Scott Coastal Plain – a Strategy for a Sustainable Future (for public comment)

Scott Coastal Plain Steering Committee

Report by the Environmental Protection Authority under Section 16(j) of the Environmental Protection Act 1986

Environmental Protection Authority
Perth, Western Australia
Bulletin 991
September 2000

ISBN. 0 7309 6614 4
ISSN. 1030 - 0120

Contents

1. Introduction

1.1 Purpose of EPA advice

The purpose of this report by the Environmental Protection Authority (EPA) is to provide advice on matters relating to the document entitled *'Scott Coastal Plain: A Strategy for a Sustainable Future (for public comment)'* (hereafter referred to as 'the Strategy') which was released as a draft for public comment by the Scott Coastal Plain Steering Committee (SCPSC) in November 1999 (SCPSC, 1999). The final Scott Plain Strategy is expected to be finalised and made public later this year.

The Scott Coastal Plain Steering Committee, which is administered by Agriculture Western Australia, contains representatives of a number of government agencies including a representative of the Department of Environmental Protection (DEP) and it is understood that the DEP has had input to the Strategy from an early stage.

The EPA's advice is provided on the Strategy, independently of the DEP, to assist government agencies in the finalisation of the Strategy and to ensure that environmental issues are adequately recognised, addressed and integrated into future planning and development of the area.

1.2 Advice issued under Section 16(j)

The EPA's advice is provided under Section 16(j) of the Environmental Protection Act 1986 (the EP Act). Section 16(j) of the EP Act states that one of the functions of the EPA is 'to publish reports on environmental matters generally'. Because the EPA reports publicly, its advice can be seen and considered by the public, industry, State and local government and other stakeholders.

This report does not constitute a formal assessment under Part IV of the Environmental Protection Act 1986 and does not lead to the setting of legally binding environmental conditions.

In compiling this report, the EPA has considered the information provided in the Strategy, specialist advice from the Department of Environmental Protection and other government agencies and other relevant information such as the EPA's Position Statements and Guidance Statements. In its consideration of the Strategy, the EPA acknowledges that the Strategy is to be implemented partly through the local authorities' Town Planning Schemes and by statutory mechanisms of State Government agencies such as the Water and Rivers Commission (WRC) and the Commissioner for Soil and Land Conservation. It is the intention of the EPA in providing this advice that the advice will provide guidance to those agencies. Formulation and implementation of the final strategy document taking into account the EPA's advice should reduce the requirement for formal environmental assessments of individual development proposals by the EPA. Additionally, the EPA will take into account (but not be limited by) advice set out in this report when determining the level of environmental assessment for proposals within the area covered by the strategy which are referred to it under Sections 38 and 48A of the EP Act 1986.

1.3 Key principles guiding the EPA's advice

In considering the Strategy, the EPA was guided by the key principles listed below:

Ecologically Sustainable Development

The EPA supports the concept of ecologically sustainable development as set out in the National Strategy for Ecologically Sustainable Development (Commonwealth of Australia, 1992); that is "development that improves the quality of life, both now and in the future, in a way that maintains ecological processes on which life depends." A Core objective of the National

Strategy for Ecologically Sustainable Development is to provide for equity within and between generations.

Conservation of Biological Diversity

The Commonwealth and all state governments have signed the National Strategy for the Conservation of Australia's Biodiversity (Commonwealth of Australia, 1996) which has established the goal of conserving biological diversity and maintaining ecological processes and systems. Maintaining biodiversity is not only about protecting flora and fauna species in nature conservation reserves, it is also about wise use of biological resources outside reserves and safeguarding the life support systems of earth.

Interdependence

Ecological processes are interconnected with physical and biological systems, food webs and natural cycles. Being interconnected and interrelated requires an understanding and appreciation that impacting on or managing one part of the environment (such as vegetation in a catchment) may impact on one or a number of other parts (such as fauna in wetlands or estuaries). Research has demonstrated that these interrelated and interdependent systems can be finely balanced.

Precautionary principle

The precautionary principle provides that environmental impacts and decision-making will be considered in a cautious way, where there is a significant risk of an irreversible environmental impact or where a high value element of the environment might be affected. This principle is a guiding principle of the National Strategy for Ecologically Sustainable Development. Use of the precautionary principle in the context of catchment management implies recognition that although we may not perceive a potentially major problem within the receiving environment at present, the significance of that receiving environment may need to be taken into account when considering the level of risk which should be accepted in making land use or land management decisions.

Prevention of pollution

A primary responsibility of the EPA is to make recommendations to prevent pollution of the environment so that alterations to the environment do not cause unacceptable detriment or degradation of the environment and its beneficial use. 'Beneficial use' of the environment is defined in the EP Act as meaning:

> *"use of the environment, or of any portion thereof, which is —*
>
> *(a) conducive 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)* (of the EP Act*) to be a beneficial use to be protected under an approved policy."*

1.4 Relevant State and Commonwealth agreements and legislation

Legislation and policy documents considered by the EPA to be of particular relevance to the Scott Coastal Plain Strategy and the advice provided in this report include the following:

1. National and State Water Quality Management Strategies (WQMS's);
2. National Principles for the Provision of Water for Ecosystems (ANZECC/ ARMCANZ, 1996);
3. National Framework for the Management and Monitoring of Australia's Native Vegetation (ANZECC, 1999);

4. Natural Heritage Trust (NHT) State–Commonwealth Partnership Agreement and related work plans;
5. Commonwealth Environmental Protection and Biodiversity Conservation Act (2000);
6. Wetlands Conservation Policy for Western Australia (Government of Western Australia, 1997);
7. Western Australia's State of the Environment Report (Government of Western Australia, 1998); and
8. Western Australia's Salinity Strategy (Government of Western Australia 2000a).

1.5 Relevant EPA policies and guidelines

The following policies of the EPA are considered to be of particular relevance to the Scott Coastal Plain Strategy and the advice provided in this report:

1. EPA Position Statement Number 2 (Preliminary): Environmental Protection of Native Vegetation in Western Australia
2. EPA Position Statement Number 3 (Preliminary): General Requirements for Terrestrial Biological Surveys for Environmental Impact Assessment (EIA) in Western Australia
3. EPA Draft Guidance Statement Number 48: Groundwater Environmental Management Areas.

2. Background

The Scott Coastal Plain Strategy study area is located east of Augusta and is the water catchment for the Scott River which, together with the Blackwood River, feeds into the Hardy Inlet (figure 1). The 107 000 hectare plain is in a high rainfall area (> 1000 mm/year) and contains approximately 49 600 ha of private freehold land. Approximately 18 060 hectares of private freehold land within the study area retains its native vegetation (SCPSC, 1999).

Large quantities of good quality groundwater are contained in underground aquifers below the plain. With the recent decline in returns from traditional agricultural activities (eg grazing, dairy farming) conducted on the plain, interest has turned to more intensive forms of agriculture, in particular, to large scale irrigated agriculture. Agriculture Western Australia (AgWA) is encouraging this development on behalf of the Government in order to stimulate and diversify regional economic activity and development. Coincident with the changeover from grazing to intensive horticultural land use is an expansion in the development of tree plantations in the area (mainly for *Eucalyptus globulus* for woodchips).

In 1996, the EPA formally assessed a proposal to develop 200 ha of land on the Scott Coastal Plain for irrigated horticulture (EPA, 1996). In its assessment report on that proposal, the EPA raised concerns regarding the potential impacts of intensification of agriculture in the Scott Coastal Plain area on the region's environmental values, in particular the Scott River, Hardy Inlet and remnant vegetation. The view of EPA at that time (and at present) was that while the government has recognised the significant potential of the Scott Coastal Plain for intensification of land use in Planning Documents such as the Warren-Blackwood Regional Strategy (WAPC 1997), there was (and is) a clear need for strategic evaluation of environmental values and potential land use constraints on the Scott Coastal Plain.

To address these concerns the EPA recommended that:

"the Minister for the Environment request that the Minister for Primary Industry give consideration to the preparation of a catchment management plan or land use strategy through the Scott Coastal Plain (SCP) Steering Committee;

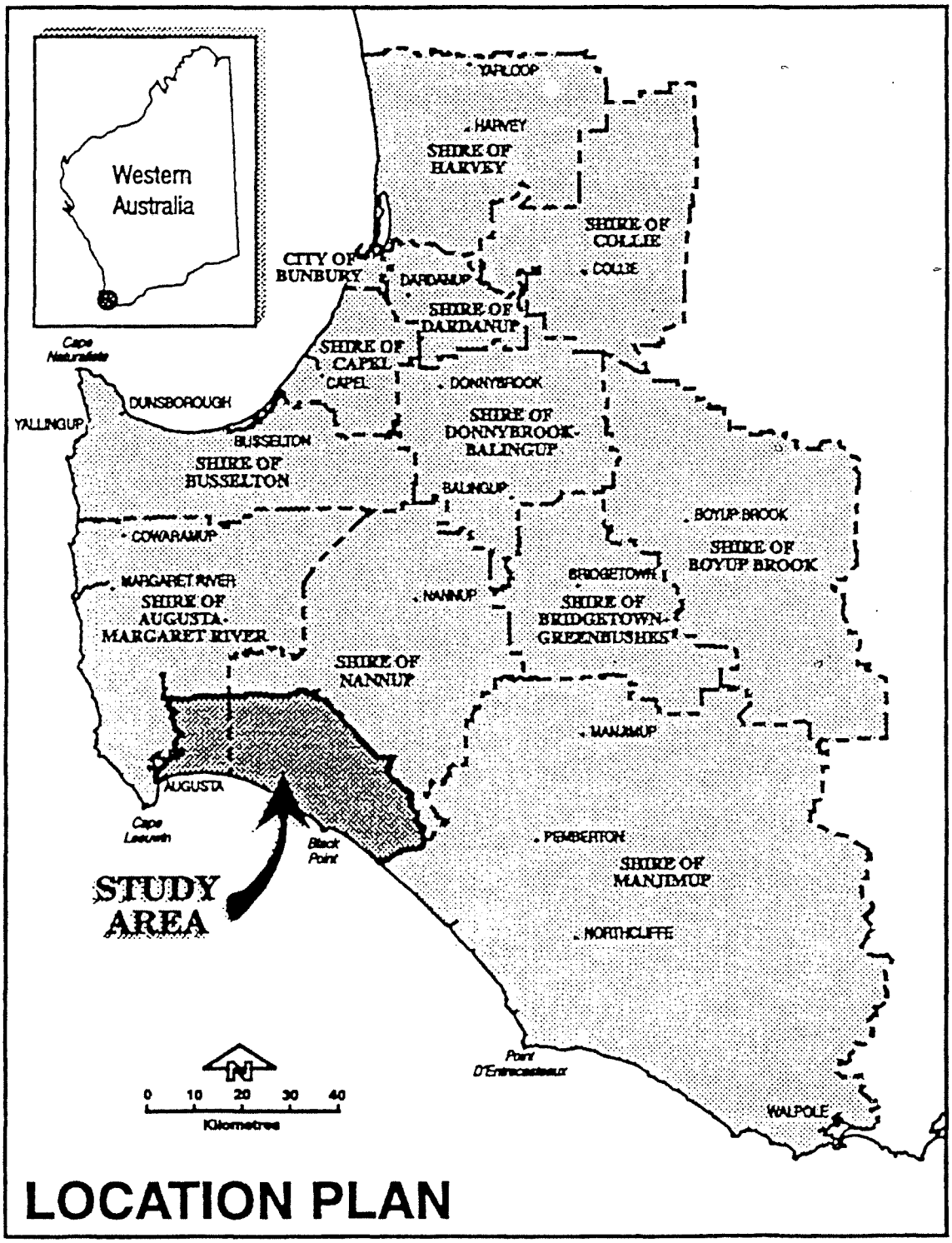

Figure 1: Locality of the Scott Coastal Plain Strategy study area (Source: SCPSC, 1999)

1) *the Minister for the Environment request the Water and Rivers Commission to prepare and implement a coordinated catchment monitoring program for nutrients and pesticides on the Scott Coastal Plain; and*

2) *the Minister for the Environment acknowledges and supports the preparation, by industry, with advice from government agencies, of environmental Best Management Practices (BMPs) for horticulture on the Scott Coastal Plain and the implementation of these BMPs on the Scott Coastal Plain."*

At least partly in response to the EPA's recommendation 1, Agriculture WA and the Scott Coastal Plain Steering Committee have engaged in an extensive process of technical information gathering and public and government agency stakeholder consultation between 1997 and 1999. This culminated in the recent release of the document *'Scott Coastal Plain - A Strategy for a Sustainable Future'* for public comment in November 1999.

The Strategy is organised into sections that deal with key issues relating to:

- the process used to develop the strategy;
- relevant government policy and legislation;
- key management issues, such as the current state of the water resources, the values of native vegetation present and the potential for agricultural development;
- a proposed framework for sustainable development;
- strategies for management of native vegetation, water and land;
- an implementation mechanism; and
- a mechanism for measuring the outcomes of the strategy.

The period available for public submissions on the Scott Coastal Plain Strategy closed on 10 March 2000.

3. Discussion of environmental matters

3.1 Overview

Following from the EPA's 1996 recommendation for the preparation of a catchment management plan or land use strategy for the Scott Coastal Plain, the EPA supports the preparation and use of the Strategy as a strategic planning framework for consideration of environmental, development and social issues. The EPA acknowledges and commends the high level of community consultation conducted and the extensive stakeholder input provided during the development of the Strategy

The EPA has identified a number of matters in relation to the content and application of the Strategy which it considers should be addressed, either during the finalisation of the Strategy or subsequently by local government authorities and / or government agencies though regional planning and decision-making. This advice is intended to augment the stakeholder input provided in order to achieve a 'whole of government' direction for sustainable development of land use on the Scott Coastal Plain. The issues raised and advice provided in this report is therefore intended to provide a positive contribution to the formulation of the final Strategy.

3.2 Ecologically sustainable development

The EPA notes that the Strategy recognises the need to ensure that future development is carried out in a 'long term sustainable manner'. The Strategy's Vision and several of the objectives refer to the need for sustainability, including 'sustainable land use' and 'sustainable agricultural development'. Sustainability can refer to a number of different societal considerations. For example it can refer to sustainability of resources, sustainability in physical, environmental or social terms, or economic sustainability.

The EPA recognises the overall thrust of the Strategy (particularly the set of defined management objectives) is broadly consistent with the principles of Ecologically Sustainable Development . However, since the term 'sustainability' can be used to derive management objectives quite different to, or even potentially conflicting with, the National Strategy for Ecologically Sustainable Development (NSESD), the EPA believes there is a need to clarify within the strategy document, the meaning of the term 'sustainable' if that meaning is different to 'ecologically sustainable' as set out in the NSESD.

Additionally, the EPA notes that the current objectives of the Strategy are not explicitly framed with reference to the principles of ESD but do include 'preservation of ecological integrity'. The EPA advises that ideally, the final Strategy objectives would be framed with reference to the principles of ESD.

3.3 State of catchment water resources and water management strategy

Discussion

Section 4 of the Strategy and previous work by the Department of Conservation and Environment (Hodgkin *et al.* 1978) have identified the Hardy Inlet as an estuary of considerable significance for protection of biodiversity, flora and fauna habitat, fisheries and recreational and tourism use.

The Strategy also identifies a number of significant wetlands in the study area and lists potential threats to these wetlands including increased surface and groundwater nutrient loads, alteration of wetland water regimes by clearing and or drainage and clearing of wetland buffer zones. The Lake Jasper, Quitjup Lake and the Gingilup Swamp wetland systems are considered to be of particular (national) significance and are listed in the Australian Directory of Nationally Important Wetlands (ANCA 1996).

The Strategy has identified that water monitoring by catchment landholders and the Water and Rivers Commission (WRC) has established that high levels of nutrients, which on occasion exceed maximum ANZECC guidelines (ANZECC, 1992), are currently entering the Hardy Inlet via the Scott River. Nutrient levels in the Scott River and Hardy Inlet, in particular nitrogen and ammonia, are at levels, which are considered to be 'of concern. The high levels of nitrogen in the Scott River have previously been identified as being of concern in the published working papers of the State of the Environment Reference Group Report (Government of Western Australia, 1997), which was prepared as part of the development process for Western Australia's 1998 State of the Environment Report.

The Strategy has identified the high levels of colour, possibly originating from areas of native vegetation in the Scott River catchment, as an explanation for the lack of algal blooms and other symptoms of declining water quality in the Scott River. The EPA notes and agrees with the observation in the Strategy that native vegetation associated with wetlands may be important in contributing (along with a reduction in nutrient inputs) to the maintenance or improvement of water quality in the Scott River.

However, the Strategy indicates that although there is cause for concern with respect to the nutrient levels in the Scott-Blackwood system, there is presently no publicly perceived 'major problem' with water quality, and the system is perceived by stakeholders as being 'in reasonable health'. In the absence of sufficient information on a number of key biophysical and ecological characteristics of the system which would allow determination of ecologically based

water quality targets, the Scott Coastal Plain Steering Committee, has set initial targets for the water quality of the Scott River and Hardy inlet. These targets aim to maintain nutrient and other inputs at current levels (except where these are above the national standards (ANZECC guidelines), in which case these standards prevail).

Section 7 of the Strategy proposes a number of recommendations, strategies and 'guidelines' for action to meet the objective developed by the Scott Coastal Plain Steering Committee, of ensuring that all land users in the area contribute to ensuring that the nutrient inputs to the Blackwood and Scott Rivers are not increased, and also to minimise adverse impacts on significant wetlands.

Section 11 of the Strategy indicates that catchment and farm scale criteria and indicators of environmental performance have been developed and will be incorporated in a proposed 'report card' sustainability reporting system to be coordinated by AgWA. The report card is to be based on information provided by involved agencies and landholders every three years. Additionally, it is proposed that the WRC will report annually on the results of the water quality monitoring programme in the Hardy Inlet and the Scott River.

EPA advice

The EPA commends the Scott Coastal Plain Steering Committee for its initiative in identifying the key values and characterising the current state of water resources and water bodies on the Scott Coastal Plain. Identification of the environmental values of wetlands and associated values (such as endangered species and communities) to be protected and the state of those values are key steps in developing actions to protect environmental values and are consistent with actions which the Government has agreed to take in order to meet the objectives of the Wetlands Conservation Policy for Western Australia (Government of Western Australia, 1997a). These steps have also been employed in formulation of management actions through State of the Environment reporting process.

Water quality and nutrient status of the Hardy Inlet

The EPA notes the Steering Committee's observation that there is presently no publicly perceived 'major problem' with water quality in the Hardy Inlet and that the Hardy Inlet system is judged to be in 'reasonable health.' The EPA also notes however, that water quality measurements in the Scott River and Hardy Inlet appear to indicate that water quality levels in the system, particularly nutrient levels may be of concern.

Experience in Western Australia and in other parts of the world indicates that the public perception of the condition of water bodies is not necessarily a good basis for setting objectives for management of the catchments of those water bodies.

For example, the Swan River and Peel-Harvey estuarine systems were generally accepted by the community as being in reasonable condition for many years before water quality problems were perceived to be significant enough to warrant action to fully examine and attempt to address the problems caused by catchment land uses and practices. This lead to a significant lag time between when water quality was identified by scientists as being a significant issue and when action to address the issue was initiated, with major water quality problems occurring in the intervening period.

The EPA recognises that in many respects, the Hardy Inlet system may be seen as different to many other estuaries in the South West of Western Australia in that the Inlet system is considered to be a comparatively 'well flushed' system. The large annual discharge volume of the Blackwood and (to a lesser extent) Scott Rivers coupled with the size and physical and dynamic characteristics of the Inlet mean that several times the full volume of the estuary is flushed from the Inlet each year (Hodgkin *et al.*1978). It therefore appears likely that much of the sediment and nutrient load delivered to the estuary in winter is simply flushed from the Inlet and out to sea.

However, some organic material may be retained in the Inlet annually and be available for release of nutrients during the warmer months (Hodgkin *et al.* 1978, Gerritse, 1996). Furthermore previous investigations (eg Hodgkin *et al.*1978) have indicated that the upper

reaches of the Inlet are poorly flushed over the summer months, leading to pronounced intrusion of a wedge of marine water into the upper reaches of the estuary and occasional blooms of toxic cyanobacteria (also known as blue-green algae) over the summer-autumn period.

Gerritse (1996) and Deeley (unpublished) have postulated that release of nutrients from organic silt and other material from the extensive bottom sediments of the Hardy Inlet during summer conditions may be facilitated by pronounced stratification (vertical separation of fresh and marine water layers). The continued accumulation of nutrients in the sediments of Hardy Inlet in combination with sufficient levels of nutrient in the water in the Inlet in summer to trigger algal blooms may therefore lead to greater potential for more serious algal blooms in the future. In particular, nutrient release from enriched sediments combined with nutrient-rich water entering the estuary from low lying sandy coastal areas could fuel potentially harmful phytoplankton blooms in the upper estuary in the warmer months (Deeley, unpublished).

Gerritse (1996) has expressed the view that in fact most algal problems in estuaries of the South West of WA are caused by release of nutrients from the sediments during the spring to autumn period. The penetration of marine water into the upper reaches of the Hardy Inlet in summer and autumn leads to anoxic conditions in the sediments and release of nutrients through the processes of sulphate reduction followed by oxidation of organic sediment material. These processes and the resulting nutrients have already demonstrated a capacity to feed and sustain algal blooms in the Inlet in summer and autumn in a number of years (Gerritse 1996).

Based on the above considerations, the EPA believes that there may be significant potential, if nutrients accumulate in the sediments of the Hardy Inlet over time, for the system to eventually deteriorate to the degree that it is unable to assimilate further inputs of nutrients from the catchment without a significant deterioration of water quality. If this threshold is reached, a significant decline in the biodiversity, ecological function and public amenity of the whole or part of the estuary may result.

This situation has occurred in a number of instances in South West Western Australia (eg the Peel-Harvey system and Wilson Inlet) and the EPA is of the view that this situation should be avoided through pre-emptive management if possible.

Monitoring and Ecological Investigation

The EPA considers that the timely completion of the proposed programme of ecological investigation of the Hardy Inlet estuary system which referred to on page 26 of the Strategy will be critical to providing guidance to the Scott Coastal Plain Steering Committee and stakeholders, in terms of evaluating and validating the appropriateness of the interim water quality targets currently proposed. Accordingly, the EPA recommends that an action plan be prepared for the proposed investigative studies, which clearly identifies the timing of these studies and resources available and that this plan be incorporated in the final Strategy.

The EPA also considers that the monitoring programme for water quality in the system, in rivers, streams and groundwater, will need further consideration so that it is designed to be sensitive enough and adequately targeted to detect incremental changes in water quality and the effect that these changes may have on the ecosystem related, recreational and other values of water bodies and wetlands. In particular the Scott Coastal Plain Steering Committee may wish to give consideration to increasing the frequency of water quality observations, and to measuring other parameters such as levels of bacteria, based on a threats analysis of the various proposed development activities.

The EPA recommends that the water quality, hydrology and condition of significant wetlands potentially affected by changes in land use on the Scott Coastal Plain should be monitored to measure any changes as they occur. In particular the Gingilup Swamp and Scott River wetland systems have been identified by the WRC as being of high (national) significance but also as being potentially impacted by adjacent agricultural land use (WRC, 1997).

The EPA recommends that additional hydrological and ecological investigations be undertaken to evaluate the ecological water requirements of the significant wetlands and associated endangered species and communities of the Scott Coastal Plain, in order to ensure that

allocation of groundwater for development on the Scott Coastal Plain is carried out in accordance with the National; Principles for Provision of Water for Ecosystems (ANZECC / ARMCANZ, 1996) and with commitments made in the Wetlands Policy for Western Australia (Government of Western Australia, 1997b).

The EPA has provided further advice with respect to the environmental values of wetlands within the strategy area and proposed land use zonings within the catchments of these wetlands in Section 3.5.

Water Quality Targets for the Scott River and Hardy Inlet

The EPA considers that notwithstanding its concerns referred to in the previous section, the target of maintaining water quality in the Scott River and Hardy Inlet at current levels or ANZECC Guidelines (whichever is most stringent), which has been set by the Scott Coastal Plain Steering Committee, is an ambitious one, given the possible expansion in irrigated horticultural activities foreshadowed by the Strategy and the soil and hydrological characteristics of the Scott Coastal Plain. By adopting these target levels, the Steering Committee appears to be making the judgement that any increases in the amounts of nutrients exported which are brought about by new horticultural developments or other land use changes, can be fully offset by best practice management of new and existing agricultural enterprises and catchment restoration activities such as revegetation and improved drainage management.

The EPA considers that the proposed water quality targets may be difficult to achieve in the short to medium term if there is a significant expansion in the extent or intensity of irrigated land use activities (particularly horticulture or dairying) on the Scott Coastal Plain. The EPA therefore recommends that the relevant authorities take into account the ability of current land users to demonstrate reductions in the levels of nutrient and pesticides exported from properties, when assessing new enterprises on sites with similar soil and hydrological characteristics.

The EPA also notes that the mechanisms to be used to respond to non attainment of water quality targets have not been formally identified in the Strategy and recommends that these mechanisms be identified in the final Strategy document.

Additionally there will be a need to clearly identify measures, which will be taken to manage nutrient export from new development proposals and provide for an effective mechanism of ensuring these measures are implemented, and their effect monitored over the life of each project. Project Environmental Management Plans, required for new developments as conditions on water allocation licences or other necessary approvals may be an effective mechanism for this purpose. The EPA will therefore need to take these matters into account when considering new development proposals on the Scott Coastal Plain through the involvement of the DEP in the inter agency process for assessing new developments which is set out in the Strategy.

National and State Water Quality Management Strategies

The National Water Quality Management Strategy (NWQMS) is a joint strategy developed by two Australian Ministerial Councils; the Agriculture and Resource Management Council of Australia and New Zealand (ARMCANZ) and the Australian and New Zealand Environment and Conservation Council (ANZECC). The NWQMS provides the information and tools to help communities to manage their water resources to meet their current and future needs. It provides policies, a process and a series of national guidelines for water quality management (ANZECC / ARMCANZ, 1998).

The Principles on which the NWQMS is based include:

- Ecologically Sustainable Development;
- An integrated approach to water quality management;
- Community involvement in setting the water quality objectives and developing management plans; and
- Government endorsement of water quality objectives.

The National Water Management Strategy identifies a series of steps for the development of catchment (and coastal waters) management plans. These steps are identified in Appendix A of the Implementation Guidelines for the NWQMS (ANZECC/ ARMCANZ, 1998) which is provided as Appendix 2 of this report.

The Western Australian State Water Quality Management Strategy (SWQMS) was published as a public consultation document by the Western Australian Government in February 2000 (Government of Western Australia, 2000b). The SWQMS proposes supporting strategies for implementation of the NWQMS, based on the national framework and has the objective of ensuring that an administrative structure for water quality management is established in WA that is consistent with the NWQMS (Government of Western Australia, 2000b). The Supporting Strategies for the SWQMS are provided as Appendix 3 of this report.

One of the key supporting strategies of the SWQMS is the determination of environmental values or beneficial uses. In referring to the determination of environmental values or beneficial uses, the SWQMS refers to;

- Determining the environmental values or beneficial uses of the water resources present as the starting point for any water quality management process;
- The provision of advice to government by the EPA, where appropriate, on policy for environmental values and any associated environmental objectives and water quality guidelines, in consultation with other government agencies and the community;
- The recognition of environmental values of uses identified in the Australian Water Quality Guidelines for Fresh and Marine Waters (ANZECC/ ARMCANZ, 1992); and
- Following the above, the establishment of environmental objectives that ensure protection of each value and identify those key ecological functions and processes that need to be maintained in order to meet environmental objectives and protect values and uses.

The EPA considers that the approach used to develop environmental objectives for water quality within the development of the draft Scott Coastal Plain Strategy is broadly consistent with that outlined above. Significant wetlands and water bodies have been identified and water quality objectives (targets) have been proposed and have been considered by the public through the publication of the Strategy in draft form. To strengthen the link between the Strategy and the NWQMS and SWQMS the EPA recommends that in the finalisation of the Scott Coastal Plain Strategy, consideration be given to refining the identified targets (either now or in the future), making more explicit reference to the NWQMS and SWQMS approaches, particularly with respect to identification of environmental values (beneficial uses) as discussed in the NWQMS (eg recreational & aesthetic, agricultural etc).

3.4 Vegetation management strategy

Discussion

The vegetation management strategy within the draft Scott Coastal Plain Strategy has identified the key values and significance of the vegetation of the Scott Coastal Plain at the sub regional level, based on available information supplied by the Department of Conservation and Land Management (CALM). Much of the vegetation survey work used in describing the vegetation of the region was obtained from the studies by Mattiske and Havel (1998) for the purposes of formulating the Regional Forest Agreement (RFA) for the South West forests region.

The Strategy has identified that a complex mosaic of vegetation types occur on the Scott Coastal Plain on a variety of landforms ranging from low lateritic hills to coastal dunes. These vegetation types have been classified and mapped as 32 discrete vegetation complexes. The study area is approximately 30% cleared. Approximately 49 600 hectares of native vegetation within the study area occurs on private land, with the mostly uncleared State Forest National Parks, Nature Reserves and other reserves occupying approximately 57400 hectares. Approximately 64 % of private land in the study area has been cleared (SCPSC, 1999).

Of the 32 vegetation complexes described by Mattiske and Havel (1998) for the region, 10 have been identified in the Strategy, as being 'poorly represented (vulnerable)' . These are listed in Table 8 of the Strategy (page 60).

Additionally, many populations of poorly known, rare or restricted species of flora have been identified as occurring on both public and private land within the study area, some of which are listed in CALM's schedule of Declared Rare Flora and are therefore legally protected from unauthorised damage or harm under the Wildlife Conservation Act 1950. In several cases the occurrence of particular rare or restricted flora species appear to be closely correlated with specific vegetation complexes and three vegetation complexes are considered 'hot spots' for threatened flora (SCPSC, 1999).

Work by CALM has also identified one Threatened Ecological Community (TEC), the Scott Ironstone community that occurs at 43 sites within the study area. In a similar way to species on CALM's priority flora list, TEC's currently have no specific legal protection under the Wildlife Conservation Act.

The Strategy also refers to 'well represented' vegetation complexes, which are listed in Table 9, and states that although vegetation of these complexes 'has some capacity for disturbance' within the study area, *"any potential disturbance must still be examined in the appropriate manner outlined in the Memorandum of Understanding governing the protection of native vegetation on private land within the agricultural region of Western Australia"* (SCPSC, 1999).

Other matters discussed in the vegetation strategy include the need for protection of the extensive floodplain wetland vegetation which occur on parts of the Scott Coastal Plain and the need for provision of vegetated corridors to provide for an effective ecological connection between areas of native vegetation and fauna habitat across the landscape.

EPA Advice

Vegetation Protection for conservation of biodiversity

The EPA is aware that the vegetation strategy section of the draft Strategy is currently being reviewed as a result of the Regional Forest Agreement (RFA), which was finalised after the draft Strategy was published, and that the final vegetation strategy may differ significantly from the draft. Accordingly the EPA's advice on this section should be viewed as guidance only.

Since the publication of the Strategy, the EPA has published a preliminary Position Statement on the environmental protection of native vegetation in Western Australia. This Position Statement sets out the EPA's position on land clearing throughout Western Australia. The position statement is intended to provide effective guidance to proponents, government agencies and the general community as to the EPA's approach in applying the principles of the National Strategy for the Conservation of Australia's Biodiversity through its role in impact assessment, policy formulation and the provision of environmental advice to government.

In particular the Position Statement makes reference to Objective 7.1 of the National Strategy in which State, Commonwealth and Territory Governments have agreed to:

"avoid or limit any further broadscale clearance of native vegetation, consistent with ecologically sustainable development and bioregional planning, to those instances in which regional biodiversity objectives are not compromised."

The EPA's position in relation to clearing outside the main agricultural region, as explained in Section 4.3 of the Position Statement (entitled 'Clearing in Other Areas of Western Australia'), sets out a number of basic elements to be considered in the assessment of the biodiversity impact of proposals involving clearing of native vegetation. These elements are:

- *a comparison of development scenarios or options to evaluate protection of biodiversity at the species and ecosystem levels;*

- *no known species of plant or animal is caused to become extinct as a consequence of the development and the risks to threatened species are considered to be acceptable;*

- *no association or community of indigenous plants or animals ceases to exist as a result of the project;*

- *there is comprehensive, adequate and secure representation of scarce or endangered habitats within the project area and/or in areas which are biologically comparable to the project area, protected in secure reserves;*

- *if the project area is large (in the order of 10 to 100 ha or greater, depending on where in the State) the project area itself should include a comprehensive and adequate network of conservation areas and linking corridors whose integrity and biodiversity is secure and protected; and*

- *the on-site and off-site impacts of the project are identified and the proponent demonstrates that these impacts can be managed.*

The EPA considers that government agencies involved in assessment of new proposals should make it clear to landholders (via the final Scott Coastal Plain Strategy and through other means) that these elements will require detailed consideration in the evaluation of each proposal for clearing on the Scott Coastal Plain. The EPA also advises that reference within the strategy to 'well represented' vegetation complexes will not constrain the EPA's consideration of clearing proposals within the Strategy area on their individual merits.

The EPA acknowledges the approach taken in the Strategy to protection of biodiversity, involving the identification of threatened ecological communities and 'vulnerable' vegetation complexes and also identifying those that are 'well represented.' However the EPA is not aware of the criteria, which were used in the vegetation strategy to determine how particular vegetation communities were judged to be 'well represented' as the criteria are not described in the document. The EPA is aware however that that the term 'secure representation' in many other management documents dealing with conservation of ecosystems, (for example Hopkins *et al.* 1996) is usually defined in terms of the level of representation of those ecosystems (in comparison to the total estimated extent of those systems which existed prior to European settlement of Western Australia), within IUCN Reserve Categories I to IV (generally considered to be equivalent to National Parks, Nature Reserves, and Conservation Parks in Western Australia) (Hopkins *et al.* 1996).

The EPA views the definition of secure representation referred to in Hopkins *et al* (1996) as being the most appropriate one to use when considering the potential impact of further permanent loss of vegetation through clearing. The EPA also notes that the current representation of vegetation complexes in the Strategy area within IUCN category I to IV reserves may change within the next few years as a result of implementation of the RFA.

The EPA has become aware, that as a result of vegetation studies conducted for the RFA process, the 'Blackwood Plateau Region,' which includes the Scott Coastal Plain, is now acknowledged to be one of the most significant centres in the southwest forest region in terms of plant species richness and endemism (Commonwealth of Australia, 1998). Furthermore the EPA understands that some species and communities which occur in the region may be or may become threatened by *Phytophthora* dieback disease.

The EPA is also aware that new arrangements for the protection of biodiversity under the Commonwealth Environmental Protection and Biodiversity Conservation Act (particularly environmental impact assessment) may affect new development proposals on the Scott Coastal Plain.

On the basis of the matters discussed above, the EPA therefore recommends that the current review of the vegetation strategy should make reference to relevant nationally accepted criteria for conservation of biodiversity, the definition of secure representation which is used in Hopkins *et al* (1996) and the particular conservation significance of the flora of the Scott Coastal Plain in terms of species rarity, species diversity, endemism and the presence of threats such as *Phytophthora* dieback disease.

Vegetation protection on the Scott Coastal Plain in the context of catchment management

In the broader sense, the EPA considers that for the Scott Coastal Plain, the value of native vegetation for protecting biodiversity at the broad regional scale and for protecting and buffering the effects on water quality of agricultural land uses may, in many cases, obviate the necessity to consider the biodiversity impacts of individual clearing proposals in detail.

Furthermore, the EPA considers that due to the nature and extent of threats to remaining native vegetation from a variety of threats including waterlogging, weed infestation, increased nutrients and *Phytophthora* dieback, there is a need to protect much of the remaining native vegetation in the Strategy area to provide some degree of contingency for threats through replication of protected areas.

The EPA therefore advises that in view of :

1. the high level of plant species richness, species and community rarity and endemism occurring in the Scott Coastal Plain Region which contributes to the high level of significance of vegetation in the area at the broad regional scale (Commonwealth Government, 1998);
2. the recognition that water quality in the Hardy Inlet may already be at the 'of concern level' and there is a need to apply the precautionary principle where there is already clear evidence of significant and potentially irreversible environmental impacts;
3. the widely acknowledged link between the extent of catchment clearing and the levels of nutrients entering waterways; and
4. the target set by the Scott Coastal Plain Steering Committee of maintaining nutrient levels in the Scott River and the Hardy Inlet at current levels (or reducing them to meet national standards (ANZECC guidelines)),

there should be no further reduction in the extent of native vegetation within the catchment of the Scott River.

In view of the potential cumulative impact of clearing of native vegetation for agriculture on biodiversity and water quality of the catchment of the Scott River, any further proposals for clearing of native vegetation in the Scott Coastal Plain Strategy area for agricultural purposes are likely to be considered by the EPA, as environmentally unacceptable unless the proponent is able to demonstrate that:

1. the vegetation proposed for clearing is not riparian vegetation (associated with waterways or wetlands)
2. there will not be a net reduction in the areal extent of vegetation on the property or the catchment as a result of the proposal (see further discussion below);
3. any vegetation proposed to be cleared is not considered by relevant government agencies to be of significance for the conservation of biodiversity; and.
4. The principles and criteria referred to in Section 4.3 of the EPA's Position Statement Number 2 can be met.

The 'no net reduction' principle referred to in criteria 2 above is only intended to apply to areas which are currently extensively degraded by fire, weeds, *Phytophthora* dieback disease, or other threats. This will necessitate some evaluation and judgement by relevant government agencies, of the ability for rehabilitated areas of previously cleared land to replace vegetation lost through clearing proposals. In some cases no net reduction may involve off-setting of vegetation lost by revegetation, with local native species, of a greater area of land than that cleared. Replacement or offsetting the clearing of native vegetation with exotic timber plantations is not considered by the EPA to be environmentally acceptable.

Vegetation of significance for conservation of biodiversity as referred to in criteria 3 above includes vegetation containing rare or priority flora species, threatened ecological communities and vegetation within complexes or communities which are poorly represented in secure conservation reserves (see previous advice). In providing this advice, the EPA appreciates that

there may be equity issues to be addressed in terms of disallowing individual clearing proposals. However, the EPA believes that these issues should be addressed through means other than by allowing clearing.

The EPA also advises that it supports and recommends the protection and management of native vegetation within the Strategy area through targeting programmes such as Bushcare, Land for Wildlife, the Remnant Vegetation Protection Scheme and other Natural Heritage Trust programmes.

Biological Surveys for clearing proposals

The EPA notes the recommendation within the vegetation strategy for there to be a requirement for clearing proposals to be preceded by intensive flora surveys during the appropriate flowering seasons for threatened species 'where the vegetation proposed for clearing occurs within vegetation complexes known to be associated with rare species'. However, in accordance with the principles set out in the EPA's preliminary Position Statement Number 3 on Terrestrial Biological Surveys , the EPA believes that as a precautionary measure, all areas of native vegetation proposed for clearing within the Strategy area, should undergo an intensive and comprehensive flora survey which is targeted to detect the presence of rare, threatened or poorly known flora species or communities and new or endemic flora species.

3.5 Land use strategy

Discussion

The State Planning Commission and the Scott Coastal Plain Steering Committee intend the land use strategy within the Scott Coastal Plain Strategy, to function as a sub-unit of the Warren Blackwood Regional Planning Strategy (WAPC, 1997). As stated in the Strategy, the Warren Blackwood Regional Planning Strategy (WBRPS) deferred detailed assessment and proposals for the Scott Coastal Plain pending the outcome of the planning process for the Scott Coastal Plain Strategy and proposed to adopt the findings and recommendations of the Strategy. The EPA therefore recognises the significance of the Strategy as being of a similar level to the WBRPS.

The land use strategy effectively divides the Scott Coastal Plain into 4 zones as follows:

- Rural Agricultural Zone,
- Rural Landscape and Conservation Zone
- Other (possible new townsite); and
- CALM Managed Estate

The Strategy provides objectives for each of these zones and sets out proposed zone provisions for each of these.

Key recommendations of the Strategy include Recommendation 17 (incorporation of recommended zoning categories and provisions in planning schemes), Recommendation 18 (Regional Coastal Management Strategy), and Recommendation 19 (investigation of options for a new townsite).

EPA advice

General

The EPA recognises the value of effective broad area land use planning in providing early guidance to the community on development opportunities and environmental constraints and commends the Scott Coastal Plain Steering Committee for preparation of the land use strategy component of the Strategy.

The State Planning Commission's Statement of Planning Policy Number 11 (WAPC, 1999) provides a clear statement of guidance to decision-making authorities that provides for the integration of catchment and environmental matters within rural land use planning. The EPA is therefore pleased to see clear statements of policy within the Strategy with respect to the broad acceptability of certain land uses within designated zones of the Scott Coastal Plain and qualification of acceptability with statements within the provisions for each zone which outline some of the relevant design and management considerations and approval processes.

The land use strategy as the basis for decision-making

The EPA considers that the environmental acceptability of some land uses proposed as permissible or discretionary under the proposed zonings outlined in the Land Use Strategy is currently unproven. For example, while recognising that employment of best practice land and water management and design has significant potential to mitigate the risk to the environment from intensive horticulture development, the EPA would have liked to have seen the Strategy contain an analysis of soils, land capability, water availability and other site characteristics linked to environmental constraints in different parts of the Scott Coastal Plain. For example, the EPA considers that an environmental hazard rating system, based on site characteristics such as soil nutrient retention capability, proximity to wetlands and drainage lines and flooding potential may have been useful to provide further guidance to stakeholders with respect to the manageability of pollution risk in the Strategy area.

The EPA believes that this approach, which has been adopted in agricultural areas elsewhere (for example by the Western Australian Water Resources Council, on the Swan Coastal Plain (WAWRC, 1992)), would assist stakeholders reading the Strategy to understand the reasons for the land use zonings and provisions adopted in the Strategy.

The EPA notes and supports the recommendation that the Land Use Strategy is proposed to be brought into effect to a large degree, through incorporation of the zoning and related provisions in district planning schemes so that local government will assume some responsibility for making decisions which are consistent with the Strategy in terms of deciding the overall acceptability of individual development proposals.

However, given the limited degree of justification for the zoning provisions of the Strategy, the EPA considers that the environmental acceptability of proposals is likely to be highly dependent on the particular site characteristics of the relevant property and the willingness of individual proponents to commit to, and then to implement best practice land and water management.

The EPA therefore considers that the suitability of each site of future development will require careful evaluation by relevant government agencies in order to ensure that Strategy objectives can be met. Implementation of management commitments could potentially be addressed (at least in part) by making development and implementation of government agency approved land and water management strategies, a condition of local authority approval. This would require a willingness of the part of an involved local authority, to enforce such conditions if necessary where there are no other mechanisms to do so.

With particular reference to Tables 12 and 13 of the Strategy, the EPA advises that the EPA's consideration of development approvals will not necessarily be confined to the impacts of nutrient loss or clearing of native vegetation. The EPA may, if necessary, consider any and all of the environmental impacts of development proposals with reference to the design and location of each proposal and the proponent's willingness to implement best practice measures including those outlined in the Strategy.

With respect to proposals referred to it under Part IV of the EP Act, the EPA's decision as to whether a proposal requires specific environmental assessment and its recommendation to government on whether any assessed proposals should proceed is dependent primarily on:

- the nature and predictability of environmental impacts which may occur in each case;
- the location of the proposal with respect to areas of environmental significance; and

- the confidence that the EPA has that environmental commitments (such as best practice land and water management) will be implemented and will be effective in ensuring that impacts are managed to be within acceptable levels.

Compatibility of land uses

The EPA notes and supports the concept of providing some guidance, within the objectives and provisions of each zoning category, with respect to the likely appropriateness of the various types of land use development proposals. However, the EPA considers that the assertion within the Strategy that some land uses are incompatible with intensive agriculture and may need to be excluded from the rural agricultural zone is contingent on the premise that intensive agricultural use is a priority use for that zone and necessarily more appropriate and more sustainable for the area than other uses such as subdivision or tourism development. The EPA is of the view that this premise has yet to be conclusively demonstrated.

Protection of native vegetation

The EPA believes that the land use strategy may have benefited from the inclusion of advice on the requirement for vegetation protection within the zoning provisions. This advice which would reinforce the vegetation management strategy, should be consistent with the advice provided by the EPA in Section 3.4 of this report.

Protection of significant wetlands

The EPA has recently released a draft Guidance Statement for the protection of the groundwater catchments of important wetlands in Western Australia. This Guidance Statement, entitled *Groundwater Environmental Management Areas*, is intended to provide guidance to development proponents, decision-making authorities and the general public with respect to the approach that the EPA is likely to take with regard to the protection of groundwater dependent ecosystems through impact assessment of new development proposals.

Under the Guidance, an Environmental Management Area (EMA) is defined as the groundwater catchment of an environmentally significant wetland with a hydrology which is dominated by groundwater and not surface water.

The objective of the Guidance is to ensure that where changes are proposed on land within the catchment of an important wetland those changes will not lead to unacceptable impacts on either the water quality or hydrology of that wetland.

The guidance recognises two types of Groundwater EMAs:

EMA Category A. Groundwater catchments of wetlands of national or international significance, and ;

EMA Category B. Groundwater catchments of wetlands of state or regional significance .

The Guidance also recognises three types of land uses, being;

- Rural, including related intensive land uses like golf courses;
- Rural residential; and
- Urban, which includes industrial.

The main effect of the guidance is to set out environmental objectives for each EMA category and to provide general guidance as to the assessment of new proposals within EMAs.

As some of the wetlands in the area covered by the Scott Coastal Plain Strategy are of national significance, having been listed in the Australian Directory of Important Wetlands, the advice provided in the draft Guidance is likely to be applicable to land use proposals within the Strategy area. In particular, it appears likely that the groundwater catchment of the Gingilup-Jasper Wetland system, incorporating the Gingilup Swamp, Lake Jasper and associated swamps, Quitjup Lake and Smith, and Wilson Lakes, would be considered as falling within the definition of EMA Category A.

The draft Guidance sets out the EPA's view that in general, land uses which use large quantities of chemicals (in particular fertilisers and pesticides and herbicides) or groundwater should not be permitted.

The Strategy has identified environmentally significant wetlands on the Scott Coastal Plain within the water management strategy. However the catchments of these important wetlands have not been clearly identified by the Strategy. Furthermore it is not clear whether additional constraints will need to be applied to any of the types of development which would be permitted by the proposed land use zoning regime, within the catchments of significant wetlands. The EPA therefore recommends that the Scott Coastal Plain Steering Committee review the land use strategy section of the Strategy taking into account the EPA's draft Guidance Statement on groundwater Environmental Management Areas and the hydrological characteristics of nationally significant wetlands and their catchments . This review should specifically consider the appropriate zoning of areas within the groundwater catchment of the nationally significant Gingilup-Lake Jasper wetland systems.

Coastal Management

The EPA supports the recommendation within the land use strategy (Recommendation 18), that the vesting of vacant crown land along the coastal strip be resolved and that a regional coastal management strategy be prepared for the coastal portion of the Scott Coastal Plain west of Black Point.

The EPA recommends that these matters be resolved at the State level through an effective and transparent process with the benefit of public involvement.

Infrastructure development (powerlines, roads and townsites)

The EPA notes the advice given in the land use strategy with respect to the future need for development of roads, powerlines and other new infrastructure such as townsites. The EPA considers that the Strategy and the advice provided by the EPA with respect to environmental issues (particularly the management and protection of native vegetation) should form a useful reference for planning of new infrastructure developments.

The EPA recommends that landholders, decision-makers and utility providers incorporate an analysis of potential environmental constraints (many of which have been identified in the Strategy) and consult with the DEP early in the formulation of any proposals for development of new infrastructure.

3.6 Implementation and performance monitoring

EPA Advice

Responsibility for implementing the strategy

The EPA endorses the principle of creation of a Scott Coastal Plain Zone Steering Committee (SCPZSC) as a sub unit of the Blackwood Basin Group to assist in pursuing the catchment management initiatives that have been developed in the Strategy. The EPA agrees that the role of this group should be advisory and should act as a focus for obtaining funding for catchment based initiatives such as catchment planning, catchment management, native vegetation protection and revegetation.

The EPA considers that given the established need for the SCPZSC to;

1. provide continuous and ongoing development of best practice management of new and existing land use activities ;
2. encourage new initiatives in catchment management and restoration; and
3. monitor and evaluate environmental performance and attainment of environmental objectives,

it is crucial for this group to be supported by Government on a long term basis.

Assessment process for new development proposals

The inter-agency assessment process referred to in the Strategy which is proposed for individual assessment of applications for land use development was originally established to evaluate land clearing proposals. The EPA is not aware of whether or not the process was designed, or is adequate, to properly assess broader impacts of agriculture and other development proposals.

Reliance on this process rather than having in the public arena as part of the Strategy, a broadscale evaluation of land capability and pollution risk to guide land users may lead to increased uncertainty, and in some cases frustration, for landholders if case-by-case assessment results in approval for their proposal being delayed or refused.

In the absence of broadscale constraints analysis, the EPA envisages that proposals which involve clearing of native vegetation or for which it cannot be demonstrated that the proposal will have a neutral or positive effect on water quality in downstream water bodies within the catchment, will be referred to the EPA by the involved government agencies. Unless adequate information can be provided by proponents at the referral stage to demonstrate that such proposals can meet the objectives set out in the Strategy and the EPA's environmental objectives, such proposals are likely to be considered environmentally unacceptable by the EPA.

Reporting on performance

The EPA endorses the model for reporting indicators contained within the "Sustainability Report Card" as described in section 11 of the Strategy. However the EPA believes that since the effectiveness of the Strategy in meeting environmental objectives potentially has impacts on public natural assets such as the Hardy Inlet, AgWA and the WRC as the lead government agencies responsible for implementation of the Strategy, should be responsible for reporting to the community on its effectiveness.

The EPA endorses the use of biological indicators to supplement physical and chemical indicators of environmental quality such as the monitoring of phytoplankton species and distribution the Scott River and recommends that such monitoring be extended to include targeted measurement of environmental change in other significant wetlands in the study area.

The EPA also recommends that consideration be given to reviewing the Sustainability Report Card indicators to enable them to be fully integrated with Western Australia's State of the Environment reporting framework (Government of Western Australia, 1998).

The EPA also recommends that the report card include regular re-evaluation of the reservation and protection status of vegetation complexes, threatened ecological communities and significant (rare, restricted or poorly known) plant species in the catchment (in addition to reporting on the total area of vegetation extant and reserved).

4. Summary of EPA advice

4.1 Matters supported

1. The EPA supports the preparation and use of the Strategy as strategic planning framework for consideration of environmental, development and social issues. The EPA acknowledges and commends the high level of community consultation conducted and the extensive opportunity for stakeholder input provided during the development of the Strategy.
2. The EPA supports the concept of providing some guidance, within the objectives and provisions of each zoning category, with respect to the likely appropriateness of the various types of land use development proposals.

3. The EPA supports the provision of clear statements of policy within the Strategy with respect to the broad acceptability of certain land uses within designated zones of the Scott Coastal Plain and qualification of acceptability with statements within the provisions for each zone which outline some of the relevant design and management considerations and approval processes.

4. The EPA supports, in principle, the recommendation that the land use strategy be brought into effect to a large degree, through incorporation of the zoning and related provisions in district planning schemes so that local government will assume some responsibility for making decisions which are consistent with the Strategy, in terms of deciding the overall acceptability of individual development proposals.

5. The EPA supports the recommendation within the land use strategy section of the Strategy (Recommendation 18), that the vesting of vacant crown land along the coastal strip be resolved and that a regional coastal management strategy be prepared for the coastal portion of the Scott Coastal Plain west of Black Point. The EPA considers that this strategy should be developed with the benefit of public involvement at the regional and state level.

6. The EPA supports the principle of creation of a Scott Coastal Plain Zone Steering Committee as a sub unit of the Blackwood Basin Group to assist in pursuing the catchment management initiatives that have been developed in the Strategy. The EPA agrees that the role of this group should be advisory and should act as a focus for obtaining funding for catchment based initiatives such as catchment planning, catchment management, native vegetation protection and revegetation. The EPA considers that this group will need strong support from government on a long term basis to fulfil this role.

7. The EPA supports the model for reporting indicators contained within the 'sustainability report card' as described in section 11 of the Strategy (see also recommendation 15).

4.2 EPA recommendations

1. The EPA **recommends** the timely completion of the proposed programme of ecological investigation of the Hardy Inlet estuary system referred to on page 26 of the Strategy. The results of this programme are critical to providing guidance to the Scott Coastal Plain Steering Committee and stakeholders, in terms of evaluating and validating the appropriateness of the interim water quality target levels currently proposed by the Strategy. Accordingly, the EPA also **recommends** that an action plan be prepared for the proposed investigative studies, which clearly identifies the timing of these studies and resources available and that this plan be incorporated in the final Strategy.

2. To strengthen the link between the Strategy and the NWQMS and SWQMS the EPA **recommends** that in the finalisation of the Scott Coastal Plain Strategy, consideration be given to refining the identified targets (either now or in the future), making more explicit reference to the NWQMS and SWQMS approaches, particularly with respect to identification of environmental values (beneficial uses) as discussed in the NWQMS (eg recreational & aesthetic, agricultural etc).

3. The EPA **recommends** that the monitoring programme for water quality in rivers, streams and groundwater, be carefully designed and adequately funded to ensure that it is sensitive enough and adequately targeted to detect incremental changes in water quality and the effect that these changes may have on the identified environmental values of water bodies and wetlands. In particular, the Scott Coastal Plain Steering Committee may wish to give consideration to increasing the frequency of water quality observations and to measuring other parameters such as levels of bacteria, based on a threats analysis of the various development activities.

4. The EPA **recommends** that the water quality, hydrology and condition of significant wetlands potentially affected by changes in land use on the Scott Coastal Plain be monitored to measure any changes in environmental quality as they occur. In particular the Gingilup Swamp and Scott River wetland systems have been identified by the WRC

as being of high significance but potentially impacted by adjacent agricultural land use (WRC, 1997).

5. The EPA **recommends** that additional hydrological and ecological investigations be undertaken to identify the ecological water requirements of the significant wetlands of the Scott Coastal Plain and to facilitate the allocation of groundwater resources for development on the Scott Plain in accordance with the National Principles for Provision of Water for Ecosystems.

6. The EPA **recommends** that the mechanisms to be used to respond to any future non-attainment of the defined water quality targets be identified in the final Strategy document.

7. EPA **recommends** that review of the vegetation strategy component of the Strategy which is understood to be in progress, be undertaken with reference to relevant nationally accepted criteria for conservation of biodiversity, the definition of secure representation referred to in Hopkins *et al* (1996), the particular conservation significance of the flora of the Scott Coastal Plain in terms of species rarity, species diversity, endemism, and the presence of threats such as *Phytophthora* dieback disease.

8. The EPA **recommends** that all proposals for clearing of native vegetation within the Strategy area incorporate the documented results of an intensive and comprehensive flora survey targeted to detect the presence of rare threatened or poorly known flora species or communities and new or undescribed species.

9. The EPA advises that it supports and **recommends** the protection and management of native vegetation within the Strategy area through targeting of programmes such as Bushcare, Land for Wildlife, the Remnant Vegetation Protection Scheme and other Natural Heritage Trust programmes.

10. The EPA **recommends** that the Scott Coastal Plain Steering Committee consider reviewing the land use strategy section of the Strategy taking into account the EPA's draft Guidance Statement on Groundwater Environmental Management Areas and the hydrological characteristics of nationally significant wetlands and their catchments . This review should specifically consider the appropriate zoning of areas within the groundwater catchments of the nationally significant Gingilup-Lake Jasper wetland system.

11. The EPA **recommends** that, in view of the limited degree of stratification of zoning categories proposed in the Strategy and the limited level of site specific analysis of pollution risk from horticultural development which has been possible in the development of the Strategy, new intensive horticulture developments be listed as a discretionary use in the designated 'Rural Agricultural Zone'.

12. The EPA **recommends** that the vesting of vacant Crown land along the coastal strip be resolved and that a regional coastal management strategy be prepared for the coastal portion of the Scott Coastal Plain west of Black Point through an effective and transparent process with the benefit of public involvement at the state level.

13. The EPA **recommends** that landholders, decision-makers and utility providers incorporate an analysis of potential environmental constraints (many of which have been identified in the Strategy) and consult with the DEP early in the formulation of any proposals for development of new infrastructure such as new or upgraded roads and powerlines.

14. The EPA **recommends** that the relevant government authorities take into account the ability of current land users to demonstrate reductions in the levels of nutrient and pesticides exported from properties, when assessing new enterprises on sites with similar soil and hydrological characteristics.

15. The EPA **recommends** that consideration be given to reviewing the Sustainability Report Card indicators to enable them to be fully integrated with Western Australia's State of the Environment reporting framework (Government of Western Australia, 1998).

16. The EPA **recommends** that the relevant government agencies involved in the implementation of the Strategy clearly identify measures which will be taken to manage nutrient export from new development proposals and provide for an effective mechanism (such as a project management plan) for ensuring these measures are implemented, and their effect monitored over the life of each new project.

17. The EPA **recommends** that the Sustainability Report Card include regular re-evaluation of the reservation and protection status of vegetation complexes, threatened ecological communities and significant (rare, restricted or poorly known) plant species in the catchment (in addition to reporting on the total area of vegetation extant and reserved).

18. The EPA endorses the use of biological indicators within the 'Sustainability Report Card' to supplement physical and chemical indicators of environmental quality such as the monitoring of phytoplankton species and distribution the Scott River and **recommends** that such monitoring be extended to include targeted measurement of environmental change in other significant wetlands in the study area.

Appendix 1

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Appendix 2

Appendix A, National Water Quality Management Strategy: Implementation Guidelines

APPENDICES

Appendix A: Steps to Develop Catchments and Coastal Waters Management Plans

A step by step model has been developed to provide a consistent approach to the development of water quality management plans for catchments and for coastal waters. It is intended as a guide only, as the steps that will be used in the different States and Territories will depend on the administrative structures in that State or territory, and on the current development of water management plans and on other local factors.

STEP 1 Identify the planning region

Planning regions for water quality management should be based on natural catchment areas, modified where necessary, to take account of major aquifers crossing catchment boundaries.

Within major natural catchments, there is also need to take account of 'social catchments' characterised by close linking of social interests which may include:

- economic activities
- upstream/downstream catchment interactions
- regional cultural identity
- 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 acting in a catalyst role 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 environmental values and future values 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 environmental values 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 environmental values 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 *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 guidelines that may give relevant information include *Guidelines for Sewerage Systems-Effluent Management, Guidelines for Urban Stormwater Management* and the series of effluent management guidelines for industries such as piggeries, tanneries, wineries and distilleries etc. The papers of the National Water Quality Management Strategy are listed in Appendix E.

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.

The *Australian Water Quality Guidelines for Fresh and Marine Waters*, ANZECC 1992, should be used to provide general guidelines for setting of water quality objectives in relation to environmental 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 the Guidelines 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.

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.

The Adaptive Environmental Assessment and Management (AEAM) approach to system assessment and management satisfies these demanding criteria.

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

STEP 16 Release draft 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

Procedures will vary in States and Territories. Cross-portfolio implications will generally warrant consideration by either Cabinet or the appropriate Cabinet Committee or Ministerial Council.

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.

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

The lead agent, along with other relevant agencies and committees, should co-ordinate implementation.

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

The lead agent should undertake progressive review of the strategy, drawing upon agency and community water quality monitoring and in-depth evaluation of pilot initiatives.

Appendix 3

Table 2 of Western Australia's State Water Quality Management Strategy

(Government of Western Australia, 2000b)

Table 2. The State Water Quality Management Strategy

Supporting Strategies

Use an integrated resource management approach (Principle 1 & 7)

Water quality management processes administered by governments should consider all the following matters:

- the whole water catchment;
- the complete water cycle;
- interdependence of water quality with land use and management;
- differences in the socio-economic characteristics of the industrial, agricultural and domestic sectors;
- coordination across all agencies, levels of government, industry and community; and
- ownership by the community and key stakeholders of process outcomes and procedures.

Determine environmental values or beneficial uses (Principle 4, 5 & 7)

Determine environmental values or beneficial uses of the water resource as the starting point in any water quality management process. These values or uses of the environment are those that are conducive to public benefit, welfare, safety or health and that require protection from the effects of pollution, waste discharges and deposits.

The Environmental Protection Authority has a statutory function to provide advice or policy for environmental values and any associated environmental objectives and water quality guidelines in consultation with other government agencies and the community.

The environmental values or uses recognised in the *Australian Water Quality Guidelines for Fresh and Marine Waters* (ARMCANZ & ANZECC, 1992) are:

- Protection of aquatic systems;
- Recreational water;
- Raw water for drinking water supply;
- Agricultural water use;
- Industrial water quality.

Then establish environmental objectives that ensure protection of each value and identify those key ecological functions and processes that need to be maintained in order to meet environmental objectives and protect values and uses.

Prepare water quality management guidelines (Principles 3, 4, 5 & 7)

Prepare water quality management guidelines in partnership with industry and community as necessary by:

- encouraging production of codes of practice and appropriate effluent treatment and disposal practices;
- adopting national guidelines developed under the NWQMS, which may be adapted for different regional and local situations, to ensure a consistent approach;
- developing physical, chemical and biological criteria that describe acceptable water quality, consistent with NWQMS guidelines, for meeting the objectives of designated environmental values and beneficial uses; and
- developing procedures for improving water quality management (including public involvement).

Use a mixture of regulatory and market measures (Principle 6)

Identify market and regulatory mechanisms that may be applied in management processes to protect water quality. Consider market measures such as contaminant load trading and charges, water pricing and subsidies for slow release fertilisers.

Contaminant load trading and charges should include the costs of waste management and benefits that lead to optimum process and profit outcomes.

Avoid pollution and require the polluter to pay for clean up (Principle 6)

Where relevant, the polluter pays concept should be employed. This implies that the parties primarily responsible for existing or potential deterioration of water quality are financially liable for the cost of remediation or rendering the activity harmless to the environment. The extent to which this concept is applied in a particular situation is dependent on a number of considerations including government authorisation of the polluting activity, identification of the polluter, and economic circumstances of the polluter(s). This concept should apply to all sources of pollution.

Involve and inform community and stakeholders (Principle 7)

Involve and partner the community and key stakeholders in water quality management processes to ensure establishment of water resource values, ownership of management measures and appropriate water quality management outcomes. Community stewardship of water quality management programs can facilitate locally driven solutions and achieve greater success. Inform the community and key stakeholders of the state of water resources (particularly at the regional and local levels) and on the impact of development and domestic activities on water quality.

Encourage collaboration between key stakeholders to limit conflict and seek cooperation.

Adopt a cautious approach and encourage continuous improvement (Principles 2 & 8)

Adopt a cautious approach when evaluating proposals, developing water quality criteria/guidelines and management plans to avoid, wherever practicable, serious or irreversible change to the environment. Encourage continuous improvement and the application of best management practices to reduce risks to water resource values and uses.

Apply the pollution prevention concept to promote cleaner production, waste minimisation and appropriate land use and management practices prior to consideration of treatment options. This concept involves reducing the risk of unacceptable contamination of water supplies and environment by:

- firstly, ensuring appropriate land uses and development activities in a catchment;
- secondly, encouraging appropriate land management practices, material usage and production processes that reduce the potential for offsite contamination;
- thirdly, installing treatment facilities to provide water or wastewater of an appropriate quality; and
- fourthly, dispersing any wastewater that needs to be discharged to the environment in a manner that avoids adverse impacts on water resource quality.