More specifically, the Wungong project could yield an extra 6 GL of stream flow annually through selected thinning of the catchment. The aim of the project is to start moving the forest structure from its current dense regrowth state back towards a mature forest, and so improve the environment. The environment benefiting most will be the aquatic ecosystem, although there are benefits for other flora and fauna. The project includes funded research into areas of uncertainty, monitoring, independent auditing, public reporting and projects for additional environmental benefit.

The Wungong scientific adaptive management trial builds on three decades of hydrological and forest science related to catchment management. The project will be a public demonstration of best practice catchment management.

2. Site Selection

The proponent should demonstrate to the community that the new approval is consistent with the previous approval and that they have considered both site locations fully. More information should be provided as to why the Kwinana site for this proposal is the preferred location. In addition, future port proposals should be a factor for consideration before deciding on a site location. The Rockingham site for the proposal should therefore be given greater consideration. Could the Water Corporation please comment?

The Water Corporation started to look for possible sites along the coast between Fremantle and Mandurah and inland for about 1.5 kilometres in November 2001. The three essential requirements were that the site must be near the ocean, near a power supply and near the water distribution system.

In May 2003 the Water Corporation obtained Ministerial permission to develop a 30 Gigalitre plant at one of two sites – one in East Rockingham and one on Western Power's Kwinana Power Station site. Note that it is not possible to build a desalination plant in the north of the city because there is no power station nor is the water storage or distribution system north of the city large enough to handle an additional 130 million litres per day.

The Kwinana site (which already has a power station) is preferred over the East Rockingham site because the desalination plant may be needed in two years time and it is not possible to build the required power station at the East Rockingham site in this time frame. Further, the Kwinana site is closer to the ocean and there are less environmental issues at this site with regard to native flora and fauna. Finally, co-locating the desalination plant with a large power supply is world best practice as warm

feed seawater via a power plant's cooling system assists in maximising the desalination plant's operating efficiency.

The changes to the existing approval are clearly summarised in Tables 1 and 3 of the Environmental Review. The effects of these changes are also described in the Environmental Review.

With respect to the intake water quality, a number of studies show that Cockburn Sound now has good water quality and the Water Corporation is confident that it will be a suitable water supply for the desalination plant.

Cockburn Sound Management Council and Kwinana Industry Council funded studies of Cockburn Sound show a steady improvement in water quality from the early 1990s. All local beaches currently meet human health guidelines for swimming and shellfish harvesting.

Specific tests recently conducted by the Water Corporation indicate that the seawater quality in Cockburn Sound is excellent, and suitable for reverse osmosis desalination processing and subsequent supply as drinking water.

In addition, the Department of Environment has undertaken an independent water quality study of Cockburn Sound that shows the levels of metals are low by world standards and comply with strict environmental guidelines. The Water Corporation understands that these results should be published in the near future.

3. Economics of desalination

There is much evidence about the cost of desalination plants decreasing as technology improves which could be a good reason to mothball the development of a desalination plant and just keep a watching brief. Can the Water Corporation please comment?

In order to minimise costs, the Water Corporation does not proceed with projects until they are needed to supplement the water supply to the integrated water supply system. Assuming that projects are socially and environmentally acceptable, the order that projects are implemented mostly depends upon the volume of water to be supplied, the projected cost (i.e. trends are taken into account) and the length of time needed to develop the project. This approach is applied to all projects including the desalination plant.

4. Greenhouse gas emissions and renewable energy use

The larger upgraded plant will have lower greenhouse gas emissions as a result of using a new combined cycle gas turbine unit at the Kwinana Power Station. This is a positive outcome, however, can the Water Corporation explain:

The average demand figure quoted in the environmental documentation of 25.6 MW is the peak energy demand rather than the average demand. It should read 24.1 MW average demand at 100% availability (i.e. all reverse osmosis units in the plant are available and operating).

The greenhouse gas estimates still stand. This is because the figure used to generate 85,000 CO_2-e tonnes per annum was 24.6 MW average demand based on 96% availability.

- Its evidence that use of renewable energy sources, including wind power, has been researched and cannot be achieved?

Existing situation

The Corporation is committed to making use of renewable energy wherever economically viable. For example, it has a contract for supply of renewable energy that services 86 of the Corporation's sites. This contract accounts for around 5% of the Corporation's energy use.

In general terms, the Water Corporation is not only a major purchaser of renewable energy, but also a producer. It has implemented an innovative environmental solution at the Woodman Point Wastewater Treatment Plant that uses biogas generated by the treatment plant to produce electricity. Woodman point generated 5212 MWh of renewable energy in 2002, 6805 MWh in 2003 and is expected to generate in excess of 9000 MWh for 2004/2005 and beyond. This will equate to around 3% of the Water Corporation's electricity demand.

Biogas is also burnt at the Beenyup Waste Water Treatment Plant for heating the sludge digestion process, and any excess biogas is flared, reducing the greenhouse gas CO_2-e

by 21-fold since methane is converted to carbon dioxide which is 21-fold lower in greenhouse global warming potential (GWP).

Further investigation is underway to assess the feasibility of using biogas generated at the Beenyup facility to produce electricity. The Water Corporation's conversion of biogas into electricity and its commitment to purchasing renewable energy makes a significant contribution to the reduction of greenhouse gases.

In the original proposal dated October 2002 (i.e. for a 30 GL/a plant at either East Rockingham or Kwinana) it was stated that there is not yet a single supplier that could provide 20 MW of renewable energy. This statement was correct.

Future situation

In light of very recent announcements, developments and trends in renewable energy it is possible that sufficient renewable energy will be available in the future to power the desalination plant. For this reason, the current Environmental Review (page 50) states that the Water Corporation will prepare a greenhouse management plan for the desalination plant that will include use of sources of renewable energy as far as is practicable.

Practical issues

In terms of renewable energy, the important consideration is the outcome, not how it is achieved. The aim should be to minimise the net greenhouse gas emissions resulting from the energy use associated with this project. There are various ways of doing this, including ensuring energy efficiency, fuel switching, use of renewable energy and sequestration.

The choice from these options will include a triple bottom line (i.e. economic, social and environmental) assessment to find the low cost alternatives with the best outcomes. Renewable energy, if available, would not provide the secondary benefits provided by a carbon sequestration option. Sequestration, which is readily available, will allow the Corporation to plant trees, which will sequester CO_2. Further, such plantings can be designed to maximise secondary benefits of biodiversity enhancement, salinity mitigation and/or water quality (catchment) improvement.

As stated in the Environmental Review, the Water Corporation is committed to reducing greenhouse gas emissions from its overall operations. This commitment is demonstrated by it having won the National Australian Greenhouse Office Greenhouse Challenge Gold Award in 2003.

- How will the contract for the purchase of the gas-fuelled electricity be structured to achieve this?

The Water Corporation is currently negotiating with Western Power. The Water Corporation can simply specify in the contract that gas sourced power only is to be used. This is similar to a consumer purchasing renewable energy whereby the source of the power is effectively specified.

- What happens when Kwinana is not operating or during the night when Perth's power supply is predominantly from Muja and Collie Power Stations?

It is proposed that the desalination plant be connected to the Kwinana Power Station. The contract with the power supplier will specify that gas generated power only is to be used. Thus the fact that Perth's power supply is predominantly from Muja and Collie Power Stations at night is not a relevant factor.

- How will sourcing of renewables be achieved and from whom?

The Water Corporation, apart from using its own renewable energy sources, will generally buy any and all renewables that are available for a comparable price to conventionally generated energy.

It is not possible to say where future renewables will be sourced from except to say that the Water Corporation maintains an active watch on the entire energy market and enters into direct negotiations with power wholesalers whenever appropriate opportunities arise.

The Water Corporation's actions to date (i.e. currently deriving 8% of its power from renewable energy sources) demonstrate its commitment.

- If it is not feasible to supply the plant with renewable energy, why doesn't the Water Corporation purchase Natural Power?

Natural Power is one of Western Power's brand names for its power generated from renewable energy. The Water Corporation's approach to its purchasing of renewable energy is discussed under the first dot point of this section.

- It would be preferable for the Water Corporation to commit to implementation – rather than simple commitment to a management plan.

The Water Corporation has an excellent track record in greenhouse gas management. This is demonstrated by it having won the National Australian Greenhouse Office Greenhouse Challenge Gold Award in 2003.

Consistent with this, as stated in the Environmental Review, the Water Corporation is committed to reducing greenhouse gas emissions from its operations overall. To this end the Water Corporation is developing a new more sophisticated greenhouse gas management strategy to cover all of its activities – not just the desalination plant. As already pointed out, there are various ways of mitigating greenhouse gas emissions, including ensuring energy efficiency, fuel switching, use of renewable energy and sequestration. Further, secondary benefits of biodiversity enhancement, salinity mitigation and/or water quality (catchment) improvement can be obtained.

It is anticipated that the new corporate wide greenhouse gas management strategy will be completed by mid-2004. In turn, the greenhouse management plan specific to the desalination plan will be consistent with this new greenhouse gas management strategy so that the best mix of primary and secondary benefits can be obtained.

5. Access to foreshore

The social impacts of the proposal, including access to the foreshore are to be addressed in the Consultative Environmental Management Plan (CEMP). Can the Water Corporation refer the CEMP to the Department of Planning and Infrastructure for comment?

The Water Corporation intends to have stakeholder consultation while developing the Consultative Environmental Management Plan (CEMP). The Water Corporation will specifically include the Department of Planning and Infrastructure as a stakeholder in this process.

6. Noise

In relation to noise, the East Rockingham site is of the most concern to the City of Rockingham. Residents in north-east Rockingham and Hillman already experience considerable noise levels and the upgrade has the potential to add to noise in the area. Could the Water Corporation please comment?

It should be noted that approval already exists for a 30 GL/a desalination plant at either East Rockingham or Kwinana. The Environmental review for the upgrade to 45 GL/a only applies to the Kwinana site. Residents of north-east Rockingham and Hillman will experience lower noise levels from the desalination plant if it is sited at the Kwinana rather than East Rockingham.

In the Environmental Protection Statement for this original approval, there was a section on noise (Section 12). In this section the Water Corporation stated that it will demonstrate compliance with the Environmental Protection (Noise) Regulations and relevant Occupational Health, Safety and Welfare provisions. This also applies to the current proposal (i.e. the upgraded plant).

As stated in the Environmental Review, and consistent with the original proposal, the Water Corporation will prepare a Consultative Environmental Management Plan (CEMP) within four months following a decision to construct. The CEMP, which includes stakeholder input, is to address in detail the commitments associated with the approved project including noise. However, some additional information is provided here.

The most recent relevant example is the Kwinana Water Reclamation Plant (KWRP). In this instance, the Water Corporation has required its construction contractors to demonstrate compliance with Environmental Protection (Noise) Regulations and Occupational Health, Safety and Welfare provisions. Modelling conducted by an independent acoustic consultant, has demonstrated that the noise emissions from KWRP plant will not exceed the regulatory limit of 65 dBA at the boundary of the plant. The predicted noise levels at the most critical residences was identified and shown to be acceptable. From an occupational health and safety point of view, noise levels will not exceed 85 dBA at 1 m from operating machinery within the plant.

7. Nutrient Load to Cockburn Sound

The discharge from the desalination plant, depending upon the treatment chemicals used, may add nitrogen to Cockburn Sound. At this stage the proposal does not include worst case estimates for nitrogen discharges from the plant. Could the Water Corporation please respond to this concern?

The Environmental Review specifically discusses worst case estimates for nitrogen discharges from the plant. For example, nitrogen loads are discussed on page 44 of the Environmental Review and in both the text and in the relevant table (Table 12), the words "estimated worst case nitrogen loads" are used.

The proponent should demonstrate that all efforts have been made to reduce the amount of nitrogen discharged into Cockburn Sound. The Water Corporation's Kwinana Water Reclamation Plant project will result in a significant reduction of nitrogen loads entering Cockburn Sound. However, this is because of nutrients from current industrial discharges being diverted and not a Water Corporation source. Can the Water Corporation please comment?

The Water Corporation is fundamentally committed to continual improvement within the framework of its Triple Bottom Line (social, economic and environmental) approach to providing a service to society. For this reason, the Water Corporation included a commitment in the Environmental Review (page 64, Commitment 10) to use nitrogen free alternatives for process chemicals where appropriate and practicable.

It is correctly stated in the submission that the Kwinana Water Reclamation Plant project will result in a significant reduction of nitrogen loads entering Cockburn Sound because nutrients from current industrial discharges will be diverted. The facts are that:

- Industry is currently adding this nitrogen to Cockburn Sound.
- The Water Corporation is providing the means to divert the nitrogen to Sepia Depression which is better flushed and less environmentally sensitive, and
- The Water Corporation is the proponent for this diversion within the environmental approvals process.

The intent of industry to reduce nitrogen loads to Cockburn Sound in the above process is acknowledged.

8. Dangerous goods storage

The proposed plant capacity upgrade will not significantly impact on the dangerous goods storages mentioned in the original proposal. The Water Corporation is required to obtain a dangerous goods storage licence from the Department of Industry and Resources, which will involve demonstrating that the facility meets the requirements of the Explosive and Dangerous Goods (Dangerous Goods Handling and Storage) Regulations 1992. Can the Water Corporation please comment?

The Water Corporation will apply for a dangerous goods storage licence from the Department of Industry and Resources in compliance with the Explosive and Dangerous Goods (Dangerous Goods Handling and Storage) Regulations 1992 as required.

9. Future port development in Cockburn Sound

When the original proposal was assessed, Fremantle Ports did not have any significant concerns in respect to its potential interaction with the proposed future port development in Cockburn Sound. More recently, there has been some concern that increased discharges from the desalination plant may limit the ability to progress the necessary approvals for future port development.

One specific concern is that of reduced mixing in the harbour due to the stratification arising from the saline discharge. However, it is understood that rather than residing in the harbour, the saline discharge will flow via the main shipping channels to the deeper waters of Cockburn Sound and that the discharge will be high in dissolved oxygen. Further, turbulence associated with ship movements within the port is likely to assist vertical mixing. Can the Water Corporation please confirm this?

The Water Corporation concurs with this view.

It is worth noting that approval already exists for a 30 GL/a desalination plant. The actions required by any subsequent port developers with respect to a 45 GL/a desalination plant would be exactly the same as for the already approved 30 GL/a plant.

Because of the ship movements associated with a harbour, such as the proposed Cockburn Sound harbour, there is an increased risk of oil spills. Accordingly, the Water Corporation should take this into account when designing their plant and intake structures. Can the Water Corporation please comment?

Even without an additional harbour, there is the risk of an oil spill in Cockburn Sound. The Water Corporation recognises that increased ship movements associated with a harbour results in an increased risk of oil spills and notes:

- Any harbour would be expected to have an emergency management plan for oils spills that would involve rapid containment and removal actions.
- Even if interception actions were not perfect, oil is buoyant and will float on the surface of the water and therefore is not likely to enter the submerged intake to the desalination plant.
- However, in the unlikely event that oil was not intercepted and managed to enter the intake, the desalination plant would simply be shut down until the oil spill was dissipated.

Overall, Fremantle Ports is comfortable that the increased capacity for the desalination plant will not have a significant environmental impact or a significant impact on the suitability of the area for future port development. However, the cumulative environmental impacts should be considered in light of the Cockburn Sound EPP and

the Fremantle Ports proposed port development. Can the Water Corporation please comment?

The Water Corporation concurs that the increased capacity for the desalination plant will not have a significant environmental impact or a significant impact on the suitability of the area for future port development.

The environmental effects were specifically discussed in light of the Cockburn Sound EPP. However, the Fremantle Ports proposed port development is essentially at the concept stage with many alternatives available including different layouts or siting the port elsewhere. It is not appropriate for the Water Corporation to second guess which of these is the best option or what will transpire with regard to port development in Cockburn Sound, especially when the timescale for such a development is anticipated to be over a decade.

The Water Corporation:

- Has assessed cumulative impacts based upon the existing situation in Cockburn Sound,
- Considers that future cumulative impacts for developments well into the future are the responsibility of the future developer, and
- Had discussions with Fremantle Ports and satisfied itself that necessary actions can be taken, if and when a new port is developed in Cockburn Sound, to ensure the successful operation of the desalination plant.

Finally, it is worth noting that the cumulative environmental effects of the Water Corporation with respect to Cockburn Sound since the 1980's have been positive and include:

- Diverting a large part of Perth's sewage effluent from Cockburn Sound to the better flushed environment of Sepia Depression (4.2 km offshore) in 1984,
- Interception of nutrient rich groundwater via the Jervoise Bay Groundwater Recovery Scheme, and
- Acceptance of industrial effluent to the Sepia Depression Ocean Outlet Landline as part of the proposed Kwinana Water Reclamation Plant project. This will result in significantly reduced industrial effluent loads to Cockburn Sound.

10. Intake of marine organisms

Increased amounts of phytoplankton will enter the intake during phytoplankton blooms. This may mean that backwash estimates may be underestimated. Can the Water Corporation please comment?

The backwash estimates were provided by the German company Fichtner. This company is one of the leading consultants worldwide for desalination plant design and has worked on numerous plants. The estimates that they have provided for backwash substances are based upon actual operating experience with varying water quality around the world and are considered to be conservative estimates. Further

phytoplankton blooms only occur, at most, for a small portion of the year and are thus not likely to significantly affect annual backwash estimates.

More detailed information is required on how the proponent proposes to ensure the operations of the plant, specifically the intake pipe, do not significantly impact upon juvenile marine fauna (e.g. recreational fish species) in Cockburn Sound.

The Environmental Review discusses changes in environmental effects associated with upgrading the already approved 30 GL/annum desalination plant to 45 GL/annum. There is no change in the screening arrangements from the approved proposal. As explained in the original proposal, a number of measures will be used to mitigate effects on juvenile marine fauna (e.g. recreational fish species) in Cockburn Sound. These may include inlet screens and stilling ponds.

11. Protection of Cockburn Sound

In respect to the protection of Cockburn Sound, the City of Rockingham is eager to ensure that all measures are taken to minimise the impact on marine habitat and biota as a result of the Plant's operations. This includes appropriate water quality being met after taking account the salinity and chemical treatment of discharge.

The Water Corporation agrees that all reasonable measures should be taken to minimise the impact on marine habitat and biota as a result of the desalination plant's operations. Further, this includes appropriate water quality being met after taking account the salinity and chemical treatment of discharge

As noted in the Environmental Review, The EPAs Revised Draft Environmental Protection (Cockburn Sound) Policy was released in November 2002. The supporting document released with the EPP is the Revised Environmental Quality Criteria Reference Document (Cockburn Sound) which establishes environmental quality guidelines (EQG) and environmental quality standards (EQS) for the High and Moderate ecological protection areas.

The EPA guidelines are based on the precautionary trigger level framework established by the Australian and New Zealand Environment and Conservation Council (ANZECC) together with the Agriculture and Resource Management Council of Australia and New Zealand (ARMCANZ) (ANZECC/ARMCANZ 2000). Accordingly, the guideline values established for Cockburn Sound are conservative and it is assumed that meeting the guideline values, as demonstrated in the Environmental Review document, will not result in any adverse physiological or toxicity effects on the marine biota of Cockburn Sound.

12. Stratification in Cockburn Sound

The potential for the discharge of increased levels of saline water to cause prolonged periods of vertical stratification remains a concern. It is understood that the Water Corporation has committed to seek written independent expert opinion on the modelling outcomes presented in the Environmental Review. The Cockburn Sound Management Council requests to be advised of such outcomes when they become

available and to be involved in any consultation relating to this matter. Can the Water Corporation please comment?

The Water Corporation has previously consulted with the Cockburn Sound Management Council (CSMC) and intends to continue this consultative process on all relevant issues. As such, the CSMC will be advised of the outcomes of the expert opinion on vertical stratification when it becomes available.

It should be noted that oxygen levels tend to decline in the deeper portion of Cockburn Sound during prolonged periods of naturally occurring stratification that occur in autumn. This is because the stratification effectively stops the vertical transfer of oxygen from the atmosphere to the deeper waters. The Water Corporation expects that the additional stratification associated with the saline discharge will make relatively little difference to this process of vertical oxygen transfer. Further, the high levels of oxygen contained in the saline discharge provide additional oxygen to the deeper waters that would not otherwise occur at such times. As noted in the above question, the Water Corporation has committed to obtaining an expert assessment in relation to this anticipated stratification scenario (Commitment No. 3 in the Review Document).