Explanatory Document
on the
Draft Environmental Protection Policy

and the

Draft Environmental Management Plan
for
Cockburn Sound

December 2001

1. The Setting – the Issues – the Response

Cockburn Sound is the most intensively used marine embayment in Western Australia (Map 1). With its sheltered waters, diversity of marine life and close proximity to Perth's southern suburbs, the Sound is highly valued by the community for recreation and commercial purposes such as swimming, sailing, fishing, aquaculture and tourism. The embayment also provides a safe shipping anchorage and a protected setting for significant maritime facilities for the State's major industrial complex and Australia's Naval forces.

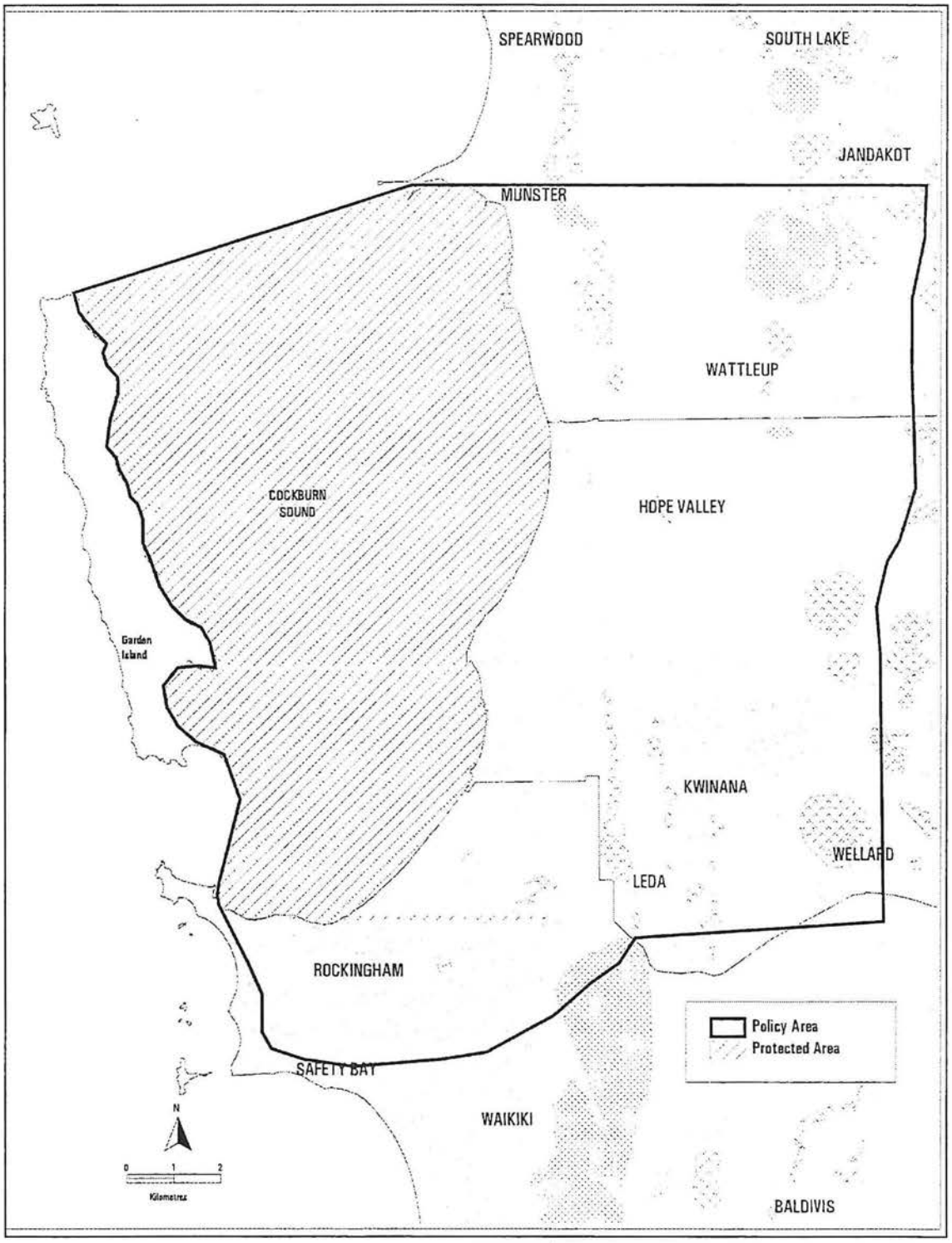
The hinterland of Cockburn Sound supports a wide range of land uses including urban, agricultural, industrial, defence and nature conservation. These many, and sometimes competing, uses are placing increasing pressure on the Sound and they are expected to intensify as the population in the catchment increases by over 30% within the next 10 years (Western Australian Planning Commission, 2000). The need to manage these complex, multiple uses and the associated environmental impacts has never been greater.

Since 1954 the eastern foreshore of Cockburn Sound has been the site of the State's heavy industrial area. Industry commenced here with an oil refinery and expanded over the next 25 years to include: iron, steel, alumina and nickel refining/processing plants; chemical and fertiliser production; wastewater treatment; power generation; and a bulk grain terminal. Wharves and groynes were built and shipping channels dredged to support these industries.

The first comprehensive environmental study of Cockburn Sound (1976 to 1979) identified a large variety of contaminants in industrial discharges to the Sound, resulting in the deterioration of water quality and widespread death and loss of seagrass beds, which are a vital part of the Sound's ecosystem (Department of Conservation and Environment, 1979). Industry responded by reducing contaminant and nutrient discharges, particularly nitrogen, and by the early 1980s the water quality was much improved compared to the 1970s.

By the late 1980s, however, the water quality had declined again, triggering a second comprehensive study – the Southern Metropolitan Coastal Waters Study (1991-1994). This study found that nutrient levels in the water were only slightly better than in the late 1970s and that although the loss of seagrass had slowed considerably, there was no evidence that it was re-establishing. Groundwater rather than industrial outfalls was found to be the main source of nitrogen, with groundwater contributing approximately 80% of the total nitrogen load. Levels of metals and organic contaminants (for example, pesticides and petroleum products) in sediments and mussels were generally well below environmental and health standards, however, there was widespread contamination with tributyltin (a highly toxic ingredient in anti-foulant paints), particularly near harbours, marinas and commercial and naval wharves (Department of Environmental Protection, 1996). A review of recent studies (2001) has confirmed the continued decline in nitrogen loads, and in levels of metals, organic contaminants and tributyltin. However, tributyltin levels in sediments still remain above acceptable levels, most notably in Jervoise Bay and Careening Bay (Lord, 2001).

The Cockburn Sound Management Council (CSMC) was established by the Government in August 2000. It draws on the legislative powers of the *Water and Rivers Commission Act 1995* and the *Environmental Protection Act 1986*. The CSMC performs the essential



Map 1: Management area of the Cockburn Sound Management Council.

role of ensuring a coordinated approach across Government, industry and the community to enable appropriate environmental planning and management of the Sound to protect the environmental values of the Sound and its catchment.

Towards this end, the Environmental Protection Authority (EPA) and the CSMC are developing an Environmental Protection Policy (EPP) and an Environmental Management Plan (EMP), building on previous research, including the *Cockburn Sound Environmental Study (1976-1979)*, the *Southern Metropolitan Coastal Waters Study (1991-1994)* and, the compilation of the most recent work, the *State of Cockburn Sound* report (2001).

There is a co-operative agreement – a "Memorandum of Understanding", between the major Government agencies represented on the CSMC, to aid in the development and implementation of this process. At a local level, the CSMC is working with the three local government councils in the catchment to reach agreement on arrangements for determining acceptable land-uses and appropriate conditions on the use of land, such as lot sizes and nutrient uses. The option of developing a Statement of Planning Policy to guide land use planning in the catchment is also being explored with the Dept. for Planning and Infrastructure. This approach would ensure a consistent approach across the catchment, by requiring local Councils to adopt uniform land use regulations.

2. The Management Framework

To continue the positive trend towards a healthier Cockburn Sound, the EPA, in consultation with the CSMC, is developing an environmental management framework to protect the Sound from groundwater pollution, waste discharges and deposits (e.g. dredge spoil).

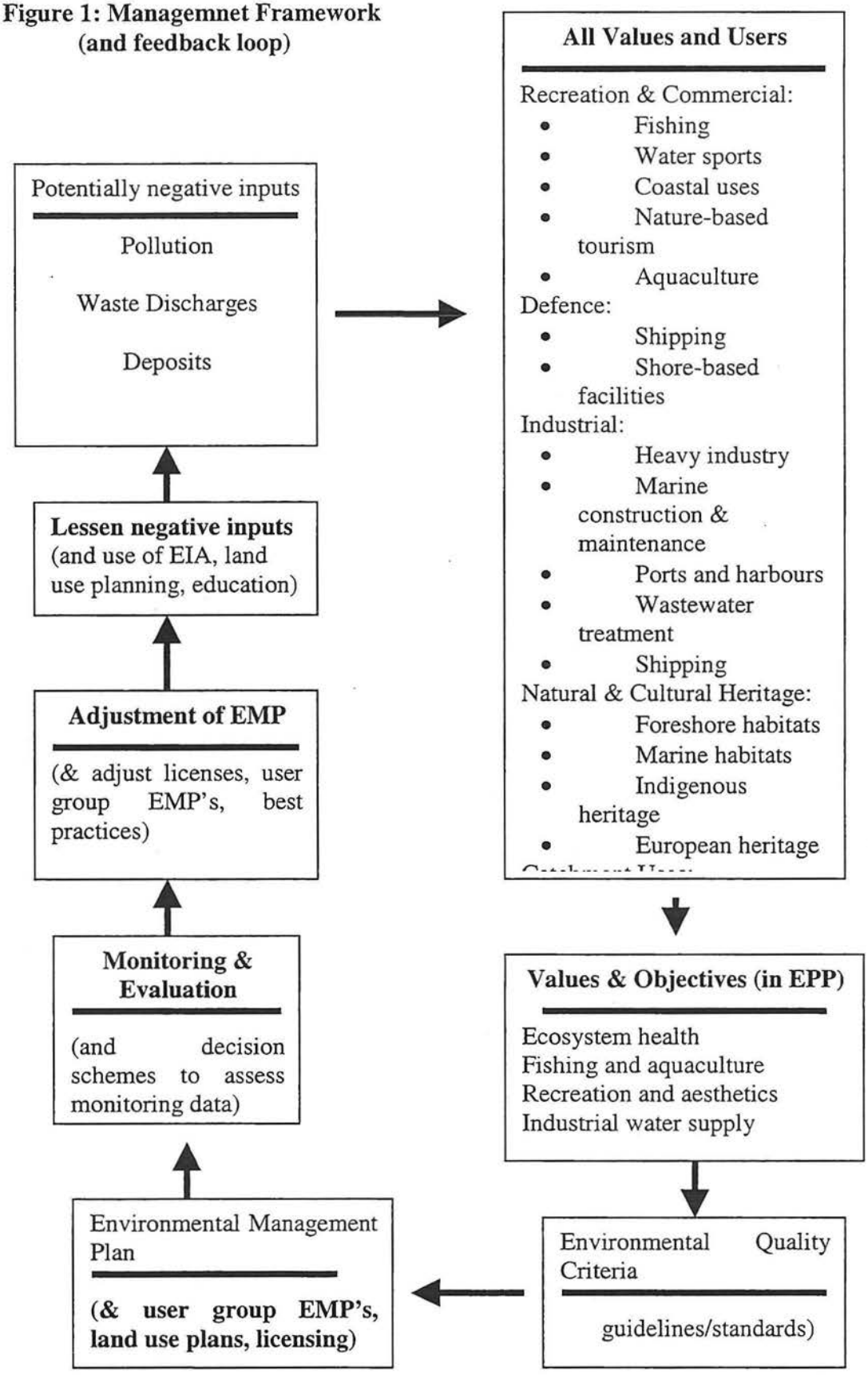
The objective of the proposed management framework (Figure 1) for Cockburn Sound is to maintain a level of water and sediment quality that will preserve the integrity and biodiversity of the marine ecosystem, as well as to manage and provide for the current and projected future societal uses that are not in conflict with the preservation of this environmental quality. The management framework is to be applied in consultation with the community and stakeholders, and is based on, and consistent with, the Australia and New Zealand Guidelines for Fresh and Marine Water Quality(ANZECC/ARMCANZ). These "National Guidelines" are in turn, underpinned by the principles of the *National Strategy for Ecologically Sustainable Development* (ESD Steering Committee, 1992).

This management framework recognizes existing mechanisms, such as:

- environmental impact assessment, under Part IV of the *Environmental Protection Act 1986*;
- licensing of operations, under Part V of the *Environmental Protection Act 1986*;
- land use planning provisions;
- best management practices; and,
- education and public awareness.

The framework builds upon these mechanisms to enable a more focused approach. This is achieved through two main actions:

Figure 1: Managemnet Framework (and feedback loop)



1. the draft Environmental Protection Policy, which establishes environmental values and environmental quality objectives for the waters of Cockburn Sound; and,
2. the draft Environmental Management Plan, which will coordinate the actions needed for the environmental protection of the Sound.

The management framework relies on monitoring and feedback mechanisms to operate effectively. It also relies upon an active and on-going cooperative management presence which the CSMC will provide.

As a consequence of this management approach, existing regulatory mechanisms will need to be reviewed (in the light of the draft EPP) and adjusted as required, such as licencing arrangements (see Appendix A).

Future development proposals (e.g. new port facilities) would be subject to an environmental impact assessment by the EPA under Part IV of the *Environmental Protection Act 1986*. The Part IV decision process will be compatible with the EPP. Should the EPA find that any proposals have significant implications for the environmental quality objectives of the EPP, then the EPA would advise the Minister for the Environment and Heritage accordingly. The Minister would then seek to resolve the matter.

The management framework also establishes three ecological protection zones across Cockburn Sound (Map 2).

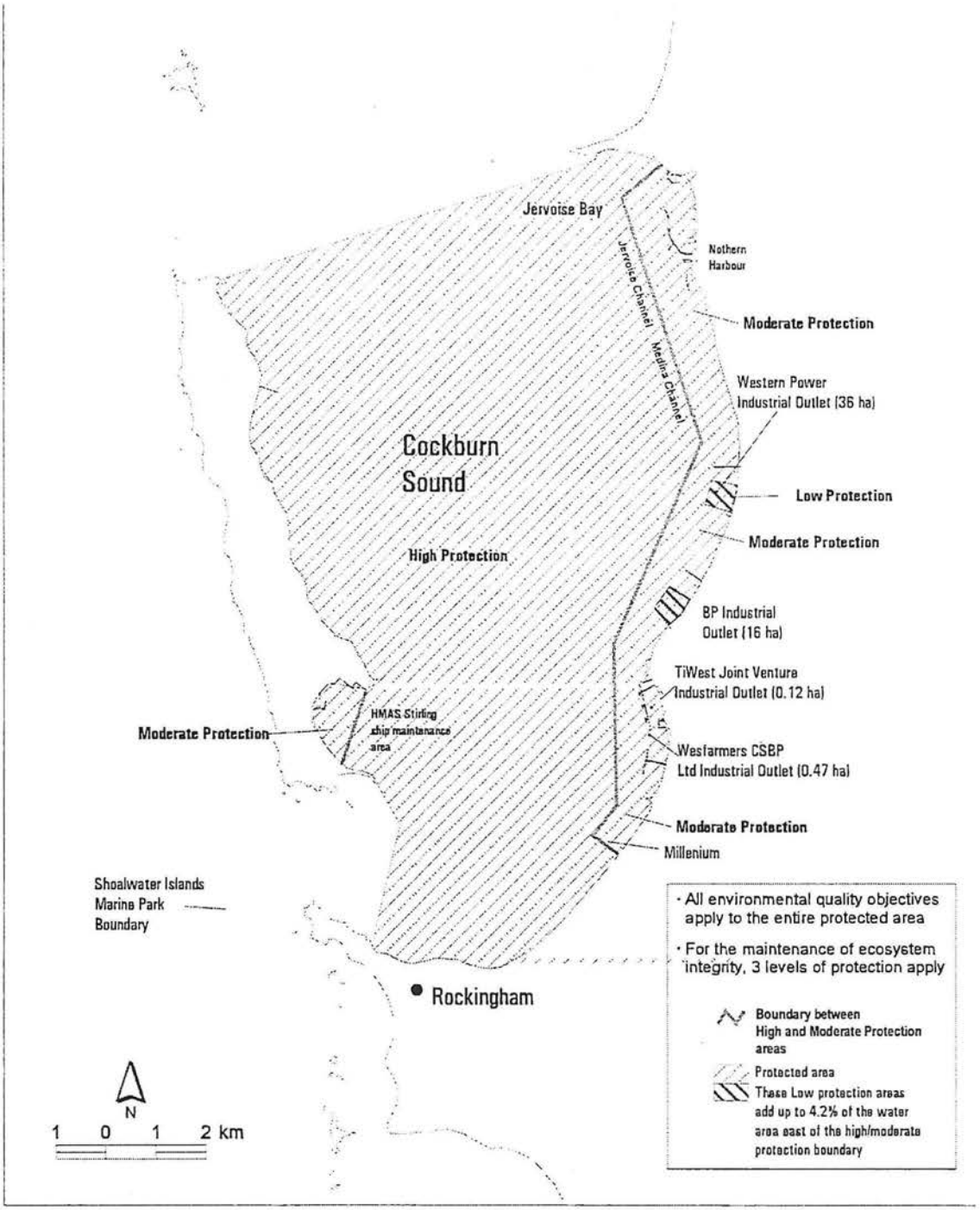
3. The Environmental Protection Policy (EPP)

The EPA has developed a draft EPP for Cockburn Sound which sets out the environmental values of the Sound. The environmental values and objectives apply to the waters of Cockburn Sound were identified in the EPA document titled: *Perth's Coastal Waters: Environmental Values and Objectives* (EPA, 2000a), and are shown in Table 1. These values and objectives were derived from extensive community consultation.

Table 1: Environmental Values and Objectives for Cockburn Sound

Environmental Values	Environmental Quality Objectives
Ecosystem Health	Maintenance of ecosystem integrity. For example, there should be no further decline in seagrass meadows.
Fishing and Aquaculture	Maintenance of aquatic life for human consumption. That is fish and shellfish should be clean and safe for people to eat.
Recreation and Aesthetics	Maintenance of primary contact recreation values (waters safe for swimming). Maintenance of secondary contact recreation values (waters safe for boating). Maintenance of aesthetic values (pleasant, attractive environment - water and beaches clean).
Industrial Water Supply	Maintenance of industrial water supply values (e.g. good quality water should be available for industrial use).

(From EPA, 2000)



Map 2: Indicative location and size of low protection zones for current industrial effluent discharges to Cockburn Sound. (This map does not form part of the EPP for Cockburn Sound.)

The Cockburn Sound EPP broadly aims to:

- establish environmental values (EV), environmental quality objectives (EQO) and environmental quality criteria (EQC) for waters in Cockburn Sound;
- identify a program to protect the environmental values of Cockburn Sound;
- requires a response to any exceedence of the EQCs;
- integrate environmental planning and management for the land and marine environment for the Sound and its catchment;
- provide for the establishment of an Environmental Management Plan to coordinate appropriate actions and their management against agreed objectives;
- provide a mechanism for the Cockburn Sound Management Council to coordinate environmental management efforts; and
- provide for a monitoring framework and regular reporting on progress against objectives.

Through Part III of the *Environmental Protection Act 1986*, the Environmental Protection Policy for Cockburn Sound will provide specific statutory (i.e. legislated) protection of the environmental values of Cockburn Sound. The statutory process for the development of this EPP is shown in Figure 2.

4. The Environmental Management Plan (EMP)

The need to balance competing uses of the marine and foreshore environment of Cockburn Sound in an ecologically sustainable manner presents major challenges. The Sound's deep, sheltered waters are extremely popular for commercial and recreational activities, yet at the same time, they support a busy port, a heavy industrial area and a strategic naval base. Furthermore, all these uses are expected to intensify in the near future.

A key role of the EPA, through consultation and coordination with the CSMC, is to reach an acceptable balance of outcomes across the full range of uses and users. The EMP for Cockburn Sound consists of a five point plan of action that involves:

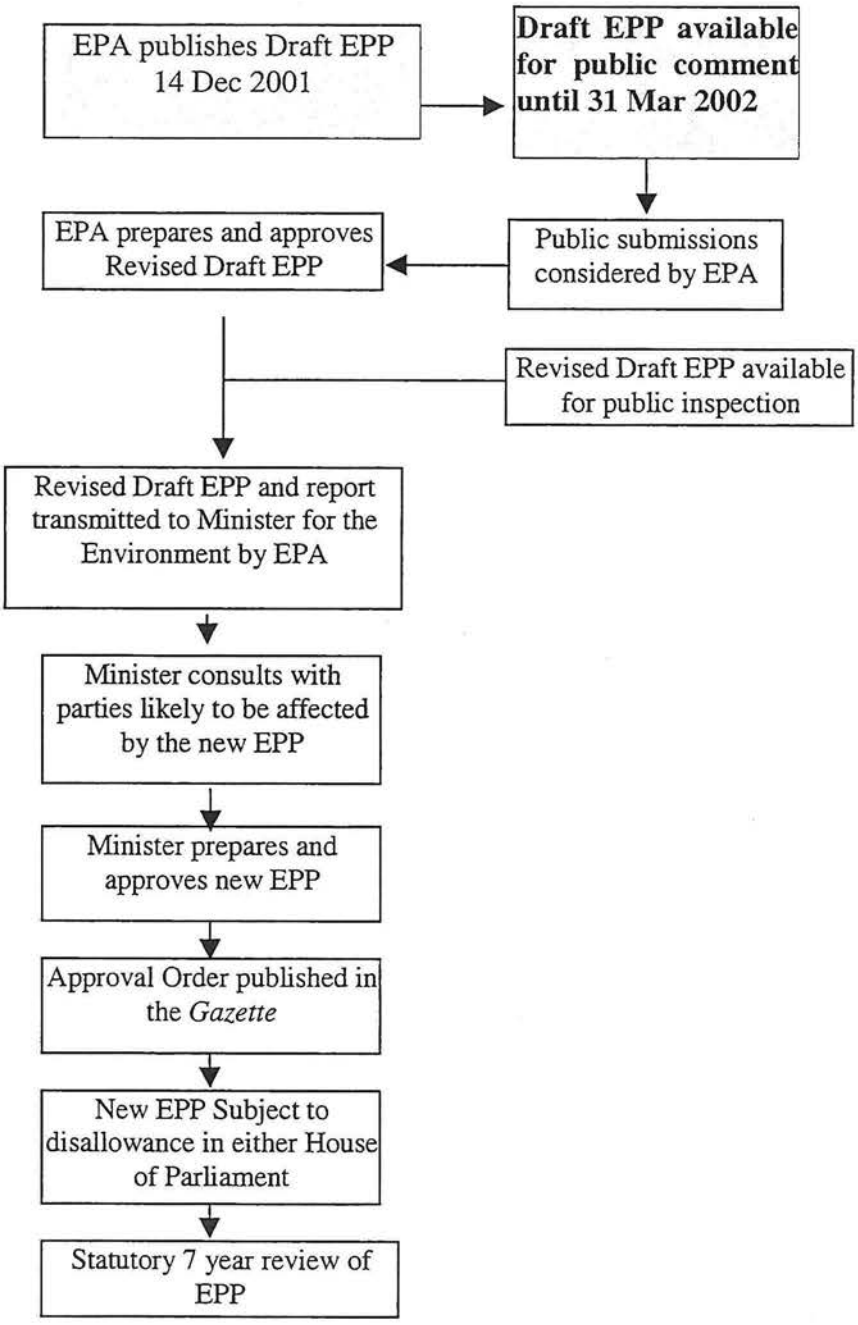
1. Protecting the environmental values of Cockburn Sound from pollution;
2. Facilitating multiple use management of Cockburn Sound;
3. Integrating environmental planning and management;
4. Coordinating research and investigations; and
5. Monitoring and reporting on performance.

The EMP consists of the following sections:

Management Context – This section outlines the principles and policies that guide the management of Cockburn Sound and describes the relationship between the EPP and the EMP. The roles and responsibilities of the bodies involved in implementing the EMP are also listed.

Management Response – This section details a five point action plan for Cockburn Sound and its catchment. The format of each of the five sub-sections broadly follows the

Figure 2: Steps in Development of the Cockburn Sound EPP.



approach taken by the Department of Conservation in management planning for marine areas in the conservation estate of Western Australia.

A cooperative approach is used to implement the EMP. This approach involves: recognising the key ecological and social values; identifying the main management issues regarding these values; and developing management objectives and recommendations to address these issues. Listed next to each recommendation in the EMP are the agencies/groups responsible for implementation, together with the time frame for commencing and completing the task.

5. The Environmental Quality Criteria (EQC) Reference Document

The Environmental Quality Criteria Reference Document provides the benchmarks to enable the policy to be implemented. It contains environmental quality criteria (EQC) and decision schemes (DS) that explain how the environmental quality criteria should be applied. The EPP provides the legal standing for the EQC Reference Document by prescribing in the EPP's schedules how the EQCs are to be used. The EQC Reference Document allows the EMP to implement the EPP.

The EQCs are expressed as either numerical values or narrative statements. For EQCs related to ecosystem health, there are three levels of protection (high, moderate or low), and these all have separate numerical values or narrative statements.

These criteria (levels) represent a benchmark, and if contamination levels rise above them an action is triggered. There are two types of criteria which prompt different responses if they are exceeded:

Standard	If a standard level is exceeded it initiates co-operative management action to address the problem.
Guideline	If a guideline level is exceeded it triggers investigations to determine if the environmental values of Cockburn Sound (e.g. ecosystem health - seagrass health) are at risk.

For example, for cadmium the EQS, expressed as a *narrative*, is a set of steps to follow to determine if there are unacceptable biological effects (high and moderate). The EQG *numerical values* for cadmium are: 0.7 micrograms/litre (high), 14 (moderate) and 36 (low).

Development of the environmental quality criteria has mainly been based on the guidelines and approaches recommended in the "National Guidelines". Cockburn Sound is one of the first areas in Australia where these "National Guidelines" are being applied in a local context.

Process to Change EQCs

As the EQC Reference Document is given legal standing through the EPP, any changes to it must also follow due process. The EPP (in Schedule 6) sets out the steps required to be taken in order to change any feature or numerical entry in the EQC Reference Document.

The draft EPP requires the EQC to be reviewed within 24 months of the EPP's gazettal. The steps to do this review and any subsequent review are described in Schedule 6 of the EPP. This review includes a public consultation component.

6. Monitoring and Evaluation

The primary means to assess the performance of the management framework is to evaluate the responses to the management actions of Government agencies, industry, defence, local councils and user groups, and to report to the community on collective progress towards a healthier Cockburn Sound.

A water quality monitoring program will inform the evaluation process. This monitoring would focus only on the environmental quality indicators for contaminants that were considered to pose a potential threat to achieving the environmental quality objectives (i.e. a small subset of the lists in the EQC Reference Document).

The EPP provides a mechanism for the CSMC, in conjunction with industry and regulators, to produce the list of contaminants for monitoring and reporting. Once this list has been determined, then the monitoring program will need to be conducted at two levels:

- Firstly, the contaminant source(s) should be identified and monitored on an on-going basis to provide information on contaminant inputs and early warning of potential risks to environmental quality through environmental exposure modelling. This may involve sampling an effluent stream, , groundwater, stormwater drains or any other potential sources.
- Secondly, a program for monitoring the water quality of the Sound is required. Sampling would be required on a less regular basis than at the contaminant source.

Where the monitoring program indicates a guideline or standard has been exceeded, the EPP sets out steps to be taken in decision schemes. For exceeding an EQG, an investigation is required. For exceeding an EQS, a management action is required. The response would focus on reducing loads of the contaminant of concern (ie. source control) but may also require *in-situ* remedial work to be undertaken. The CSMC, in consultation with the EPA, will oversee the monitoring program, review the results and determine what management response should be undertaken.

7. The Management of Nutrient-related Environmental Quality in Cockburn Sound

The EPP recognizes the nutrient history of Cockburn Sound and sets appropriate EQS' and EQGs. The Environmental Quality Guidelines (EQG) for *chlorophyll a* as set out in Table 1a under Water Quality Measures in the EQC Reference Document addresses this issue. The level of *chlorophyll a* has been found to be a useful indicator of nutrient loads.

A characteristic of Cockburn Sound is that there has been a significant loss of seagrass as a result of both industrial development and nutrient enrichment of the area. Most of the

seagrass along the eastern border of the Sound has disappeared, whilst the seagrass along the western border remains in good condition.

Cockburn Sound is a multi-use area, and it may never return to a situation where seagrass is re-established throughout the eastern border. However, two things are clear: firstly, it would be unacceptable for there to be further nutrient-related loss of seagrass area in Cockburn Sound, and secondly, the trend in the overall nutrient-related water quality should be towards a reduced level of *chlorophyll a*, with the long term goal of reaching the Environmental Quality Guidelines for both *chlorophyll a* and water clarity.

The Department of Environmental Protection provides information each year in its Annual Reports on levels of *chlorophyll a*, and this shows that, overall, the nutrient related water quality has improved slightly since the early 1990's. Nutrient inputs from human activities have declined from an estimated 2000 tonnes/year in 1978 to about 300 tonnes/year in 2000, and about 70% of this 300 tonnes is from groundwater.

The Kwinana Industries have significantly reduced nutrient input to the Sound, and this could be reduced further if some of the industry effluent is discharged through the Water Corporation Cape Peron outfall in the future.

Future management of nutrients will need to focus on the more diffuse sources of nutrient inputs (eg groundwater, drainage waters) which are now the dominant sources, but also are the most challenging to locate, quantify and manage.

Because of historic nutrient-related water quality issues impacting on the seagrass in Cockburn Sound, the responsible parties are, and have been for some years, in an on-going investigation mode. There has thus already been the need for an investigation into ecosystem health conditions, in advance of this water quality management framework. There is also an on-going need to take direct biological measurements of seagrass health as set out in the Environmental Quality Standard columns in Table 1, as well as to measure *chlorophyll a* and water clarity.

The EQG selected for nutrient management in Cockburn Sound are based on data collected from Warnbro Sound immediately to the south. The values selected need to be independent of Cockburn Sound because the Sound has been impacted upon by nutrients to a considerable degree. Accordingly, Warnbro Sound is a logical choice. It provides a useful comparison against which changes in Cockburn Sound can be judged. However, it is recognised that a reduction in *chlorophyll a* to the proposed EQG values may not be achieved for many years, if at all. What is clear is that, if monitoring over time does show that the *chlorophyll a* levels do move towards the Warnbro Sound level, there will have been a significant improvement in the management of nutrient inputs, which are now nearly all from enriched groundwater and diffuse sources. As with all of the EQCs, the nutrient related criteria will be reviewed within two years of gazettal of the EPP – see section 8(3)(c) of the draft EPP.

8. Low Protection Zones

The draft EPP provides for the establishment of Low Protection Zones through specifying ecological criteria that would apply to these areas. These Zones encompass the mixing zones of point source discharges (Map 2).

Within these zones, the EPP enables the EPA to exempt some or all social values. A process for determining these exemptions is under development, and would be based on a case by case assessment.

9. The Process and Your Submission

Drafts of the Environmental Protection Policy, the Environmental Management Plan, and the Environmental Quality Criteria Reference Document are being released for public comment. A series of public meetings will be held to facilitate the explanation of these documents – details of these meetings will be provided in local newspapers.

Revised versions of these documents will be produced afterwards, taking into account public comments.

The Draft EPP and the Draft EQC Reference Document will be revised by the EPA before transmitting the documents to the Minister for the Environment and Heritage for her action (see Fig 2).

The Draft EMP will be reviewed by the CSMC and submitted to the Ministerial Council for Cockburn Sound for endorsement.

Comments on the Draft EPP, Draft EQC Reference Document and Draft EMP should be directed to:

The Chairman, Environmental Protection Authority, Floor 8, 141 St Georges Terrace, Perth 6000 WA.

Please send your submissions by 31 March 2002.

Appendix A

Department of Environmental Protection's intended approach to licensing prescribed premises based on the Draft Environmental Protection Policy for Cockburn Sound.

Limits on the quantity and quality of contaminants that can be discharged from prescribed premises may be established through licence conditions under Part V of the Environmental Protection Act.

The Management Framework of the Cockburn Sound EPP depends on spatially-defined Environmental Quality Objectives (EQOs) for the Cockburn Sound. Environmental Quality Criteria (EQC) are the threshold concentrations of a contaminant, or some other critical indicator of environmental quality, that are used to tell whether the EQOs are being met and hence the Environmental Value specified in the Draft EPP is being protected.

EQC consist of two levels: Guidelines and Standards. If a guideline is met there is a high degree of certainty that the associated EQO has been met. Standards indicate a level above which there is a significant risk that the associated EQO may not be achieved and a management response is triggered.

The Licensing System will be used to limit the quality and quantity of contaminants that can be discharged from prescribed premises into Cockburn Sound. In the context of the Draft Cockburn Sound EPP, the primary aims of licence limits are to ensure that:

- effluent quality does not lead to the EQC being exceeded and:
- total loads of contaminants to the environment are kept as low as is reasonably practicable.

When determining appropriate effluent discharge limits, the DEP would initially refer to the EQGs which, if met, provide a high degree of certainty that associated EQOs are being met. The EQGs for toxicants are not intended to be transferred directly into licence conditions. However, it is possible to use these ambient criteria to back-calculate maximum permissible concentrations in the effluent that would still protect the values of that environment, taking into consideration the outfall dilution and dispersion characteristics and background concentrations (see calculated example below). This value would represent an upper threshold of a possible licence limit.

Some contaminants, identified as biomagnifiers/bioaccumulators, are assigned low protection guideline values and therefore require to be met within a low protection zone. In these cases the values represent upper thresholds for licence limits.

In setting the final licence limit, the DEP would also take into account waste minimisation and best practice principles, then take into account current performance. The aim is to ensure that the EQOs are met and that total loads of contaminants to the environment are kept as low as are reasonably practicable.

While the draft EQC Reference Document to the draft Cockburn Sound EPP contains Low Reliability Values it is not proposed to use these values to determine licence limits because of their low reliability.

If a Low Reliability Value is exceeded it should signal to the regulator and the discharger that some level of investigation may be appropriate to ensure environmental impacts are avoided.

A licence may also contain a Licence Target that provides an operational target for dischargers to aim to remain below. This is distinct from a Licence Limit which is a maximum discharge level that should not be exceeded. If effluent quality remains below the licence target the frequency and intensity of ambient monitoring requirements may be reduced. If effluent quality exceeds the licence target and remains below the licence limit, a routine monitoring programme will be required to provide surety that the EQG is not being exceeded.

If ambient monitoring shows the EQG is being exceeded, it triggers more detailed assessment against the EQS to determine if the environmental values of Cockburn Sound are at risk. The costs of monitoring against the EQS are likely to be higher than those costs associated with monitoring against the EQG. Instead of expending resources on monitoring against the EQS, the discharger may choose to commit those resources to reducing discharge levels further so that contaminant levels in the environment fall below the EQG.

If the EQS is exceeded a management response is required. The response would focus on reducing loads of the contaminant of concern (i.e. source control) but may also require *in situ* remedial work.

CALCULATING LICENCE DISCHARGE LIMITS

EXAMPLE:

Company A discharges process water containing low levels of copper into Cockburn Sound.

Company A has a sub-sea diffuser 60 m long, and under worst case conditions achieves 150 dilutions at the edge of its mixing zone which is approximately 20 x 80 m. To be consistent with the EPP, contaminants in the effluent should not result in ambient concentrations rising above the:

(A) Moderate Protection Guideline levels at the edge of the moderate protection area; and,

(B) High Protection Guideline Levels beyond the Moderate/High Protection boundary.

Using copper (Cu) as an example,

(A) The Moderate Protection Guideline level is 3 µg/L
The background level for Cu in Cockburn Sound is 0.15 µg/L

Applying a back calculation:

$Ce = D (Ca - Cb) + Cb$ (1)

Where:
Ce = effluent concentration
Ca = ambient concentration (at edge of mixing zone)
Cb = background concentration
D = dilutions (at edge of mixing zone)

To calculate Ce such that Ca = 3 (so that the Moderate Protection Guideline level is met at the edge of the mixing zone). Substituting into equation (1)

$Ce = 150*(3 - 0.15) + 0.15$

$= 428$ µg/L

This is an upper limit which has not yet taken into consideration Best Practice / As Low As Reasonably Practical / Waste Minimisation Principles.

The Company A licence limit for Cu is currently 250 µg/L.

Company A reports a range of effluent Cu concentrations of 20 - 200 µg/L. The current licence limit already incorporates waste reduction principles. It is well below the upper limit and is considered to adequately protect the Moderate Protection Zone in Cockburn Sound.

(B) A similar analysis shows that effluent of this quality also meets the High Protection Guideline Levels at the Moderate/High Protection Boundary.

Draft Environmental Protection (Cockburn Sound) Policy 2001

Release of the Draft for Public Comment
As required under section 26 of the Environmental Protection Act, 1986

Environmental Protection Authority
Perth, Western Australia
December 2001

ENVIRONMENTAL PROTECTION ACT 1986

Environmental Protection (Cockburn Sound) Policy Approval Order 2001

Background to the approval of this environmental protection policy

The Government of Western Australia –

(a) *recognises that Cockburn Sound, situated within Perth's coastal waters, is highly valued by the community for its ecological, economic and recreational attributes;*

(b) *is conscious of the need to protect the intrinsic value of biological diversity and of the ecological, genetic, social, economic, scientific, educational, cultural, recreational, aesthetic, and natural values of biological diversity and its components;*

(c) *recognises the importance of Cockburn Sound for commercial purposes, including activities such as fisheries, aquaculture and tourism, which require a high level of marine water quality;*

(d) *recognises the need for other uses of Cockburn Sound such as industrial water supply, shipping, harbours and marinas even though they can lower environmental quality in localised areas;*

(e) *recognises its obligations under the Intergovernmental Agreement on the Environment made between the Commonwealth, the States and Territories, and the Australian Local Government Association on 1 May 1992; in particular to the four principles of ecologically sustainable development pertaining to management of ecosystems, biodiversity, intergenerational equity, and the precautionary principle;*

(f) *recognises that all the uses of Cockburn Sound and its catchment, as they affect the Cockburn Sound, need to be managed in accordance with the above-mentioned principles of ecologically sustainable development;*

(g) *recognises that events and activities outside the policy area may adversely affect the environmental values established in the policy from time to time; and*

(h) *recognises the importance of Cockburn Sound and Naval Waters to the Australian Defence Force and acknowledges the Commonwealth environmental, legislative and policy framework by which it abides.*

Made by the Minister under section 31(d) of the *Environmental Protection Act 1986.*

1. **Citation**

This policy may be cited as the *Environmental Protection (Cockburn Sound) Policy Approval Order 2001.*

2. **Approval of environmental protection policy**

The environmental protection policy set out in the Schedule –

(a) is approved; and
(b) shall have the force of law on and from the day of its publication in the *Government Gazette.*

Schedule 1

[Clause 2]

ENVIRONMENTAL PROTECTION ACT 1986

Environmental Protection (Cockburn Sound) Policy 2001

Approved by the Minister under section 31(d).

Part 1 – Preliminary

1. Citation

This policy may be cited as the *Environmental Protection (Cockburn Sound) Policy 2001*.

2. Purpose of policy

The purposes of this policy are –

(a) to declare, protect and maintain the environmental values of Cockburn Sound;

(b) to abate pollutants and restrict activities that diminish the environmental values of Cockburn Sound;

(c) to establish a program of protection for the environmental values of Cockburn Sound;

(d) to give effect to the environmental quality objectives and the environmental quality criteria for Cockburn Sound; and,

(e) to give effect to the Environmental Management Plan for Cockburn Sound.

3. Interpretation

(1) In this policy -

"background level" means the level of an indicator (measured in a manner and at a location specified by the Environmental Protection Authority) in marine waters outside the influence of any discharges containing a measurable level of that indicator;

"biodiversity" means the variety and types of naturally occurring marine life. This encompasses genetic, species and ecosystem levels at the local and regional scale;

"Cockburn Sound Management Council" means the Cockburn Sound Management Council as established under clause 15 of schedule 1 of the *Water and Rivers Commission Act 1995*;

"decision scheme" specifies the way monitoring data are to be assessed against the environmental quality criteria in order to determine whether or not a management response is required;

"diffuse source" in relation to pollution means multiple small sources spread over a wide area;

"environmental management plan" means the Environmental Management Plan referred to in clause 10(1)(a);

"ecological integrity" means the state of an ecosystem being whole and unimpaired, which is usually determined by reference to appropriate ecosystem indicators and criteria;

"environmental quality criteria" means the numerical values or narrative statements that serve as benchmarks to determine whether a more detailed assessment of environmental quality is required (these criteria are termed environmental quality guidelines), or whether a management response is required (termed environmental quality standards);

"environmental quality guideline" means a numerical value or narrative statement which if met indicates there is a high probability that the associated environmental quality objective declared under 7(2) has been achieved;

"environmental quality objective" means a specific management goal for a part of the environment and is either ecologically based by describing the desired level of health of the ecosystem or socially based by describing the environmental quality required to maintain specific human uses;

"environmental quality standard" means a numerical value or narrative statement beyond which the associated environmental quality objective declared under clause 7(2) has not been achieved and a management response is triggered;

"environmental value" means a particular value or use of the marine environment that is important for a healthy ecosystem or for public benefit, welfare, safety or health and which requires protection from the effects of pollution, waste discharges and deposits. Two types of environmental value are considered: ecological and social;

"licensed premises" means a residential, industrial or other premises of any kind whatsoever and includes land, water and equipment, licensed under Part V of the Act;

"marine environment" means that portion of the environment that is on the landward side of the territorial seas of Australia, as determined under Schedule 2 of the *Petroleum (Submerged Lands) Act 1967 (Commonwealth),* including the intertidal zone bounded by the high water mark of the ocean;

"mixing zone" means an explicitly defined area around an effluent discharge where the effluent is actively diluted with the ambient water;

"policy area" means the area to which this policy applies, as shown in Schedule 1;

"pollutant" means any matter or thing that could have the potential to alter, directly or indirectly, the environment to the detriment of the environmental values;

"pollution" means direct or indirect alteration of the environment to its detriment or degradation; to the detriment of any environmental values; or, of a prescribed kind;

"practicable" means reasonably practicable having regard to, among other things, local conditions and circumstances (including costs) and to the current state of technical knowledge;

"protected area" means the marine waters within the policy area;

"public authority" means Minister of the Crown acting in his official capacity, department of the Governor, State agency or instrumentality, local government or other person, whether corporate or not, who or which under the authority of a written law administers or carries on for the benefit of the State, or any district or other part thereof, a social service or public utility;

"social value" means a particular value or use of the marine environment that is important for public benefit, welfare, safety or health and which requires protection from the effects of pollution, waste discharges and deposits;

"the Act" means the *Environmental Protection Act 1986*;

"the policy" means *the Environmental Protection (Cockburn Sound) Policy 2001* approved under the *Environmental Protection (Cockburn Sound) Policy Approval Order 2001* and set out in the Schedule of that order;

"the schedules" means the Schedules made under the *Environmental Protection Act1986* to implement this policy and which are a part of the policy; and,

"to discharge" in relation to waste or other matter, means to deposit it or allow it to escape, or cause or permit it to be, or fail to prevent it from being, discharged, deposited or allowed to escape.

(2) Words and expressions that are given a meaning in the Act have that meaning in this policy.

4. Application

(1) The portion of the environment to which this policy applies is the portion of land and its marine environment within the area bordered black on Department of Land Administration *Miscellaneous Plan No. XXXX*, and which is shown in Schedule 1 as the policy area.

(2) A copy of the plan referred to in subclause (1) is available for public inspection during normal office hours at the head office of the Department of Environment, Water and Catchment Management in Perth and its Kwinana-Peel regional office.

(3) The area declared as a protected area under this policy is the portion of marine waters within the policy area.

Part 2 – Environmental values, environmental quality objectives and environmental quality criteria for the protected area

5. Basis for protection

Environmental protection under this policy is based on:

(a) recognition of the importance of ecological processes and the interconnectedness of terrestrial and marine ecosystems;
(b) recognition of the potential effects of toxicants and nutrients in water, sediments and biota;
(c) the requirement that discharges to marine waters from all sources should not be such as to cause the levels declared under clause 8(2) to be exceeded; and,
(d) recognition of the need for the management of cumulative impacts.

6. Environmental values

(1) The environmental values for the protected area under this policy are –

(a) Ecosystem health (an ecological value);
(b) Seafood safe for eating (a social value);
(c) Aquaculture (a social value)
(d) Recreation and aesthetics (a social value); and,
(e) Industrial water supply (a social value).

(2) The environmental values require protection from the effects of pollution, waste discharges and deposits.

7. Environmental quality objectives

(1) Environmental quality objectives may be defined for each environmental value declared under clause 6(1).

(2) The environmental quality objectives declared under this policy are -

(a) For ecosystem health:
Maintenance of ecosystem integrity:
The level of protection to be maintained for ecosystem integrity is measured in terms of structure (e.g. biodiversity, biomass and abundance of biota) and function (e.g. food chains and nutrient cycles). The level of protection is described within the environmental quality guidelines in Tables 1 to 8 of the Environmental Quality Criteria Reference Document and is set at one of the three levels, such that -

(i) High Level of Protection allows small changes in the quality of water, sediments and biota;
(ii) Moderate Level of Protection allows moderate changes in the quality of water, sediments and biota; and,
(iii) Low Level of Protection (Mixing Zone) allows for a reduced level of environmental quality.

(b) For seafood safe for eating:
Maintenance of aquatic life for human consumption, such that seafood is safe for human consumption when collected or grown;
(c) For aquaculture: -
Maintenance of aquaculture, such that water is of a suitable quality for aquaculture purposes;
(d) For recreation and aesthetics:
(i) *Maintenance of primary contact recreation values*, such that primary contact recreation (e.g. swimming) is safe;
(ii) *Maintenance of secondary contact recreation values*, such that secondary contact recreation (e.g. boating) is safe;
(iii) *Maintenance of aesthetic values,* such that the aesthetic values are protected; and,
(e) For industrial water supply:
Maintenance of industrial water supply values, such that water is of suitable quality for industrial water supply purposes.

(3) For ecosystem health –
(a) the boundaries between the High and Moderate protection areas of the particular environmental quality objective identified in sub-clause 2(a) are mapped in Schedule 2 of the policy; and,
(b) a contemporary map of the geographical distribution of authorised Low protection areas will be maintained by the Environmental Protection Authority and be made available on its web site and at the public reading room of the Department of Environmental Protection.

(4) For ecosystem health, Low protection areas will –
(a) be located east of the boundary between the High protection area and the Moderate protection area on the eastern side of Cockburn Sound; and,
(b) occupy a maximum cumulative water surface area, [to be determined by the EPA following completion of current modelling work being undertaken by DEP officers, and completion of the public consultation process for the EPP. This maximum cumulative water surface area will be expressed as a percentage of the total *water* surface area east of the boundary between the High protection area and the Moderate protection area on the eastern side of Cockburn Sound. At this stage the EPA anticipates this figure would not exceed 5%.]

(5) The environmental quality objectives identified in sub-clause (2)(b-e) -
(a) apply to High and Moderate protection areas as delineated in Schedule 2 of the policy; and,
(b) apply to the Low protection areas, except where varied by the Environmental Protection Authority on a case by case basis.

(6) Any reduction in areal extent of the protected area will need to be in accordance with approvals through the *Environmental Protection Act 1986*.

8. Environmental quality criteria

(1) To protect the environmental values and meet the environmental quality objectives established under this policy, environmental quality criteria are established, which comprise numerical and narrative values.

(2) Environmental quality criteria will be the benchmarks against which the level of achievement of the environmental quality objectives declared under clause 7(2) will be measured.

(3) The environmental quality criteria –

(a) are established as numerical and narrative values in tables in the Environmental Quality Criteria Reference Document, published by the Environmental Protection Authority, and are summarised in column 4 of the table below; and,
(b) apply to the protected area through the decision schemes prescribed in schedules 3 to 5 in the policy. These are summarised in column 3 below as -

Environmental value	**Environmental quality objective**	**Decision scheme**	**Environmental quality criteria** (contained in EQC Reference Document)
Ecosystem health	Ecosystem integrity	Schedule 3	Table 1 (Nutrient/physical indicators) Table 2 (Toxicants in water) Table 3 (Toxicants in sediment)
Fishing and aquaculture	Seafood safe for eating Aquaculture	Schedule 4	Table 4 Table 5
Recreation and aesthetics	Primary contact Secondary contact Aesthetics	Schedule 5	Table 6 Table 7 Table 8

Note: There are no environmental quality criteria for Industrial water supply

(c) values are contained within the Environmental Quality Criteria Reference Document and may be reviewed by the Environmental

Protection Authority 24 months after Gazettal of this policy, and then as required by the Environmental Protection Authority. The review will follow the process identified in schedule 6 of this policy.

(4) The focus of management activity will be based on monitoring data undertaken in the policy area, such that –

(a) if it is determined that no environmental quality guidelines are exceeded, then the environmental values of the policy area are declared to be fully met;
(b) if an environmental quality guideline is exceeded, it will trigger more detailed investigations to determine whether the environmental quality standard has been met; and,
(c) if an environmental quality standard is exceeded, it will trigger an adaptive management response.

9. **Application of environmental quality criteria**

(1) Activities and practices within the policy area must be managed and reasonable and practicable measures be taken so that the environmental quality objectives established by this policy are achieved.

(2) The focus for management is to ensure that the environmental quality objectives are achieved by meeting environmental quality guidelines. If an environmental quality guideline is not met then there is uncertainty over whether the associated environmental quality objective has been achieved and a more detailed assessment against an environmental quality standard is triggered.

(3) The relevant public authorities shall –

(a) determine which parameters listed in the environmental quality criteria tables should become a focus of monitoring, further investigation and/or reporting in areas under their jurisdiction; and,
(b) through the Cockburn Sound Management Council, cause the list of monitoring parameters provided in sub-clause 3(a) and an outline of their monitoring programs to be published, as part of their annual performance report.

(4) Where an exceedence of an environmental quality guideline occurs –

(a) environmental quality shall be investigated and assessed against the environmental quality standards according to the decision schemes prescribed in schedules 3 to 5 of the policy;
(b) the relevant public authorities through the Cockburn Sound Management Council shall report to the Minister through the Environmental Protection Authority, in accordance with steps outlined in schedules 3 to 5 of the policy; and,

(c) the relevant public authorities shall report the results of the assessment against the environmental quality standards.

(5) Where an exceedence of an environmental quality standard occurs, the relevant public authorities shall –

(a) report such exceedences to the Environmental Protection Authority as soon as practicable;
(b) coordinate an investigation into its cause and report to the Minister through the Environmental Protection Authority, in accordance with the steps outlined in Schedules 3 to 5 to the policy;
(c) provide a management response, such that where the discharge is found to be from diffuse or unlicensed premises, then a cooperative management response will be implemented by the Cockburn Sound Management Council and where the discharge is found to be from a licensed premises, then the licensee and relevant public authority will implement a management response; and,

(d) through the Cockburn Sound Management Council, report to the Environmental Protection Authority on the outcomes of the management response.

(6) If the EPA establishes a reasonable case that unlicensed activities have caused or contributed to the environmental quality guidelines or standards being exceeded, and does not get cooperation from the party or parties believed to be contributing to the exceedences in addressing the problems, then it may make recommendations to the Minister as to what actions should be taken.

(7) The environmental quality guidelines and environmental quality standards established by this policy are not intended to identify when pollution has occurred, but are intended as triggers for investigation and management action.

(8) This policy recognises existing authorisations within the policy area.

Part 3 – Program to protect environmental values and achieve environmental quality objectives

10. **Framework for the program to protect**

(1) The protection of the environmental values is to be achieved by –

(a) management to meet the environmental quality criteria as prescribed in the schedules to the policy, to include -

(i) implementation of an Environmental Management Plan;
(ii) implementation of strategic planning mechanisms over the land portion of the policy area;
(iii) public authorities taking decisions and actions that are consistent with the environmental quality objectives referred to in clause 7;
(iv) the promotion and understanding of this policy; and,
(v) the co-operation of public authorities, industry organisations and the general public in the implementation of this policy.

(2) The decisions and actions referred to in subclause (1)(d) include the decisions and actions taken by –

(a) the departments, principally assisting the Minister to whom the administration of the following Acts is for the time being committed by the Governor in the administration of those Acts –

(i) *Conservation and Land Management Act 1984;*
(ii) *Environmental Protection Act 1986;*
(iii) *Fish Resources Management Act 1994;*
(iv) *Health Act 1911;*
(v) *Jetties Act 1926;*
(vi) *Land Administration Act 1997;*
(vii) *Land Drainage Act 1925;*
(viii) *Local Government Act 1995;*
(ix) *Local Government (Miscellaneous Provisions) Act 1960;*
(x) *Main Roads Act 1930;*
(xi) *Metropolitan Region Town Planning Scheme Act 1959;*
(xii) *Mining Act 1978;*
(xiii) *Petroleum Act 1969;*
(xiv) *Petroleum (Submerged lands) Act 1982;*
(xv) *Shipping and Pilotage Act 1967;*
(xvi) *Soil and Land Conservation Act 1945;*
(xvii) *Stock (Identification and Movement) Act 1970;*
(xviii) *Town Planning and Development Act 1928;*
(xix) *Transport Co-ordination Act 1966;*
(xx) *Water and Rivers Commission Act 1995;*
(xxi) *Water Corporation Act 1995;*
(xxii) *Port Authorities Act 1999;*
(xxiii) *Dangerous Goods Act 19XX;*
(xxiv) *Dangerous Goods (Transport) Act 19XX;*

(3) The Environmental Protection Authority will report publicly on the implementation of this policy.

11. **Management program to protect**

(1) The management program to protect will consist of the collective actions of public authorities responsible for elements of the framework, and include the following components -

(a) an Environmental Management Plan for the policy area to be -
  (i) prepared and implemented by the Cockburn Sound Management Council;
  (ii) reviewed as necessary with community consultation; and,
  (iii) approved by the Environmental Protection Authority and endorsed by the Ministerial Council on advice from the Minister.

(b) The Environmental Management Plan is to -
  (i) incorporate the environmental quality objectives and the environmental quality criteria referred to in clauses 7,8 and 9;
  (ii) identify critical areas within the policy area which require priority protection, or priority remedial action to achieve the environmental quality objectives referred to in clause 7;
  (iii) foster the integration of environmental planning and management for the land and marine environment within the policy area; and
  (iv) recognise and facilitate multiple use management of the protected area.

(c) The Cockburn Sound Management Council will –
  (i) administer and coordinate the implementation of the Environmental Management Plan, and publicly report on its performance in achieving its stated objectives;
  (ii) promote the understanding of the policy;
  (iii) investigate, monitor, review, report and continuously improve on the achievement of environmental objectives, criteria and targets where appropriate in accordance with the Environmental Management Plan and the policy;
  (iv) co-ordinate or undertake research and investigations to support environmental management to meet the objectives of the Environmental Management Plan; and,
  (v) report annually to the Environmental Protection Authority, relevant public authorities, stakeholder organisations and the public on the performance of the Environmental Management Plan against the objectives of the policy.

(d) Public authorities with management responsibilities in the policy area shall, within their area of jurisdiction -
  (i) make decisions and actions consistent with the objectives of the policy;
  (ii) include strategies for the development of best management practices for the control of drainage, sewage and the disposal of wastewater and the discharge of wastes and nutrients, whether

point or diffuse source, and directly or indirectly discharged into the policy area;

(iii) provide an implementation framework for achieving the environmental quality objectives outlined in clause 7, for activities which include but are not limited to diffuse sources of emissions and to licensed premises discharging wastes or nutrients, directly or indirectly, into the policy area;

(iv) establish monitoring programs and inventories as appropriate, using monitoring and analytical protocols approved by the Environmental Protection Authority; and,

(v) establish reporting procedures and progress against environmental quality objectives referred to in clause 7 as appropriate and report these to the Environmental Protection Authority.

Summary of Schedules to the Policy

Schedule:

1 Policy area and protected area

2 Environmental quality objective zones in the protected area

3 Environmental quality criteria: Ecosystem integrity
Decision scheme for:
- Nutrient/physical indicators
- Toxicants in water
- Toxicants in sediment

4 Environmental quality criteria:
Decision scheme for:
- Seafood safe for eating
- Aquaculture

5 Environmental quality criteria:
Decision scheme for:
- Primary contact recreation values
- Secondary contact recreation values
- Aesthetics

6 Process by which EQC values (numerical and narrative) contained in the EQC Reference Document might be changed as science improves

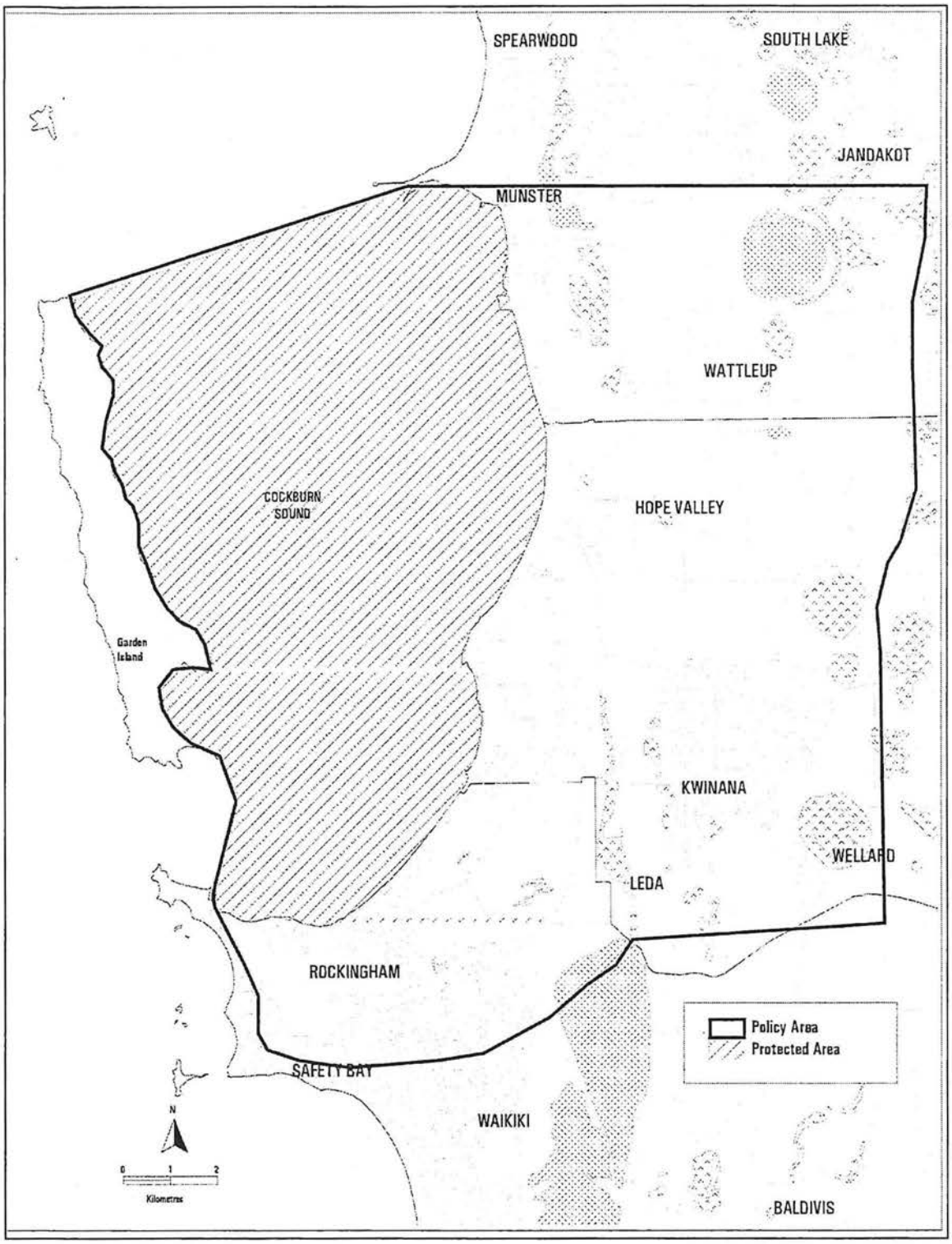
Schedule 1

[Clause 4]

Policy Area

Depicting

The policy area (the marine waters and catchment area of Cockburn Sound)



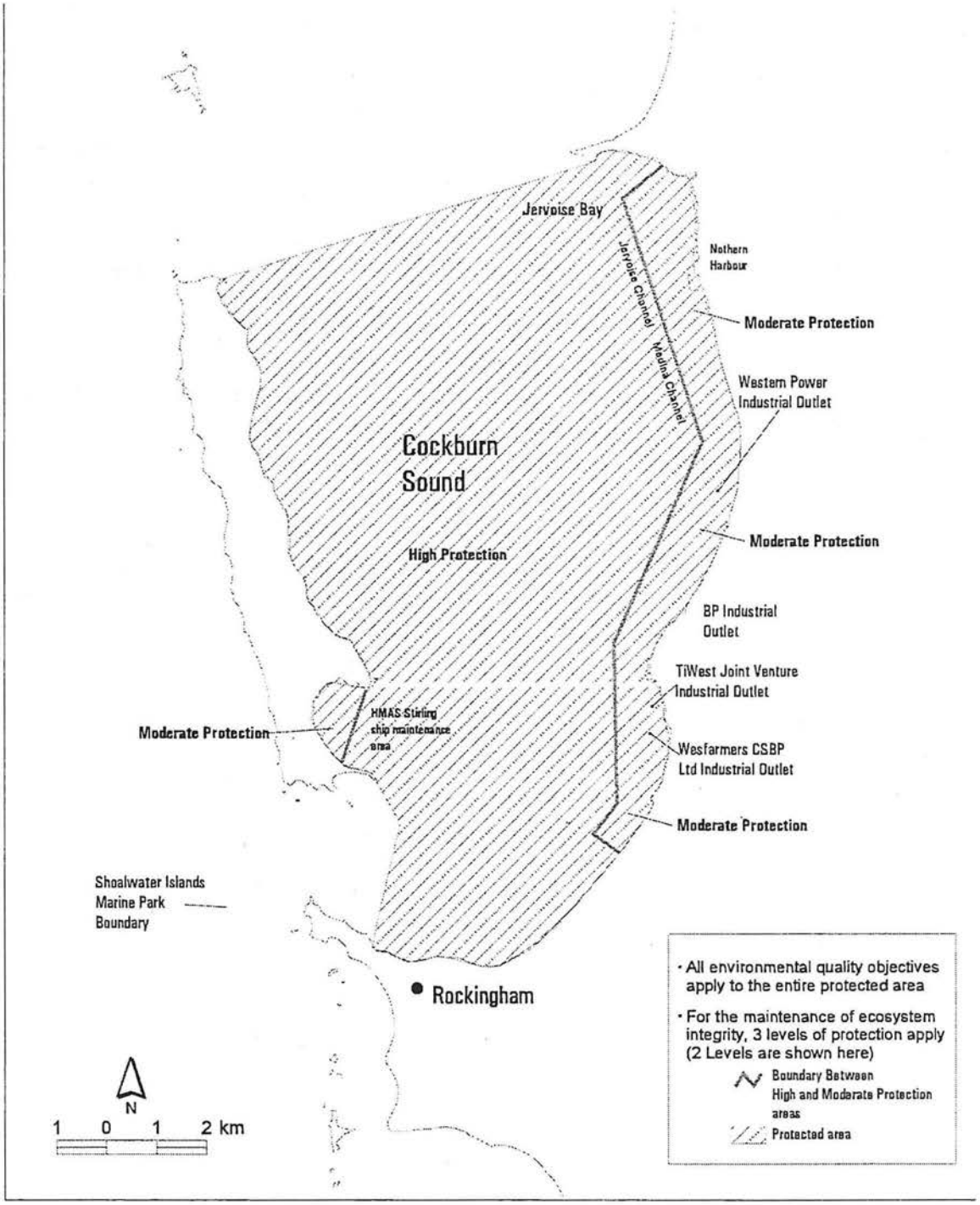
Schedule 1: Policy Area and Protected Area.

Schedule 2

[Clause 7(3)]

The Boundaries between the High and Moderate Protection Areas

(Identifies areas of High and Moderate protection within the marine waters)



Schedule 2: The Boundaries between the High and Moderate Protection Areas.

Schedule 3

[Clause 8(3)]

Decision scheme 3.1: Nutrient/physical indicators

Decision scheme 3.2: Toxicants in water

Decision scheme 3.3: Toxicants in sediment

Decision scheme 3.1: For applying the EQC for physical and chemical stressors

1. Conduct routine monitoring program covering the area to be assessed using Standard Operating Procedures. Monitoring program should be designed to allow assessment of environmental quality against
   EQG (A,B,C,D and E) ..... go to step 2

2. Determine whether nutrient-related EQG (A, D or E) has been exceeded
   [N] ..... go to step 3
   [Y] ..... go to step 5 unless back-up samples or immediate resampling does not confirm exceedance of the EQG.

3. Determine whether dissolved oxygen-related EQG (B) has been exceeded
   [N] ..... go to step 4
   [Y] ..... go to step 8 unless immediate re-measurement does not confirm exceedance of the EQG.

4. Determine whether temperature-related EQG (C) has been exceeded
   [N] ..... go to step 1
   [Y] ..... go to step 9

The EQG is exceeded triggering more intensive investigation. Ambient quality is now monitored and assessed against the Environmental Quality Standard

5. Revise monitoring program as appropriate and implement to assess environmental quality against EQS (E and F) go to step 6

6. Determine whether EQS (E or F) has been exceeded
   [N] ..... go to step 1
   [Y] ..... go to step 7

7. Determine whether EQG (A or D) has been exceeded
   [N] ..... go to step 1, and investigate possible non nutrient-related causes of exceedence of EQS
   [Y] ..... **Management response required go to step 10**

8. Determine whether EQS (B) has been exceeded
   [N] ..... go to step 1
   [Y] ..... **Management response required go to step 10**

9. Determine whether EQS (C) has been exceeded
   [N] ..... go to step 1
   [Y] ..... **Management response required go to step 10**

The EQS is exceeded triggering a management response.

10. Initiate management response to reduce contaminant loads and restore environmental quality to comply with the objectives within specified timeframes.

Decision scheme 3.2: For applying the EQC for toxicants in marine water and sediment pore water

(Options are provided in the decision tree for skipping steps once an EQG has been triggered (eg. go straight to testing against biological measures, or implement agreed management strategies to reduce contaminant inputs, without undertaking all of the prior steps). This will largely be based on a simple cost/benefit analysis undertaken for each step, and would require the agreement of all key stakeholders.)

1. Determine whether an EQG exists for the contaminants of concern:
   [N]..... - go to step 2
   [Y]..... - go to step 3

2. Is it appropriate to establish an EQG by determining the 80^{th} percentile for a high protection area, or 95^{th} percentile for a moderate protection area, of natural background concentration?
   [N]..... - go to step 14.
   [Y]..... - go to step 3.

3. Undertake routine monitoring program covering the area to be assessed and the contaminants of concern using the standard operating procedures and go to step 4.

4. Was the laboratory practical quantitation limit (PQL) for any of the contaminants above the EQG value?
   [N]..... - go to step 5.
   [Y]..... - if detection of the contaminant is confirmed in a filtered sample go to step 10, otherwise assume the contaminant has not been detected.

5. Determine whether EQG (A) has been met:
   [N]..... - go to step 6.
   [Y]..... - go to step 9.

6. If the exceedance was for the last sampling occasion has it been confirmed by analysing the back-up samples or samples collected immediately from the same sites?
   [N]..... - go to step 9.
   [Y]..... - go to step 7 if high or moderate protection area;
   - go to step 16 if the EQG was established for a low protection area.

7. Was the EQG identified as a low reliability guideline?
   [N]..... - go to step 8 (optional); or
   - go to step 10.
   [Y] - consult with relevant regulators to ensure unacceptable impacts are avoided.

8. For naturally occurring chemicals determine whether the 80th percentile for a high protection area, or 95th percentile for a moderate protection area, of natural background contaminant concentration exceeds the EQG:

   [N]..... - go to step 10.
   [Y]..... - establish the 80th or 95th percentile of background concentration as the new EQG then go to step 4.

9. For the primary contaminants determine whether EQG (B) has been met:

   [N]..... - go to step 13.
   [Y]..... - no toxicity problem, go to step 3.

The EQG is now triggered and ambient quality is compared against the EQS.

10. Determine whether EQS (A) has been met:

    [N]..... - go to step 17
    [Y]..... - go to step 11, or
    - go to step 14 if PQL > EQG.

11. Has the contaminant of concern been identified in Table 2 of the EQC Reference Document as having the potential to adversely bioaccumulate or biomagnify?

    [N]..... - go to step 12 (steps 14 or 15 also an option).
    [Y]..... - go to step 12 (steps 14 or 15 also optional); and
    - go to step 16.

12. Resolve bioavailable concentrations of relevant contaminants and determine whether EQS (B) has been met:

    [N]..... - go to step 14 (steps 15 or 17 also an option).
    [Y]..... - go to step 13.

13. For the primary contaminants determine whether EQS (C) has been met:

    [N]..... - go to step 14 (steps 15 or 17 also an option).
    [Y]..... - environmental quality acceptable, go to step 3.

14. Undertake direct toxicity assessment (DTA) using locally relevant species and determine whether EQS (D) and (E) have been met:

    [N]..... - go to step 15 or step 17.
    [Y]..... - environmental quality acceptable, go to step 3.

15. Undertake detailed field investigation to determine whether EQS (F) and (G) have been met for high protection areas, or EQS (F), (I) and (J) have been met for moderate protection areas:

    [N]..... - **EQS triggered.** Go to step 17.
    [Y]..... - environmental quality acceptable, go to step 3.

16. Determine whether EQS (H) has been met:

    [N]..... - **EQS triggered.** Go to step 17.

    [Y]..... - chemical not bioaccumulating, go to step 3.

17. Implement management action to reduce contaminant inputs to the ambient environment and achieve the environmental quality objective within an agreed timeframe. Prior to implementing management action procedures such as TIE and CBR might be required to confirm the specific cause of toxicity or the source of contaminants. In extreme circumstances environmental remediation may be considered appropriate.

Decision scheme 3.3: For applying the EQC for toxicants in sediment

(Options are provided in the decision tree for skipping steps once an EQG has been triggered (eg. go straight to testing against biological measures, or implement agreed management strategies to reduce contaminant inputs, without undertaking all of the prior steps). This will largely be based on a simple cost/benefit analysis undertaken for each step, and would require the agreement of all key stakeholders.)

1. Determine whether an EQG value exists for the contaminants of concern:
   [N]..... - go to step 2
   [Y]..... - go to step 3

2. Is it appropriate to establish an EQG value based on natural background concentration:
   [N]..... - go to step 11.
   [Y]..... - go to step 3.

3. Undertake routine monitoring program covering the area to be assessed using the standard operating procedures and go to step 4.

4. Determine whether EQG (A) has been met:
   [N]..... - go to step 5
   [Y]..... - go to step 8.

5. If the exceedance was for the last sampling occasion has it been confirmed by analysing the back-up samples or samples collected immediately from the same sites?
   [N]..... - go to step 8.
   [Y]..... - go to step 6.

6. Was the exceeded EQG established for a low protection area?
   [N]..... - go to step 7 (optional); or
   - go to step 8 to define any 'hot spots'; and
   - to step 10 to assess the entire sampled area against the EQS.
   [Y] - go to step 15.

7. For naturally occurring chemicals determine whether the natural background contaminant concentration exceeds the EQG value (unlikely in most cases, note that test site and reference site must have comparable grain sizes):
   [N]..... - go to step 8 to define any 'hot spots'; and
   - to step 10 to assess the entire sampled area against the EQS.
   [Y]..... - establish the 90%ile of background concentration as the new EQG value then go to step 4.

8. Determine whether sediment contaminant concentration at individual sampling sites exceed the EQG re-sampling trigger:
   [N]..... - no toxicity problem, go to step 3.
   [Y]..... - go to step 9.

9. Determine whether the extent of potential contamination needs to be characterised further (in most cases this will be necessary):

[N]..... - no toxicity problem, go to step 3.
[Y]..... - determine area of potential contamination, if sufficient data for its assessment go to step 4; or
- determine area of potential contamination, design sampling program for this area and go to step 3.

The EQG is now triggered and ambient quality is compared against the EQS.

10. Has the contaminant of concern been identified in Table 3 of the EQC Reference Document as having the potential to adversely bioaccumulate or biomagnify:

[N]..... - go to step 11 (steps 12, 13 or 14 also an option).
[Y]..... - go to step 11 (step 12, 13 or 14 also optional); and
- go to step 15.

11. Resolve bioavailable concentrations (as far as possible) for relevant contaminants and determine whether EQS (A) and (B) have been met:

[N]..... - go to step 12 (steps 13, 14 or 16 also an option).
[Y]..... - environmental quality acceptable, go to step 3.

12. Sample and analyse sediment porewaters for those contaminants of concern that have an initial management standard in water (schedule 3, table 2) and determine whether EQS (C) has been met:

[N]..... - go to step 13 (steps 14 or 16 also an option).
[Y]..... - environmental quality acceptable, go to step 3.

13. Undertake sediment toxicity testing using relevant species and determine whether EQS (D) and (E) have been met:

[N]..... - go to step 14 or step 16.
[Y]..... - environmental quality acceptable, go to step 3.

14. Undertake detailed field investigation to determine whether EQS (F) and (G) have been met for high protection areas, or EQS (F), (I) and (J) have been met for moderate protection areas:

[N]..... - **EQS triggered.** Go to step 16.
[Y]..... - environmental quality acceptable, go to step 3.

15. Determine whether EQS (H) has been met:

[N]..... - **EQS triggered.** Go to step 16.
[Y]..... - chemical not bioaccumulating, go to step 3.

16. Implement management action to reduce contaminant inputs to the ambient environment and achieve the environmental quality objective within an agreed timeframe. Prior to implementing management action procedures such as TIE and CBR might be required to confirm the specific cause of toxicity or the source of contaminants. In extreme circumstances environmental remediation may be considered appropriate.

Schedule 4

[Clause 8(3)]

Decision scheme 4.1: Seafood safe for human consumption

Decision scheme 4.2: Aquaculture

Decision scheme 4.1: For applying the EQC for seafood safe for human consumption

1. Conduct routine monitoring program covering the area to be assessed and the contaminants of concern using the standard operating procedures and go to step 2.

2. Determine whether EQG (A, B and/or C) have been met, or whether EQS (D, E or F) have been met:
   [N]..... - go to step 3.
   [Y]..... - seafood suitable for consumption, go to step 1.

3. Are any of the exceedances confirmed by analysing the back-up samples or samples collected immediately from the same sites?
   [N]..... - seafood suitable for consumption, go to step 1.
   [Y]..... - go to steps 4 and 7 if EQG A not met; and
   - go to step 6 if EQG B not met; and
   - go to step 7 if EQG C not met; and
   - go to step 8 if EQS (D, E or F) not met.

The EQG may now be triggered and ambient quality is compared against the EQS.

4. Determine whether EQS (A) has been met:
   [N]..... - go to step 5 (step 8 also an option).
   [Y]..... - go to step 7 for advice on conducting sanitary survey; and
   - go to step 1.

5. Determine whether EQS (B) has been met:
   [N]..... - **EQS triggered**. Go to step 8.
   [Y]..... - go to step 7 for advice on further monitoring and conducting sanitary survey; and
   - go to step 1.

6. Determine whether EQS (C) has been met:
   [N]..... - **EQS triggered**. Go to step 8.
   [Y]..... - EQS not triggered, go to step 7; and
   - go to step 1.

7. Contact the Health Department of WA with the results and seek advice on any additional monitoring or management requirements to ensure human health risks are managed at an appropriate level.

8. Implement management action to reduce contaminant inputs, or if this is not practically feasible, then reduce risk to public health through appropriate management on advice of the Health Department of WA. If appropriate, environmental remediation may be required.

Decision scheme 4.2: For applying the EQC for aquaculture

(Options are provided in the decision tree for skipping steps once an EQG has been triggered (eg. go straight to testing against biological measures, or implement agreed management strategies to reduce contaminant inputs, without undertaking all of the prior steps). This will largely be based on a simple cost/benefit analysis undertaken for each step, and would require the agreement of all key stakeholders.)

1. Conduct routine monitoring program covering the area to be assessed and the contaminants of concern using the standard operating procedures and go to step 2.

2. Determine whether EQG (A and/or B) have been met:
   [N]..... - go to step 3
   [Y]..... - suitable for aquaculture, go to step 1.

3. If the exceedance was for the last sampling occasion has it been confirmed through the analysis of back-up samples or samples collected immediately from the same sites?
   [N]..... - suitable for aquaculture, go to step 1.
   [Y]..... - go to step 4 if EQG A not met; and
   - go to step 6 if EQG B not met.

The EQG may now be triggered and ambient quality is compared against the EQS.

4. Determine whether EQS (A) has been met:
   [N]..... - go to step 5 (step 9 is also optional).
   [Y]..... - EQS not triggered, go to step 1.

5. Determine whether EQS (B) has been met:
   [N]..... - **EQS triggered**, go to step 9.
   [Y]..... - EQS not triggered, go to step 1.

6. Determine whether EQS (C) has been met:
   [N]..... - go to step 7 (steps 8 or 9 also optional).
   [Y]..... - EQS not triggered, go to step 1

7. Determine whether EQS (D) has been met:
   [N]..... - go to step 8 (step 9 also optional).
   [Y]..... - EQS not triggered, go to step 1.

8. Determine whether EQS (E or F) have been met:
   [N]..... - **EQS triggered**, go to step 9.
   [Y]..... - EQS not triggered, go to step 1.

9. Implement management action to reduce contaminant inputs to the ambient environment and achieve the environmental quality objective within an agreed timeframe. Prior to implementing management action procedures such as TIE and CBR might be required to confirm the specific cause of toxicity or the source of contaminants. In extreme circumstances environmental remediation may be considered appropriate.

Schedule 5

[Clause 8(3)]

Decision scheme 5.1: Primary contact recreation

Decision scheme 5.2: Secondary contact recreation

Decision scheme 5.3: Aesthetic quality

Decision scheme 5.1: For applying the EQC for primary contact recreation

1. Conduct routine monitoring program covering the area to be assessed and the contaminants of concern using the standard operating procedures and go to step 2.

2. Determine whether EQG (A, B, C and/or D) have been met, or whether EQS (C or D) have been met:

   [N]..... - go to step 3 if EQG B or D or EQS C exceeded.
   - go to step 4 if EQG A not met and
   - go to step 7 if EQG C not met and
   - go to step 8 if EQS D not met.

   [Y]..... - suitable for recreation, go to step 1.

3. If the exceedance was for the last sampling occasion has it been confirmed (eg. through the analysis of back-up samples or samples collected immediately from the same sites)?

   [N]..... - suitable for recreation, go to step 1.

   [Y]..... - go to step 6 if EQG B not met and
   - go to step 8 if EQG D not met and
   - go to step 9 if EQS C not met.

The EQG may now be triggered and the EQS need to be considered.

4. Determine whether EQS (A) has been met:

   [N]..... - go to step 5 and
   - go to step 9.

   [Y]..... - go to step 5.

5. Undertake a sanitary inspection of the site in liaison with the Health Department of WA to further assess the risk to recreational users. Develop predictive approaches to give early warning of periods or events likely to result in poor microbiological water quality and increase sampling frequency in these areas then: - go back to step 1.

6. Intensify monitoring of potentially toxic algal species to assess human health risk and determine whether EQS (B) has been met:

   [N]..... - go to step 9;

   [Y]..... - No issue identified, go to step 1.

7. Swimmers should be urged to use caution when swimming in these waters. Signage may be an option.

8. Contact the Health Department of WA with the results and seek advice on setting an appropriate environmental quality standard that protects recreational users and on any additional monitoring or management requirements to ensure human health risks are managed at an appropriate level.

9. Implement management action to reduce contaminant inputs, or if this is not practically feasible, then reduce risk to public health through appropriate management on advice of the Health Department of WA. If appropriate, environmental remediation may be required.

Decision scheme 5.2: For applying the EQC for secondary contact recreation

1. Conduct routine monitoring program covering the area to be assessed and the contaminants of concern using the standard operating procedures and go to step 2.

2. Determine whether EQG (A, B and/or C) have been met, or whether EQS (C) have been met:

   [N]..... - go to step 3 if EQG B or EQS C not met and
   - go to step 4 if EQG A not met and
   - go to step 7 if EQG C not met.

   [Y]..... - suitable for secondary contact recreation, go to step 1.

3. If the exceedance was for the last sampling occasion has it been confirmed (eg. through the analysis of back-up samples or samples collected immediately from the same sites)?

   [N]..... - suitable for recreation, go to step 1.

   [Y]..... - go to step 6 if EQG B not met and
   - go to step 8 if EQS C not met.

The EQG may now be triggered and the EQS need to be considered.

4. Determine whether EQS (A) has been met:

   [N]..... - go to step 5 and
   - go to step 8.

   [Y]..... - go to step 5.

5. Undertake a sanitary inspection of the site in liaison with the Health Department of WA to further assess the risk to recreational users. Develop predictive approaches to give early warning of periods or events likely to result in poor microbiological water quality and increase sampling frequency in these areas then: - go back to step 1.

6. Determine whether EQS (B) has been met:

   [N]..... - go to step 8;

   [Y]..... - No issue identified, go to step 1.

7. Contact the Health Department of WA with the results and seek advice on setting an appropriate environmental quality standard that protects recreational users and on any additional monitoring or management requirements to ensure human health risks are managed at an appropriate level.

8. Implement management action to reduce contaminant inputs, or if this is not practically feasible, then reduce risk to public health through appropriate management on advice of the Health Department of WA. If appropriate, environmental remediation may be required.

Decision scheme 5.3: For applying the EQC for aesthetic quality

1. Conduct routine monitoring program covering the area to be assessed and monitor public complaints. Go to steps 2 and 3.

2. Determine whether all of EQG (A to I) have been met:
   [N]..... - go to step 5.
   [Y]..... - go to step 1.

3. Determine whether EQG (J) has been met:
   [N]..... - go to step 4
   [Y]..... - aesthetic values not compromised, go to step 1.

4. If the exceedance was for the last sampling occasion has it been confirmed through analysis of back-up samples or samples collected immediately from the same sites?
   [N]..... - aesthetic values not compromised, go to step 1.
   [Y]..... - go to step 6.

The EQG may now be triggered and the EQS need to be considered.

5. Undertake community survey and determine whether EQS (A) has been met:
   [N]..... - go to step 7;
   [Y]..... - aesthetic values not compromised, go to step 1.

6. Determine whether EQS (B) has been met:
   [N]..... - go to step 7;
   [Y]..... - aesthetic values not compromised, go to step 1.

7. Identify the causes for the loss of aesthetic value in Cockburn Sound and implement management actions to prevent further reduction of, and if possible to enhance, the aesthetic value within an agreed timeframe.

Schedule 6: Process for Changing the EQC Values (as contained in the EQC Reference Document), pursuant to clause 8 (3) (c)

1. A reason to review (a trigger)
    a. Change in National/State guidelines
    b. Change in science
    c. Cockburn Sound Management Council reporting or request
    d. EPA initiates

2. for EPA to consider need for a review

3. EPQ request a "Review Paper" (to focus on parts to change, the reasons, etc) [developed in consultation with Cockburn Sound Management Council]

4. EPA considers "Review Paper' – releases for public comment

5. EPA reviews in light of comments

6. EPA publishes and advises Minister and Cockburn Sound Management Council