Implementation Framework for Western Australia for the Australian and New Zealand Guidelines for Fresh and Marine Water Quality and Water Quality Monitoring and Reporting (Guidelines Nos 4 & 7: National Water Quality Management Strategy)

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Executive Summary

This document constitutes EPA's advice to Minister for the Environment regarding a framework for implementing Guidelines Nos 4 & 7 for ambient waters. The scope of this framework relates primarily to environmental protection and some social matters. This document should not be read as a legal or coercive document.

The framework has been developed following extensive consultation with an array of stakeholders. Every endeavour has been made to address the matters raised during this consultation. Those matters and EPA's responses are appended to this framework as they assist with the understanding of the framework.

In 2000, when sign-off of the Australian and New Zealand Guidelines for Fresh and Marine Water Quality and Water Quality Monitoring and Reporting (NWQMS Guidelines Nos 4 & 7 respectively) was sought from Western Australia, concerns were expressed by some Government and non-Government stakeholders regarding the nature of the guidelines and implications of sign-off. As a consequence, the then Minister for Environment sought EPA's advice regarding these concerns. In response, EPA offered to consult with concerned and interested stakeholders and report back to the Minister for Environment on a suitable implementation framework for Guidelines Nos 4 & 7. The Minister for Environment accepted this advice and signed off Guidelines Nos 4 & 7 for guidance use only until EPA reported.

The framework proposes:

- That all significant water resources in Western Australia be defined spatially, on a primary basis;

- Through a thorough consultative process involving the community, environmental values (EVs) for water quality be developed for each significant water resource. An EV is a particular value or use of the environment important for a healthy ecosystem or for public benefit. Typically a default EV of 'environmental health' and all the social values would normally apply. For some small areas subject to human pressure, EVs such as aquatic food safe for eating, public water supply, recreation etc may not be appropriate. For highly degraded areas, EVs could be aspirational;

- For each EV a set of broad 'environmental quality objectives' (EQOs) be developed. An EQO should reflect the desired state of water quality. This may need a program over time to be achieved. An EQO is a management goal. For example, an EQO for ecosystem health would be the maintenance of ecosystem integrity in terms of structure (biodiversity, biomass, abundance of biota) and function (food chain and nutrient cycle);

- For each broad EQO, 'environmental quality criteria' (EQCs), some times known as benchmarks, be set. EQCs can comprise numerical values and/or narrative statements;

For EQCs two thresholds may be set:

(a) Environmental quality guidelines (EQGs). If a guideline is breached, then an investigation should be initiated against the EQS. Breaching an EQG does not automatically imply environmental problems but does imply a warning level;

(b) Environmental quality standards (EQSs). If a standard is breached, then a management response should be initiated to fix the problem and if necessary restore the environmental quality. Breaching an EQS implies that there is some risk of environmental problems occurring.

Where water resources are highly degraded, the use of EQSs may not be the most appropriate mechanism in the first instance. Under such circumstances interim remediation targets should be set. For the purpose of this document, these targets have been called Natural Resource Management Targets (NRM Targets). The notion of a breach of a NRM Target would not apply because remediation would have been agreed to and management action would already be under way. This would usually apply to terrestrial water resources with significant salinity, euthrophication and sedimentation problems arising from diffuse source activities.

- The Australian and New Zealand Water Quality Guidelines be used as default EQGs unless better information pertaining to the local water resource is available;

- Environmental quality standards be developed specific to the water resource and may be numerical or narrative. It is noted that there is no single methodology for developing standards from guidelines.

- The day to day water resource manager for water quality would implement an 'environmental management system' for each significant water resource, comprising:

  (a) EVs;

  (b) EQOs (EQCs or NRM Targets);

  (c) Implementation plans, including management response procedures;

  (d) Monitoring;

  (e) Auditing monitoring results against specific EQOs; (criteria or NRM Targets); and

  (f) Reviewing and, if necessary, improving management;

- The EPA has a role in signing off the EVs, EQOs including EQCs and NRM Targets;

- The resource management agency has the day to day role in managing the resource; and

- The EPA has a role in evaluating the performance against the EQOs and publicly reporting to Government.

The cumulative **outcome** of systematically setting EVs and EQOs (EQCs or NRM Targets) for each of the State's significant water bodies, and having them underpinned with appropriate monitoring, auditing and reporting procedures, should be sustainable water resources that meets the State's, community's and environment's needs. To this end, this framework offers guidance to proponents with new proposals for EPA assessment, to operators of prescribed premises that discharge treated wastewater to the environment, and to day-to-day managing agencies that deal with non-point source contamination.

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1. Introduction

Water is a vital and precious resource and arguably the State's most important natural and renewable resource. All life depends on adequate water supplies (quantity and quality) for survival.

Predominantly over the past 150 years, development has impacted on the State's water resources, changing their available quantity and quality. In some cases these changes have affected the long-term viability of the resources and their dependent anthropogenic and ecological uses. In addition to the decreasing amount of water available to the environment because of the damming of many rivers. The Western Australian State of the Environment Report (1998) documented the impacts that salinisation, eutrophication and sedimentation are having on many of Western Australia's catchments. In particular, the report noted the relationship between poor water quality and loss of Western Australia's unique biodiversity.

The National Water Quality Management Strategy (NWQMS) notes that water management is a State responsibility. Future generations will rely on the State's water resources for their existence. Therefore, it falls to the State, acting in partnership with stakeholders and the community, to ensure good stewardship of its water resources.

In its 1997-8 annual report, the National Competition Council (NCC), which supports the implementation of the Council of Australian Governments (COAG) Water Reform Agenda (1994) stated:

> *'Water reform is an area that extends beyond competition policy matters to embrace social policy issues such as recognising the environment as a legitimate user of water. The Council has said that full implementation of the reform package (on water) could do more to benefit the broad community than any other single National Competition Policy measure'.*

The Minister's request to develop a framework

In 2000 Western Australia signed off the Australian and New Zealand Guidelines for Fresh and Marine Water Quality and Water Quality Monitoring and Reporting (NWQMS Guideline Nos. 4 & 7 respectively). In response to some concerns, the then Minister for Environment requested the Environmental Protection Authority (EPA), the independent advisor to Government on environmental matters, to draft a framework to implement the above guidelines. This document provides that framework in response to the Minister for the Environment's request. It has been developed following a consultation process with a wide array of stakeholders (Appendix 1), and every endeavour has been made by the EPA to address the matters raised during the consultation phase (Appendix 2).

Section 2 introduces the principles and practices to be followed in the implementation of the framework, and Section 3 provides some preliminary comments. Section 4 is the core section which outlines in detail how the framework will be implemented, who is involved and their responsibilities. Additionally, it sets out the policy instruments available for its implementation and its pertinence to Environmental Impact Assessment and the licensing of prescribed premises. Section 5 is the Conclusions.

As this is a response framework, it includes numerous appendices that elaborate on matters raised by stakeholders. Some of these appendices expand on matters already addressed in the main text to assure stakeholders that their views have been properly considered.

The whole thrust of the framework emphasises that implementation of the guidelines will be successful only if all parties have ownership of the outcomes to be achieved. The framework, in the first instance, may appear somewhat complicated. What is required is an initiative from a lead agency to apply the framework to one or two demonstration areas, and report back to the EPA for discussion and review.

This framework recognises that many authorities, agencies, organisations, businesses, groups and individuals, including the State and Local Governments, have important roles to play in water resource protection (Appendix 3a & b). The NWQMS (1992), which underpins this framework, notes that:

> *'each State... will have its own approach to the way it involves local community groups in the development of water quality management plans; and*
>
> *These various interests and levels of government need to be brought together to plan for and achieve sustainability of our water'.*

This framework offers stakeholders and the community a transparent, flexible and inclusive approach to implementing the NWQMS's Guideline Nos. 4 and 7.

The framework proposes a hierarchical set of steps:

- Defining the spatial boundaries for all significant water resources in Western Australia on a priority basis;
- Establishing environmental values (EVs) for each significant water resource in a manner consistent with the NWQMS Guideline No. 4.
- For each EV, establishing a set of broad 'environmental quality objectives' (EQOs) to reflect the desired state of water quality in a manner consistent with the NWQMS Guideline No. 4;
- For each broad EQO, establishing more specific EQOs called 'environmental quality creiteria' (EQCs), sometimes know as benchmarks. For EQCs two thresholds are set: Environmental quality guidelines (EQGs) and environmental quality standards (EQSs).
- Managing each significant water resource through the use of an 'environmental management system'.

It is noted that where the water quality is highly degraded by diffuse source influences such as salinity, euthrophication and sedimentation, the application of the NWQMS Guideline No. 4 should be seen in the context of EVs and EQOs being aspirational. For such cases, the framework proposed the use of interim targets, otherwise called NRM Targets in this document, until the designated EV can be met. These targets would be set through a community consultative process. When the aspirational EVs and EQOs are finally met, it is then appropriate to use EQGs and EQSs. It is noted however that Guideline No. 4 offers very limited guidance on salinity and euthrophication and no guidance on sedimentation.

During the development of this framework all key government stakeholders and peak bodies (Appendix 1) were invited to become involved. All matters raised by these groups and the EPA's response to those matters are given in Appendix 2.

Appendix 4 links the draft State Water Quality Management Strategy (SWQMS) to this framework. When finalised, this framework will form part of the SWQMS series of documents.

When this framework is implemented, it should achieve the overall policy objective of the NWQMS, that is:

'to achieve sustainable use of the State's water resources by protecting and enhancing their quality while maintaining economic and social development'

This framework should not be read as a legal or coercive framework. Rather, it should assist all parties involved in the protection, management and use of Western Australia's marine, estuarine and freshwater resources. This includes the use of borewater in the metropolitan area as most water resources, be they surface or shallow groundwater are interconnected. This interconnection can cause environmental problems in areas far removed from where over-extraction occurs. For instance, over allocation of groundwater causing significant drawdown can lead to loss of wetland and riverine habitats which in turn can impact on biodiversity over a wide area.

From hereon, the Australian and New Zealand Guidelines for Fresh and Marine Water Quality and Water Quality Monitoring and Reporting will be referred to as Guideline No 4 & Guideline No 7 respectively.

In releasing this document for comment, the EPA wishes to note that many of Western Australia's catchments are, as reported in the State of the Environment Report (SOE Report, 1998), already degraded in one or more ways. Rectifying this matter may take many years. Nevertheless, it is important to set the EVs for each significant catchment, regardless of the issue affecting it, and to have a high level of community involvement so that everyone is focused on the same outcome.

MODEL FOR PROTECTING WATER RESOURCES

TASK	EMS	PROCESS	WHO DOES IT?	WHO REVIEWS?
Environmental Values	Mission Statement	Social/Political	Lead Agency(s), Government Appointed Committee or Panel	EPA
Broad Environmental Quality Objectives	Management Goals Including Benchmarks	Social/Scientific	Lead Agency(s), Government Appointed Committee or Panel	EPA
Specific Environmental Objectives (Guidelines, Standards and NRM Targets)	Management Goals Including Benchmarks	Scientific/Social	Lead Agency(s), Government Appointed Committee or Panel	EPA
Broad Implementation Strategy	Implementation Strategy	Bureaucratic	Lead Agency(s), Government Appointed Committee or Panel	
Local Implementation Plans	Implementation Strategy	Bureaucratic	Day to day Management Agency	
Monitoring, data Analysis and Reporting	Monitoring & Reporting	Scientific	Day to day Management Agency/Lead Agency(s) Committee or Panel	
Performance Evaluation and public reporting	Auditing	Bureaucratic	EPA Service Unit DEWCP (Pt 4 & 5)	EPA
Reviewing and improving	Adaptive Management	Social/Scientific	Day To Day Management Agency/Lead Agency(s), Committee or Panel	EPA

Figure 1: ***Broad process for setting EVs and EQOs (including EQGs and NRM Targets)***

Note: ***EPA's role is that of reviewing, auditing and reporting publicly to Government***

2. Principles and practices to be followed when implementing the proposed framework

Water resource protection may require specific sets of EVs and EQOs (EQCs or NRM Targets) to be assigned to aquatic systems on a case-by-case basis. Notwithstanding that, the principles and practices to be used for determining the above are:

- community involvement – a partnership approach (Appendices 3a & b);
- an integrated approach to water management – a holistic approach (Appendix 5)
- sustainability – a balanced approach (Appendix 6);
- as appropriate, assessment of 'EVs' and 'EQOs' (including EQCs or 'NRM Targets) for significant water resources by EPA before submission to Government: - (Figure 1);
- Government endorsement of 'EVs' and 'EQOs' (including EQCs or NRM Targets) as appropriate – Government coordination approach, and
- performance auditing – an Environmental Management Systems (EMS) approach (Figure 2).

These six principles and practices reflect those proposed in the NWQMS and the SWQMS. However, two of the above are particularly related to EPA's functions (Figure 1). They are the 'review' and 'EMS' approaches. Both approaches are important as they not only reflect EPA's functions (scrutinising, auditing and public reporting) but also meet the community 'watchdog' expectation of EPA.

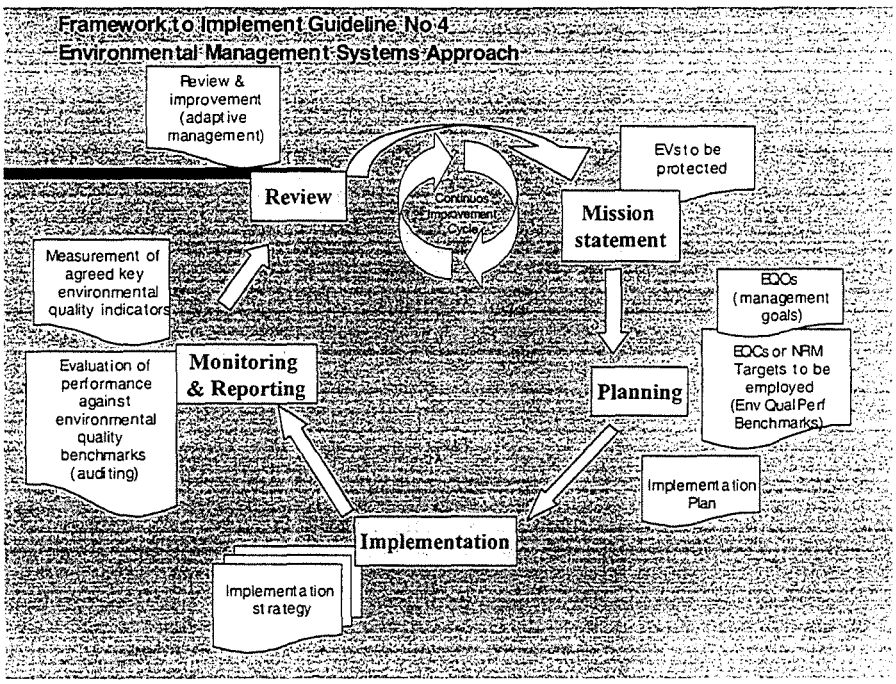

Figure 2: Environmental Management System to Implement Guideline No. 4 (provided by the Australian Water Association).

3. Comments regarding the framework

3.1 Understanding Guideline Nos. 4 & 7

It is important to understand the nature and context of Guideline Nos. 4 & 7 and their relationship to the framework. In this regard, some significant matters raised during the stakeholder consultation period included:

- strict science approach versus the partnership approach (Appendix 7);
- the intertwining of science with implementation policy; and
- inconsistency between implementation policy matters in Guideline No 4, in particular, with the practical policies and principles approach of the NWQMS.

3.2 Terminology used in the framework compared to that used in Guideline Nos. 4 & 7

The NWQMS articulates the notion that its implementation should be flexible and adaptable to local situations. The EPA has adopted flexibility in this framework by using many of its own terms as presented in the draft EPP for Cockburn Sound (Appendix 7). Whilst consistency of use of terms within Western Australia is highly desirable, it may be that other departures will also occur on an 'as needs' basis. For instance, Section 4 proposes that the use of EQGs and EQSs are most appropriate when the water quality is generally good and is to be maintained at existing levels (eg marine environments). Where water quality is poor and the guidelines are either irrelevant or grossly exceeded, it is more appropriate to use Natural Resource Management Targets (NRM Targets) (eg in saline catchment and eutrophied estuaries). EPA believes that this approach offers water resource managers the flexibility to address the broad range of issues confronting them given the diversity of water bodies in Western Australia.

3.3 Selection of environmental values

The most important step in the framework is the selection of EVs for each water resource. The setting of EVs is a community exercise (Figure 1). This decision determines the subsequent approach to protecting each resource and can be the most contentious step because of its subjectivity and competing stakeholders' interests. This decision has a cascading effect on the selection of appropriate EQOs (EQCs or NRM Targets).

EVs endeavour to reflect the wishes of all interested parties and are derived through a co-operative process. Some parties confuse EVs with EQOs. It should be noted that an EV could be established immediately (or can be aspirational) as it is a statement of philosophy (vision) relating to the beneficial use of the environment. On the other hand, an EQO that underpin an EV may not necessarily be achievable immediately or in the short term. For this reason the framework promotes the use of the guideline trigger values in Guideline No 4 for ambient waters of good quality whilst NRM targets are proposed for areas that have persistently poor water quality because of years of neglect (Appendix 7).

3.4 Use of Guideline No. 4 for the protection of pristine waters

Guideline No 4 was written largely in response to the deterioration of freshwater quality, and to a lesser extent marine water quality, especially on the eastern seaboard of Australia. Guideline No 4 is concerned with addressing the issue of improving poor water quality where possible and is most useful when dealing with point source contamination. Hence the applicability for setting EVs for pristine areas needs clarification.

There is a tendency amongst some to automatically assume that the highest level of protection should be applied to areas that are deemed pristine. Unless a pristine area is deemed to have a high conservation and/or high ecological value, such an assumption should not be made automatically. If that assumption were correct, the ramification would be that most of Western Australia's coastline that is pristine would be potentially quarantined from most anthropogenic activities. The corollary of this is that some areas that are already disturbed and which have very high conservation and/or ecological value may not be given the appropriate level of protection.

3.5 Benefits of this framework

This proposed approach is shown conceptually in Figure 3. It captures the lower (EQGs) and upper (EQSs) bounds of the "uncertainty" associated with assessing the risk of an environmental problem. The intensity of management response triggered by not meeting a criterion depends on whether it is a guideline (EQG) or a standard (EQS), which in turn reflects the degree of surety of whether or not there maybe an environmental problem. Most importantly, the accompanying management response is staged, which allows flexibility to use risk-based assessment and management approaches, and the opportunity to determine local EQGs or issue specific EQSs as necessary. This approach offers surety to operators and regulators alike as it reduces the likelihood of a management response being triggered too early which could place an un-necessary burden on the operator, or triggered too late to prevent serious or irreversible damage from occurring.

Another benefit is that it distinguishes between water bodies of good and poor water quality and proposes that guideline trigger values be use to protect the former while NRM Targets be used to remediate the latter. Notwithstanding this, the guideline trigger values should always be used in the back calculation of the upper limit for waste discharges from point sources (See Section 4.5 below).

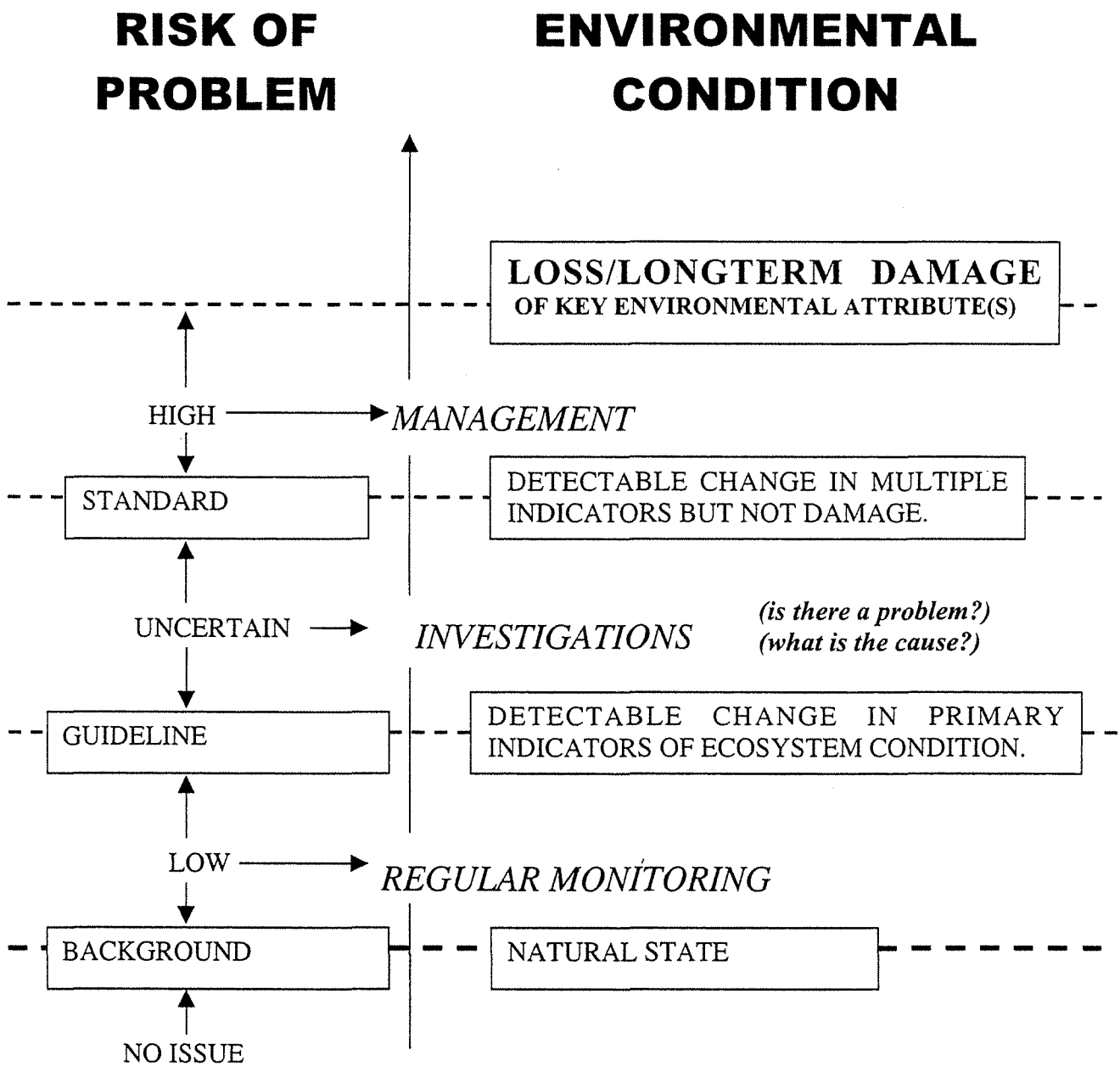

Figure 3: ***Conceptual diagram showing the relationship between the two types of EQC on the left hand side with the associated environmental condition on the right hand side. The diagram shows that the intensity of management response triggered by exceeding an EQC depends on which type of EQC has been exceeded which in turn reflects the level of risk of whether or not there is an environmental problem.***

4. Proposed framework to implement Guideline Nos. 4 & 7

4.1 Introduction

Figure 1 sets out the process through which Guideline Nos. 4 and 7 would be implemented for each significant water resource and who is responsible and for each activity. Responsibilities have been assigned to lead government agencies, EPA, regulators, proponents of new proposals and operators of prescribed premises.

4.2 Responsibilities of the lead agency(ies) as appointed by Government

Figure 1 sets out the steps that a lead agency would follow to carry out its responsibilities.

STEP 1 Determining Environmental Values (EVs) for EPA Review and Endorsement

(a) The first decision that needs to be made for the protection of a water body is the establishment of EVs that stakeholders and the broad community wish to protect.

An **'environmental value'** means a particular value or use of the environment that is important for a healthy ecosystem or for public use, welfare, safety or health and that require protection from the effects of pollution, waste discharges and deposits (ANZECC & ARMCANZ, 2000) (Draft EP Cockburn Sound Policy 2001). Several environmental values maybe designated for a specific water body. Environmental values could be either ecological or social.

The lead agency(ies), for the day-to-day management of each significant water body should consult, in a transparent and open manner, with all stakeholders and the community to establish appropriate draft EVs (Appendices 3a and by and 9). The resulting draft EVs should reflect a holistic (Appendix 5) and sustainable (Appendix 6) approach to water resource management.

(b) The lead agency should refer to EPA the set of draft EVs for each significant water body accompanied by a synopsis of the consultation undertaken with stakeholders and the community. This synopsis should include stakeholder and community concerns regarding the draft EVs.

For most water bodies, be they marine or freshwater, stakeholders and the general community may desire a range of EVs to be protected. The desires of all stakeholders may not always be complementary. In such circumstances, EPA would expect the lead agency, in its synopsis, to offer a solution to potential concerns.

The EPA suggests that for extensive water bodies, the area for which a specific EV would apply could be spatially defined (eg catchments), to minimize potential difficulties when defining the corresponding EQOs.

It is noted that spatially defined EVs have not been proposed for Cockburn Sound in the draft Environmental Protection Policy because the system is relatively simple. However, three sets of objectives have been set. This matter is discussed in step 6c below.

(c) Where there are residual concerns, EPA may consult further before advising Government on a suitable set of EVs.

STEP 2 Determining Environmental Quality Objectives (EQOs) for EPA Review and Endorsement

(a) For the protection of each EV, an appropriate set of EQOs would need to be set.

An **'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 (Draft EP Cockburn Sound Policy 2001).

(b) The lead agency should consult the community, stakeholders and scientific experts to select suitable draft EQOs. For instance, if the EQOs relates to ecology or biodiversity, it would be assumed that DEWCP would consult CALM and its constituents. CALM has developed ecological and biodiversity baseline data for much of WA. Alternately, CALM could act as one of the joint lead agencies. Likewise, if EQOs relates to Fisheries, the Department of Fisheries and its constituents should be consulted. This would be similar for every other Government acency.

(c) The lead agency should submit to EPA the set of draft EQOs accompanied by a synopsis of the consultation undertaken with all involved parties and indicate the timeframe for implementation. This synopsis should include concerns raised regarding the draft EQOs.

(d) Where there are residual concerns, EPA may consult further before advising Government on a suitable set of EQOs.

STEP 3 Determining Environmental Quality Guidelines and Standards (Criteria) or NRM Targets for EPA Review and Endorsement

(a) Successful implementation of the framework relies on the lead agency's ability to measure environmental quality against EQSs and, if appropriate, trigger management responses (Figure 3) when monitoring shows that environmental quality does not meet agreed benchmarks. Environmental Quality Criteria (EQC) and NRM Targets are environmental 'benchmarks' or specific objectives designed for this purpose. The EQC and NRM Targets therefore, relate to *ambient* environmental quality and underpin broader objectives.

'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) (Draft EP Cockburn Sound Policy 2001).

A **'Natural Resource Management Target'** means the numerical value or narrative statement that serves as long or short-term time related benchmarks. The long term NRM Target should equate to the guideline trigger value in Guideline No. 4 for the chosen EV.

It is noted that the setting of EQCs (guideline trigger values and management response standards) is a complex matter and may vary significantly between locations. In some locations (eg catchments and estuaries) it maybe more appropriate to set NRM Targets (Appendix 11). However, for the purpose of licensing waste discharges from prescribed premises in catchment and beside estuaries, Guideline 4 would be used for back calculating acceptable discharge quality (Section 4.5).

(b) For appropriate areas, Guideline No. 4 provides the basis for developing and applying EQC to support the framework. The varying degrees of confidence and uncertainty in water quality guidelines within Guideline No. 4 and the associated criteria derived from them must be recognized. This uncertainty and how it will be addressed is a key consideration for regulators, managers, operators and the community alike. Where there is uncertainty, conservative judgements are made; uncertainty is not an excuse for no action. Accordingly, this framework acknowledges this uncertainty and provides a flexible way to work within these constraints.

(c) For significant water bodies, EQCs or NRM targets would be established through the EPA using one of three processes outlines under EPA's responsibilities (Section 4.3).

STEP 4 Environmental Management Systems

Having established the EVs and EQOs (including EQCs or NRM Targets) for a significant water resource, the lead agency should then establish an Environmental Management Systems (EMS) to make sure that the water body is managed properly (Figure 2). The EMSs should include the following elements:

- EVs to be protected (Mission Statement);
- EQOs to be protected (The Broader Management Objectives);
- EQCs or NRM Targets to be employed (The Specific Management Objectives: Performance Benchmarks);
- The Implementation Plan (Implementation Strategy);
- Measurement of agreed key environmental quality indicators (Monitoring);
- Evaluation of performance against environmental quality benchmarks (Auditing); and
- Review and improvement (Adaptive Management, Continuous Improvement).

Each EMS would need to be reviewed and endorsed by the EPA.

STEP 5 Selection and Application of Environmental Values From Guideline No. 4

Appendix 9 should be referred to regarding the importance of setting EVs.

(a) Six EVs are recognized in Guideline No. 4, they are:

- Aquatic ecosystems;
- Primary industries (irrigation and general water uses, stock drinking water, aquaculture and human consumption of aquatic foods);
- Recreation and aesthetics;
- Drinking water;
- Industrial water; and
- Cultural and spiritual values.

Appendix 10 notes that some stakeholders are confused regarding differences between EVs and EQOs. In brief, an EV is a beneficial use of the environment while and EQO is goal or objective to ensure that use is protected.

(b) All stakeholders and community should be aware that Guideline No. 4 only offers specific environmental quality guidance for the first four EVs.

(c) The totality of the EVs for a given water body should reflect the broader stakeholders' and community's aspirations (desires and ethos) for its use (Holistic Approach [Appendix 5] & ESD [Appendix 6]).

(d) The level of environmental quality required to maintain each EV may be different. For areas where more than one EV applies, it may be necessary to manage environmental quality to the level required by the most conservative EV (eg if the EV for drinking water is protected, then all other EVs would be protected).

(e) Because the determination of EVs is a social-political process (Figure 1), EVs may change with time in response to changes in social expectation and circumstances. Hence the suitability of selected EVs should be reviewed at regular intervals.

STEP 6 Selection and Application of Environmental Quality Objectives (EQOs)

(a) EQOs are equivalent to management goals (broad and specific) described in Guideline No. 4. EQOs describe precisely the attributes to be protected in an area so that the designated EVs are protected.

(b) For most water bodies, be they marine or freshwater, a range of EVs would be protected. Hence a corresponding range of EQOs would also be established. It is appropriate that management first focuses on EQOs requiring the highest water quality. If they are met, the EQOs for the remaining EVs would be met.

(c) For expansive and partly modified waterbodies, it is appropriate to have a range of spatially separated broad EQOs for the same EV. For instance, the EV 'Ecosystem health' is proposed in the draft EPP for the whole of Cockburn Sound. To underpin this EV, three broad EQOs (high, moderate and low levels of protection) have been chosen to spatially cover the Sound. This is in recognition of current social expectations and environmental attributes. The three equivalent sets of specific EQOs that underpin the broad EQOs are the guideline trigger values (EQGs) taken from Guideline No. 4.

(d) The designation of EQOs in catchments and terrestrial water bodies (lakes, rivers and estuaries) is likely to be much more complicated than that for Cockburn Sound. As commercial and social pressures increase seaward along major catchments, so do the societal and stakeholder's needs and aspirations. An example would be the Swan Canning system. Not only should the system be spatially divided into different levels of ecological protection, it should also be divided into discrete management units. Further, because of the wide range of water quality in the system, the EQOs should include a mix of time-related NRM targets and guidelines. Time-related targets would be used where there are serious problems within a management unit that could not be resolved in the short term. Guidelines would be used in management units where water quality is adequate to meet current aspitations.

(e) Upstream water quality invariably influences downstream water quality, and diffuse source contamination is much more difficult to manage than point source contamination. Accordingly, lead agencies should take a holistic approach and ensure that all objectives for all management units within a system are compatible.

(f) For the EV 'ecosystem health', the level of environmental quality to be achieved for an area would be related its ecological and conservation value and its present degree of modification. Guideline No. 4 offers ecological guidelines (Guideline No 4, Ch3, p3,1-10 and Tables 3.4.1 & 3.4.2, p3,4-5 to 3,4-11) for three level of protection. The question of which set of ecological guidelines one uses, would need to be negotiated on a case-by-case basis with stakeholder and community involvement. It is noted that many of the decisions are subjective. For instance, for Cockburn Sound, three sets of EQOs have been negotiated for the EV 'ecosystem health'. They are as follows:

- set for the high protection area which account for approximately 95% of the Sound;
- set for the moderate protection area adjacent to developments and which accounts for approximately 5% of the Sound; and
- set for the low protection areas adjacent to a number of industrial discharge points.

Unlike the Cockburn Sound example, terrestrial systems are likely to be far more complex. because:

- the main freshwater issues in WA are salinisation, eutrophication and sedimentation, all of which mostly emanate from diffuse sources and none of which are dealt with to any great extent in Guideline No. 4;

- WA river systems are subject to significant long and short term climatic change resulting in erratic water flows and flushing;

- poor water quality in general usually arises from diffuse source problem;

- spatial limitation causing effluent discharges to form chemical barriers across rivers hindering the movement of some aquatic biota;
- the environment's incapacity to assimilate wastewater;
- downstream users of waterways having the same right to good quality water as those upstream;
- there is an ever increasing demands on the water resources for consumptive purposes including for drinking water and irrigation;
- freshwater resources are more susceptible to diffuse source contamination because of a lack of flushing; and
- a large number of small stakeholder perceive that they have 'prior right' to water use and discharge facilities in accordance with their needs based on historical practices;

Accordingly, selection of EQOs would need to be considered on a case-by-case basis as would the decision regarding the use guidelines or targets or a mix or both (Appendix 11).

(g) When drafting EQOs, the lead agency, stakeholders and community should not assume that pristine areas are 'high conservation or ecological value' areas. Nor should they assume that areas of 'high conservation or ecological value' are necessarily pristine. If those assumptions were the case, vast lengths of Western Australia's coastline could be quarantined from anthropogenic change. Further, areas already impacted that have 'high conservation, ecological or social value' may not be afforded the appropriate level of protection in the future simply because they were not considered a modified environment.

(h) Just as for EVs, EQOs should be reviewed by the lead agency in conjunction with the EPA on a regular basis.

STEP 7 Selection and Application of Environmental Quality Guidelines and Standards (Criteria)

(a) For the purpose of ensuring that EVs are protected and broad EQOs are meaningful, scientific guidelines (EQGs) and standards (EQSs) or time related NRM Targets (benchmarks) could be embodied into EQOs. These benchmarks can be used in the monitoring and assessment of management areas.

(b) As noted in Step 6, it is much easier to adopt guidelines direct from Guideline No. 4 for marine waters than it is for estuarine and freshwaters. This is specifically relevant to Western Australia since the three main problems in terrestrial water are salinity, euthrophication and sediments. Guideline No 4 only offers broad and generalised guidance on these matters. The use of time-related NRM Targets rather than an attempt to use guidelines should always to

be considered for highly degraded areas (Appendix 11). The long term NRM Target, however, would normally be the guideline trigger values given in Guideline No. 4 for a designated EV unless a more appropriate local guideline has been developed in the meantime. Shorter term NRM Targets (interim targets) would serve as benchmarks against which progress towards the long term target would be audited. Accordingly, where targets are adopted, the use of guideline trigger values and standards would be redundant except for the purposes of licensing prescribe premises (Section 4.5) until the long term target is achieved.

(c) Where the setting of EQGs and EQS are appropriate, they can be set through three policy options outlined in Section 4.3.

Environmental Quality Guidelines (EQGs)

(d) An EQG is a specific objective in that if it is exceeded a management action would need to be undertaken.

An **'EQG'** means a numerical value or narrative statement which if met indicates there is a high probability that the associated environmental quality objective has been achieved.

An EQG signifies the 'lower error bound' of the zone of uncertainty associated with environmental monitoring (Figure 3). If ambient monitoring shows an EQG has been met, then there is a high degree of certainty that the overall EQO has also been achieved. However, if the EQG has not been met, a management response would be triggered. The response would be risk-based and investigative in nature and would have benchmarks of acceptability embodied in them.

(e) Where sufficient local environmental or ecological data exists, local guidelines would be adopted in preference to the default guideline trigger values in Guideline No 4.

How do we use EQGs

(f) An example of the use of EQGs is given in the draft EPP for Cockburn Sound. Whilst the EV "Ecosystem Health' has been set for all of Cockburn Sound, three EQOs have been adopted (high, moderate and low level of protection) and they are reflected in the chronic exposure guideline trigger value taken directly from Guideline No. 4.

(g) If a guideline trigger value is exceeded, the management body would initiate a series of investigations against the EQS as laid out in the draft EPP for Cockburn Sound. If the investigation indicates that there is no problem, the results of the investigation could be used to substitute default guideline trigger values in Guideline No. 4 with a more appropriate guideline specific to the area under investigation. If the results indicate that there is a problem, the management body would take appropriate action to investigate the causes and take appropriate action to ensure that the EQOs would not be compromised.

(h) Where guideline trigger values provided in Guideline No 4 are referred to as low reliability guidelines, they would not to be used in any rigorous manner, but rather would be viewed as supporting information only.

(i) Where a guideline trigger value in Guideline No 4 is a reiteration of public health guidelines, it would be viewed as an EQS (see below). These guidelines relate to human health (eg Australian Drinking Water Guidelines [NH&MRC, 1996 or later], microbiological standards for contact recreation, and the Australian and New Zealand Food Authority food standards for contaminant levels in seafood [ANZFA, 2002]). For these guidelines, EPA would expect the Health Department to manage those matters.

Environmental Quality Standards (EQS)

(j) An EQS is a specific objective that should never be exceeded. If it is exceeded, management action would need to be implemented.

An **'EQS'** means a numerical value or narrative statement beyond which there is an unacceptable risk that the associated environmental quality objective has not been achieved and a management response is triggered.

(k) Where NRM interim targets would be used, it is inappropriate to use EQS until the long term NRM target (EQG) is met (see Item b above and Appendix 11). NRM target could be viewed as rehabilitation targets that are agreed by the majority, if not all stakeholders.

(l) Where it is appropriate to set EQSs, an EQS signifies the 'upper error bound' of the zone of uncertainty associated with environmental monitoring against the EQOs (Figure 3). Item (g) above indicates how EQSs are related to EQGs in the draft EPP for Cockburn Sound. If an EQS is not met then a management body, in consultation with key stakeholders and the decision making agencies should respond immediately. The response should focus on identifying and eliminating the causes of reduced environmental quality (ie source control) but may also require in-situ remedial work to be undertaken. The management response should be selected after considering the cost-effectiveness of a range of options and would have timelines and performance reviews built in.

(m) EQSs are linked to specific socially based EQOs and/or to specific levels of protection for ecologically based EQOs. An EQS does not need further refinement to take account of local factors. It is set at a level where, if exceeded, there is a significant and unacceptable level of risk that the EQOs will not be met. For highly degraded areas it is more appropriate to set NRM Targets rather than use EQGs and EQSs except for the purposes of licensing prescribe premises (Section 4.5).

(n) It is preferable to use a 'multiple lines of evidence' for EQSs as it adds confidence to decision making. Where possible, an EQS should contain 'multiple lines of evidence' indicating that there is a persistent problem and that one particular source is largely responsible before management action is implemented, particularly when imposed on a third party (Appendix 12). Clearly this matter becomes very complex, especially where diffuse and multi-source contamination takes place in catchments and estuaries. Hence, it is imperative that the issuing of waste water discharge licenses under Part V of the EP Act 1986 by DEWCP be consistent with Policies, EVs, EQOs (EQCs) and Ministerial Conditions set for a relevant water body.

(o) For protection of ecosystem health, an EQS would largely be based on biological effects and underpinned by an EQG. An EQS should use biological/ecological indicators of ecosystem health as well as bioavailable estimates of the more traditional chemical measures. This composite approach incorporates both the risk-based decision frameworks and the integrated monitoring and assessment strategies recommended in *ANZECC & ARMCANZ* (2000a). Biological/ecological indicators are selected according to a conceptual model of the cause-effect pathway developed for the site, and should include a key ecological indicator (eg. seagrass as an indicator for nutrient enrichment where water clarify is shown to be influenced by phytoplankton biomass). The EQS should be set at a level that signifies detrimental change to, but not loss of, the key ecological indicator. However, for some highly disturbed systems where key ecological indicators have already been significantly impacted, the EQS may need to be set at a level that sets a limit to any further losses or adverse changes.

(p) See Item (i) above for where Guideline No 4 relates to public health matters.

4.3 Responsibilities of the Environmental Protection Authority: Assessing EVs, EQO, EQCs as proposed by the lead agency for significant water resources

Policy Options for Implementing the EVs, EQOs and EQCs for Significant Water Resources

The EPA is aware of the time it takes to publish specific catchment and coastal zone policies. Some aquatic environments are under sufficient pressure at present that speedy policy responses are appropriate. Hence, using the principle of 'adaptive management' as espoused in the NWQMS, any of the following three policy approaches may be chosen to give broad formal effect to agreed EVs, EQOs, EQCs and associated environmental management systems (EMS). The options include:

- an Environmental Protection Policy (EPP) (a whole of Government Policy);
- a Cabinet endorsed policy; or
- an EPA endorsed policy.

Notwithstanding the above, EPA recognises that some agencies have their own management policies that have not been endorsed by the above bodies. In the long term, all significant policies underpinning NRM would need to be reviewed for consistency.

Regardless of which policy approach is adopted, it should be used in the spirit of 'cooperation and partnership' as espoused in the NWQMS. The policies need not necessarily be regulatory instruments. For instance, point source wastewater discharge to the environment is already dealt with under the provisions Pts IV & V of the EP Act 1986. Part IV empowers the Minister for the Environment to set conditions on new proposals and Pt V empowers DEWCP to set license conditions on point source wastewater discharges from prescribed premises.

Policy Options

(a) Environmental Protection Policy (EPP)

An Environmental Protection Policy (EPP) is initiated by EPA. The EPA would identify EVs, EQOs and EQC to be adopted under the policy, and the areas where they apply. To this end, EPA consults widely when drafting an EPP. As the drafting progresses, stakeholder and community views are considered. The drafting process involves legal drafting by Parliamentary Counsel and is submitted to the Minister for the Environment and Heritage for wider public circulation. To that end, the Minister consults with affected parties before making a decision. If approved, the EPP is Gazetted and then tabled in Parliament.

(b) Government Endorsed Policy

Another policy approach is for EPA to follow a similar process to that above without the statutory steps. Instead, EPA would submit the draft policy to the Minister for the Environment and Heritage for Cabinet's consideration. In this case there are two mechanisms for seeking community and stakeholder comment. One is for EPA to release the draft for public and stakeholder comment before submission to the Minister for the Environment and Heritage. The other is for Cabinet to endorse the draft for public and stakeholder review before finalisation.

This general approach is being used for the development and publication of the SWQMS series. The first of that series, The Framework (SWQ1), was endorsed by Cabinet in 2001.

(c) EPA Published Policy

A third policy approach is for EPA to publish its own policies. Such a policy would normally involve community and stakeholder consultation. In this case the final document would reflect EPA's thinking as to how it would assess aquatic matters that it advises Government on. Whilst such a policy would have no statutory powers, it is likely to have broad community support. The advantage of having such a policy approach would be that policies are more easily finalised, can be reviewed at time convenient to EPA and hence be more responsive to new information, circumstances and changing community views.

4.4 Responsibilities of the EPA's Service Unit: advice to proponents on environmental impact assessment

STEP 1 Understanding EPA's Service Units relationship with the EPA and Proponents

(a) The EPA's Service Unit advises EPA on the environmental acceptability of new proposals assessed under Pt IV of the EP Act 1986. EPA considers EPA's Service Unit's advice, consults with others including specialist technical advice as appropriate, makes independent decisions from EPA's Service Unit and advises Government as it deems appropriate.

(b) EPA's Service Unit gives advice to proponents by preparing scoping documents for new proposals. As apart of this advice, the EPA Service Unit would draw a proponent's attention to relevant policies, EV's and EQOs (EQC and NRM targets) against which the proposal would be evaluated through the Environmental Impact Assessment (EIA) process. Where there are no formal policies, EVs and EQOs, the EPA Service Unit and the proponent would agree upon interim or notional performance benchmarks for the purposes of project design and assessment. This provides a basis for proponents and the EPA to ensure that any potential contaminant-related impact resulting from a development remains within acceptable bounds.

STEP 2 Use of Guideline No. 4 for determining EVs for Ecological Protection

(a) Proponents and regulators should understand that whilst Guideline No 4 offers different levels of ecological protection (eg 99%, 95%, 90% and 80% species protection for toxicants: Table 3.4.1, pp 3.4-5 to 10), environmental quality is a continuum ranging from pristine to highly disturbed conditions. Hence, designation of a level of protection to water resources (see Guideline No. 4, pp 3.1-10 to 31-13), and the application of Guideline No 4 for ecological protection, is somewhat subjective. Accordingly, designation of a level of protection is a matter for discussion between proponents, the EPA Service Unit and the EPA before Guideline No 4 is used for project design and assessment.

STEP 3 General Use of Guideline No. 4 for the Protection of the Freshwater Environment

(a) The 1998 Western Australian SOE Report stated that the major pressures affecting inland waterways are salinisation, loss of fringing vegetation, eutrophication, sedimentation, and contamination. Over extraction of water from the environment is also a major issue. Given the drying climate over the past 20 years in the South West of Western Australia and the damming of watercourses for stock and potable supplies, this problem is likely to get worse. The pressure on many waterways is further accentuated because of their ephemeral nature, vegetation clearing in their catchments and acidification and fertilization of surrounding land from commercial fertilisers. Accordingly, the EPA and proponents would assume that if freshwater quality deteriorates further, it is likely to have a profound effect on biodiversity and abundance of aquatic life especially in the South West of Western Australia. Hence, the EPA Service Unit, on behalf of the EPA, when discussing new project design with proponents, would make every effort to ensure that new proposals do not compromise further the quality and quantity of water in the South West of Western Australia.

(b) There should be a presumption against new proposals that would lead to a significant physical or chemical change in the freshwater environment resulting from wastewater discharge. Notwithstanding the above, if a proponent proposes to dispose wastewater into a freshwater resource, the proponent would have to demonstrate to EPA that it has investigated:

- the alternatives of recycling and reusing water in its process; and
- the feasibility of irrigation of the wastewater to land.

If the above were deemed by the proponent to be unfeasible, the proponent would have to demonstrate to EPA that discharge of wastewater to a water resource would not impact the formal or notional EVs, EQOs and EQCs designated to that resource.

STEP 4 Specific Use of Guideline No 4 for New Proposals

(a) The EPA's Service Unit, when it first discusses a new proposal with a proponent, would inform the proponent of any formal policies, EVs and EQOs (including EQCs and NRM Targets) relevant the proposal area. Where policies, EVs and EQOs have not been established, EPA's Service Unit would indicate the likely environmental issues that would need to be addressed in the proposal and with EPA's concurrence, set interim/notional EVs and EQOs (including EQCs) for the purpose of project design and assessment. For public health related EVs and EQOs, the EQGs provided in Guideline No. 4 would be used as EQSs (see Step 4.2, Item p). For the maintenance of ecological health the following points provide a guide for setting an appropriate level of protection and equivalent EQGs.

Near pristine areas with high conservation and/or ecological value areas

(b) EPA would generally expect that a proposal for the above area would not cause any detectable ecological or chemical change in its surrounds. This level of protection is designated as 'High Conservation/Ecological Value Systems' in Guideline No. 4 (p3.1-10). Where resources are not available to establish background conditions for toxicants, the guideline trigger values in Table 3.4.1 covering the protection of 99% of the species would be considered as default EQGs. As a guide, no area in Cockburn Sound falls into this category. Areas around Ningaloo Reef and Shark Bay may fit this category.

Pristine areas with high ecological value but undefined formal conservation value

(c) EPA would generally find that a proposal for the above area to be acceptable so long as there was no significant ecological change. This level of protection is designated as 'Slightly to Moderately Disturbed' in Guideline No 4 (p3.1-10). In such areas, ambient water quality guidelines for toxicants in Table 3.4.1 covering the range of protection for 95% - 99% of the species should be used as default EQGs. The exact guidelines may have to be determined by EPA on a case-by-case basis depending on background conditions. For physio-chemical and nutrient related parameters, EQGs would be developed using percentiles of the natural distribution for each parameter at a suitable reference site (Appendix 13).

Slightly to moderately disturbed areas with moderate ecological and conservation value

(d) EPA would generally find that a proposal for the above area to be acceptable if it complied with the EQGs in Guideline No. 4 for 'slightly to moderately disturbed systems' (See Tables 3.4.1 & 3.4.2, pp3.4-5 to 11). Given that this level of protection is likely to be relevant to many proposals assessed under Pt IV of the EP Act 1986, it is highly desirable that local EQGs be used (or developed) as an alternative those in Guideline No 4.

Slightly to moderately disturbed areas with moderate to low ecological and conservation value

(e) EPA would generally find that a proposal for the above area to be acceptable if it complied with the EQGs in Guideline No. 4 for 'slightly to moderately disturbed systems' (See Tables 3.4.1 & 3.4.2, pp3.4-5 to 11) for most discharge parameters. For the remainder, the EQGs for 'highly disturbed systems' (See Tables 3.4.1 & 3.4.2, pp3.4-5 to 11) would apply. The decision on what mix of guidelines would be used would be dealt with by EPA on case-by-case basis . Given that this level of protection is likely to be relevant to many proposals assessed under Pt IV of the EP Act 1986, it is highly desirable that local EQGs be used (or developed) as an alternative those in Guideline No. 4.

Highly disturbed areas with little conservation and ecological value

(f) Many areas in the above category are already subject to widespread diffuse source contamination (salinisation, eutrophication and sedimentation). This matter is dealt with in Appendix 11 which discusses the merits of NRM Targets versus Guideline Trigger Values.

For contaminants discharges similar to those contaminants in the ambient waters, the discharge should not cause any material effect to the time related NRM targets agreed for that area (See Tables 3.4.1 & 3.4.2, pp3.4-5 to 11).

For the remainder of contaminants, the EQGs for 'highly disturbed systems' would apply (See Tables 3.4.1 & 3.4.2, pp3.4-5 to 11).

Mixing and buffer zones

(g) The use of mixing and buffer zones may be acceptable in some marine areas (Guideline No 4, p3.1-10). The water quality in the buffer zone should not be worse than the 90% species protection levels as given in Table 3.4.1 (pp 3.4-5 to 10). The level of acceptable environmental quality in the mixing zone will need to be addressed on a case-by-case basis. For instance, where human pathogen loads are high, some social Environmental Quality Objectives may not be maintained. For the maintenance of ecosystem integrity, the level of protection that should apply, as a minimum is the 80% species protection values for those chemicals identified as potentially bioaccumulating or bioconcentrating substances (Guideline No. 4, Table 3.4.1, pp 3.4-5 to 10). The existence of a mixing zone around an outfall should not necessarily require that any or all of the designated EQOs be excluded from the area.

The Cockburn Sound EPP refers to the matter of EQOs in mixing zones, otherwise known as low protection zones (draft EPP, pp5-7). A low protection zone allows for further reduction in the level of ecological quality to be met, but no EQOs are excluded. For instance the draft EPP for Cockburn Sound would expect that the EQOs would be met for:

- primary and secondary recreation;
- aesthetics;
- aquaculture; and
- aquatic food at the end of a discharge pipe.

The draft EPP allows operators of prescribe premises to apply to EPA for an exemption. If it were granted, discharge license would reflect this.

The topic of mixing zones is discussed briefly in Guideline No 4 (Section 2.2.2 of Volume 1 (p2-17, and Appendix 1 of Volume 2).

Notwithstanding the above, the framework recognises that one of the most contentious matters for industry is the provision for mixing zones. The framework notes that when a proposal involving a mixing zone is submitted to the EPA for assessment, the proponent would need to demonstrate the necessity for proposing a mixing zone and show reason why it should not be seen as method of discharging inadequately treated effluent to the environment. As appropriate, EPA would make recommendations to the Minister for the Environment and Heritage on the acceptability of such a proposal. The EPA notes that if the Minister for the Environment and Heritage accepts EPA's recommendations, the resulting Ministerial Conditions would reflect EPA's recommendations. In turn, DEWCP would issue licence condition for that proposal under Pt V of the EP Act 1986 consistent with the Ministerial Conditions.

(h) An example of how Guideline Nos. 4 & 7 would be applied for Environmental Impact assessment is given in Appendix 14.

4.5 Responsibilities of the DEWCP: advice to licensees of prescribed premises under Pt V, EP Act 1986

STEP 1 Understanding DEWCP's Role as Regulator/Licensor

(a) The DEWCP has a regulatory role (pollution prevention) under Pt V of the EP Act 1986. Accordingly, it issues licence conditions on discharges to the ambient environment from prescribed premises.

STEP 2 Discharge of Wastewater to Terrestrial Water Resources

(a) The DEWCP intends to use Guideline No 4 when issuing licenses to operators that discharge effluent to the environment. Licensees should note that discharging wastewater to the terrestrial water resources is generally more problematic than discharging to the marine environment. This matter has already been partly addressed in Section 4.2 (step 6f) above.

STEP 3 Notional, Interim, and Formal EVs, EQOs and EQCs

(a) Where policies, EVs and EQOs (including EQCs and NRM Targets) have not been established for a significant water body and discharge of treated effluent maybe acceptable, the Licensing Branch of DEWCP would use notional or interim EVs and EQOs (including EQCs) for the purposes of licensing prescribed premises.

The DEWCP's objectives, through its licensing role and in collaboration with the licensee, would be to ensure that both ambient EQC are not exceeded and that total loads of contaminants to the environment are kept as low as are reasonably practicable.

Accordingly, license conditions would be consistent with the interim EVs, EQOs and EQCs. These conditions would be conservative, recognising the limited data normally available, and would be consistent with the precautionary principle.

(b) For the purposes of determining appropriate license conditions, the EQCs would be used to determine the maximum permissible concentrations of a substance in an effluent that would still protect the designated EVs. This is done by back-calculation from the relevant EQC, taking into consideration the dilution and mixing (if permitted by the regulatory agency) that occurs in the receiving environment, contaminant filtration in soils, dispersion characteristics, and background concentrations etc. An example is given in Appendix 15.

(c) License conditions would also reflect the different types of EQC and the different management responses they trigger (See Monitoring Section below). For example a licence may include a *Licence Limit* based on back-calculation from the EQG, or from the EQS when it is a numerical standard. A licence may also include a *Licence Target* that provides an operational target for dischargers to ensure the discharge quality remains below a determined value, whereas the *Licence Limit* is the discharge level that should not be exceeded, and may attract enforcement action if exceeded.

(d) If effluent quality remains below the *Licence Target* then ambient monitoring requirements may be relaxed. If effluent quality exceeds the *Licence Target* but remains below the *Licence Limit*, a routine monitoring program (See Monitoring Section below) would be required to provide surety that the ambient EQG is not being exceeded. If ambient environmental monitoring shows the EQG to be exceeded then the monitoring focus could be shifted to

assessing environmental quality against the EQS. The costs of defining and then monitoring against the EQS are likely to be higher than those costs associated with monitoring against the EQG. Instead of expending resources on defining and monitoring against the EQS, the discharger would be encouraged to reduce discharge levels so that contaminant levels in the ambient environment fall below the EQG. This is particularly pertinent for discharges to waterways and estuaries that are already stressed.

4.6 Responsibilities of the DEWCP: monitoring advice to stakeholders that discharge or intend to discharge wastewater to the environment (Guideline No 7)

STEP 1 General comment regarding discharge of wastewater to the aquatic environment

(a) Monitoring of the ambient environment is generally undertaken to gather information that can be used to assess the health of a system or to improve understanding of how the system works. Since it can be an expensive exercise, those organisations charged with this responsibility generally need to focus their resources on waters with identified or suspected problems, such as declining or poor water quality. In most cases the problem or issue threatening a water resource is already known and the resources available for ambient monitoring can be further focused onto the relevant parameters.

STEP 2 Who Monitors the Ambient Environment

(a) Given that this management framework is about building partnerships, monitoring the ambient environment could involve any individual/organisation comprising the partnership. However, prime responsibility for monitoring the ambient environment rests with Government agencies. Notwithstanding that, if multiple lines of evidence identifies a particular organisation, be it government or private, impacting the ambient environment, the EPA would anticipate that that organisation would become more involved in monitoring the ambient environment until the offending activity is rectified.

STEP 3 Use of Guideline No 7

Guideline No 7 provides a useful set of standard approaches to assist the range of groups involved in monitoring to design consistent monitoring programs and collect comparable data that can be integrated across broad regions.

Like all natural systems, the aquatic environment is subject to a high degree of natural variability that must be taken into account in any environmental decision making process. Ideally long-term baseline monitoring programs would be established to characterise natural variability. Also, impact-monitoring programs should have sufficient sensitivity to identify adverse and unnatural trends in the environmental quality indicators, providing early warning of environmental degradation before the EQG, and in particular the EQS, are exceeded and in time to reverse the trend and protect designated EVs.

Many of the potentially confounding problems associated with the inherent natural variability of the environment can be minimised by deriving EQCs for specific regions and/or seasons and monitoring accordingly or by including one or more reference sites. Reference sites are used either as controls (ie. an unimpacted site identical to test site) for comparison with an impacted site so that local or site-specific impacts can be isolated from regional/global scale changes and influences (eg. climate), or as a target condition to aim for or compare against. For some environmental quality indicators the inclusion of reference sites is essential to enable any inferences to be drawn about an impact site (eg. biological indicators) or to derive site-specific criteria (eg. physical and chemical stressors).

It is essential that the timescales for detecting an adverse trend and the timescales for affecting the appropriate management response are reconciled between key stakeholders during the design of the monitoring program. In other words it is no good implementing a monitoring program to detect an unacceptable effect one year in advance if it takes five years to implement a suitable management response.

Sediment and biota tend to integrate the often intermittent or pulsed exposure to toxicants through the water column over time and therefore concentrations in sediment and biota are likely to provide a better measure of potential ecological effects at that site. The use of 'water quality' criteria may therefore not always be the preferred approach for monitoring toxicants in the environment due to the intense spatial and temporal frequency of sampling required, and other technical difficulties (eg. analytical detection limits). In these situations routine monitoring would be focussed on the more integrative measures of exposure such as sediment quality and quality of filter-feeding organisms. This monitoring could be considered surveillance monitoring and is a check to ensure environmental quality is as expected. If however, this monitoring shows criteria have not been met, or adverse trends in key parameters and the cause is unknown, then more detailed water quality monitoring may be required to identify the source of the contaminant and develop the most appropriate management response.

Nutrient concentrations in marine waters are also highly variable and influenced by a range of factors, including biological uptake, and therefore provide limited guidance for managers. The more appropriate indicators of environmental stress caused by nutrient enrichment are related to the biological effects (ie. indicators, such as periphyton and phytoplankton biomass, along the cause-effect pathway).

STEP 4 Decision criteria for determining when the EQG and EQS are not met and the EQOs not achieved

In most circumstances there would be insufficient confidence to trigger a management response if a single data point marginally exceeded an EQC. Therefore when comparing monitoring data with the EQG and EQS, relatively simple statistical approaches are generally used to determine when a management response is triggered. These approaches are based on those outlined in Guideline No 4, although for some health related criteria the Health Department of Western Australia may recommend alternative approaches. In general, the approaches for the physical and chemical

indicators identify both frequent and infrequent broad-scale exceedances and frequent localised exceedances of the criteria, but ignore infrequent localised exceedances.

Firstly, for those EQG or EQS that are based on actual biological effects data (eg. toxicants), if the 95th percentile of the sample data for a defined sampling area from one sampling run, or from all runs over an agreed period of time (eg. season or year), exceeds the designated criteria then it is considered to have been exceeded (either for the area or for the site). For other EQG or EQS it is the median of the sample data that is compared against the criteria. This aims to maintain an acceptable level of environmental quality over broad areas.

Secondly, if either the 95th percentile or median (whichever is appropriate) of the sample data from an individual site over an agreed period of time (eg. season or year) exceeds the designated criteria then it is considered to have been exceeded. This is to protect the environment from localised but frequent exceedances of the EQCs.

These are general approaches that may need to be modified for particular situations. For example, if there are insufficient data to calculate the 95th percentile then the recommended approach is to trigger an appropriate response if any sample does not meet the criteria.

Where biological indicators are used to assess environmental quality it will be necessary to select control sites for comparison with impact sites, and to determine acceptable effect sizes (ie. the maximum amount of change considered acceptable in a biological indicator) and give consideration to both Type I error (probability of concluding that the effects size has been exceeded when in fact it has not) and Type II error (probability of concluding that the effect size has been achieved when in fact it hasn't). The actual effect size and decision criteria selected for any particular indicator will need to be determined on a case-by-case basis so that natural variability is taken into account. Guidance on the selection of appropriate effects sizes and the determination of suitable Type I and Type II error rates is provided in Guideline No 4 (section 3.2 and chapter 7).

In all cases, if an exceedance occurs then the key stakeholders (eg. regulators, environmental managers or relevant community groups) should be immediately informed and an appropriate management response initiated. Management responses may include further investigation against the EQS if an EQG has been exceeded or development and implementation of strategies to reduce contamination if an EQS had been exceeded.

More detailed information on the design and implementation of programs to monitor environmental quality and on the interpretation of monitoring data can be found in chapter 7 of Guideline Nos. 4 & 7.

5. Conclusions

The Environmental Protection Authority (EPA), proposes the framework set out in this document be used to implement the NWQMS Guideline Nos 4 & 7.

The framework:

(a) links the Guidelines Nos 4 & 7 with the relevant Headpowers of the Environmental Protection Act (1986) and related activities:

- Environmental Protection Policies (Part III);
- Environmental Impact Assessment (Part IV); and
- Licensing of prescribed premises (Part V).

(b) sets out the linkage with the SWQMS in that, when finalised, it will constitute one of the SWQMS series of documents.

(c) emphasises the importance of developing a cooperative, transparent and flexible partnership with all involved parties when implementing Guideline Nos 4 & 7. The partnership should include:

- involved government agencies;
- interested communities;
- industry;
- landholders and water users;
- environmental groups; and
- special interest groups.

(d) notes that setting EVs (beneficial uses) and EQOs (EQCs [EQG and EQSs]) or NRM Targets) for all significant catchments and coastal zones is fundamental to good management. The totality of setting the above and embodying them into an EMS for each significant water body is the essence of this framework.

(e) indicates how Guideline Nos. 4 and 7 could be adopted as EQG for a variety of environmental circumstances. It notes that for highly modified environments that require rehabilitation, NRM Target setting maybe more appropriate than using guideline trigger values. It also notes that the use of bio-indicators may be also more valuable than simply using guideline trigger values.

(f) outlines the roles and responsibilities of the EPA, the EPA Service Unit, lead government agencies including DEWCP. Additionally, it offers advice to proponents for new proposal subject to EIA and operators of prescribed premises that wish to discharge wastewater to the environment.

(g) applies to a large range of aquatic environments. Accordingly, several mechanisms are jointly proposed for its implementation. They include:

- Environmental Protection Policy (a whole of Government Policy);
- Cabinet endorsed policy; and
- EPA endorsed policy.

If Guideline Nos 4 and 7 are implement using this framework the NWQMS's objective:

> *'to achieve sustainable use of the State's water resources by protecting and enhancing their quality while maintaining economic and social development'.*

should be met in Western Australia.

Glossary of Terms

Term	Definition
Ambient waters	All surrounding waters, generally of largely natural occurrence.
Anthropogenic	Produced or caused by humans.
Aquatic ecosystem	Any watery environment from small to large, from pond to ocean, in which plants and animals interact with the chemical and physical features of the environment.
Assimilation	The incorporation of absorbed substances into cellular material.
Assimilative capacity	The maximum loading rate of a particular pollutant that can be tolerated or processed by the receiving environment without causing significant degradation to the quality of the ecosystem and hence the environmental values it supports.
Biodiversity	The variety and types of naturally occurring like. This encompasses genetic, species, and ecosystem levels at the local and regional scale.
Contaminant	Biological (e.g. bacterial and viral pathogens) and chemical (see Toxicants) introductions capable of producing an adverse response (effect) in a biological system, seriously injuring structure or function or producing death.
Decision framework	A series of steps for tailoring guideline trigger levels to a specific site or region and for assessing water quality by considering the local or regional environmental factors that will modify the effect of the particular water quality parameter. The decision frameworks or trees begin with the simplest steps and finish with the most difficult and expensive.
Diffuse source	In relation to pollution means multiple small sources spread over a wide area.
Ecological integrity	The ability of an ecosystem to support and maintain key ecological processes and organisms so that their species compositions, diversity and functional organisations are as comparable as possible to those occurring in natural habitats within a region.
Environmental management systems	environmental management systems: provides the management, administrative and monitoring framework which ensures that an organisation's environmental risk is minimised and the its environmental policy together with associated objectives and targets are achieved. Stages in an EMS, based on the ISO 14000 series comprises commitment to a policy, planning which includes evaluation of relevant regulatory framework, setting objectives and targets, establishing a management program (EMP), definition of personnel and responsibilities, identifying training needs, establishing and maintaining EMS documentation, emergency and preparedness and response procedures and establishing operational controls, carrying out audits and reviews including monitoring and review (ARMCANZ & ANZRCC 1995. NWQMS, Guideline No 16 B, Effluent Management Guidelines for Dairy Processing Plants.
Environmental quality criteria	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	A numerical value or narrative statement which if met indicates there is a high probability that the associated environmental quality objective has been achieved.
Environmental quality objective'	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 (Draft EP [Cockburn Sound] Policy 2001).

Environmental quality standard	A numerical value or narrative statement beyond which the associated environmental quality objective has not been achieved and a management response is triggered.
Ecologically sustainable development	Development that improves the total quality of life, both now and in the future, in a way that maintains the ecological processes on which life depends.
Environmental values	**EP Amendment Bill 2002:** Environmental value means – (a) a beneficial use; or (b) an ecosystem health condition **EP Act 1986:** Beneficial use means use of the environment, or of any portion thereof, which is – (a) conductive to public benefit, public amenity, public safety, public health or aesthetic enjoyment and which requires protection from the effects of discharges of wastes or of emissions of noise, odour or electromagnetic radiation; or (b) identified and declared under section 35 (2) to be a beneficial use to be protected under an approved policy. **EP Amendment Bill 2002:** Ecosystem health condition means – a condition of the ecosystem which is – (a) relevant to the maintenance of ecological structure, ecological function or ecological process and which requires protection from the effects of emissions or of activities referred to in paragraph (a) or (b) of the definition of "environmental harm" in section 3A(2); or (b) identified and declared under section 35 (2) to be an ecosystem health condition to be protected under an approved policy.
Guideline trigger values	These are the concentrations (or loads) of the key performance indicators measured for the ecosystem, below which there exists a low risk that adverse biological (ecological) effects will occur. They indicate a risk of impact if exceeded and should 'trigger' some action, either further ecosystem specific investigations or implementation of management/remedial actions.
Indicator	A parameter that can be used to provide a measure of the quality of water or the condition of an ecosystem.
Licensed premises	A residential, industrial or other premises of any kind whatsoever and includes land, water and equipment, licensed under Part V of the EP Act 1986.
Mixing zone	An explicitly defined area around an effluent discharge where the effluent is actively diluted with the ambient water.
NRM Target	A 'Natural Resource Management Target' means the numerical value or narrative statement that serves as long or short term time related benchmarks. The long term NRM Target should equate to the guideline trigger value in Guideline No 4 for the chosen EV.
Performance indicators	These are the indicators used to assess the risk that a particular issue will occur (they are used in the guideline packages to compare against the trigger levels). They are generally median (or mean) concentrations in the ambient water, and may be stressor and/or condition indicators.
Pollutant	Any matter or thing that could have the potential to alter, directly or indirectly, the environment to the detriment of the environmental values.
Pollution	Direct or indirect alternation of the environment – (a) to its detriment or degradation; (b) to the detriment of any environmental value, or (c) of a prescribed kind, that involves an emission.

Potable water	Water suitable, on the basis of both health and aesthetic considerations, for drinking or culinary purposes.
Practicable	Reasonably practicable having regard to, among other things, local conditions and circumstances (including costs) and to the current state of technical knowledge.
Quality assurance (QA)	The implementation of checks on the success of quality control (e.g. replicate samples, analysis of samples of known concentration).
Quality control (QC)	The implementation of procedures to maximise the integrity of monitoring data (e.g. cleaning procedures, contamination avoidance, sample preservation methods).
Risk	A statistical concept defined as the expected likelihood or probability of undesirable effects resulting from a specified exposure to known or potential environmental concentrations of a material. A material is considered safe if the risks associated with its exposure are judged to be acceptable. Estimates of risk may be expressed in absolute or relative terms. Absolute risk is the excess risk due to exposure. Relative risk is the ratio of the risk in the exposed population to the risk in the unexposed population.
Safety factor	A number used to provide an extra margin of safety beyond the known or estimated sensitivities of aquatic organisms. Often applied when sufficient information about the toxicity, particularly the chronic toxicity, of a particular substance is not known.
Social value	A particular value or use of the environment that is important for public benefit, welfare, safety or health and which requires protection from the effects of pollution, waste discharges and deposits.
Stakeholder	A person or group (e.g. an industry, a government jurisdiction, a community group, the public, etc) who have an interest or concern in something.
Sustainable development	Development that provides economic, social, and environmental benefits in the long term, having regard to the needs of living and future generations. Defined by the World Commission on Environment and Development as development that meets the needs of the present without compromising the ability of future generations to meet their own needs'. Thus, the satisfaction of human needs and aspirations is the major objective of development. Sustainable development considers both the living and non-living resource base with regard for conservation and the advantages and disadvantages of alternative courses of action for future generations. It allows the use of depletable resources in an efficient manner, with an eye to the substitution of other resources in due course. Sustainable development calls for much more emphasis on conserving natural systems and the resource base on which all development depends; a greater regard for equity within society at present and between rich and poor nations, with particular regard to the world's poor; and a planning-horizon that goes well beyond the needs and aspirations of those alive today. It requires an integration of environmental, social, and economic considerations in decision-making.
Trigger values	These are the concentrations (or loads) of the key performance indicators measured for the ecosystem, below which there exists a low risk that adverse biological (ecological) effects will occur. *They indicate a risk of impact if exceeded and should 'trigger' some action, either further ecosystem specific investigations or implementation of management/remedial actions.*

Acronyms

ANZECC	Australian and New Zealand Environment and Conservation Council
ANZFA	Australia New Zealand Food Authority
ARMCANZ	Agricultural and Resource Management Council of Australia and New Zealand
COAG	Council of Australian Governments
DEWCP	Department of Environment, Water and Catchment Protection
ESD	Ecologically sustainable development
EQC	Environmental Quality Criteria
EGG	Environmental Quality Guideline
EQO	Environmental Quality Objective
EQS	Environmental Quality Standard
EV	Environmental Value
ICM	Integrated catchment management
NHMRC	National Health and Medical Research Council
NWQMS	National Water Quality Management Strategy
SoE	State of Environment
EPA	WA Environmental Protection Authority
WC	WA Water Corporation
WHO	World Health Organisation
WQG	Water Quality Guideline
SWQMS	State Water Quality Management Strategy
SWQ1	SWQMS - No1: Framework for Implementation

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Appendix 1

List of Government and non-Government stakeholders invited to be part of the development of the framework

Government Stakeholders:

Aboriginal & Torries Strait Islander Commission
Department of Agriculture
Department of CA L M
Department of Environmental Protection
Department of Fisheries
Department of Health
Department of Indigenous Affairs
Department of Local Government and Regional Development/
Regional Development Council WA
Department of Minerals and Petroleum Resources
Department for Planning and Infrastructure
EPA Service Unit
Office of Water Regulation
Water and Rivers Commission
Water Corporation
Western Power

Non Government Stakeholders:

Aquaculture Council of WA(Inc)
Aquaculture Development Council
Australian Petroleum Production & Exploration Association Ltd (APPEA)
Australian Water Association
Busselton Water
Chamber of Commerce and Industry of WA
Chamber of Minerals & Energy of WA Inc
Conservation Council of WA
Kwinana Industries Council
Pastoralists and Graziers Association of WA (Inc)
Urban Development Institute of Australia
WA Aboriginal Native Title Working Group
WA Farmers Federation of WA (Inc)
WA Fishing Industry Council
WA Municipal Association
Unions WA

Appendix 2

Submission made by stakeholders on the draft framework to implement NWQMS

ISSUE No	STAKEHOLDER ISSUES	EPA'S RESPONSE
1	Are there other ways to implement the NWQMS?	The Summary explains why Government has requested EPA, the independent advisor to Government on environmental matters, to draft a framework for implementing NWQMS Guideline Nos 4 & 7 in WA. The summary also notes that this framework will become part of the SWQMS which is a complementary Government initiative. The SWQMS is being developed by an intergovernmental agency Panel (Senior Review Panel) (chaired by WRC). All Panel members have been involved in the development of this framework. All comments made by Panel members have been incorporated into the framework. An alterative approach is mot appropriate,
2	Framework does not deal adequately with non-point source (diffuse) pollution. Maybe the framework should set catchment (NRM) targets Submission questions the appropriateness of using Guideline No. 4 for non point source discharge standards for catchment management compared with more general point source contamination. Submission questions the appropriateness of using Guideline No. 4 for runoff from agricultural land as most streams are degraded	The point is largely correct. The matter of non-source pollution and severe pollution has been addressed in Section 4.2 step 3 and Appendix 11. NRM Targets should be used in catchment where the environment is so highly modified that the use of guidelines and standards are inappropriate the management of diffuse pollution
3	The framework should allow for an EQS to be developed in consultation with the community in the same way as an EQC is developed. EQSs should be catchment specific and take local conditions into account	There is no problem regarding community involvement in the development of EQSs. This framework is underpinned by community involvement. (Section 2, Appendices 3 a & b, and 5). Section 4.2 details how EVs and EQOs (including EQCs) are established. The submission may misunderstand the definition of an EQS. This matter is set out in detail in Section 4.2 (steps 3 & 7). It is noted that an EQS is an EQC (an EQS is a specific EQC). The setting of an EQC is a subordinate exercise to setting EVs. EQCs are scientific statements that simply underpin the agreed EVs. The community and stakeholders, including the lead agencies have a major input into the establishment of EVs and EQOs (including EQCs). Section 4.2 (step 3) proposes that NRM Targets (interim targets)be used in areas that are highly degraded until the long term objective is met (Appendix 11).
4	The framework needs to recognise that water quality varies naturally throughout the year. Therefore the setting of EQCs is problematic if they do not take this into account.	The framework allows for all relevant data to be considered. Section 4.2 (step 7) notes that the setting of EQCs (EQGs, EQSs or NRM Targets) is largely a scientific exercise. Accordingly, all scientific information including climatic data would be taken into account when determining EQCs.
5	The framework should recognise where social and economic development has taken place, the goal should not necessarily be to rehabilitate degraded areas to pristine conditions	One of the purposes for developing the framework is to achieve a practical way for implementing NWQMS Guideline Nos 4 & 7. The framework makes several references to the NWQMS's goal. That is *'to achieve sustainable use of the State's water resources by protecting and enhancing their quality while maintaining economic and social development'.* WA has signed off on this national goal. Notwithstanding that, the National Competition Council has linked improvement in water quality management in WA to significant financial payments from the Commonwealth to WA. Hence WA is obliged to make significant progress in this regard. Section 4.2 provides for the lead agency, the community and stakeholders to have a significant input into the setting of EVs and EQOs. Guideline No 4 recognises that management is not always about rehabilitation. Guideline No 4 is flexible. It recognises three levels of ecological protection based on conservation/ecological matters and the existing state of the environment.
6	The submission questions the suggestion that proponents set the EQS. The submission suggests that the EQS should be set in consultation with the community.	This framework does not delegate the setting of EVs and EQOs (including EQGs and EQSs) to any proponent with a proposal subject to EIA under Pt IV of the EP Act 1986. Where EVs etc have not been established, interim or notional EVs etc may have to be set for the purposes of project design and assessment. Section 4.4 (steps 2 and 3) address the issue of setting notional or interim EV's and EQOs for the purpose of project design and expediting the assessment of proposals. In such circumstance, the EPA Service Unit, following consultation with EPA, would discuss this matter with the proponent and would seek agreement upon an appropriate set of interim EVs and EQO (including EQCs). This is an important matter as the timeframe for project design and assessment is often pressing. Given that very few formal EVs and EQOs (including EQSs) have already been set for the State's water resources, this process is likely to be employed frequently for some time.
7	The role of the AusRivAs program for monitoring rivers in WA should be considered in the Framework	Correct. Section 4.2 provides for any relevant Government agency to be either a lead agency or joint lead agency. This framework allows for any involved Government agency to had a significant role in developing EVs and EQOs (including EQCs) for any matter relating to its responsibilities.

ISSUE No	STAKEHOLDER ISSUES	EPA'S RESPONSE
8	The ability to distinguish between EQSs and Prescribed (Pollution) Limits may be difficult except in stable ecosystems.	Correct. The matter of prescribed limits has been deleted from the framework.
9	The key issue for ecosystem health is the choice of indicators for 'multiple lines of evidence' and the mechanisms for setting EQSs. While it is theoretically possible to set the EQS for each indicator at a level that represents detrimental change to, but not loss of, the indicator, the intensity of monitoring required to achieve this may be prohibitive. In some cases setting pollution limits may cause problems.	Correct. The framework has purposely avoided over-prescribing details for monitoring (Section 4.6). The framework recognises that catchments, regions etc are diverse, their state of health varies greatly, climatic conditions are changing and resources are not infinite. Accordingly, the framework attempts to strike a balance between articulating the principle for monitoring and prescribing monitoring details. It is up to the lead agency to make a professional judgement and justify its monitoring approach to the EPA. It is also noted that a practical balance has to be achieved between addressing matters of uncertainty, resource allocation and focusing on outcomes rather than processes.
10	Natural variability needs to be accounted for in monitoring	Correct. See response to Item 4
11	Assessing exceedences and biological significance maybe very difficult to calculate because of a lack of background information. Whilst community involvement is a positive process, the technical difficulty of estimating catchment loads and their sources should not be underestimated	Correct. The framework does not presume that the information is available to set EVs and EQOs (including EQCs) for each of the State's significant water resources, nor does it presume that all these matters will be addressed simultaneously or immediately. Rather, the framework set out the *modus operandi* through which the above could be achieved on an on-going basis over an extended period. The spirit of the framework is one of a partnership and cooperation to manage public water resources for the common good as quick as is practicably possible.
12	Threshold values may be habitat specific to regions and hence using local thresholds may be unnecessary.	Correct. Section 4.2 provides for the lead agency to make this judgement and justify its approach to the EPA.
13	Government agencies expects to be a lead agency when setting EVs for matters relating to their responsibilities	No problem. Section 4.2 provides for any relevant Government agency to be a lead or joint lead agency where appropriate.
14	Non – Government stakeholders expect to involved when implementing the framework	No problem. Appendices 3a and 3b (The Partnership Approach) provides for all relevant stakeholders to be involved in the setting of EVs and EQOs. See response to Item 13.
15	Industry will need to be educated about the planning implication of the guidelines	No, Problem. See response to issues 13 & 14. Section 4.2 acknowledges that lead agencies have a significant role to communicate this framework to their constituents. The WRC chairs the Senior Review Panel that is drafting the SWQMS. This framework will become part of the SWQMS. All matters regarding the communication and implications of all parts of the SWQMS are matter for the members of the Senior Review Panel in the first instance. Notwithstanding that, EPA would also play a role in explaining this framework to interested parties as EPA is the author and also plays an independent role as reviewer and advisor to Government.
16	The framework need to recognise the vast variety of catchments and regions in the State and take them into account when setting EVs, EQOs and EQCs	Correct. See responses to issues 2, 3 and 10. Section 4.2 (Selection of EVs) and Appendix 11 (EQGs v NRM Targets) makes specific reference to the difficulty of applying default guidelines in a very narrow manner. The intention of this framework is to achieve practical and sustainable outcomes that most, if not all, stakeholders can agree upon. The framework recognises that, because the State comprises a vast number of geographic and climatic types, it encourages the developemt of local EVs and EQO (including EQC) etc..
17	The framework should recognise that some Government agencies have initiatives in place to implement the Guideline Nos 4 & 7	Correct. Section 4.1 paragraph 2 recognises that some Government agencies have already commenced implementing the Guidelines in one form or other. Notwithstanding that, from a NRM perspective, it would be valuable to formalise these initiatives for SOE Reporting and NRM auditing.
18	The Fisheries Resources Management Act 1994 does not have the powers to control the water quality upon which fisheries relies on. COMMERCIAL It is important that WA fisheries retain the 'clean and green' image for international marketing purposes. RECREATIONAL: Water quality is important to the biology of recreational fish species and to seafood and safety. This is because most recreational fishing occurs in estuaries or coastal embayments close to urban areas (eg Cockburn Sound and Mandurah). AQUACULTURE: Pearl farming, Way's biggest aquaculture industry is carried out in pristine waters unaffected by man. Fisheries Department recognises that water quality is important with respect to	Correct. Section 4.2 provides for all relevant Government to be a lead agency and be involved in setting of appropriate EVs and EQO (including EQC). Matters relating to water quality for the purposes of fisheries can be managed under the EP Act 1986.

ISSUE No	STAKEHOLDER ISSUES	EPA'S RESPONSE
	productivity and seafood quality. Aquaculture in bays and estuaries may be critically impacted and the guidelines will be of great importance. FISH HABITAT: The freshwater rivers of the SW of WA supports native species found nowhere else, and the maintenance of water quality values are a biodiversity issue of considerable concern to the Department.	
19	Under Section 255, Fisheries Resources Management Act 1994, the Minister for Fisheries may prohibit activities that pollute waters. However, an aggrieved person can appeal to the Minister for the Environment. Therefore there is a need for a shared understanding between the Minister for Fisheries and for the Minister for the Environment as to what is pollution. The framework has the potential to provide an agreed understanding.	Correct. The draft Revised EP Act 1986 defines pollution (See Glossary). Concerns between Government agencies regarding pollution could be discussed at the Senior Review Panel and acted upon by DEWCP using the provisions of the revised EP Act 1986 when appropriate. See response to issue 13
20	Aquaculture and human consumption of aquatic foods Department of Health concerns relating to aquaculture are essentially confined to the harvesting of shellfish for human consumption. In this respect Table 4.4.4 (at page 4.4-14 of the Guidelines), setting ambient indicator bacteria levels for all fish destined for human consumption, is inappropriately broad. The Department would only support these sorts of levels for shellfish for human consumption. Other aquatic foods do not need this level of protection. While the Department supports the indicator bacteria levels in the flesh of shellfish as set in the Food Standards Code issued by the Australia New Zealand Food Authority, its main concern with commercial shellfish is to act preventively by controlling their harvesting based on demonstrated or predicted ambient indicator levels. The levels used for this purpose are based on those described in the Australian Shellfish Quality Assurance Program (ASQAP) Manual of Operations, which has been developed by a joint federal/state government and shellfish industry committee. The Department will not be changing these procedures in the light of the A&NZWQG. The other major issue of concern with shellfish is their propensity to accumulate marine biotoxins. It is not safe to declare waters protected for shellfish harvesting solely on the basis of indicator bacteria levels – some sort of marine biotoxin risk assessment is also needed. The occurrence of potentially dangerous blooms is erratic and notoriously difficult to predict, so that some form of ongoing monitoring program is necessary. Discussions are currently taking place at national level on developing a common approach to marine biotoxin monitoring. Recreational water quality This chapter is basically a re-run of the old recreational water chapter in the 1992 Guidelines, and was inserted as a holding operation, for the sake of completeness, until new national guidelines could be developed. It is not suitable for adoption in WA in its present form, and the Department has already recommended to the DEP a different approach to the development of environmental quality criteria for the protection of recreational water quality objectives for Perth's coastal waters. This approach is based on recent WHO thinking as expressed	Section 4.2 (step 7i) notes that public health issues are for the Department of Health to manage. When the lead agency (or joint lead agencies) is not the Health Department and matters relate public health, it is assumed that the lead agency would consult the Department of Health. as appropriate, and convey the Department of Health's views to the EPA.

ISSUE No	STAKEHOLDER ISSUES	EPA'S RESPONSE
	in the report of an expert consultation in Farnham, UK, earlier this year, attended by Dr Lugg. NHMRC has recently commenced the development of new national guidelines, which will also be based on the WHO approach. Dr Lugg is to become a member of the NHMRC Working Group on Recreational Water Quality, which will oversee this process. It is expected that the new guidelines will take a different approach to indicator bacteria, favouring enterococci, and will supplement this with a form of site-specific evaluation based on sanitary inspection findings. Drinking water This chapter essentially refers the reader to the 1996 Australian Drinking Water Quality Guidelines, which form part of the National Water Quality Management Strategy. Implementation of these guidelines is already proceeding in WA under the aegis of the Advisory Committee for the Purity of Water. The Senior Officers Panel overseeing the implementation of the State Water Quality Management Strategy, serviced from the Water and Rivers Commission, has asked that Committee to undertake the drinking water aspect of its brief and to keep it informed of progress. Further action for the implementation of this aspect of the A&NZWQG is therefore unnecessary.	
21	The framework target key industries and land users as means of implementation. In regards to this, the DEP needs to have a greater understanding of community expectations re: shellfish collection and swimming in almost all of Perth's Coastal Waters. To have a balance between essential services i.e. wastewater disposal, power generation, shipping etc. and supporting sustainable development, while ensuring recreational and environmental needs are met, there needs to be an Identification and recognition of valid societal uses in the implementation strategy and a measurement of tolerance from the community.	The framework does not target any stakeholder or section of the community. The framework endeavours to implement NWQMS Guideline No. 4 & 7 though a process of inclusion of all interested parties (Appendix 3 a & b). Section 4.2 specifically encouraged relevant Government agencies to become involved in the development of draft EVs, and EQO (including EQC) before their submission to EPA for review and endorsement. Government agencies that are on the Senior Review Panel (which is developing the SWQMS) are in an ideal position to discuss its concerns with other lead agencies on any relevant matter.
22	The commitment made by the EPA Service Unit that EQSs would be defined in terms of agreed biological responses to the stressor(s) of concern, eg persistent phytoplankton blooms should appear in the framework.	Section 4.2 (step 7n & Appendix 12) notes that multiple lines of evidence would need to be established before a management response involving a third party was triggered.
23	The framework should target particular industries and land users as the means of implementation, rather than following NSW catchment-based approach. Defining the minimum acceptable set of management measures in consultation with each group would make the management requirements more real for people - Catchment Management Plans are too diffuse and unfocussed. This approach would also build on the existing set of Industry Best Practice Guidelines, which in theory could form the basis for industry-specific regulations when the voluntary approach (inevitably) fails.	The framework does not target any particular sector of society. The framework endeavours to develop a constructive working relationship between all interested parties (Appendix 3a and b). It should be remembered that the objective of this framework is the same as that of the NWQMS and draft SWQMS. That is: *'to achieve sustainable use of the State's water resources by protecting and enhancing their quality while maintaining economic and social development'.* To this end, the framework provides for a flexible approach taking all local and climatic conditions into account and the views of all interested parties. Section 4.2 provides for the lead Government agency to recommend to EPA a priority list of water resources to be protected. Some maybe rural catchments largely subject to diffuse sources of contaminants (Peel Harvey system), others maybe embayments subject to numerous industrial discharges (Cockburn Sound) whilst others maybe river systems subject to diffuse contamination in its upper reach and point source contamination in its lower reaches (Swan and Canning Rivers). Unlike practices of the past, this framework proposes that water resources should be protected in a transparent and auditable manner using EMSs (Section 4.2, step 4). To this end, the framework incorporates the 'review role' of the EPA (Figure 1). Government has given the EPA the roles of NRM audit and SOE Reporting. Accordingly, whilst the framework on one hand offers flexibility with respect to water resource protection, on the other hand, if significant progress is not achieved, this will

ISSUE No	STAKEHOLDER ISSUES	EPA'S RESPONSE
		become apparent through the above processes. With respect to the matter of 'best practice', Section 4.2 provides for all interested parties to put forward their views as to how to sustainably manage WAs water resources on a locality-by-locality basis. For some areas 'Industrial Best Practice' may very well be appropriate and acceptable, while in others it may not. This framework does not propose that all significant water resources across WA be managed in an identical manner. Notwithstanding that, the framework endeavours to address the matter of water quality deterioration across WA in a collaborative, flexible and timely manner.
24	The Water Corporation's risk-based approach, with confirmatory monitoring is a straightforward way to implement the guidelines on a site by site basis	Guideline Nos 4 & 7 offers generic guidance on risk assessment. Section 4.2 provides for the lead agency to offer advise to EPA on whatever method of risk assessment it deems most appropriate at the local level. EPA would evaluate that method against the generic guidance offered in Guideline Nos 4 & 7 on a case-by-case basis before advising Government.
25	The framework needs to ensure that it offers a balance approach to facilitate the needs of the water industry	Correct. The framework has adopted the principle of the NWQMS. These principles are those signed off by all jurisdictions across Australia and embody all the principles of sustainable development (Appendix 6). The framework will ultimately form part of the SWQMS.
26	The framework needs to give due recognition to the limited resources of some Government agencies with respect to monitoring	Correct. Section 4.2 specifically provides for the lead agency(ies) to develop draft EVs and EQO (including EQC) within the capacity of its resources. The framework does not prescribe, in detail, how this should be done. However, Appendix 3 a & b (The partnership approach) offers guidance. Appendix 3 b is a reiteration of NWQMS Guideline No 3 (Implementation Guidelines) that has already been signed off by WA in 1998. The frameworks acknowledges that the proposed process is ongoing and that it is more important to prioritise tasks and achieve significant progress rather than simultaneously and immediately focus on most issues and end up with resource problems.
27	The relationship between the framework and the development of the SWQMS needs to be articulated	Correct. See Appendix 4. This linkage notes that the framework will ultimately form part of the SWQMS.
28	The new 2000 guidelines represents a real step forward (by promoting a risk based philosophy) and should contribute to greater confidence in decision-making. They are an authoritative reference, although it is recognised that some scientific derivations (trigger values) are still compromised by lack of sufficient quantity and quality of Australian data.	Correct. Section 4.2 (step 3b) acknowledges the uncertainty surrounding the Guideline No. 4, as does Guideline No. 4 itself in its Introduction. To circumvent some of this uncertainty, Sections 4.2 (step 7e) and 4.4 (Step 4) notes that the guidelines should be used as default values in the absence of more reliable or appropriate data. The framework also encourages the generation of site-specific data to overcome any uncertainty.
29	The new NWQMS guidelines are very complex and lengthy, and the practicalities of the new guidelines are yet to be comprehensively tested. It is recommended that widespread training be undertaken to enable users to understand and utilise the guidelines properly. Some stakeholdres have commented that both the guidelines and the implementation framework could be summarised and still convey the same message.	Correct. Response to issue 15 (educating interested parties). Section 4.2 acknowledges that lead agencies have a significant role in communicating this framework to their constituents. That would include clarifying how the Guideline No 4 would be applied through the framework. The WRC chairs the Senior Review Panel that is drafting the SWQMS. This framework will make up part of the SWQMS. The Senior Review Panel comprises all relevant Government agencies. Accordingly, matters regarding the communication and implications of all parts of the SWQMS, including Guideline No. 4, is for the WRC and other relevant Government agencies to address in the first instance. Notwithstanding that, EPA would play a role in explaining this framework to interested parties as EPA is the author of the framework and also plays an independent role when advising Government
30	The EPA is to be congratulated for its staged, consultative approach in drafting the Implementation Framework. This will help to build partnerships between regulators and stakeholders. It is understood that the Implementation Framework is not intended to be a legal or coercive document. Key roles for the EPA/DEP in implementing the new guidelines consistent with best practice regulation should be - cost/benefit analysis; stakeholder consultation (currently underway); determining costs the communities and stakeholders are willing to bear; transparency and accountability (including an appeals process).	See response to issue 2 regarding the stakeholder and community participation in the process for setting EVs and EQOs. See response to issue 5 regarding the National goal, ESD and WA's obligations to the National Competition Council. See response to issue 23 regarding best practice. Notwithstanding the above responses, it is noted that the EP Act 1986 restricts EPA to confining its advice to environmental and some social matters although EPA would be mindful of other information when formulating its advice..

31	It will be very important to work with industry on desired *outcomes* but not to tell industry how to do its job. The challenge for industries will be to balance their risk management practices with the sensitivity of receiving environments. The staged management approach seems sensible and flexible.	Correct. See response to issue 30. The framework does not direct any particular sector of the community as to what it has to do. In this regard the framework is underpinned three principles: The Partnership Approach (Appendix 3a & b), The Holistic Approach (Appendix 5) and the Balanced Approach (Appendix 6). Section 4.2 notes that it is the lead agency responsibility to consults with interested parties including industry when developing EVs and EQOs for submission to EPA for review and endorsement. Section 4.3 notes that the EPA's independent role is to review, and endorse if appropriate, and advise Government accordingly in a publ;ic manner. To this end, EPA would consult with whom it deems appropriate, including industry, to achieve good outcomes.
32	The 2000 guidelines make provision for users to refine trigger values (through detailed investigations) to best suit local environments – i.e. develop site-specific guidelines. This is a sensible approach, however sampling and testing costs should not be underestimated. Careful selection of agreed reference sites will be a difficult and key issue. Cooperation and partnering between industries and regulators during such investigations will be critical to ensure agreement of aims and outcomes.	Correct. The development of local guidelines is supported throughout the framework. It is not a requirement to do so. The guidelines should be used as default values unless more appropriate site-specific guidelines exist. Appendix 13 addresses the matter of selecting reference sites. In practice, a reference sites needs to have similar ecology to that of the management area under review and be in as good a condition as possible. Some stakeholders misunderstand the use of reference sites. Some stakeholders believe that using a high quality reference site is inappropriate for the management of a degraded area. This is not the case. The linkage between the two types of sites is through the use of percentile benchmarks. Whilst Guideline No 4 offers guidance, the exact percentile used is negotiable. However, the percentile chosen should be consistent with the agreed EVs and EQOs. The framework provides for the lead agency to negotiate draft percentiles and present them to EPA for review and endorsement. As a balance and check, the framework also requires the lead agency to draw to the EPA's attention draft outcomes that have not been reached through consensus. In such cases, EPA may then consult with whatever party it deemed appropriate before advising Government.
33	The National Guidelines should be used as Guidelines (as they were intended), don't turn them into mandatory Standards. WA Ministerial sign off (of the new guidelines) was conditional on the document being used as guidance only. The ANZECC/ARMCANZ (2000) water quality guidelines specifically state, on the bottom of page 1-1, that 'these guidelines should not be used as mandatory standards because there is significant uncertainty associated with the derivation and application of water quality guidelines'. Many of our members are concerned that the "devil may be in the detail". The actual values to be used by the EPA as *standards* are yet to be seen. It will be therefore important to keep stakeholder dialogue happening. The guidelines are conservatively derived, and are based on chronic (i.e. long-term) effects. Let's not forget to consider exposure times when looking at effects on the environment. Requiring compliance to guidelines when exposure times are a matter of minutes is needlessly over-protective. This applies particularly to mixing zones and buffer zones. We would like some more clarification on the proposed use of EQSs (environmental quality *standards*). It is our understanding that in the EPA's Implementation Framework that the term "standards" will relate to concentrations at which actual environmental *impacts* are observed, while the lower level EQGs (Environmental Quality Guidelines) and the 2000 guidelines provide triggers for investigation/action well before an EQS value is reached. Is that correct? Also, if standards are to be part of the Framework we believe the document should have more text describing how, and under what circumstances, guideline numbers are turned into standards/EQSs. The use of the term "standard" concerns industries, so it certainly warrants more detailed and clear explanation. There is still some concern that these guidelines could be incorporated into a Commonwealth NEPM and hence become (heavy handed) *national law.*	As noted earlier, Guideline No 4 are a set of default guidelines that should be used as guidelines where insufficient local information exists. Section 4.2 specifically separates the treatment of EQGs from EQSs so that the reader can see they are significantly different. The framework also distinguishes point source contamination from diffuse source contamination by making provisions for the application of NRM Targets. This framework does not propose that guidelines should be used as standards except where they relate to public health matters (Section 4.2, step 7i). By definition, the NWQMS Guidelines are not mandatory standards and should not be used by regulatory agencies as standards. Section 4.2 distinguishes guideline from standards. Guideline No. 4 should be used as guidance for developing water quality management framework for each of the State's significant water resources. The National Guidelines states, "Where appropriate, state and/or local jurisdictions can use their own legislative and regulatory tools to refine these national water quality guidelines either into their own regional guidelines or into specific water quality objectives". This framework is consistent with that statement. Section 4.2 (step 7f) notes that guideline trigger values are based on protection from chronic exposures rather than short-term or pulsed exposures. Exceedence of EQGs trigger investigation into whether an environmental effect has occurred. EQSs on the other hand are set at a level where there are detectable impacts on the EVs being protected, and as such would trigger a management response aimed at reducing the contaminant load and possibly remediation if considered necessary. EQSs are not necessarily concentration based, for example ecological EQS may be based on observable changes in key biological or ecological indicators. The NWQMS guidelines are not being used as standard in the draft EPP for Cockburn Sound. The standards in the draft EPP for Cockburn Sound are a set of local environmental performance benchmarks that have been negotiated between the stakeholders. To date Western Australia, like all of the other States, have informed the Commonwealth that the development of an NEPM is not appropriate. The setting of National ecological standards would be inappropriate because of the physical, climatic and biological diversity across Australia.

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34	The framework must allow scope to establish trigger values/EQGs by determining the 80th percentile of the *local* reference site for comparison with median values from sample sites, rather than relying only on the very conservative (generic) triggers given in the guidelines.	Appendix 13 addresses the matter of using reference sites (20th and/or 80 percentile of natural distribution for a parameter to capture natural variability at the reference site).
35	It is important to recognise that the guideline trigger values are very conservative and that some are based on limited data and have high uncertainty. CSIRO (D Fox 13/11/01) states ... "we should treat trigger values with a degree of caution ... it is possibly a very large leap of faith to claim that the ... trigger value does what it claims, ie protects x% of all species". We emphasise that regulators should take a holistic view and not go heavy handed on *single* trigger values.	Correct. See Section 4.2 (step 7g) and Appendix 12 regarding the "multiple lines of evidence approach' for management bodies. Also see response to issue 28 regarding "uncertainty" The default guideline trigger values are proposed as EQGs for ambient waters only. Exceedance of an EQG does not necessarily signify that an EV has not been protected for the ambient water. It only triggers further investigation by the management body (eg the Cockburn Sound Management Council for Cockburn Sound) to determine whether there is a high risk of the broader EQO not being achieved and hence the EV not being protected.
36	Mixing zones are (deliberately) loosely described in the guidelines, allowing fair scope for negotiation with regulators. It is understood that the guidelines do not apply *within* mixing zones, but that a 90% species protection rule would apply to the buffer zones surrounding mixing zones. However page 29 of the Framework states that an 80% protection rule (for bioaccumulators) would apply *in* the mixing zone? This seems contradictory and could be better explained.	This issue is partly correct See response to issue 33 regarding the use of guidelines not being standards. When Guideline No 4 is viewed as a guideline, its application can vary from location to location. In some cases the desired outcome by the majority of stakeholders and the community maybe more or less stringent than Guideline No 4. However, the essence of this framework is to provide sensible and practicable outcomes through a consultative process. Notwithstanding that, it should be kept in mind the revised EP Act 1986 notes that causing serious or material environmental harm is illegal. Section 4.4 (step 4g) addresses the matter of mixing zones. Mixing zones are discussed at some length in Guideline No. 4 (Vol 2) including issues relating to their management. The issue of bioaccumulation is discussed therein and the following restriction is suggested for consideration: *Mixing zones should not be used for chemicals which bioaccumulate, unless it can be demonstrated that the discharge of these substances into the environment will not result in long-term adverse effects to biota.* The suggested approach in the draft Cockburn Sound EPP does not recognise mixing zones as areas where protection of EVs are excluded. In the draft Cockburn Sound EPP all the designated EVs and EQOs apply throughout the Sound. However, a very low level of ecological protection is proposed for small areas around licensed industrial outfalls (low protection areas). For these areas the 80% species protection values for potentially bioaccumulating or bioconcentrating substances are proposed as EQGs to trigger an investigation to determine whether these substances are in fact accumulating in the biota from the surrounding area (outside the low protection areas). This approach is not inconsistent with the Guideline No 4. The approach taken for Cockburn Sound may not be appropriate for all discharges to aquatic environments as the quality of some effluents may preclude certain social EQOs. For example the EQOs for primary and secondary contact recreation may be excluded from a zone around an outfall with high human pathogen loads. For the draft EPP for Cockburn Sound, the final decision regarding mixing zones is delegated to the EPA who may grant an exemption. More generally, given the state of WA's terrestrial freshwater resources, their ecological value and their value to the community, the notion of discharging wastewater to them would be discouraged.

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37	The term *Industry Best Practice* is used a few times in the implementation plan. The focus of best practice should be the outcome of achieving environmental protection, not necessarily just the lowest emissions possible. What is the rationale for constantly reducing emissions if environmental protection is already achieved? It is also too often forgotten that implementing measures to reduce emissions bears its own environmental costs, in terms of increased use of energy (=greenhouse gases), chemicals and materials.	DEWCP is not restricted to merely achieving minimum standards of environmental protection. Through its regulatory processes DEWCP seeks to minimise all emissions of waste as far as is reasonably practicable, based on the precautionary principle. This approach recognises that in some circumstances it may be appropriate to consider the costs or environmental disbenefits of reducing waste emissions and to weigh these against the environmental benefits that the reduced emissions would achieve. In other cases there is an understanding that significant improvements may only be achieved through significant technology upgrades that will only occur during major plant upgrades.
38	A true comprehensive baseline of water quality data for Perth Coastal waters does not yet exist. At the EQC workshops in Feb 2001 it was agreed that there was insufficient knowledge to support the use of guidelines to derive standards and/or pollution limits. It is obvious then that we must take the necessary time get this right.	As noted earlier, the numerical guidelines in Guideline No. 4 are default values. Every effort should be made to develop more appropriate local guidelines. Section 4.2 provides for this in it extensive treatment of EQG and EQSs. Because the Perth Coastal waters are considered to be important, specific EQGs and EQSs have been derived for some parameters. However, this should not be confused with the notion of 'pollution limits' as they are not being proposed in this framework.
39	At the Stakeholder Workshop held at the EPA on 24 June 2002 it was also stated that the guideline trigger values would be applied in evaluating groundwater contamination. With respect to groundwaters, we do not believe that the 2000 guidelines for "Fresh and Marine Waters" were ever intended to be used for groundwaters. Is the philosophy in the Framework for groundwaters consistent with the Commonwealth NEPM on contaminated sites and the NWQMS document #8 Guidelines for Groundwater Protection?	The matter of contaminated sites will not be dealt with in this framework as it is adequately covered by an NEPM and the draft Contaminated Sites legislation. It is noted in the Introduction that generally groundwater is connected to surface water. Where that is likely to be the case, it is appropriate to give both elements of the resource similar protection.
40	To help in understanding Section 4 (formerly Section 7) of the framework you may wish to consider using a visual aid such as the example we have prepared below.	The diagram is appreciated and has been incorporated into the framework. Fig 3
41	I would like to clarify, as I am unsure how this document will be implemented relative to other policy frameworks that are currently under review. Environmental Objectives and Criteria Section 6.2 notes that "*The NWQMS articulates the notion that implementation of the strategy should be flexible and adaptable to local situations*". The section later discusses that whilst consistency is highly desirable, departures will occur on an as-needs basis. I believe that this is a common sense approach that recognises the importance of understanding local applications of broader management plans. However Step 7 of Section 4.2 appears to be quite prescriptive in relation to management responses resulting from Environmental Quality Standards (EQS's), which is not consistent with the more general concept of "local application". Section 4.2 defines an Environmental Quality Objective (EQO) as "*a specific management goal for a part of the environment that 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*". Section 4.2 also states that an EQS signifies the "upper error bound" associated with monitoring EQO's, and if an EQS is not met, then a management response should be triggered which may require in-situ remedial work to be undertaken. The aspect of the draft Framework of concern is that in seeking to	Section 7 which the submitter frequently refers to is now Section 4 in this framework. The essence of the framework is flexibility with stakeholder and community involvement (Section 4.2, Appendices 3 a & b,,5 &6). The lead agency would be expected to negotiate outcomes at the local level that would reflect the broader stakeholder and community wishes. This does not mean that consensus will always be achieved at the local level. This flexibility is necessary as most of WA's water resource problems are terrestrial and estuarine in nature. As problems and solutions are often locality specific, so should be the management approach. The issue of EQSs is largely concerned with the method of setting EQSs, for Cockburn Sound. The EQSs for the draft EPP for Cockburn Sound have been developed specifically for Cockburn Sound through a consultative process including the community and stakeholders. It is noted that since this submission was made, the nature of the EQS's for Cockburn Sound have been amended considerably following further consultation. No specific EQSs have been put forward in this framework except those relating to public health. The reason for this is two fold. Firstly, because EQSs are often site specific and secondly because, as in the case Cockburn Sound, there is some degree of negotiation involved. This matter raises the age-old dilemma, flexibility versus certainty. If one seeks certainty, an appropriate way forward is to establish an NEPM covering Australian coastal waters. Response to issue 33 agrees with the AWA that that is in appropriate.

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	protect the EQO's, the EQS's are being used as the primary evidence of infringing upon or protecting that EQO. Depending on the parameter being assessed, it is appropriate that some EQS will signify a quality where the EQO will not be met. For example, in terms of the protection criteria for human consumers of aquatic foods, the EQS are the human health limits set by Australian and New Zealand Food Authority (ANZFA) and indicate the contaminant level beyond which it is not safe to eat the seafood. Therefore if the EQO were that seafood should be safe for human consumption, then an exceedance of the EQS would indicate that the EQO had not been met. Given that in the case of consumption of aquatic foods the EQS have been derived from scientific data for the target species, and were developed with intention of being used as a standard, then the use of the EQS as a "standard" or action level is appropriate. However for the ecosystem health (toxicants), aquaculture and aesthetics EQO's in the Cockburn Sound EPP, the EQS have not been derived using scientific data on the target species concerned. For example, adopting broad protection levels from Table 3.4.1 of the ANZECC 2000 guidelines has derived the EQC's for ecosystem health criteria. The data are not specific for Western Australian species, or for that matter Australian species, and were never intended to be used as "standards" or "action levels". ANZECC 2000 clearly states that the ecosystem health guidelines were not intended and should not be used as standards above which ecosystem health has been damaged[1] (i.e. the EQO has not been met). The intention for the ANZECC guidelines is they are used as triggers to investigate if ecosystem health has been impacted, and the purpose of deriving different trigger levels is to allow stakeholders to trigger responses depending on the appropriate level of conservativeness for different ecosystem categories. For example, ANZECC recommends that the 95% species protection levels be used for waters with little or no human disturbance. Therefore EQS's may provide some confidence that the EQO's are being impacted, however depending on how EQSs are developed, they can provide no certainty. I understand that no EQS's have been specifically developed as part of the draft Framework, and from previous conversations, I believe the Framework intends EQS's to be developed by specifically considering the local environmental quality it seeks to protect. However as you are aware, the only example to date where EQS's have been developed has been the Cockburn Sound Environmental Protection Policy (EPP), where the exceedance of EQS's as an indicator of damage to an EQO is yet to be agreed by all stakeholders. It is quite conceivable that depending on how an EQS is developed, exceedance of an EQS could have no impact at all on an EQO. As an alternative, it is suggested that the paragraphs that relate to EQS's in Section 4.2, Step 7 be modified to reflect that if an EQS is not	

[1] Reference: ANZECC 2000/Guidelines and Documents/Volume 2 p8.3-71, based Pifher and Egan, 1989, *Natural Resources and the Environment*, 4,13(5)

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	met, then there is a high probability that the EQO's are not being met (the exception to this being the EQS based on the protection of human health, where the standard derived has been based on species-specific research). Exceedance of an EQS then serves as a trigger for an investigation into whether there has been any impact on agreed EQO's. That is, the Framework should allow that as part of the management response to an exceedance of an EQS, direct measurement of the ecosystem be allowed to determine if the EQO has not been met. This modification means that both the EQS's and EQG's become investigative targets, which may appear redundant -- however the distinction between the two trigger levels would be the nature of the response – the intensity and immediacy in which the investigation is carried out. If the EQO's have been impacted, then a management response that includes identification and elimination of the cause is appropriate. However if the EQO has not been impacted, and the basis of this assessment should be agreed as part of the draft Framework, then the EQS will need to be modified to reflect the improved understanding of the local environment.	
42	Implementation of the framework to Contaminated Sites In November 2001 the DEP's Contaminated Sites Branch released the draft "Assessment Levels for Soils, Sediment and Water" document to provide stakeholders the criteria used by the DEP in assessing site contamination and determining the requirements for further investigation, management or remedial action. This document reflects the accepted risk-based approach to managing contaminated sites, and aims to be consistent with the National Environmental Protection Measure (NEPM) on the assessment of site contamination. This approach requires when assessing contaminated sites, the criteria established are only used as response levels at the point of use or discharge (the receptor), and are trigger levels within the aquifer. Clarification about whether this accepted contaminated sites management approach has been adopted in Section 4.6 of the draft Framework is required. Section 4.6 Step 4 indicates that the Environmental Quality Criteria (EQC's – including EQS's) will be applied beneath a contaminated site. Furthermore, Step 5 indicates that if an EQS is exceeded, intensified management action will be required. While the validity of assuming exceedance of an EQS based on general ecological data will necessarily impact an EQO is yet to be agreed, the management approach suggested by the draft Framework indicates that groundwater beneath sites is the receptor for assessing contamination. If this is the intention of the draft Framework, then this is a significant departure from the current risk-based approach and the Cabinet-endorsed NEPM. At the workshop held on the 24th June 2002 to discuss the draft Framework, advice from the DEP appeared to reiterate this position. Subsequent discussions with the DEP have suggested that the EQS to be met under contaminated sites is the Australian Drinking Water Guidelines. The NEPM approach clearly requires that ambient water quality guidelines (ecosystem health) should only be applied at the point where	This framework no longer covers matters relating to contaminated sites. These matters are adequately dealt with in the NEPM and the draft WA legislation for Contaminated Sites.

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	the groundwater impacts the receptor (i.e. the interface between groundwater and surface water). Groundwaters naturally have a different chemistry to surface waters, due to the interaction between the groundwater and the geochemistry of the aquifer. The risk-based NEPM approach not only recognizes the different conditions between ground and ambient waters, but also recognizes that it is impossible to remediate groundwater in some aquifers to meet the proposed ambient guidelines. In this respect, the role played by naturally occurring biochemical and geochemical transformations at the interface is very important in ensuring that ambient water quality is protected. Given that the NEPM approach recognizes these considerations, if the DEP is seeking to develop a new approach, it must be asked where is the value to society and the environment of significant expenditure to be committed to cleaning up a groundwater plume when there is no impact on a receptor? In trying to remediate to targets that may not be possible to achieve, the clean up would result in significant emissions (e.g. provision of power) for no environmental benefit. In terms of sustainability, enforcing remediation where there is no impact on receptors does not appear to meet the needs of the environment or the community Similarly, the drinking water guidelines are only intended to be applied at the point of consumption. Most of the groundwater used in Perth's potable water supply requires treatment before it is suitable for consumption. In addition, a lot of the groundwater in Western Australia is not suitable for potable water supply because it is either too saline, naturally contaminated with toxicants or the aquifer is unsuitable for viable supply. In Perth outside of the declared groundwater zones, it is not generally considered that drinking water is a beneficial use of groundwater. The understood beneficial use is the provision of water for irrigation. If contaminated groundwater is affecting an identified receptor, the groundwater may need to be remediated so that it is suitable for irrigation (or an alternative management action developed to provide irrigation water to an identified receptor). It is important to acknowledge that for some parameters in some aquifers, there is no known technology that can remediate a plume to drinking water standards. On this basis, the benefits to society of expending significant resources to remediate groundwater to a drinking water standard, even when the resource is not going to be used for that purpose, are unclear. It would be helpful if the next version of the draft Framework could clarify whether the DEP is seeking to develop a modification to the current approach to managing contaminated sites, and also provide some further guidance on how the EQS's will be applied within a risk-based management approach.	

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43	While it was a most informative session, there were a number of issues raised that I seek clarification upon, specifically relating to the application of these guidelines to contaminated sites in section 4.6 of the draft implementation framework. 1. The use of the term "management action" or "intensified management action" in Step 5 (a) of the draft implementation framework requires clarification. Many contaminated sites practitioners have interpreted these terms to mean active remediation of the groundwater. The intent of Step 5(a) could be much clearer by stating what actions would be expected for exceeding an EQS at each point listed. (ie. at point of extraction, groundwater beneath a site, etc) 2. As stated in section 6.3 of the implementation framework, the most important step in the framework is the selection of EVs for a water resource, because of the cascading effect on subsequent EQO's and EQCs. Two areas of clarification arise out of this. Firstly, the notion of setting EVs as a social exercise, outlined in section 6.3, may not be fully represented by the statement in Step2 (b) of section 4.6, which states that DEWCAP will set interim EVs following discussions with relevant parties, if formal EVs haven't been set. Do these statements mean the same thing? Secondly, the draft DEWCAP document "Assessment Levels for Soil, Sediment and Water", appears to be inconsistent with the concept of a cascading effect from the establishment of EVs, allowing the establishment of EQOs and EQCs. The draft DEWCAP document states that if trigger values (EQCs) don't exist for a certain EV, then more conservative trigger values should be used from a more sensitive EV, effectively changing the EV because a trigger value doesn't exist. The example used was to implement drinking water EQCs where irrigation water EQCs aren't published. This has the potential effect of requiring costly remediation to occur to a standard far exceeding the EV. This notion appears inconsistent with the concept of establishing EVs as a social exercise, then utilising EQCs for that EV. Clarification is necessary on this matter, in this document. 3. The matter requiring the greatest clarification is stated in Step 4 (a) of section 4.6, whereby EQCs for groundwater quality will be applied beneath a site, and in Step 5 (a) whereby management action will be required where an EQS is exceeded in the groundwater beneath a site. If this means that groundwater beneath a site requires remediation or clean up, even though no receptor is being exposed or impacted, then it represents a fundamental change in Government policy on contaminated sites management, being a risk based approach. The WA Cabinet endorsed a position paper on the Assessment and Management of Contaminated Sites released by the Department of Environmental Protection in 1997. This document has formed the basis for proposed contaminated sites legislation and it clearly states that groundwater cleanup will only be required at its point of use (eg. Wellhead) or point of discharge (eg. Marine environment, Lake etc). In addition, the National Environmental Protection Measure on the	This framework no longer covers matters relating to contaminated sites. These matters are adequately dealt with in the NEPM and the draft WA legislation for Contaminated Sites

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	assessment of site contamination, another Cabinet endorsed policy document, states that when assessing contaminated sites, the criteria established for each EV are only used as response (clean-up) levels at the point of use or discharge, and are trigger (assessment) levels within the aquifer. If the intent of this framework document is to change the policy such that groundwater requires remediation beneath a site where no receptor is impacted, then BP submits that this document is not the appropriate vehicle to canvas that policy change. Your clarification of this matter would be greatly appreciated.	
44	Environmental Objectives and criteria The premise of Section 6.2 that states *"The NWQMS articulates the notion that implementation of the strategy should be flexible and adaptable to local conditions"* is strongly supported As discussed in the Framework, while there is much value in consistency there will be occasions when local conditions will require departures from usual practices. This is a very desirable approach that allows the development of the most appropriate management plans for the protection of fresh and marine water. Section 4.2 seems to be prescriptive in relation to management responses for exceedences of Environmental Quality Standards (EQSs). Our concern is that EQS's are being used as the evidence that the EQO has been not been met, rather than as a trigger for investigation. In some cases, such as the protection criteria for consumption of aquatic foods where there has been extensive scientific investigation to support the selection of an EQS, this is appropriate. However, in other cases such as ecosystem health (toxicants) and aesthetics there is not the same level of scientific confidence that if an EQS has been exceeded then an EQO has not been met Therefore, the response to an exceedance of an EQS should be based on a good understanding of the resultant impact on an EQO. Section 4.2, Step 7 of the Framework that relate to EQSs should be changed to reflect that if an EQS is not met, then it is possible that the EQOs are not being met, and should be investigated (except for EQSs for the protection of human health that are based on adequate scientific data). The exceedance of an EQS would then serve as a trigger for an investigation into whether there has been an impact on an agreed EQO. Suitable management responses would need to be developed if an EQO is affected, however if the EQO has not been affected it may be more appropriate to modify the EQS in the light of the improved understanding of the local environment.	See Response to Issue 41 The framework has been written for Statewide application. It provides for flexibility and thorough consultation between involved parties. The framework offers the opportunity to achieve negotiated outcomes that the majority of involved parties consider appropriate at the local level. In the case of the draft EEP for Cockburn Sound, the EVs and EQO (including EQGs and EQSs) have been derived through such a process.
45	Implementation of the Framework in relation to Contaminated Sites The National Environmental Protection Measure (NEPM) for the assessment of contaminated sites and the Department of Environmental Protection's *Assessment Levels for Soils, Sediment and Water* both use a risk based approach to managing contaminated sites. The risk-based approach requires that established criteria are only applied at the point of use or discharge (i.e. at the receptor).	This framework no longer covers matters relating to contaminated sites. These matters are adequately dealt with in the NEPM and the draft WA legislation for Contaminated Sites.

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	Section 4.6 Step 4 of the draft Framework indicates that the Environmental Quality Criteria (EQCs – including EQSs) will be applied beneath a contaminated site and Step 5 indicates that if an EQS is exceeded then intensified management action will be required. The management approach suggested by the Framework indicates that groundwater beneath the sites is the receptor for assessing contamination. This is a significant departure from the risk-based approach adopted by the DEP and the NEPM, which clearly requires that ambient water quality guidelines for ecosystem health should only be applied at the point of use or discharge. It is believed that the use of groundwater under a contaminated site as a receptor is not appropriate and that the Framework should be consistent with the NEPM and current DEP approach. It is also also understood that the EPA has suggested the use of Australian Drinking Water Guidelines as a suitable EQS to be met under contaminated sites. We note that most of the groundwater in Perth's potable water supply requires treatment before it is suitable for consumption, and that a substantial proportion of the remainder of Western Australia's groundwater is naturally unsuitable for potable water supply (and that some for some parameters in some aquifers there is no known technology that can remediate a plume to drinking water standards). Therefore it is believed that it is inappropriate to use the Australian Drinking Water Guidelines as an EQS for contaminated groundwater for all groundwaters across the State. Prior to publication of the guidelines stakeholders identified key problems that the low risk trigger levels for some of the low risk trigger value guidelines are so low that they will not be met in some natural waters. Measurements are likely to create unwarranted public concerns. There will be pressure for regulatory action that would divert government and industry resources away from key environmental objectives There is concern that regulatory authorities when setting licence conditions will be tempted to use the lowest concentration listed in the various tables without a risk assessment to establish the appropriateness of that stringent standard to the specific application. This would be contrary to the intention of the Guidelines, which is to establish a process rather than fixed numerical numbers.	
46	There is significant support for this framework. However, there are a few alterations that we believe need to be considered, and these are discussed below. Generally, the approach of the framework will enable water quality criteria to be set that are area/site specific rather than the utilisation of national guidelines that do not take into account regional or local conditions. Where Environmental Quality Guidelines (EQGs) are met, then it is expected that the protection of the Environmental Quality Objectives (EQOs) have occurred. Where EQGs are not met, further investigation is required as to whether the exceedance is an issue. However, where they exceed Environmental Quality Standards (EQSs), then an	See Response to Issue 41 and 44

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	appropriate management response is required. The setting or use of EQSs needs to be made clearer, to ensure that an appropriate EQS for a particular area is defined with respect to EQOs. It is noted that the framework will consider agreed benchmarks based on Guideline No 4 to become the EQS. Application of these benchmarks needs to be considered on a case-by-case basis. For example, EQOs may be set that are above EQSs due to local Environmental Values (EVs).	
47	For groundwater quality, the framework specifies that the EQC would be applied beneath and in the vicinity of the contaminated site. Where an EQS is exceeded beneath a site, in the vicinity of a site, at the point of extraction, at the point of use or at the point of discharge, then management action, or intensive management action would be required. This contradicts the DEP draft *Assessment Levels for Soil, Sediment and Waters* (DEP, 2001 – Contaminated Sites Management Series), which indicate "... levels should be applied as investigation levels at the point of extraction, and as response levels at the point of use, or, where there is a likelihood of an adverse environmental effect, at the point of discharge." Application of the guidelines in terms of groundwater quality requires clarification to ensure consistency with the already published approach. *In respect to contaminated sites and groundwater quality, we endorse the comments of other concerned stakeholders. We regard this, as the single most important issue in implementing what otherwise seems to be a generally sensible approach to environmental protection. The implementation of the Guidelines as presented, in this area, will have severe consequences for groundwater remediation in Western Australia, and in many cases set objectives that will not be possible to meet, no matter how much effort (and money) is expended that could be better used elsewhere.*	This framework no longer covers matters relating to contaminated sites. These matters are adequately dealt with in the NEPM and the draft WA legislation for Contaminated Sites
48	The real test of the acceptability of the process will occur when Environmental Quality Criteria (EQC's) are being established, as it is at this stage that the requirements for management actions will emerge.	Correct. Significant debate may occur when Guideline No. 4 is applied on a case-by-case basis. This is one of the outcomes of taking that flexible and inclusive approach (See response to issue 3). This debate has already begun to occur during the drafting of the Cockburn Sound draft EPP. Whilst this may appear to be a weakness of the framework, it is actually its strength as it offers flexibility for finding an agreeable way forward for most situations (See response to issue 41: Flexibility versus certainty). Much discussion has taken place regarding the EQSs for Cockburn Sound. Whilst not legislated at this stage, they have been derived through a consultative process involving all key stakeholders and the community. Appendices 3 a & b,, 5 and 6 outline how all interested parties can be involved in the process of developing EVs and EQOs. Appendix 2 reinforces this by noting that the same approach is taken in the SWQMS. Section 4.2 specifically refers to the roles of lead agencies regarding the negotiation of practical and meaningful. For Cockburn Sound, that agency would be the Cockburn Sound management Council in the first instance. Attention is also drawn to Appendix 1 'Multiple lines of evidence' in ambient waters being required before an management agency would commence draconian action against a third party to ensure that a problem is not simply an anomaly. The use of the guidelines as default values is also addressed in Section 4.2 (Step 7: Selection and Application of EQGs and EQGs) and Section 4.4 (steps 4): EIA). Appendix 11 specifically acknowledges that the use of NRM targets is a suitable alternative to the use of guidelines and standards in areas where the water quality is persistently poor because of diffuse source contamination. Accordingly, the framework not only provides for local guidelines and standards to be negotiated but also provides for interim NRM Targets for diffuse source contamination. Section 4.2 (Step 7) deals with the matter of guidelines not being standards.

ISSUE No	STAKEHOLDER ISSUES	EPA'S RESPONSE
49	In light of the parallel processes regarding the development of an EPP and associated EQC's for Cockburn Sound, some comparisons between the two processes will occur. It is suggested that draft Implementation Strategy for Western Australia has a number of characteristics that could be suitably incorporated into the Cockburn Sound EPP and EQC's including: Definition of Sustainability The definition used in the ANZECC document is appropriate. Economic and social development needs to be included in the understanding of sustainability, with clearly environmental protection being paramount.	The ANZECC definition of sustainability has been incorporated into the spirit of this framework. There is no intention in the framework to limit the scope of the three elements of ESD (See response to issue 30 and Appendix 6). Response to issues 23,41,44 and 48 deal with the matter of flexibility. Appendices 3a & b and 5 offer all stakeholders and the community extensive involvement in water resource management. Section 4.2 specifically proposes that lead agencies assume this responsibility when drafting EVs and EQO etc. Accordingly, the approach to the management of each significant water resource will have site-specific characteristics. The specific approach taken for the draft EPP for Cockburn Sound does not fall outside the scope of this framework. Notwithstanding the above, the EP Act 1986 limits the scope of EPA' advice to Government to environmental and some social matters.
50	Collaboration, and Independent Review The ANZECC document emphasises partnerships and a 'balanced' approach. We understand that this implies the consideration of the full range of views and positions that would be associated with the development and acceptance of the management frameworks proposed. It is essential for a framework like this to be practical and effective, and receive broad support. In addition the draft document recommends appropriate independent scrutiny of the relevant EV's, EQO's and EQC's prior to submission to Government for their endorsement. This process too is essential; no single organisation retains or has access to all of the relevant experience and knowledge to develop these protocols in isolation.	Section 4.2, Appendix 3a & b, 5 and 6 support the partnership approach. See responses to issues 3, 11, 30, 41 and 49. With respect to review, the purpose of the Government and non-Government seminars/workshops and review periods was to achieve broad support for the framework. All stakeholders were invited to participate in the process, raise concerns and offer solutions to those concerns. The framework has been amended extensively to accommodate stakeholders' suggestions. Unfortunately, some stakeholders offered no solutions to their concerns when requested. Ideally, unanimous approval by all stakeholders would be desirable. Given the diversity of opinions amongst stakeholders across WA, the framework has met with significant stakeholder support. It offers flexibility to stakeholder to negotiate EVs and EQOs on case-by-case basis before the lead agency submits draft EVs and EQOs to EPA for review and endorsement. The submission appears to misunderstand the role of EPA and possibly the EPA Service Unit. Section 4.3 and 4.4 addresses this matter. EPA is a 5 person independent body that advises Government on environmental matters. EPA communicates with whom it deems appropriate before advising Government. The EPA Service Unit on the other hand gives advice to the EPA and carries out day-to-day duties on behalf of the EPA. Accordingly, EPA would ensure that appropriate independent comment is made on any matters of concern.
51	Non-coercive approach The best environmental outcome for any issue is usually obtained when the parties involved reach concurrence on objectives, procedures and desired outcomes. The ANZECC approach allows for a suitable level of interaction between all parties, in the knowledge that a rational and supportable set of outcomes will ensue. In our experience, the coercive approach is fundamentally flawed, leads to antagonistic interaction and ultimately takes longer, costs more, and produces a less effective management protocol.	Correct. Section 4.2, Appendix 3a & b, 5 and 6 support the partnership approach. See responses to issues 3, 11, 30, 41, 49 and 50. The submission is also correct in pointing out that the NWQMS is not a coercive strategy. Section 1 (Introduction) notes that implementation of the NWQMS in all States is tied to an obligation to the National Competition Council's policy that requires the States to implement the NWQMS. However, the nature of implementation is flexible. It is more concerned with outcomes rather than processes.
52	Comments are made on p14 of the document "There is a tendency amongst some to automatically assume that a high level of protection should be applied to areas that are deemed pristine. Unless a pristine area is deemed to have a high conservation and/or high ecological value, such an assumption should not be made automatically". There appears to be a rigorously held view that any departure in conditions from pristine must be considered as degradation. We have always questioned this view, as we know of no supporting evidence for this position. We therefore endorse the rational approach taken in the draft document.	Correct. The revised framework supports this point in Section 4.4 (Step 4)

53	Finally, a minor point. On pages 22 and 23, the statement is made; "Biological/ecological indicators are selected according to a conceptual model of the cause-effect pathway developed for the site, and should include a *key ecological indicator* (eg. Seagrass as an indicator for nutrient enrichment). We only wish to comment that the statement (eg. Seagrass as an indicator for nutrient enrichment) may not be the most appropriate example to use. Perhaps, "Seagrass as an indicator for water clarity" would be more appropriate.	Section 4.2 (step7n and p) and Appendix 12 addresses this matter. Appendix 12 reads 'From a day to day management point of view, a *'multiple lines of evidence'* and a *'persistence line of evidence'* approach would be used for evaluating *'cause and effect relationships'* for environmental quality. Not until multiple lines of evidence persisting over a significant time period has occurred would a trigger response be formally invoked by the management body. The general thrust of this environmental quality management framework is to take a multiple lines of evidence approach through the application of EQGs and EQSs that use indicators along the cause-effect pathways for each contaminant. For instance, an EQS could be defined in terms of agreed biological responses to the stressor(s) of concern, eg persistent phytoplankton blooms. This approach circumvents the problem of triggering major management responses following one-off unexplained events. With respect to the involvement of persons or agencies that discharge contaminants to the environments, a management response should only be triggered if it can be shown that the relevant EQS has not been met and the source/cause of the impact has been identified. This approach offers surety to operators and regulators alike in that it reduces the likelihood of a management response being triggered too early which could place an un-necessary burden on the operator, or triggered too late to prevent serious or irreversible damage from occurring.'
54	It is accepted that the guidelines have the potential to significantly improve the management of waters through Australia. There is also a significant risk that misapplication of the Guidelines will impose a significant financial burden on a range of productive businesses, with no demonstrable improvement in environmental outcomes	*Licence conditions relating to Cockburn Sound will be negotiated with licensees to ensure they are reasonable and practicable. If a licensee does not agree with a condition imposed by the DEP, it has right to appeal such a condition.*
55	At State level, the Implementation Statement should be prepared by the agencies that will apply the Guidelines. This should be developed in co-operation with those groups to which the Guidelines will be applied. An appropriate model would be the statement attached to the NEPM for Air, but with more detail. KIC would welcome an opportunity to discuss the scope of such a Statement, and would commit appropriate resources to its development. KIC would welcome an opportunity to discuss the scope	Implementation of the Guidelines will be developed in consultation with relevant stakeholders.
56	There is concern that regulatory authorities when setting licence conditions will be tempted to use the lowest concentration listed in the various tables without a risk assessment to establish the appropriateness of that stringent standard to the specific application. This would be contrary to the intention of the Guidelines, which is to establish a process rather than fixed numerical numbers	See response to No. 54.
57	Some of the low risk trigger value guidelines are so low that they will not be met in some natural waters. Measurements are likely to create unwarranted public concerns. There will be pressure for regulatory action that would divert government and industry resources away from key environmental objectives	Trigger values lower than background concentrations will not be placed in licences.
58	It is important to orderly and sustainable urban development that the draft framework recognises that the Australian and New Zealand water quality guidelines were largely written in response to the deterioration of freshwater quality, and to a lesser extent marine water quality, especially on the eastern seaboard of Australia.	This comment this valid.

ISSUE No	STAKEHOLDER ISSUES	EPA'S RESPONSE
59	As stated in the draft Implementation Framework, "there is a tendency amongst some to automatically assume a high level of protection should be applied to areas that are deemed pristine..... If that assumption was correct, the ramification would be that most of Western Australia's coastline would be potentially quarantined from most anthropogenic activities." With regard to the very high popularity in Western Australia to live on the coast or near water, the importance of maintaining a balanced perspective in this regard needs to be emphasised. The draft Implementation Framework is acknowledged to clarify this aspect and additional emphasis is requested.	This comment this valid.
60	There is concern that the misapplication of regionally derived water quality criteria may affect the assessment of canal and marina residential developments, or of urban lakes and water features. To avoid this concern, it is requested that the Implementation Framework should specify that EQGs and EQSs that are derived for the assessment and management of broad natural water bodies do not automatically apply to internal or constructed waterways. As an illustration of this concern, I am advised that the misapplication of the EQGs and EQSs for chlorophyll and phytoplankton blooms that are defined in the draft Environmental Protection (Cockburn Sound) Policy 2001 and the associated draft Environmental Quality Criteria Reference Document (Cockburn Sound) would deem the water quality in Hillarys Boat Harbour as requiring investigation and possible remediation. This is clearly contrary to the popular view that water quality in Hillarys marina is eminently acceptable for its recreational and residential purposes, a view supported by more than two million visitors each year. Most other internal and constructed urban waterways in Western Australia would similarly fail these very conservative water quality criteria, notwithstanding a broad acknowledgement of their high acceptability and trouble-free status. In clarification of the foregoing, we note that the Cockburn Sound EQGs and EQSs were derived with reference to water quality in offshore Warnbro Sound, a large coastal embayment, and apply most directly to assessing water quality at similar scale. Their application to internal waterways, such as Hillarys marina, is clearly inappropriate. This does not bring into question the criteria – clearly, if an extensive embayment or offshore area had chlorophyll or phytoplankton levels equal to Hillarys marina then investigations would be appropriately required. Nor does it remove from the requirement for ongoing monitoring and management of canal and marina waterways to maintain acceptable water quality. However the exceedance of a water quality investigation trigger in an internal or artificial waterway should not implicate the acceptability of such a waterbody. I am concerned that the misapplication of similarly derived water quality criteria may adversely affect water-based urban developments and requests that appropriate guidance should be provided in the Implementation Framework.	See response to issue 51 regarding stakeholder and community consultation. The setting of EVs and EQOs is an inclusive process. Section 4.2 (step 7 i) notes that EVs and EQOs relating to public health matters in Guideline No 4 (eg. drinking water guidelines and some recreational and aesthetic guidelines) are reiterations of the National Health & Medical Research Council's (NH&MRC) guidelines. Accordingly, EPA would expect that implementation of NHMRC guidelines would be adequately managed by the Health Department under its legislation'. The submission is correct with respect to the water quality within marina and canals. Canals and marinas are not constructed for the purposes of ecological health. However, their construction should not impact on the surrounding water quality to a point where the surrounding EQCs are exceeded. This approach is similar to that for protecting ambient water quality outside boat harbours and ports. Notwithstanding that, canals and marinas play a different social role and should be protected, at a minimum, for activities such as swimming and aesthetics. The final treatment of this matter will be presented in the finalised EPP for Cockburn Sound.

61	Lead Agency - there is reference throughout the document of the appointment of a lead agency to oversee implementation of the strategy for the protection of a water body. The importance of this role becomes very clear when one looks at Section 4 and Appendicies 3 a & b 5 and 6. Considerable time, money resources and leadership will be required by the lead agency to coordinate stakeholders and arrive at agreeable EVs, EQOs &EQSs and an area Environmental Management System. In this respect I have concerns that the Framework does not attempt to identify whom the lead agencies will or could be and how implementation could be resourced. We feel it important that lead agencies are able to provide a balanced approach to implementation, as outlined in Appendix 3, 5 and 6 of the WA Framework, and have the capacity to integrate stakeholders over multiple jurisdictions. In our view the Department of Environment Waters and Catchment Protection are uniquely placed to fulfil this role.	The nature of the framework is to maximise reasonable flexibility. The framework would anticipate that the lead agency for water quality and quantity matters would be the DEWCP. Notwithstanding that, where matters relate to ecology and or fisheries for example, it is anticipated that CALM and the Department of Fisheries may also be joint lead agencies. The WA SOE Report 1998 outlines all of the significant issues that are impacting WA's water resources. There is no 'quick fix' for addressing many of these impacts. The framework recognises the limited resources of WA on one hand whilst been conscious of WA's commitments to the National Competition Council's requirement to commence addressing these issues on the other hand. Accordingly, in the first instance, progress needs to be made with respect to committing to address these issue. Sign-off of this framework would be an expression on that commitment.
62	Guidance for New Proposals - Section 4.4 (step 4b) (also reflected in Section 6.4) states that in areas deemed by the EPA to be near pristine and/or of high conservation or ecological value, EPA would generally expect that the proposal would not cause any detectable ecological or chemical change in the areas surrounding the proposal. There are risks and uncertainty inherent here for industry: There is no process outlined for determining/agreeing conservation and ecological value. There is no recognition that a mixing zone and buffer could be acceptable within a high value area. The statement seems to prejudice the broad policy objective: *to achieve sustainable use of the State's water resources by protecting and enhancing their quality while maintaining economic and social development.* There is likely to be instances where localised reduced water quality is deemed acceptable by stakeholders in areas of existing pristine, high conservation/ecological values due to the economic /social benefits that arise. In fact there are areas now where contaminants are being discharged into such waters. The WA Framework would be improved by acknowledging that there may be circumstances where localised reduced water quality is acceptable in high conservation, high ecological value areas.	The submission is incorrect in suggesting that there is no process outlined for determining/agreeing on conservation and ecological values for new proposals. For areas that EVs and EQOs have been formally set, the processes would have involved the lead agency, stakeholders, the community, the EPA and possibly Government. Where there are no formal EVs and EQOs, Section 4.4 (steps 2 and 3) address the issue of setting notional or interim EV's and EQOs for the purpose of project design and expediting the assessment of proposals. Attention is drawn to step 2a which notes 'in reality environmental quality is a continuum ranging from pristine to highly disturbed conditions. Hence, designation of a level of protection (see Guideline No 4, pp 3.1-10 to 31-13), and the application of Guideline No 4 for ecological protection, is somewhat subjective. Accordingly, designation of a level of protection is a matter for discussion between proponents, EPA's Service Unit and the EPA before the Guideline No 4 is used for project design and assessment'. With respect to mixing zones, Section 4.4 (step 4g) deals with that matter. It is the responsibility of the proponent to articulate: the absolute necessity for a mixing zone; and that the proposed mixing zone is not being proposed as a substitute for proper wastewater treatment. EPA would deal with the merits of each proposal for a mixing zone on a case-by-case basis. The granting of a mixing zone should be viewed as an exception. It is noted that the NWQMS is a response to a century's decline in Australia's water resources. The spirit of the NWQMS is to halt further deterioration and, if possible, commence improving degraded water resources. Most of the trade-offs to date have resulted in 'environmental impacts'. It is not the intention of the NWQMS to adopt the 'balanced approach' in the sense that further deterioration is automatically acceptable. It should be noted that the environment has been traded off to various degrees for economic benefit since European settlement. Notwithstanding this, trade-offs and offsets are inevitable.

ISSUE No	STAKEHOLDER ISSUES	EPA'S RESPONSE
63	Proponent Initiated Implementation - In describing the EPA Service Unit's role re advice to proponents on environmental impact assessment (Section 4.4), the WA Framework advises that the EPA, through project guidelines would set interim or notional EV's, EQOs and EQCs (Section 4.4 Step 1b). Further, in Appendix 7, it states that in the absence of an EPP the assumption is that all EV and EQOs apply and will be set at a high level of protection and that if the proponent wishes to propose an alternative zoning scheme they must consult with the community and other key stakeholders. Whilst it may be possible for a proponent to demonstrate to the EPA, the Environment Minister and the majority of community stakeholders an acceptable environmental outcome for a proposed discharge to a receiving water body, what happens if the proponent is unable to achieve a consensus with the community and stakeholders to a "lowering" of the default EQOs ? How would the assessment process respond, how could decision time lines be maintained?	See response to issue 51 regarding consultation. The framework does not require a proponent or a lead agency to achieve consensus between interested parties following consultation. The framework required that meaningful and transparent consultation take place. It also requires that the EPA's attention be drawn to concerns that have been unresolved during the consultation so EPA can consult with whom so it wishes before advising Government of its assessment. In essence, the spirit of the framework is to achieve outcomes, through flexible processes, take all parties views into consideration for the community good before giving advice to Government
64	In light of comments made here (and above) our preference is that notional guidelines and/or default EVs & EQOs should be set carefully so as not to potentially prejudice a proposed development. The social and economic benefits of the opportunity should be considered along with an ALARP / best practice approach to effluent management, cognisant of existing and future disturbance when setting EVs and EQOs.	See response to issue 51 regarding consultation and the underpinning principles for the framework. The framework recognises the interests of all parties and seeks balanced outcomes for the community at large. It is noted that Australia's water resources have been in decline since European settlement. Embodied in the balanced approach is this recognition and that further deterioration in such a dry continent should be considered with care.

Appendix 3a

Partnership approach for implementing the proposed framework

Who would be involved in the implementation partnership?

The establishments of partnerships and their functions is dealt with in detail in the NWQMS's Implementation Guidelines (1998) and the draft SWQMS (Document 1; SWQ1, 2001). The proposed partnership would comprise of:

- Involved State and Local government agencies;
- Interested communities;
- Industry;
- Landholders and water users;
- Environmental groups; and
- Special interest groups.

Who are the Government agencies in the partnership and what are their roles?

SWQ1 notes the Government has the prime responsibility for water quality management in WA. Key Government agencies involved in water quality regulatory processes include:

Department of Agriculture;

Department of Conservation and Land Management;

Department of Environmental Protection;

Department of Fisheries

Department of Health;

Department of Minerals and Petroleum;

Department of Planning and Infrastructure;

Office of Water Regulation; and

Water and River Commission.

Representative of these agencies comprise the Senior Review Panel which is developing the SWQMS.

The individual roles and responsibilities of the above agencies are set out in SWQ1.

How does Local Government assist in the partnership?

SWQ1 notes that local government has a key responsibility through its management of land use, zoning and development approvals. Ensuring land uses are compatible with water quality management objectives is critical to sustainability of water resources. Local government has also operational responsibilities including road building and maintenance (eg stormwater management) and the management of land owned or vested in local government.

How does the Community assist in the partnership?

SWQ1 notes that regional coordination groups would be established by lead agencies on an 'on-needs' basis to address regionally significant problems. These groups would be open and accessible to community involvement in decision-making. Their aim would be to ensure that on-ground community programs and Government programs and priorities are properly integrated.

Community and Industry Advisory Committee

SWQ1 notes that a Community and Industry Advisory Committee will be established and will be involved in the development and implementation of water quality management programs. The main purpose of the Community and Industry Advisory Committee would be to ensure involvement of the community and industry in the drafting of EV, EQO, and EQCs or NRM Targets. In addition, the Committee may have a role in the development of local guideline and water quality management programs.

The Community and Industry Advisory Committee would be chaired by the Water and Rivers Commission and would consist of regular and occasional members from the water user groups, service organisations and community groups. Regular members would be invited to attend all meetings while occasional members would be invited to attend those meetings where issues may be of significant interest to their organisations. Regular members will include representatives from:

- Conservation Council of WA;
- Australian Water and Wastewater Association;
- Aboriginal and Torres Strait Islander Commission;
- Chamber of Commerce and Industry;
- Chamber of Minerals and Energy;
- Community representatives;
- Regional Development Council;
- Western Australian Municipal Association; and
- Water Services Association of Australia

Occasional members would include representatives from:

- Local Governments;
- Land Conservation District Committees;
- Local conservation groups;
- Local Integrated Catchment Management groups;
- Kwinana Industry Council;
- Australian Institute of Petroleum;
- Motor Trade Association of Western Australia;
- WA Farmers Federation;
- Pastoralists and Graziers Association;
- Western Australian Vegetable Growers Association;
- Western Australian Fruit Growers Association; and
- Local Waterways Management Authorities.

Linkage between the above groups

SWQ1 notes that the linkage between the activities of local community based catchment groups and Government agencies would occur through the development of regional and sub-regional strategies and endorsement by Government agencies. Through that linkage much of this present framework would be implemented. Accordingly, lead agencies would communicate this present framework to their constituents, stakeholders, and the above groups (see Section 4.2). It would be the responsibility of the lead agency to distil out, through consensus where possible, draft EVs, EQO and EQC or NRM Targets for EPA to review and endorse.

Finding ways forward between groups in the partnership on matters of concern

Where matters need to be resolved between Government agencies, it is appropriate that the Senior Review Panel address these matters in the first instance. For example, if the Department of Fisheries had planning concerns, it could raise these concerns with the Department of Planning and Infrastructure directly as both agencies are Panel member. Similarly, for non Government agency stakeholders and interested parties, they should convey their concerns to the lead Government agency on the Senior Review Panel and seek resolution.

From an EPA point of view, it would be ideal for all concerns to be resolved by the respective lead agency(ies) on the Senior Review Panel before the lead agency proposed EVs, EQO, and EQCs or NRM Target to EPA for review and endorsement.

EPA's relationship to the partnership

EPA is the author of this framework. Accordingly EPA would have a role to explain this framework to interested parties. Unlike the above bodies, the EPA is the independent advisor to Government on environmental matters. In that role the EPA would also review draft EVs EQOs and EQCs or NRM Targets that a lead agency would propose for a given area and (Figure 1) and advise Government accordingly.

Appendix 3b

Community Involvement – A Partnership Approach

National Water Quality Management Strategy (NWQMS) Guideline No 3 (Implementation Guidelines; Appendix A, pp32) presents steps to develop catchments and coastal waters management plans with stakeholder and community Involvement. These steps are given below as guidance only for implementing Guideline No 3. Notwithstanding that, Guideline No 3 has been signed off by Western Australia as an appropriate approach for community and stakeholder involvement. Guideline No 3 is incorporated herein as it is EPA's intentions that this framework be a stand alone document given the genesis for its need (See Executive Summary).

Much of the following is presently being carried out in an informal manner. The EPA would anticipate that when Government appoints a lead agency, body or panel to implement the various parts of the NWQMS, those responsible would formalise these processes.

STEP 1 Identify the planning region

Planning regions for water quality management should be based on natural areas. Within major natural catchments, there is also need to take account of 'social catchments' characterised by close linking of social interests that may include:

- economic activities;
- upstream/downstream catchment interactions;
- regional cultural identity; and
- administrative areas.

Within a social catchment, a significant number of stakeholders representing different interests need to be actively committed to catchment management if it is to be successful. If strong interest exists only at a sub-catchment scale, efforts should be initially focused there, using promotion of local achievements to stimulate action in other areas.

For coastal waters, the plan may be based on ecosystem boundaries that are commonly determined on the basis of transport systems (eg circulation), biological processes and community groups along the coast.

STEP 2 Develop appropriate mechanisms for stakeholder involvement

The key stakeholders span across the range of relevant interests. Once a core stakeholder group has been formed, it should have the responsibility to refine an involvement process suited to local circumstances and the available resources.

STEP 3 Assess the resource and scope the range of issues to be addressed

Stakeholder discussions should consider both the planning region and the scope of the issues to be addressed by the management plan.

If key stakeholders are interested in only a narrow range of issues, it may be necessary to focus on these initially, while facilitators may seek to draw out a recognition of interdependent problems or processes.

STEP 4 Identify the background information about the resource

Identify the basic background information which provides the limits for ecologically sustainable development of the resource in the region, including water sources, the natural quality and quantity variability, and the region's climatic variability.

STEP 5 Identify the environmental values of waters in different parts of the catchment

With the assistance of catchment planners and technical specialists, stakeholders should identify the current EVs and future EVs which may be needed and achievable. These judgements will be interim, pending detailed assessment.

Two crucial and inter-related judgements are needed:

1. What forms and levels of extractive use of water (drinking, agriculture, industry) may be required from different sections of waterway, taking account of water conservation measures, potentially available flows, economic development and ecological impacts?

2. What forms and levels of non-extractive use of water (ecosystem protection, fishing, swimming, boating, viewing) may be achievable in different sections of waterway, taking account of competing extractive demands and the discharge of contaminants?

Assessment of potential extractive demands will require modelling of the catchment system in relation to its hydrology, analysis of user demands and policy options for water management.

Assessment of non-extractive uses requires a combination of surveys of current and potential user demand and assessment of current habitat values and restoration potential.

Local stakeholders' knowledge of recreation patterns and their perceptions of the relative 'naturalness' of different sections of waterway, supplemented by simple 'objective' surveys, have been found to provide a sound basis for broad-scale assessment of non-extractive uses.

While tentative nominations of EVs to be protected will be determined through the consultative process, final recommendations will need to take account of scientific and economic assessments. Conversely, scientific and economic assessments will be needed to inform the consultative process.

STEP 6 Identify water quality problems and associated factors affecting environmental values

A balanced approach recognising the range of factors affecting EVs of water and waterways is needed. Water quality will often be only one of several major categories of environmental constraints. For example, stream flow, riparian vegetation and stream bed stability are major determinants of aquatic habitat potential.

A related consideration is that water quality in itself may not be a strongly motivating concern. Land managers will be primarily interested in issues affecting management of their land, rather than the effects of their management on waterways.

From the perspective of a community interest in water quality, the challenge is to encourage a 'positive' recognition of the links between the productivity of land and associated water quality issues, for instance, links between water quality and clean agriculture and also between water quality and regional economic development. The concept of best management practices can be useful in this context. Best management practices are described in more detail in the NWQMS Guideline No. 9 *Rural Land Uses and Water Quality.*

Local stakeholders will be keen to reduce water quality problems which affect them, eg irrigators who are affected by upstream water quality.

Other NWQMS guidelines that may give relevant information include *Guidelines for Urban Stormwater Management* (Guideline No 10), *Guidelines for Sewerage Systems-Effluent Management* (Guideline No 11), and the series of effluent management guidelines for industries such as piggeries, tanneries, wineries and distilleries etc (Guidelines Nos 16 –20).

STEP 7 Determine where and from what sources degradation of water quality is occurring

In most parts of Australia, available water quality data has been inadequate to identify with any confidence or accuracy the contributions of sub-catchments and contaminant sources to total contaminant loads in different sections of a waterway.

A combination of fixed-site monitoring at a small number of sites and self-monitoring of effluent discharges will provide information on the contribution of relatively regular point-source discharges to total catchment loads, but the remainder has sometimes been uncritically attributed to the effects of agriculture and forestry activities.

At least rough estimates should be obtained of the contaminant contributions from stream and catchment erosion, agricultural runoff, as well as urban and industrial wastewater. Event sampling as well as ambient water quality monitoring will enable pollutant loads to be estimated.

Assessment of the contributions of sediment and associated phosphorus from in-stream and off-stream erosion requires specialist skills. However, at a coarser scale, sub-catchment water quality can provide a strong indication of overall diffuse contributions.

Land manager and community involvement in assessing the quality of water draining from sub-catchments offers great potential for raising awareness of water quality issues and a commitment to action.

Simple technologies can be used by non specialists to assess with reasonable accuracy the level of water quality indicators including turbidity, conductivity and phosphorus.

STEP 8 Determine local water quality objectives

It may be convenient to divide the planning region into a number of geographic segments or sub-catchments with distinctive combinations of environmental values and management activities.

Sets of local water quality objectives can be established for each sub-catchment.

The following process can be used to develop objectives:

- determine the water quality required to protect desired environmental values
- assess the difference (gap) from current water quality
- assess the cost of necessary management actions
- resolve the acceptable quality/cost trade-off relative to protected environmental values.

The second step is the most relevant one at this stage of the process; interaction will be needed at a later stage to arrive at a final decision.

Guideline No 4, should be used to provide general guidelines (default values and objectives) for setting of water quality objectives in relation to environmental values. Where more appropriate guidelines and objectives are available, they should be used in preference to the default values.

However, within this general framework, the development and justification of local water quality objectives can present a substantial scientific and decision-making challenge. This is particularly so for indicators such as phosphorus and nitrogen for which Guidelines 4 specify a broad band of potentially acceptable levels.

Local or comparative evidence of threshold levels of environmental impact (eg eutrophication) is needed to guide objective-setting for such indicators. The cost implications of such critical indicators will also impinge on whether wide safety margins are acceptable.

Normally, concentration objectives for different water quality indicators will be used. However, for various cumulative (conservative) contaminants, such as salt, phosphorus and some toxicants, load objectives may also be desirable.

Load objectives need to be assessed in relation to either some specified point on a waterway or for a particular water body where the cumulative load may have a significant impact, eg provide a sufficient nutrient loading to generate an algal bloom.

They provide a potential criterion for determining acceptable contributions to the total load from different sources.

STEP 9 Identify technical options and assess implementation mechanisms for management action

Technical advisers will play a vital role in identifying potential management actions in different areas and assessing their potential effectiveness. The advisers' credibility within the local community will be crucial in enabling constructive interaction between technical and lay participants.

Advisers may offer a list of options, with an assessment of their potential effectiveness, which may be added to, interpreted and utilised by the stakeholder groups.

Stakeholder groups will have a major role in developing management options to improve water quality. It is at this point that the critical choice between mechanisms must be resolved, via:

- regulation
- market mechanisms
- education
- co-operative action
- some creative amalgam. – an innovative combination of the above?

For example, while changes in certain land management practices may be relevant technical options, the means of introducing these changes warrants careful attention to ensure the concerns of the local community are not overridden.

Factors that influence the choice of specific management actions include:

- availability of relevant technologies
- efficiency of relevant technologies
- familiarity with relevant technical practices
- availability of necessary administrative and management resources
- cost of implementation
- political acceptability of management and cost-sharing arrangements.

STEP 10 Identify priority areas and time targets for water quality improvement

Two questions will help set priorities:

1. Which actions will lead to the greatest improvement in environmental quality?
2. What should be the timetable for these improvements?

The potential social and ecological benefits of improved quality in different areas and implementation feasibility will be major considerations.

Depending on the magnitude of the gap as assessed in Step 7 and the feasibility of implementation, staged time targets will be needed to work towards long term water quality objectives.

STEP 11 Assess potential environmental effects of different management actions

Some form of modelling of the environmental effects will be necessary to enable assessment of associated benefits.

Quantitative modelling may be used if there are resources available. Modelling tools should be designed to assist decision-making, not to display technical sophistication. They should therefore:

- provide a focus for developing a shared understanding of system dynamics and management scenarios
- provide an integrative perspective of key sub-systems
- incorporate key dynamic (hydrological) processes
- provide useful information on relevant performance indicators

- enable examination of relevant management options in relation to historic system conditions
- provide an appropriate level of spatial and temporal resolution
- have realistic data requirements
- enable at least partial calibration and verification of the model against key parameters
- be capable of refinement as knowledge of system behaviour increases
- be comprehensible and fairly transparent to lay users.

STEP 12 Assess the potential ecological, economic and social impacts of different management actions

The environmental effects of various management actions, as well as associated effects, need to be assessed in terms of their impacts or costs and benefits relative to ecological, economic and social values.

STEP 13 Formulate broad management strategy options to achieve different environmental objectives or targets

Three or four distinct, strategic options, including 'do nothing', should be presented for consideration by key stakeholders, the wider community and decision makers. They may cover a range of issues, including:

- long term objectives and staged targets for environmental quality
- favoured implementation tools
- level of planning detail
- cost-sharing arrangements
- available public resources
- levels of private cost
- co-ordination and administrative arrangements.

The social and economic implications of different environmental goals will be a crucial factor. However, the most sensitive aspect will be the potential impacts upon different interest sectors.

The allocation of sectoral 'reduction targets', the means of achieving the targets, and costs for different groups will be important issues.

The impact of each of the options on point-source and non-point dischargers, and on urban and rural communities, is also likely to influence stakeholder responses.

Choosing the best option is essentially a matter of politics. Which matters can be resolved by consensus between stakeholders? Which matters will be referred to the ultimate decision makers?

STEP 14 Evaluate the cost-effectiveness and associated impacts of alternative management strategies

There should be an evaluation of the overall effectiveness, costs and other impacts of options.

Costs of the options will be needed, but many categories of impacts will be qualitative only. Comparison of the options will be both quantitative and qualitative.

STEP 15 Formulate a management strategy

The assessment and refinement of management options is usually an interactive process.

Various implications of potential options are progressively identified and a preferred strategy or combination of actions drafted.

Resource constraints will generally mean different elements of the strategy need to be staged to reach nominated objectives.

Staged targets will provide a framework for adaptive management, priority-setting for action programs being adjusted as progress is assessed.

The management strategy will contain the various options with their advantages and disadvantages. The preferred option will be nominated.

STEP 16 Release water quality management strategy for public comment

Public comments will help to extend and refine the evaluation of the potential impacts of the management strategy. A reasonable time, say three to six months, should be provided to enable considered responses to be prepared.

STEP 17 Finalise and then submit water quality management strategy to government for approval

For significant water bodies, it is anticipated that a formal process of establishing EVs, EQOs and EQCs will be followed over a period of time. The steps involved in this process is laid out in Section 4 of the main text. Cross-portfolio implications will generally warrant consideration by either Cabinet or the appropriate Cabinet Committee.

STEP 18 Develop local water quality management plans for priority areas in conjunction with related land and water management planning

Responsibility for developing local management plans should be devolved to appropriate working groups or government agencies as nominated by Government.

STEP 19 Implement management strategy (including local water quality management plans)

The lead agent(ies), body, working group, panel, committee etc nominated by Government should co-ordinate implementation as it deems appropriate to meet the overall NWQMS objective:

'to achieve sustainable use of the State's water resources by protecting and enhancing their quality while maintaining economic and social development'.

STEP 20 Monitor effects of implementation of the strategy and adjust action plans

The lead agency(ies), body, working group, panel, committee etc nominated by Government should undertake progressive review of the strategy, drawing upon agency and community water quality monitoring and in-depth evaluation of pilot initiatives.

Appendix 4

Linkage between the NWQMS, the SWQMS and this framework

Linkage between the NWQMS, the SWQMS and this framework

This framework recognises that the State Water Quality Management Strategy's (SWQMS) broader Implementation Framework (SWQ1) is complementary to the NWQMS. SWQ1 was endorsed by Cabinet and published in May 2001. Accordingly, SWQ1 should also be referred to regarding the roles and responsibilities of the various State agencies with day to day water resource management functions. When completed, the SWQMS will comprise a series of documents indicating how the NWQMS would be implemented in WA. This present framework, when finalised, will constitute one of those SWQMS documents. Accordingly, when this framework is implemented through the SWQMS, it should go a long way toward achieving the overall NWQMS's policy objective, that is:

> *'to achieve sustainable use of the State's water resources by protecting and enhancing their quality while maintaining economic and social development'.*

The NWQMS, SWQMS and this framework take the same approach to water quality protection, by following the same principles. They are:

- an integrated approach to water management – a holistic approach;
- community and stakeholder involvement, as appropriate, in selecting suitable Environmental Values (Beneficial uses) (EVs), Environmental Quality Objectives (EQOs), (including EQC and NRM Targets) to protect water resources – a partnership approach;
- sustainability – a balanced approach;
- as appropriate, assessment of 'EVs', 'EQOs' (including EQC and NRM Targets) for significant water resources by EPA before submission to Government: - an assessment approach;
- Government endorsement of 'EVs', 'EQOs' (including EQC and NRM Targets) as appropriate – Government coordination approach; and
- a systematic approach including performance monitoring, auditing and reporting – an Environmental Management Systems approach.

Appendix 5

An integrated approach to water management – a holistic approach

An Integrated Approach To Water Management – A Holistic Approach

Integrated resource management considers all aspects of the resource use - the social, economic, environmental and other impacts. It embraces:

- a holistic approach to natural resource management within catchments, marine waters and aquifers with water quality considered in relation to land use and other natural resources;

- co-ordination of all the agencies, levels of government and interest groups within the catchment; and

- community consultation and participation.

Integrated Catchment Management (ICM) otherwise know as Total Catchment Management (TCM), is the 'umbrella' for sustainable natural resource management.

It provides the framework for the community, industry and all levels of government to work together to overcome environmental and resource management problems.

Development of catchment-based plans and strategies is central to ICM.

These include the control of point sources of pollution, influence of future land use and where appropriate, the adjustment of existing land use practices to reduce diffuse source pollution.

Plans will promote cleaner production through better housekeeping, best management practices and operational processes that minimise harmful environmental impacts from the beginning to the end of the production process. These plans should integrate ecological and conservation issues within the preferred implementation framework.

The same concepts can be applied to the management of coastal waters. These waters are affected by land-based activities, strategic planning, active partnership, integrated approach, balance of social, economic and environmental impacts, and adaptive management as well as actions on the shoreline and in the sea.

These five key themes may be applied in a systems approach to water quality management.

Strategic planning

Policies, planning and action should be linked to achieve an agreed vision or outcome. The processes which lead to outcomes should be kept in perspective. Notwithstanding that, the following elements are necessary in any water resource strategic plan:

- setting of integrated objectives and priorities to protect the environmental values (beneficial uses) of fresh and marine water bodies;

- design of management options to directly or indirectly influence environmental outcomes, and which may have complementary benefits (eg wastewater treatment and wetland rehabilitation); and

- co-ordination of action plans for different aspects of resource management initiated by government, industry, landholder and community organisations.

Active partnership

Collaboration among key stakeholders is encouraged to generate credibility, commitment and co-operation. Establishing conflict-mediating processes are important.

Integrated approach

Effective assessment of impacts and variables which affect water quality and overall catchment health requires a holistic approach. The emphasis is primarily technical and implications of catchment conditions and management actions are directly relevant. At times, skills in resolving conflicts will be required. Key aspects of an integrated approach include:

- analysis of aspects of the catchment system (eg water quality, streamflows, riparian conditions) impinging upon relevant values or uses of waterways;

- assessment of the ecological, economic and social values or beneficial uses of waterways and related impacts of management actions; and

- monitoring of environmental conditions and related socio-economic factors.

Balance of social, economic and environmental impacts

Evaluation of the overall merits of alternative combinations of technical solutions and implementation devices is required. The evaluation must identify options to balance social, economic and environmental impacts with respect to:

- the efficient use of public and private economic resources;

- the effectiveness of actions in achieving desired outcomes;

- the equitable distribution of costs and benefits; and

- progress towards sustainable systems of production.

Adaptive management

Effective catchment management depends upon a reasonable understanding of:

- major factors influencing water quality in the catchment or coastal waters; and

- the impact of past changes and development on current water quality.

While it is recognised that an optimal knowledge and information base for catchment management is not available, there is usually sufficient information to identify and quantify the important local water quality issues. Key requirements are:

- a sound overview of the effect of various activities on water quality, making maximum use of existing knowledge;
- a shared understanding by managers and stakeholders; and
- good 'feedback' systems to monitor responses to management action.

Appendix 6

Sustainable development – a balanced approach

Arguably the most important of this framework's principles is sustainable development. Embodied in sustainable development is the balanced approach. If adopted properly, and all other things being equal, sustainable development should ensure that Western Australia's water resources. are sustained, both in terms of their environmental, social and economic value, now and in the future.

The National Strategy for ESD (1992) identified core objectives and guiding principles designed to achieve the goal of development that improves the quality of life in a way that maintains the essential ecological processes on which life depends.

The NWQMS Implementation Guidelines (1998) notes:

These (ESD) guiding principles and core objectives need to be considered as a package. No objective should predominate over the others; and

A balanced approach is required that takes into account all these objectives and principles to pursue the goal of Ecologically Sustainable Development.

The ESD Strategy identified core objectives and guiding principles designed to achieve the goal of development that improves the quality of life in a way that maintains the ecological processes on which life depends.

The core objectives of ESD are:

- to enhance individual and community well-being and welfare by following a path of economic development that safeguards the welfare of future generations;
- to provide for equity within and between generations; and
- to protect biological diversity and maintain essential ecological processes and life-support systems.

The guiding principles of ESD are:

- that decision making processes should effectively integrate both long and short term economic, environmental, social and equity considerations;
- where there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation;
- the global dimension of environmental impacts of actions and policies should be recognised and considered;
- the need to develop a strong, growing and diversified economy which can enhance the capacity for environmental protection should be recognised;
- the need to maintain and enhance international competitiveness in an environmentally sound manner should be recognised;

- that cost effective and flexible policy instruments should be adopted, such as improved valuation, pricing and incentive measures; and

- that decisions and actions should provide for broad community involvement on issues which affect them.

These guiding principles and core objectives need to be considered as a package. No objective should predominate over the others.

A balanced approach is required that takes into account all these objectives and principles to pursue the goal of ESD.

In the case of water resource management, the National Strategy for Ecologically Sustainable Development says that 'the challenge is to develop and manage in an integrated way, the quality and quantity of surface and groundwater resources and to develop mechanisms for water resource management which aim to maintain ecological systems while meeting economic, social and community needs.'

These principles, which are accepted by the Commonwealth, State and Territory governments and local government, are central to the management guidelines of the Strategy being developed for activities that have significant impacts on water quality.

Appendix 7

The Scientific Tools: Revised Guideline Nos. 4 & 7

NWQMS's application of Sustainable Development and that in Guideline Nos. 4 & 7

Sustainability for water resource protection is not a pure science, rather it is a set of judgements made by a broad partnership of interested parties expressing their wishes and having them endorsed by Government.

Notwithstanding the above, one tool for assisting such judgements is scientific methodology. To this end, the revised Guideline Nos 4 and 7 offer much assistance. However, some potential inconsistencies emerge when reconciling sustainability as espoused in the NWQMS Approach (1992) with policy statements on sustainability as espoused in the Guideline No 4. For instance, the National Approach (1992) states the following goal:

"To achieve sustainable use of the nation's water resources by protecting and enhancing their quality while maintaining economic and social development";

and should be read in the context of:

"The community' desire to have water resources managed to a particular level will have economic, social and environmental impacts'

Guideline No 4 deals with the guiding principle in a much narrower way. For instance; Guideline No 4 states (p1-5):

The Guidelines for Fresh and Marine Water Quality are primarily based on the philosophy of ecologically sustainable development (ESD). The Australian National Strategy for Ecologically Sustainable Development (ESD Steering Committee 1992) defined ESD as:

[development] using, conserving and enhancing the community's resources so that ecological processes, on which life depends, are maintained, and the total quality of life, now and in the future can be increased. Put more simply, ESD is development which aims to meet the needs of Australians today, while conserving our ecosystems to the benefit of future generations.

Scope of Guideline No 4: Environmental Values (Beneficial Uses)

Guideline No 4 offers narrative and numerical guidelines for the protection of ambient waters supporting four EVs. The EVs cover 'aquatic ecosystems', 'primary industries', 'recreational water quality and aesthetics', and 'drinking water'. That is certainly not to suggest that water may not be protected for other legitimate beneficial uses such as industry (Figure 1). For instance, the NWQMS Implementation Guidelines (1998) makes significant reference to a broader range of uses including intake water for industry. In doing so, it captures more fully the broader spirit of the balanced and holistic approach of the NWQMS and ESD.

In the above context, application of Guideline No 4 needs to be applied flexibly especially since many of the guidelines are generic and have been derived elsewhere using exotic species in laboratory toxicological experiments. Accordingly, this means that the Guideline No 4 may offer better guidance for protection of EVs and subordinate EQOs in some regions and localities than for others.

• Protection of aquatic ecosystems - General ecosystems - Production of edible fish, crustacea and shellfish - Water associated wildlife • Recreational water quality and aesthetics - Primary contact - Secondary contact - Visual use (enjoyment) - maintenance of landscape vegetation Raw water for drinking water supplies • Primary Industry	Agricultural water use - Irrigation - Livestock - Farmstead water supplies **Industrial water use** - **Generic processes (heating, cooling)** - **Hydro-electric power generation** - **Textile industry** - **Chemical and allied industry** - **Food and beverage industry** - **Iron and steel industry** - **Tanning and leather industry** - **Pulp and paper industry** - **Petroleum industry**

Figure 1 Environmental Values

Public Health Matters in Guideline No 4

The drinking water guidelines and some of the recreational and aesthetic guidelines that appear in Guideline No 4 are reiterations of the National Health & Medical Research Council's (NH&MRC) guidelines. The EPA expect that implementation of NHMRC guidelines would be adequately managed by the Health Department under its legislation.

Industrial Intake Water and Guideline No 4

During the revision of Guideline No 4, industry, through the Agriculture and Resource Management Council of Australia and New Zealand (ARMCANZ), noted that it did not require intake water quality guidelines to be developed as its activities were site and industry specific. This is why, with the exception of primary industry, the Guideline No 4 make little reference and offers no guidance with respect to Industrial intake water quality. Accordingly, the framework outlined in Section 4 of the main text offers no guidance for the protection of water for industrial purposes. Notwithstanding that, EPA would expect that water used presently by industry should be protected from degradation.

Cultural Importance of Water Guideline No 4

Reference is made in Guideline No 4 to 'Cultural Importance' because New Zealand considered that the matter be raised in Guideline No. 4 (Section 2.1.3, pp 2-6&7). Guidelines No 4 offers no specific guidance in this regard. Accordingly, the EPA remains silent on this matter.

Misconceptions Regarding the Application of the Guidelines No 4 and 7

Some consider that Guidelines Nos 4 & 7 should be implemented in a rigid manner, and failing to do so would lead to environmental impacts. Following discussion with other jurisdictions, EPA has become aware that the various policies, principles and guidelines comprising the NWQMS are being implemented in a variety of way across Australia. For implementation purposes in Western Australia, EPA notes that none of the NWQMS Guidelines, including the Guidelines Nos 4 & 7 are:

- mandatory instructions, but are guidelines;
- for use as proxies for ambient water standards unless justified in the public arena and endorsed by Government (read definition of Water Quality Standard in conjunction with Water Quality Objective – pp A-18-19, Guidelines No 4);
- for use in areas referred to as 'mixing zones' unless explained in the public arena and supported by Government (see Section 2.2.2, p 2-17, Guidelines 4);
- effluent treatment standard unless justified in the public arena and endorsed by Government (see Section 2.2.3, 2-18, Guidelines No 4) and
- effluent discharge licensing conditions, unless justified in the public arena and endorsed by Government.

In other words, EPA considers Guidelines No 4 and to a lesser extent No 7 to be a set of narratives and numbers which, if adopted as either EQOs, local guidelines or local standards are likely to protect their corresponding EVs for ambient waters.

Appendix 8

Comparisons in terminology between Guidelines Nos 4 & 7 and the present approach used in Western Australia

The proposed framework is similar to that presented in the draft EPP for Cockburn Sound. However, it is important to understand that the terminology proposed in the framework differs from that used in Guidelines Nos 4 & 7. That should not mean that the outcomes from both processes will be dissimilar. Figure 1 compares the equivalent terminology of both approaches.

Whilst there are significant differences between the equivalent terms below, specific attention is drawn to the term standard. There is a significant departure in meaning between the use of this term in Guideline No 4 compared to that proposed in this framework. Guidelines No 4 recognises that a standard may have social and economic considerations embedded in them and hence is not necessarily a scientifically based standard. In other words, it is a negotiated parameter. However, such a standard, once agreed upon, can be legally enforced. On the other hand, this proposed framework uses standards as scientific statements that should not to be exceeded, and if exceedance occurs, it is likely to lead to detectible ecological changes.

In this framework guidelines and standards are generically know as Environmental Quality Criteria (EQCs) and sometime referred to as benchmarks. These benchmarks can be numbers, narratives or bioindicators of health conditions.

It is also noted that there are varying degrees of confidence and uncertainty with respect to many of guidelines in Guideline No 4. Hence regulators, managers, operators and the community alike need to be aware of this when applying Guideline No. 4.

Guidelines Nos 4 & 7	WA Draft EP[Cockburn Sound]Policy (2001)
Environmental Value ***Particular values or uses of the environment that are important for a healthy ecosystem or for public benefit, welfare, safety or health and that require protection from the effects of pollution, waste discharges and deposits. Several environmental values may be designated for a specific waterbody.***	Environmental Value ***Particular value or use of the marine environment that is important for a healthy ecosystem or 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.***
Management Goal *Long-term objectives that can be used to assess whether the corresponding environmental value is being maintained. They should reflect the desired levels of protection for the aquatic system and any relevant environmental problems*	Environmental Quality Objective *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.*
Water Quality Guidelines *Numerical concentration limits or narrative statements recommended to support and maintain a designated water use.*	Environmental Quality Guideline *Numerical value or narrative statement which if met indicates there is a high probability that the associated environmental quality objectives declared under 7(2) has been achieved.*
Water Quality Objective *A numerical concentration limit or narrative statement that has been established to support and protect the designated uses of water at a specified site. It is based on scientific criteria or water quality guidelines but may be modified by other inputs such as social or political constraints*	Environmental Quality Standard *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.*

Figure 1: Examples of the different uses of terms in Guidelines Nos 4 & 7 with their equivalents in the Draft EPP for Cockburn Sound.

Appendix 9

Important decisions that need to be made before using scientific management tools

This framework recognises that before applying scientific requirements to a management area, it is necessary to address three significant questions. These questions are largely social in nature and are:

- what EVs (beneficial uses) do the community and stakeholders wish to protect for a designated management area?

  It is noted that this answer need not be restricted to the EVs set out in Guideline No 4. In the first instance, it is for the partnership of involved parties to offer their views to EPA regarding the beneficial uses for their environment. This matter will become more important as NRM takes hold in Western Australia. The range of EVs in Guidelines 4 are likely to be too restrictive when trying to articulate the range and nature of matters that affect the community. For instance, one of our most beneficial land uses in Western Australia is for wheat growing. The wheat belt coincides with areas affected by dryland salinity. For the community in the wheat belt to feel that they are part of the decision making process for EVs, they would need EVs relevant to their daily activities, otherwise they may very well consider that NRM is being imposed on them from outside.

- what time scale does the partnership consider necessary for EQOs to be met for agreed EVs?

  For example, for an area with significant ecological attributes, the answer might be 'immediately'. However, for a highly modified area the partnership wish to may adopt a 'continuous improvement' approach over a much longer timeframe. The answer to this question will have a direct bearing on the EQOs chosen as a staged approach maybe appropriate. This matter has been dealt with in Appendix 6.

- how much degradation is acceptable?

  In the case of the partnership agreeing that some degradation in an area is acceptable – the question of 'how much degradation is acceptable?' needs to be answered. To this end, the application of the principle of 'Intergenerational Equity' espoused in the principles of ESD is appropriate.

Once decisions relating to these three questions are made, the framework allows for spatially-defined EVs and subordinate EQOs to be set. Notwithstanding the above, science plays a part in the above decision-making, especially for determining EQC's and and NRM Targets but its role should not be over estimated.

Appendix 10

Relationship between EV and EQOs

There is some confusion regarding the meanings of an EV and EQO.

An EV is an agreed beneficial use for the environment. One EV is 'Ecosystem Health'. The setting of an EV is a philosophical agreement arrived at between involved parties. Implicit in that agreement is the notion that the EV would protected. It is equivalent to a 'mission statement or vision' in an EMS (Appendix 14). Accordingly, it is unnecessary to state in the EQOs that the EV's maintenance is an objective. This clouds the boundaries between an EV and an EQO. In fact, for many of the freshwater and estuarine systems in WA, they would need to be improved considerably rather than be maintained at their present level

An objective (EQO) is a narrative or numerical statement that supports an EV. If all the objectives supporting an EV are met for a particular body of water, there is a very high probability that the EV would be protected. This matter is dealt with in the NWQMS Policies and Principles Document No 2. A broad EQO would usually refer to the level of protection designated for a water body. It is a normally a subjective judgement with some philosophical basis. It maybe in the form of a narrative. More specific objectives may refer to items (bioindicators) that need protection. It may be in the form of a narrative or numerical statement and may or may not be linked to a time frame for achievement (depends on the current state of the ecosystem). Specific EQO are usually the performance benchmarks (EQC or NRM Targets)) need to be achieved. Unlike an EV, an EQO could embrace the notion of 'no net loss', 'trade-offs', 'offsets' etc. EVs on the other had are fixed agreed uses for the environment.

As an example, for the EV referred to as 'Ecosystem Health', it is unnecessary to note that in the objective that the EV is to maintain or improved. That is axiomatic and related to the current state of the system. This is implicit in the level protection ascribed to the water body. For instance, three levels of protection are suggested in Guidelines 4 (High conservation/ecological value, Slightly to moderately disturbed ecosystems and Highly disturbed ecosystems). The more specific EQOs underpin the broad EQO. They are the EQGs that correspond with the desired level of protection.

It should be noted that 'Ecosystem Health' does not fit into neat categories as above, rather it forms a continuum. Accordingly, the selection of EQOs is subjective and an infinite number of sub categories could be chosen on a case by case basis. This has been the case for the draft EEP for Cockburn Sound where three broad objectives have been chosen (high, moderate and low areas of protection), The alternative approach for highly modified systems as espoused in this framework is the use of NRM Targets. In that case interim NRM targets would be equivalent to interim objectives while the long term NRM Target would correspond to the guidelines in Guideline No. 4 for the desired level of protection (Appendix 7).

Appendix 11

Guideline trigger values or NRM targets (diffuse source and severe pollution)

The State of the Environment Report (1998) noted that many of the water bodies in the South west of Western Australia are severely impacted by salinity, eutrophication and sedimentation. The causes and extent of these problems are well understood and there is general agreement regarding the long term solutions. The SOE Report also offers suitable responses to address these matters. Example of the above are given below in the context of the use of guidelines or targets

Collie River/Wellington Dam: Drinking Water

The Wellington dam was built on the Collie River for the purposes of irrigation and water supply for local communities. The SOE Report (1998) noted that the average salinity of the Collie River was 790mg/l (Table 1) compared to 500mg/l required for potable water. The SOE Report also noted that salinity increased significantly since 1965. It is understood that the increase has flattened out recently following revegetation of parts of the catchment.

If one were to set EVs for the Wellington dam water body, the most conservative EV would most likely be for potable water. This would be managed by the day to day water resource manager and the Department of Health as it is a public health matter. To meet salinity standards for public health, one solution could be to mix the Wellington Dam water with better quality water from elsewhere. However, over the years the dam has attracted campers and other recreational users that are thought to be responsible for increased bacterial levels in the water. If one were to disinfect the water for potable purposes one would need to address the matter of discharge of disinfection by-product.

In stead of using Guideline No. 4 trigger values to manage dam water, it would be more useful to take a holistic approach to catchment management. To this end, it would be appropriate to set short, medium and long term time related NRM targets, the long term target being the guidelines for drinking water. Because the long term target would relate to public heath, it would become a standard when the NRM Target is achieved. Such a long term management approach would invariably go a long way to addressing other problems such as turbidity, eutrophication, land clearing, misappropriate recreational landuses, disinfecting potable water and the discharge of waste products to the Collie river.

Swan – Avon River: Salinity

The SOE Report (1998) notes 'In all water bodies that become saline, the biodiversity of life that can live in them decreases'. Fringing vegetation dies, leading to weed invasion and bank erosion, or is replaced with salt-tolerant species. Given the uniqueness of the Australian flora and fauna, loss of biodiversity is an urgent matter. The report notes that the average salinity of the Swan –Avon River was 5835mg/l, approximately 12 times for that for potable water. This is likely to have had a significant effect on the catchments biodiversity.

Given the population distribution throughout the catchment and the diversity of land uses, it would be appropriate to divide the catchment into segments for the purposes of management. This has been done for all of the catchments in New South Wales. For each segment, EVs and EQOs would be set ensuring that EVs in the upper catchment would not compromise those in the lower catchment.

Given that the upper reaches of the Swan-Canning system should be suitable for potable purpose while the waters in the lower reaches should be suitable for estuarine activities, a mix of NRM targets and guideline trigger values would be appropriate depending on the EVs, extent of existing problems, and whether contamination emanates from point or diffuse source. However, wastewater discharges to the system occurs from prescribed premises, the Licensing Branch of DEWCP would use Guideline No. 4 for back calculating licensing conditions for relevant contaminants.

Murray River: Sedimentation

The SOE Report (1998) notes that '.....sedimentation is a serious environmental issue that reduces water quality and biodiversity and increases the likelihood of flooding'. Sediment loads from erosion in catchments is a major source of nutrients causing eutrophication in the South West of Western Australia. Figure 1 shows that the problem of sedimentation is widespread due to erosion resulting from land clearing, pastoral and some mining activities. Accordingly, most matters relating to sedimentation (turbidity, transport of substances adsorbed onto sediment particles eg nutrients and trace elements), would need to be dealt by setting achievable time related interim and long term NRM Targets.

Estuaries: Eutrophication

The SOE Report (1998) notes that '...in the South West of Western Australia only seven estuaries out of 22 have low nutrient levels (Figure 2). Much has been made of the eutrophication of the Peel Harvey System and the Swan-Canning System. However, Fig 2 shows that many of the rivers are moderate to highly eutrophied. For instances, approximately 4/5 of the Blackwood river fall into this category. The report also notes that most important sources of nutrients are fertilisers from broad acre application. Given the linkage of nutrient distribution, land practices and sediment movement and environmental water flows, eutrophication would need to be dealt by setting achievable time related interim and long term NRM Targets.

Rivers	Proportion of Catchment Cleared (% in 1986)	Current Salinity (mg/l TSS)	Trent – Rate of salinity increase since 1965 (mg/l/y)
Frankland River	56	2760	74
Kent River	40	2087	58
Swan-Avon River	75	5835	*
Greenough River	50	4908	*
Blackwood River	85	1760	58
Collie River	24	790	24
Murray River	75	2260	93
* Insufficient data to form trend			

Table 1: Salinity in representative rivers for affected areas of the State (SOE Report 1998) and area affected by salinity

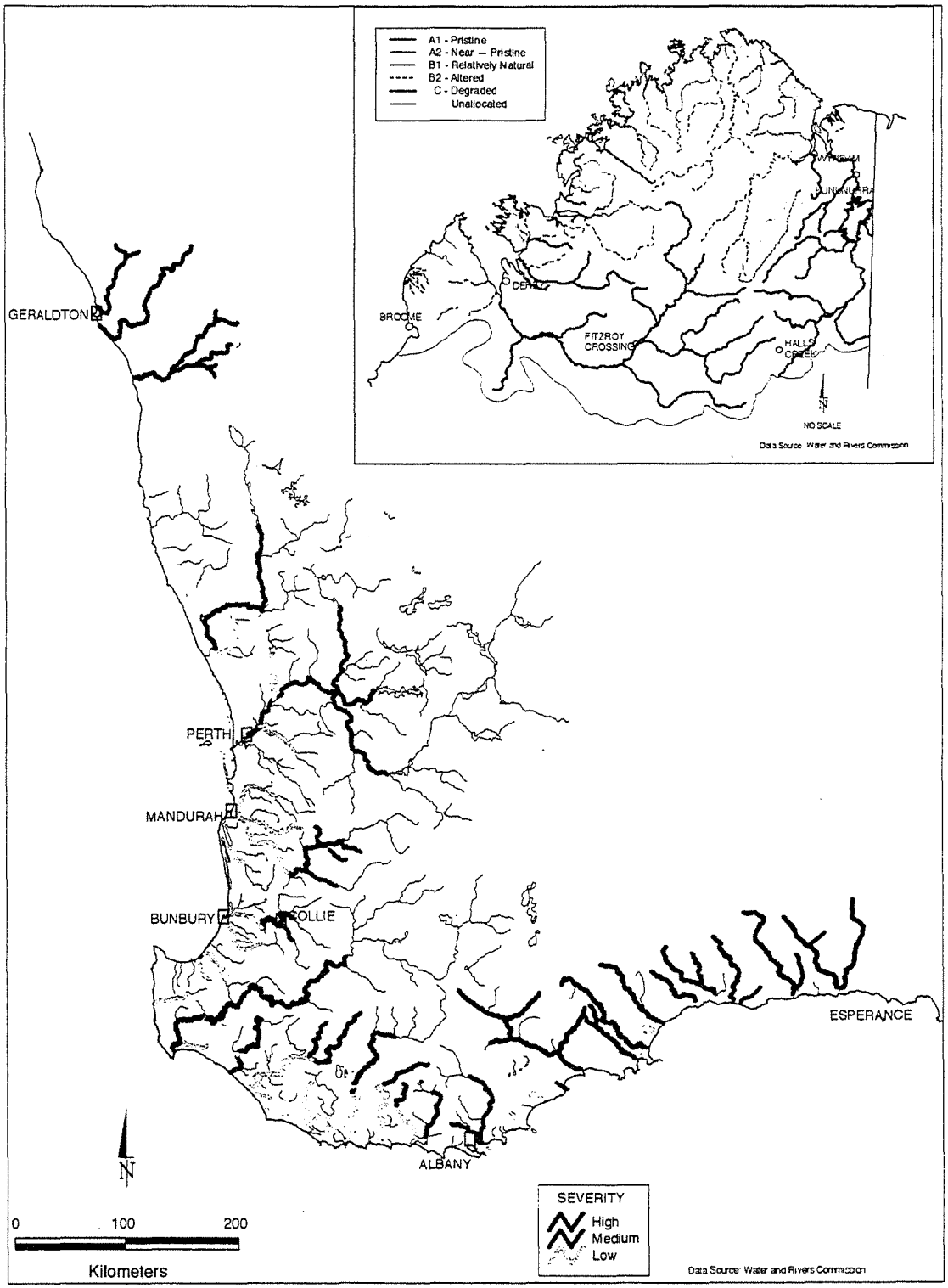

Figure 1: ***Severity of sedimentation in rivers of the State currently known to be the most affected by sedimentation (SOE Report 1998) and area affected by sedimentation***

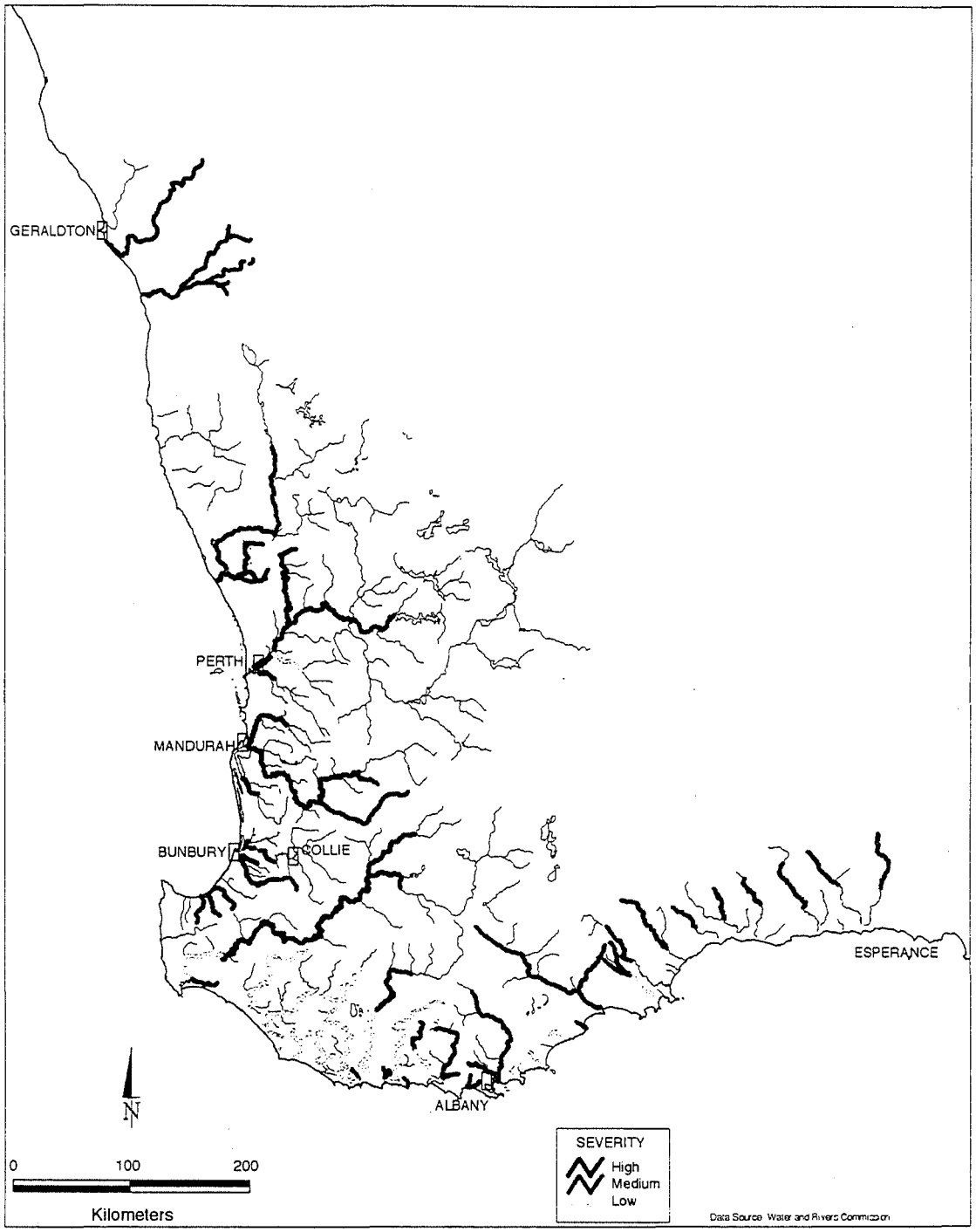

Figure 2: Severity of nutrient loads to various waterbodies in the State (SOE Report 1998)

Appendix 12

Multiple lines of evidence

In area where contributions of contaminants are from a variety of point and non point sources and there is a wide range of receiptor organisms in the ambient waters, it may be difficult to correlate exceedences of an EQC with a particular industrial discharge practice. An example could be the discharge of nutrients from a point source into a eutrophied catchment, estuary or embayment.

From a day to day management point of view, a *'multiple lines of evidence'* and a *'persistence line of evidence'* approach would be used for evaluating *'cause and effect relationships'* for environmental quality. Not until multiple lines of evidence has persisted over a reasonable time period would a trigger response be formally invoked by the management body on an individual operator of a prescribed premises. Notwithstanding that, the management body would however, trigger a more general response to address the matter in the first instance.

The general thrust of this framework is to take a multiple lines of evidence approach through the application of EQG and EQS that use indicators along the cause-effect pathways for each contaminant. For instance, an EQS could be defined in terms of agreed biological responses to the stressor(s) of concern, eg persistent phytoplankton blooms. This approach avoids triggering major management responses following one-off unexplained events. A management response should only be triggered if it can be shown that the relevant EQS has not been met and the source/cause of the impact has been identified. This approach offers surety to operators and regulators alike, in that it reduces the likelihood of a management response being triggered too early, which could place an un-necessary burden on the operator, or triggered too late to prevent serious or irreversible damage from occurring.

Appendix 13

Use of reference sites to derive EQGs

In some circumstances, use of specific numerical guidelines from Guideline No 4 may be inappropriate. However, it may also be difficult to establish local guidelines. This has been the case for the draft EPP for Cockburn Sound. In such circumstances, and as suggested in Guideline No. 4, it may be useful to use data from reference site(s) and link it back to the site under management. Reference sites need to have similar ecological attributes to that of the management area and be in as good condition as possible.

Guideline No. 4 does not infer that the EQO for the management area is to rehabilitate it to a condition similar to that of the reference site. Guideline No. 4 offers percentile benchmark guidance on how the two areas might be linked (eg median of test site to lie between the 20^{th} and 80^{th} percentile of natural distribution for a biological parameter to capture natural variability at the reference site). To apply generic percentiles to link all reference sites and their associated management areas across Australia would be problematic because the environment is a continuum and not a set of discrete modified areas and reference sites. Each area has its own individual attributes. Hence, where the lead agency cannot achieve a consensus between stakeholders regarding the percentile linking a reference site(s) and management areas, the EPA would form its own judgement and advise Government accordingly.

To take into account natural background conditions, EQGs for toxicants can also be established as a percentile of the natural background concentrations (eg 80^{th} percentile for slightly to moderately disturbed ecosystems).

Appendix 14

EPA Service Unit's advice to proponents regarding Environmental Impact Assessment of new proposals

EXAMPLE: New proposal for a Municipal Wastewater Treatment Plant Outfall

Steps in Process

Demonstrate need for proposal

1. Demonstrate need for discharge to open environment (eg. explore options for re-use)
2. Apply waste avoidance/minimisation principles (show why preferred treatment option was selected to achieve discharges corresponding to ALARP – approach)

Characterise effluent

3. Characterise effluent in terms of constituents (ie type, concentration and load) and other physical properties (eg. temperature, salinity and density) ensuring appropriate analytical resolution to enable comparisons with guideline values.
4. Define how the constituents and properties will change over time (eg. proposed and projected loads into foreseeable future).

Characterise receiving environment

5. Characterise environmental attributes of proposed receiving environment (eg. generate benthic habitat maps from surveys/remote sensing) taking into account pipeline route options and diffuser location. Identify the key habitats or most important habitats/ecosystem attributes from both ecosystem integrity and conservation significance perspectives.

6. Establish current background water quality characteristics (from surveys or literature) to assist in calculating concentration fields for the non-biostimulatory (eg. "toxicants") constituents of the wastewater.

7. Identify and quantify human-induced changes to the environmental attributes (eg benthic habitats) and environmental quality (eg. nutrient status, level and spatial extent of contamination by toxicants) that have occurred in the potential area of influence of the proposed pipeline and discharge (eg. within a defined management unit). This requires knowledge, or some estimate to be made, of natural background.

8. Describe the environmental values (EVs) and environmental quality objectives (EQOs) for the area in map form. These may be formally designated in an Environmental Protection Policy (EPP) for the area. Where these have not been defined in an EPP, the assumption is that all EVs and EQOs apply and the level of protection for high level of protection. If the proponent wishes to propose an alternative zoning scheme, the proponent will consult with the community and other key stakeholders. The proponent would then report the scope and findings of that consultation, and the level of support/opposition for the proposed alternative EQO zoning scheme, or otherwise provide justification for the proposed alternative scheme.

Project design

9. Configure and align pipeline route to minimise direct (eg. overtopping) and indirect (eg. sand trapping and subsequent smothering) impacts on key benthic habitats and locate diffuser to minimise exposure of key habitats to effluent (taking into account hydrodynamic regime, effluent characteristics and diffuser configuration).

10. Define the spatial extent of the zone of initial dilution (ie. the mixing zone) and predicted "dilutions" that would be achieved at the boundary of that zone (eg. 100 times dilution). This should be determined by numerical modelling and specified as the median and 95%ile of that dilution contour (ie. the edge of a zone outside of which 100 times or more dilution is achieved at least 50% [median] or 95% [95%ile] of the time respectively) in the first instance.

Describing potential impacts of toxicants

11. The resultant ambient concentration of each toxicant contained in the effluent is calculated at the edge of the mixing zone (zone of low protection), taking into account the concentration in the effluent, the number of dilutions (eg. 100 times), and the concentration in the ambient water (this is the "background" concentration where there are no other sources of contamination in the area, but is the actual concentration where ambient waters are elevated above background).

12. The relevant criteria for each toxicant in the effluent and for the E2, E3 and E4 levels of protection are assembled from the relevant EPP, or where this is not available, from the most relevant source (eg Guidelines No 4 or EQC for Perth's Coastal Waters; [in prep], or following discussion with the regulator).

13. The concentration of each contaminant in the undiluted effluent is compared against the relevant environmental quality guideline for each contaminant in water, for E2, E3 and E4 to see what level of protection can be achieved within the mixing zone. The highest concentration of each contaminant experienced in the E4 (ie. at end of pipe) will be the same or less than the concentration of that contaminant in the undiluted effluent. Therefore, the quality of the effluent will determine the level of protection likely to be achieved within all parts of the mixing zone, given the proposed level of treatment.

14. The calculated ambient concentrations at the edge of the mixing zone (from item 11 above) are compared against the criteria for E2, E3 and E4 to see what level of protection can be achieved at the boundary of the E4 zone (ie immediately outside the boundary). It is at this point that the maximum concentrations will be experienced outside the mixing zone. If the zone of dilution is designated E3 then the E2 criteria must be met immediately outside the E3/E2 boundary. Similarly, if the area of dilution is designated E4 then the E3 criteria must be met immediately outside the E4/E3 boundary.

Describing potential impacts of biostimulants

15. The process outlined above cannot be directly applied to nutrients, as it is not possible to simply back-calculate to a safe concentration. Toxicants are managed by controlling concentrations in water so that the biota are only exposed to "safe" concentrations determined through controlled laboratory tests. The effects of nutrients are related more to the load of nutrient to a water body compared to the concentration in that water body and so it is not possible to manage nutrient effects by relying on achieving certain in-water concentrations through dilution. This is because the bio-available nutrients are scavenged from the water by plants and rapidly incorporated into new plant biomass.

16. The key ecological attributes within the management unit, which are potentially affected by biostimulants in wastewater, are defined (from 5 above). Cause-effect pathways are described for the effects of nutrients on the key ecological attributes. The cause-effect pathways are used to select appropriate early-warning indicators of potential adverse changes. Environmental quality guidelines are defined for these indicators and become the benchmarks for initial environmental assessment. The measures, and numerical values for those measures have been defined for E2 and E3 zones in Cockburn Sound by taking into account local conditions in the South Metropolitan Perth Coastal Waters Study 1995.

17. Best available information is used to predict the magnitude and spatial and temporal extents of any changes in the key nutrient related indicators of environmental quality (EQGs for nutrients) taking into account potential or actual changes due to other human activities (ie. consider cumulative impacts). These predictions are based on an understanding of the hydrodynamic modelling, and resultant transport, bio-chemical transformations and fate of the biostimulants contained in the wastewater. The documented effects of other outfalls in similar environments can be used to help develop the predictions.

18. The magnitude and spatial and temporal extent of any changes described in 17 above are compared against the appropriate guidelines described in 16 above to spatially-define the nutrient-related environmental quality resulting from the proposed wastewater stream.

19. The zones identified in 13 and 14 above, representing the predicted environmental quality resulting from the toxicants in the proposed discharge, are combined with those defined in 17 above for nutrients to show the overall spatial extent of the resultant level of protection for the wastewater stream. In all cases the largest size of either the toxicant or nutrient effect zones will define the final extent of the zone (ie. if the E3 zone for nutrients is a circle with a 50 m radius and the E3 zone for toxicants is a circle with a 20 m radius, the composite map will show the E3 zone to have a 50 m radius. This ensures the objective is fully met immediately outside the 50 m radius zone.)

Options if concentration of a particular contaminant exceeds EQG for the preferred zoning scheme

20. If the toxicant exceeds the EQG then the concentration is assessed against the appropriate EQS for that contaminant. If the concentration exceeds the EQS then the EQO is not met. However, if the concentration lies above the EQG but below the EQS, the proponent may consider applying better techniques to characterise the bioavailability of the contaminant in the effluent or the effect of modifying factors. This is especially important in freshwaters where characteristics such as water hardness, pH and DOC can vary greatly and influence the bioavailability and hence ecological significance of a particular contaminant concentration in that environmental setting. The bio-available concentration is compared against the EQG. If the bio-available concentration does not exceed the EQG then the criteria is not exceeded. The proponent may wish to conduct direct toxicity testing to refine a site-specific standard.

Iterative design

21. The proponent is encouraged to run through the approach outlined above as early as possible in the design phase of the project. This allows various treatment options and/or outfall configurations to be considered in combination with the likely impacts early in the planning process.

Final presentation of proposal

22. The final EQO map is presented and should apply the considerations, principles and approaches outlined above. Maps should be presented to show the proposal in the local and the regional environmental quality settings. As far as is practical, the proponent should endeavour to present the proposal in context of the objectives for environmental quality in the region and in terms of the actual environmental quality of the region (eg, from SOE-type reports).

23. In presenting the maps to provide an overall impression of the current environmental quality of the region and the changes to that quality if the proposal was to proceed as defined, the proponent should provide the supporting information outlined above (ie justification and explanation).

Appendix 15

DEWCP's advice to stakeholders and the community regarding how DEWCP intends to calculate licence discharge requirements

Project design

8. Configure and align discharge pipes to minimise direct (eg. erosion) and indirect (eg. sand trapping and subsequent smothering) impacts on discharge zone.

9. If a mixing zone is allowed, determine the number of dilutions to the edge of the mixing zone (from calculations or monitoring). Use this information, and background concentration levels, to back-calculate the upper bound of a possible discharge that would meet the EQC at the edge of the mixing zone.

10. Assess the level of uncertainty in the above (ie calculated EQC or dilution rate) and apply a safety factor if appropriate (eg divide the concentration by the safety factor).

Determine achievable effluent concentrations

11. Determine industry best practice. This becomes the lower bound of a possible discharge

Describe potential impacts of contaminants

12. Compare the concentration of each contaminant predicted at the edge of the mixing zone with the relevant EQC. If no mixing zone is proposed, compare the concentration of each contaminant in the effluent with the relevant EQC.

Set appropriate licence limit

13. The upper and lower bounds of a possible licence limit have been set. The final licence limit will be set in this range after consideration of

    - current average effluent contaminant concentrations and peak concentrations; and

    - the principles of waste avoidance, minimisation and continual improvement.

<u>Options if concentration of a particular contaminant exceeds licence limit</u>

14. If the contaminant is predicted to exceed the licence limit then the applicant should reassess the proposal to determine if it can be relocated or redesigned to meet the proposed licence limit. If no further improvements are feasible, the proposal is unlikely to be acceptable.

EXAMPLE: Pesticide Manufacturer discharging washdown water containing low levels of pesticides to a drain.

Demonstrate need for proposal

1. Demonstrate need for discharge to open environment (eg. explore options for re-use in manufacturing process).

2. Apply waste avoidance/minimisation principles (show why preferred treatment option was selected to achieve discharges corresponding to "as low as is reasonably practicable" (ALARP) approach).

Characterise effluent

3. Characterise effluent in terms of constituents (ie pesticides and associated non-active constituents, concentration and load) ensuring appropriate analytical resolution to enable comparisons with guideline values.

4. Define how the constituents will change over time (eg. proposed and projected concentrations and loads into foreseeable future).

Characterise receiving environment

5. Characterise environmental attributes of proposed receiving environment taking into account the key habitats or most important habitats/ecosystem attributes from both ecosystem integrity and conservation significance perspectives (eg does the drain lead into a RAMSAR wetland, can people access the drain, are there any flora or fauna of significance in the area)?

6. Establish current background water quality characteristics (from surveys or literature) to assist in determining the EV and calculating the potential impact of the contaminants in the wastewater.

7. Determine the environmental values (EV) and associated environmental quality criteria (EQC) for the area in accordance with the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC 2000). If the applicant wishes to propose an alternative EV or EQC, the applicant should consult with the community and other key stakeholders. The proponent should then report the scope and findings of that consultation, and the level of support/opposition for the proposed alternative EV or EQC, or otherwise provide justification for the proposed alternative.

In some instances, the applicant may be willing and able to conduct a site-specific risk assessment to develop site-specific Environmental Quality Criteria. The proposal would then be re-evaluated against the amended EQC. Risk assessments can be time consuming and expensive exercises and the applicant should discuss such a step with the DEWCP prior to commencement to avoid unnecessary expenditure of resources.

Contaminant	**Ambient EQC to be achieved (mg/L)**	**Background contaminant concentration (mg/L)**	**Calculated upper bound of licence limit (mg/L)**	**Industry best practice – lower bound (mg/L)**	**Current average (and peak) contaminant concentration in effluent[2] (mg/L)**	**Licence limit (mg/L)**
Pesticide A	0.003	0.0001	0.29[3]	0.01	0.01 (0.2)	0.2[4]
Pesticide B	0.01	ND[5]	1.0[2]	0.03	0.01 (0.03)	0.1[6]

Note, these examples are for information only. Actual licence limits will be determined on a case by case basis.

[2] From direct measurement or estimated from mass balance calculations when concentrations of contaminants are low relative to analytical detection limits.
[3] Assumes 1:100 dilution rate.
[4] Peak concentration close to upper limit, peak concentration set as licence limit to provide acceptable safety factor
[5] ND = Not Detectable
[6] Peak concentration well below upper bound, licence limit above peak concentration acceptable.

Appendix 16

Components of an EMS

The following is referenced set of items that an organisation should consider as part of its EMS if f it were to adopt an international system such as Iso 14000. Regardless of the business or activity, the components are very similar.

Principles and Elements for Successful Environmental Management.

There are five environmental management system principles within ISO 14004:

- **Commitment and Policy:** An organisation should focus on what needs to be done - it should ensure commitments to the environmental management systems and define its policy.

- **Planning:** An organisation should formulate a plan to fulfil its environmental policy.

- **Implementation:** For effective implementation, an organisation should develop the capabilities and support mechanisms necessary to achieve its environmental policy, objectives and targets.

- **Measurement and Evaluation:** An organisation should measure, monitor, and evaluate its environmental performance.

- **Review and Improvement:** An organisation should review and continually improve its environmental management system, with the objective of improving its overall environmental performance.

Sayre, D. (1996). Inside ISO 14000: The Competitive Advantage of Environmental Management. St Lucie Press, Florida, US. pp 232. State Reference Library: 658.408 SAY

The three categories of activities of an organisation according to ISO 14000

- Activities to prevent pollution and conserve resources. These activities apply to new capital projects, process changes, property management, new products, and packaging;

- Daily management activities. Management assures conformance to internal and external requirements. Management also attempts to increase efficiency and to continuously improve performance; and

- Strategic management activities. It is management's responsibility to anticipate and respond to changes in environmental requirements.

Sayre, D. (1996). Inside ISO 14000: The Competitive Advantage of Environmental Management. St Lucie Press, Florida, US. pp 232. State Reference Library: 658.408 SAY

What does a Organisation's Environmental Policy means and what should it contain

An environmental policy is a statement by an organisation of its intentions and principles for environmental performance. It is the framework for action and sets environmental objectives and targets. Policy establishes a sense of direction within set parameters and aims for the 'overarching' goal of environmental performance.

ISO 14000 suggest the following elements should be in a policy:

- The organisation's vision, core values, beliefs and mission;
- Requirements of interested parties;
- Communication with interested parties;
- Continual improvement opportunities;
- Interactive alignment with other organisational policies and elements; and
- Recognition of local and regional conditions.

Sayre, D. (1996). Inside ISO 14000: The Competitive Advantage of Environmental Management. St Lucie Press, Florida, US. pp 232. State Reference Library: 658.408 SAY

Components for an EMS for Natural Resource Management

Having established the EVs, EQOs and EQCs or NRM Targets for a significant water resource, the lead agency would establish an EMS to ensure that the water body is managed properly. The EMSs would include the following elements:

- EVs to be protected (Mission Statement)
- EQOs to be protected (The Broader Management Objectives)
- EQCs or NRM Targets to be employed (The Specific Management Objectives: Performance Benchmarks)
- The Implementation Plan (Implementation Strategy);
- Measurement of agreed key environmental quality indicators (Monitoring)
- Evaluation of performance against environmental quality benchmarks (auditing); and
- Review and improvement (adaptive management, continuous improvement).