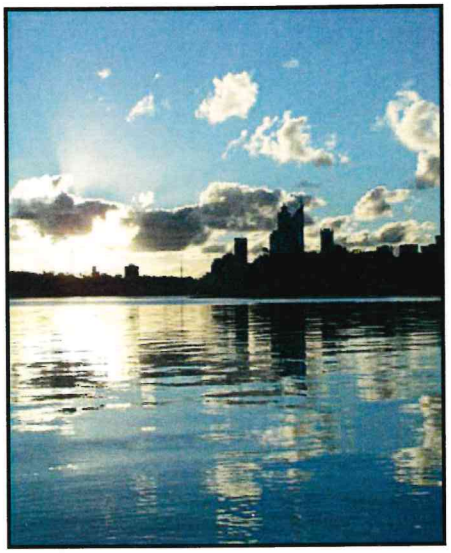

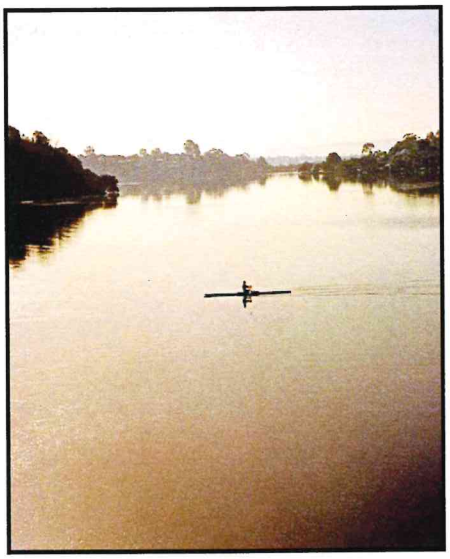

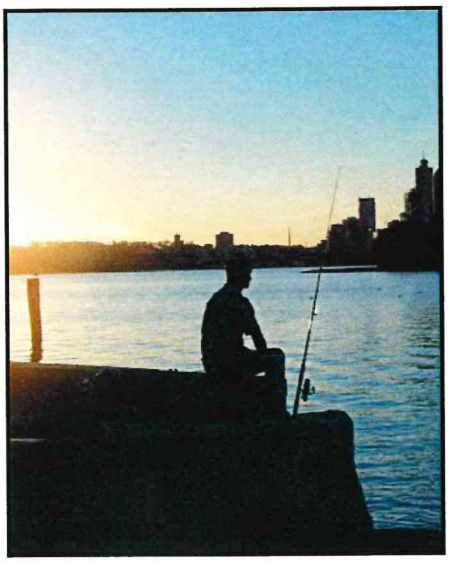

RIVERPLAN

An Environmental Management Framework for the Swan and Canning Rivers

Comprehensive Management Plan and Implementation Strategy for the Environmental Protection (Swan and Canning Rivers) Policy 1998

August 2004

Riverplan

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and
Implementation Strategy
for the *Environmental Protection (Swan and Canning Rivers) Policy 1998*

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Foreword

The Swan and Canning river system is an integral part of Perth's identity and it has been recognized as the State's first heritage icon. For this reason the development of Riverplan - the Comprehensive Management Plan and Implementation Strategy for the Environmental Protection (Swan and Canning Rivers) Policy 1998 - has been an extensive and iterative process.

The strength of community commitment towards the rivers is evident by the number of submissions received on the draft Riverplan. I acknowledge and thank those people who took the time to provide comment to ensure that improved management of our rivers occurs.

A number of recently announced initiatives are currently underway to strengthen efforts to protect the rivers. There is increased funding for the Swan-Canning Cleanup Program's community environmental rehabilitation work, drainage works and community education programs; as well as the Swan River Trust's foreshore restoration projects, and the proposed Swan Canning Riverpark and legislation. These significant initiatives complement the large range of other activities undertaken to protect and manage the rivers.

Riverplan has been developed as an important step to improve coordinated management of these initiatives and other activities that impact on the rivers. It will guide the work of the Swan River Trust, other State Government agencies and local governments in delivering the objectives of the Swan and Canning Rivers Environmental Protection Policy. The Swan River Trust Riverplan Implementation Team has been established to manage the implementation of Riverplan.

Importantly, Riverplan establishes a management framework for all projects and initiatives which underpin the management of the Swan and Canning rivers. The Swan River Trust is accountable to the Environmental Protection Authority for coordinating management and implementation of the Environmental Protection Policy. Riverplan proposes the need for partnership agreements and memoranda of understanding with public authorities to implement the Environmental Protection Policy. Riverplan also proposes the need for specific and measurable environmental values and criteria to increase accountability.

It is my pleasure to release the final Riverplan and again, I thank all those who made a contribution to improving the management of the rivers by providing comment on the draft document. In the face of increasing pressures, the challenge is for all of us to work together to help keep our rivers healthy now and into the future.

Judy Edwards

Dr Judy Edwards
MINISTER FOR THE ENVIRONMENT

Summary

This Strategy is the principal mechanism for implementation of the *Environmental Protection (Swan and Canning Rivers) Policy 1998*. The Environmental Protection Policy's (EPP) purpose is to ensure that the Swan and Canning Rivers are protected and restored by managing the activities that affect them. The Strategy establishes an overarching and comprehensive environmental management framework that ensures the environmental values of the Swan and Canning rivers are protected.

Management of the rivers is a complex, evolving process. Much is being done by a wide range of State Government agencies, local governments, community groups and industry that contribute to the protection and restoration of the rivers. Within the environmental management framework, this Strategy recognises existing activities and will largely operate through these initiatives. However, existing initiatives may need to be modified or new initiatives developed where there are currently gaps in river management. One of the key functions of this Strategy is to co-ordinate and integrate these activities.

The Swan River Trust will co-ordinate the implementation of this Strategy. Partnership agreements and memoranda of understanding will be the key mechanism for formalising the relationship between organisations responsible for individual management activities and the EPP. The agreements will set out specific commitments and activities that support the purpose of the EPP.

The EPP is due for review in mid 2005. The implementation activities of the Swan River Trust Riverplan Implementation Team will feed into this review. Due to the large number of existing activities, the likely development of new initiatives and the wide range of issues to be considered in the management of the rivers, this Strategy will be reviewed in conjunction with the EPP. The review will involve assessing the approach taken by the Strategy in co-ordinating and integrating these initiatives across the many organisations along with the implementation of the key elements of the environmental management framework.

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1 Background

1.1 What is significant about the Swan and Canning rivers?

The Swan and Canning rivers lie at the visual heart of Perth, a city of over 1.4 million people. It is the most intensively used river system in Western Australia and is highly valued by the community for its aesthetic, recreational, commercial and environmental importance. These many, and sometimes competing uses, are placing increasing pressure on the rivers. With our drying climate and anticipated population increases, the need to manage these complex, multiple uses and the associated environmental impacts has never been greater.

Box 1. Indigenous significance of the Swan and Canning rivers

The Swan and Canning rivers are highly significant to the Nyoongar people. Important campsites that were popular hunting and fishing areas[1] along the rivers are registered sites of Indigenous significance. The rivers traditionally not only provided an abundance of resources but are inextricably linked to Nyoongar spirituality[2]. The Dreaming stories of ancestral beings form the basis of indigenous spiritual and cultural beliefs, including the *Wogarl* - a serpent being that was significant in the creation and protection of the rivers and other watercourses[3]. Today, Nyoongar people retain important links to the rivers and surrounding regions.

The Swan and Canning rivers are a highly modified system and many of the changes made to the rivers are irreversible. While it may be possible to minimise our impact on the rivers, ultimately there remains a trade-off between our use and the health of the rivers. In managing the rivers sustainably, the community must balance environmental, social and economic needs in a responsible and open way, so the benefits of a healthy and productive river system can be enjoyed now and in the future.

Management of the rivers is a large and complex task. The system itself is large and has historically been poorly understood. The rivers have played a significant role in the development of Perth with the rivers' utility being of primary importance up until the 1950s. *The Swan River Improvement Act 1925*, provided the framework under which the Public Works Department carried out river works. Works done on the rivers and their banks were to 'improve' the river, essentially to enhance the rivers' ability to deliver the things that people wanted - transport, waste disposal, flood control and roads. Little thought was given to any deleterious effects that these activities may have[4].

Box 2. Key issues relating to the Swan and Canning river system

- Algal blooms and eutrophication
- Loss of riparian vegetation and wetlands
- Loss of biological linkages and species diversity and abundance
- Sedimentation and erosion
- Salinisation
- Chemical and biological contamination
- Seasonal inundation
- Altered river flows
- Environmental water requirements
- Recognition of Aboriginal and other cultural values
- Competition and predation from exotic species
- Disturbance of habitat
- Noise, visual and odour problems
- Acid sulfate soils
- Litter
- Lack of provision for public access
- Maintenance of landscape amenity

Concern for the deterioration of the Swan River and its foreshores led the State Government to form the Swan River Reference Committee in 1943. Initially a committee of five, it was constituted to co-ordinate works on the river and to deal with such problems as purity of the water and cleanliness of the foreshores. In 1959, following proclamation of the *Swan River Conservation Act 1958*, the committee was replaced by the Swan River Conservation Board. The Board, while continuing the works of the committee, also controlled building and reclamation on the river and foreshores[5].

By the late seventies, the *Waterways Conservation Act 1976* was in place and Swan River Management Authority had taken responsibility for planning and programming river works. Attitudes to dredging and reclamation works on the rivers were changing and policy began to place a greater emphasis on the environmental aspects of river works. Under the *Swan River Trust Act 1988*, the Swan River Trust

was established as an agency with strong planning and management powers with responsibilities in co-ordinating work to balance the use and protection of the waterways and shorelines, and to restore degraded environments. Today, that co-ordination involves many State Government agencies, local governments, industry and community groups, and individuals with roles and responsibilities in various aspects of river management.

Box 3. Key pressures affecting the Swan and Canning river system

- Urban, industrial and agricultural runoff
- Irrigation drainage
- Industrial wastewater
- Soil loss from farmland, roadsides and stream banks
- Damaging or clearing native vegetation
- Use of pesticides
- Livestock grazing
- Introduction of exotic flora and fauna
- Mining operations or excavation
- Dredging
- Filling and reclamation of land
- Historical land use
- Urban, industrial and agricultural development
- Recreational activities
- Fishing
- Discharge of ballast waste from vessels
- Boating and associated activities
- Antifoulents
- Groundwater contamination eg. septic tanks
- Over-abstraction
- Boat wash and wake

1.2 Swan and Canning Rivers Environmental Protection Policy

Despite past efforts to preserve the rivers' water quality and ecosystems, the Swan and Canning rivers were, by the early 1990s showing signs of a system under stress. In July 1998, the State Government gazetted an EPP for the Swan and Canning rivers, the *Environmental Protection (Swan and Canning Rivers) Policy 1998*. The purpose of the EPP is to:

> *restore, enhance, preserve and protect the environmental quality, ecological processes and ecological integrity of the Swan and Canning Rivers.*[6]

The EPP was prepared by the Swan River Trust and the Department of Environmental Protection for the Environmental Protection Authority.
The EPP outlines:

- The purpose of the EPP;
- the EPP area including the protected waterways, watercourses and catchments;
- the beneficial uses to be protected in the protected waterways and watercourses;
- activities that can cause waterways and catchments to degrade;
- environmental quality objectives for the EPP area;
- a programme for protection of the beneficial uses including the preparation of a Comprehensive Management Plan; and
- measures to achieve the environmental quality objectives.

Box 4. Environmental Protection Policies

EPPs are gazetted by the Minister for the Environment under the *Environmental Protection Act 1986*. As such, they have the force of law. Therefore, the EPP gives legal basis to the management of the rivers.

The protected waterway defined under the EPP is the Swan-Canning Estuary including the Swan River Trust management area and the Port of Fremantle. A protected watercourse is a watercourse within a protected catchment in the EPP area, a protected catchment being part of the policy area other than the waterways (see Figure 1).

1.3 About Riverplan

A Comprehensive Management Plan was prepared by the Swan River Trust under delegation from the Environmental Protection Authority in 1999. During this period the Swan River Trust undertook extensive consultation with key stakeholders. The Comprehensive Management Plan was presented to the Minister by 1 December 1999 to meet a statutory requirement under the EPP. However, the Environmental Protection Authority recommended that the Comprehensive Management Plan be revised prior to release for public comment. The Comprehensive Management Plan was not released for public comment.

Since then many important management initiatives have been developed. The Swan River Trust began implementing the Swan-Canning Cleanup Program and the Swan Catchment Council and Avon Catchment Council have drafted their Natural Resource Management Strategies for the Swan and Avon Regions. This document, Riverplan, builds on

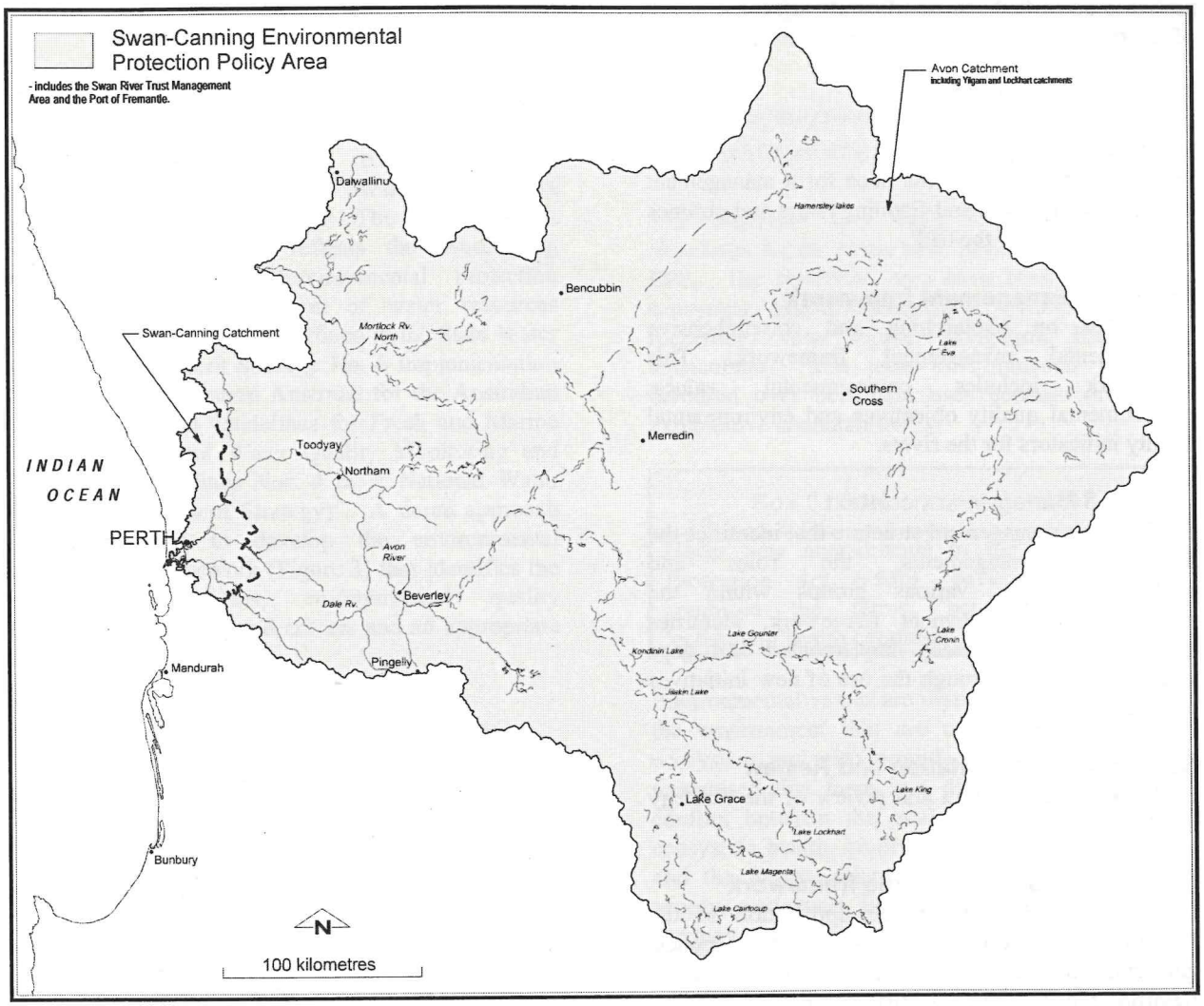


Figure 1. The Swan – Canning EPP area

these activities and provides a framework for the coordinated environmental management of the Swan and Canning rivers together with an Implementation Strategy for the EPP.

The key elements of this Implementation Strategy are derived from the EPP. Appendix 3 lists the key elements of the Comprehensive Management Plan outlined in the EPP and contains a matrix with cross references to the relevant sections in this Strategy or other management initiatives where these requirements have been fulfilled. The matrix in Appendix 3 highlights that some of the detailed requirements listed in the EPP are already being fulfilled by other initiatives, principally the Swan-Canning Cleanup Program. The purpose of this Strategy is to set an environmental management framework within which comprehensive management of the rivers can occur.

The Swan River Trust, State Government agencies, various local governments, industry and community groups, and individuals have important roles in preserving the integrity of the Swan and Canning rivers. They have roles in co-ordinating conservation and management initiatives, exercising development controls, initiating planning policies and on-ground works. This Strategy identifies these responsibilities and activities and draws together the organisations into a framework designed to ensure that the purpose of the EPP is fulfilled.

As this Strategy will be operating principally through existing management mechanisms and due to the enormity of the task of managing all activities in the EPP area, the Strategy will focus on those activities and priority areas in the Swan-Canning Catchment. However, it is recognised that the rivers are part of the wider Avon Catchment system, in which

activities occur that can significantly affect the health of rivers.

This Strategy contains 5 sections:

Section 1 Background
Provides background on the need for a management strategy for the Swan and Canning rivers and outlines the requirements of the EPP.

Section 2 Management framework
Establishes an overarching and comprehensive environmental management framework. This framework includes environmental values, environmental quality objectives and environmental quality indicators for the rivers.

Section 3 Management context
Establishes a management structure that identifies the operational arrangements, the roles and responsibilities of various groups within the environmental management framework, identifies existing activities already implemented and gaps which need filling through the use of new initiatives and partnerships.

Section 4 Implementation and Review
Outlines implementation and review of the Strategy and EPP.

Section 5 Application of the framework
Outlines key elements in the application of the framework including establishing river zones, gathering baseline information, setting criteria, reporting progress and prioritising action.

2 Management framework

The objective of establishing an environmental management framework is to protect the environmental, aesthetic, recreational and commercial importance of the Swan-Canning river system identified in the EPP. The environmental management framework reflects the overarching model used by the Environmental Protection Authority for the protection of water resources (Figure 2). This model is outlined in the State Water Quality Management Strategy No. 6 Implementation Framework for Western Australia for the Australian and New Zealand Guidelines for Fresh and Marine Water Quality and Water Quality Monitoring and Reporting (Guidelines Nos. 4 & 7: National Water Quality Management Strategy)[7]. A tiered approach has been used to develop the environmental management framework (Figure 3) that identifies the environmental values, environmental quality objectives, indicators and criteria and an appropriate management response.

Figure 2. The Environmental Protection Authority's framework for the protection of water resources

2.1 Environmental values and objectives

The beneficial uses and environmental quality objectives for the rivers have been defined under the EPP. The beneficial uses have been identified as ecosystem health, biodiversity, natural landscape, recreation, water supply, navigation, fishing and aquaculture. The term environmental values is favoured over beneficial uses because of its less exploitative connotations[8].

Box 5. Environmental values

Under new amendments to the *Environmental Protection Act (1986)* 'environmental value' combines the terms 'beneficial use' and 'ecosystem health condition'.

Environmental values are particular values or uses of the environment that are conducive to a healthy ecosystem and also provide public benefit[8]. It is recognised that there is a distinction and potential conflict between the ecologically-based values of ecosystem health, biodiversity and natural landscape and the human oriented uses of recreation, water supply, navigation, fishing and aquaculture. In this Strategy, management of the human oriented uses will be achieved by protecting the ecologically-based values. In addition, cultural values are not explicitly identified in the EPP, however it is important to identify the cultural values held by both indigenous and non-indigenous communities to ensure appropriate decisions are made in regard to the management of the rivers.

Environmental quality objectives for the Swan and Canning rivers are the goals which, when achieved, will allow the environmental values to be protected. Developing environmental quality objectives enables river managers to provide direction on how the rivers should be managed and whether the environmental values are being preserved and protected or, where appropriate, restored and enhanced.

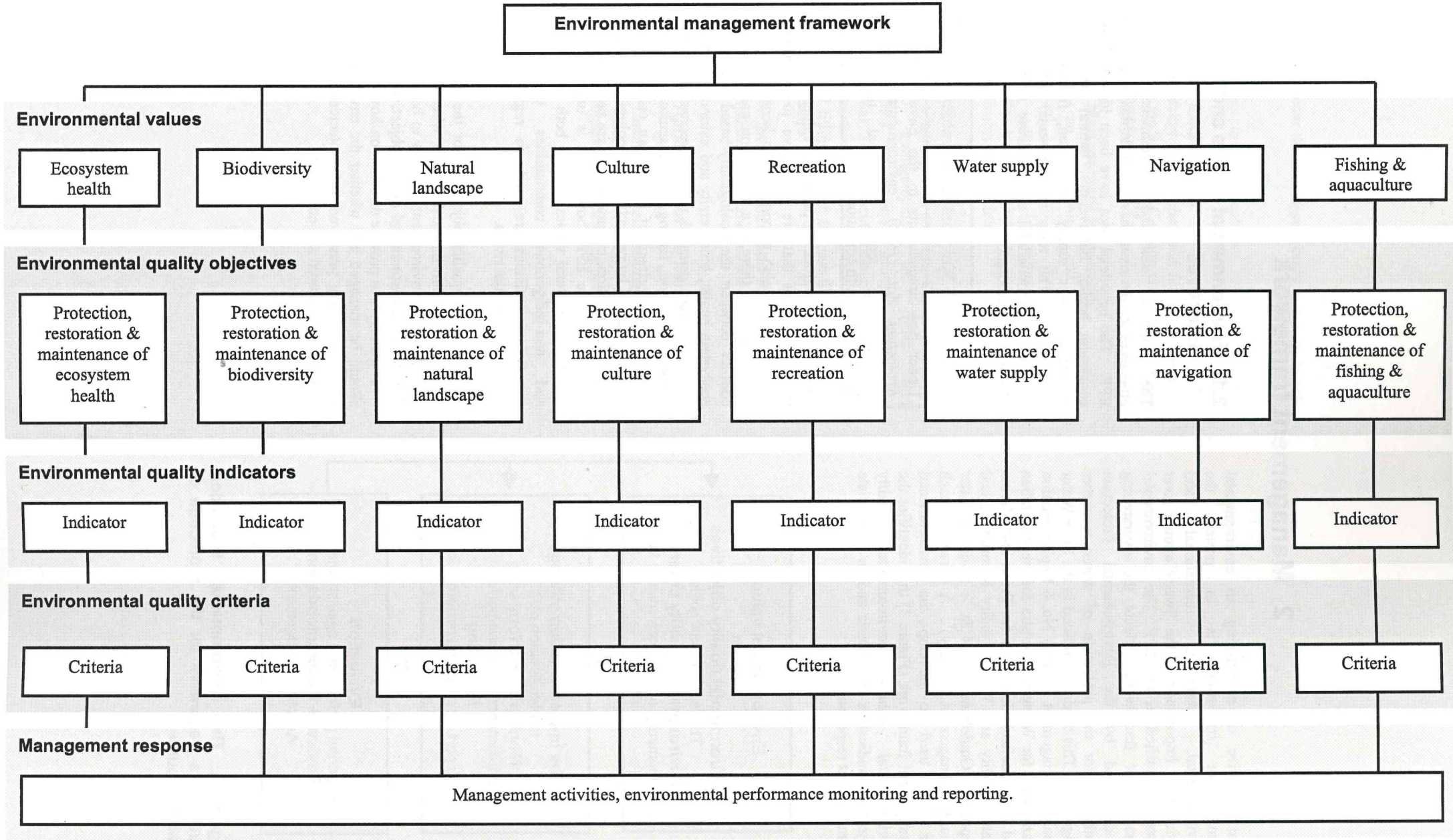


Figure 3. The environmental management framework for the Swan and Canning rivers

2.2 Environmental quality indicators and criteria

For each environmental quality objective a set of indicators and corresponding criteria will be established to provide the benchmarks against which the performance of environmental management can be measured over time. Attaining the environmental quality criteria signifies that the environmental quality objectives are being achieved and in turn indicates that the environmental values are being protected. Failing to achieve the environmental quality criteria will trigger a management response and result in the implementation of strategies to restore environmental quality to the levels defined by the environmental quality criteria.

Environmental quality objectives for the Swan and Canning rivers can be measured using representative indicators. Indicators are parameters used to help determine the condition of the environment. For example, indicators for water quality may include nitrogen, phosphorus, turbidity and pH. Good water quality is an environmental attribute required for almost all of the environmental values in the Strategy, including ecosystem health, biodiversity, water supply, recreation, fishing and aquaculture, and to a lesser extent, culture, navigation and natural landscape. However, water quality indicators are only one type of indicator needed to assess the condition of the environment. For example, in evaluating ecosystem health other types of indicators include riparian condition, flora and fauna, hydrology and river morphology.

Environmental quality criteria represent a nominated acceptable level for a specific indicator that has to be met for an environmental objective to be achieved, for example 1 mg/L of total nitrogen. They are nearly always numerical and criteria for a specific indicator may vary depending on the nature of environmental objective to be met.

Table 1 outlines proposed environmental values, environmental quality objectives and corresponding environmental quality indicators identified for the protected waterways and watercourses as derived from the EPP. The final environmental values and environmental quality objectives, indicators and associated criteria will be developed and reviewed by the relevant agencies and community representatives. The values of ecosystem health, biodiversity and natural landscape are identified in both the protected waterways, being the Swan and Canning rivers, and other watercourses in the policy area, being tributaries of the Swan and Canning rivers. The human-based values of recreation, water supply, navigation, fishing and aquaculture are identified only in the Swan and Canning rivers as defined by the EPP. The table also includes cultural values that are not identified in the EPP. Including cultural values highlights the cultural significance of the rivers to both indigenous and non-indigenous communities.

Table 1. The proposed environmental values, environmental quality objectives and environmental quality indicators for the protected waterways and watercourses

Values	Environmental quality objectives	Environmental quality indicators
In the protected waterways (the Swan and Canning rivers)		
Ecosystem Health 	*Protection, restoration and maintenance of ecosystem health.* Ecosystem health is considered in terms of ecological structure (the biodiversity, biomass and abundance of organisms), processes (interactions, changes and evolutionary development of the ecosystem) and function (food chains and nutrient cycles).	• **Water Quality** -Total phosphorous and nitrogen, dissolved oxygen, temperature, Chlorophyll *a*, turbidity, clarity, salinity, pH, chemical contaminants. • **Hydrology** - flow volume and seasonality of flow, environmental water provisions. • **Physical form** - stream bank and bed condition, erosion and sedimentation, stream form, presence of and access to physical habitat. • **Riparian zone** - structure and health of riparian vegetation, presence of weed species.
Biodiversity 	*Protection, restoration and maintenance of biological diversity* Biodiversity is considered in terms of diversity, abundance and habitat.	• **Aquatic flora and fauna** - population numbers and species composition of invertebrates, aquatic plants (including algae) and fish species. • **Terrestrial flora and fauna** - population numbers and species composition of birds, insects, reptiles, frogs, mammals.
Natural Landscape 	*Protection, restoration and maintenance of natural landscape.* The natural landscape will be protected.	• **Water quality** - Visual clarity and colour, surface films and litter, algal blooms. • **Landscape inventory categories** - To be developed based on landform, vegetation, waterform and land use characteristics.
Recreation 	*Protection, restoration and maintenance of recreation.* Recreation (eg. swimming) will be safe to undertake.	• **Water quality** - Biological contaminants, pH, turbidity, temperature, chemical contaminants, visual clarity and colour, surface films, nuisance organisms, algae.
Water supply 	*Protection, restoration and maintenance of water supply.* Water will be of a suitable quality for water supply purposes (eg. irrigation or stock watering).	• **Water quality** - Biological contaminants, chemical contaminants, salinity, pH. • **Hydrology** - flow volume and seasonality of flow, environmental water provisions.
Navigation 	*Protection, restoration and maintenance of navigation.* Water is suitable for shipping and navigation.	• **Physical form** - Depth of water.

Values	Environmental quality objectives	Environmental quality indicators
In the protected waterways (the Swan and Canning rivers)		
Fishing and Aquaculture 	*Protection, restoration and maintenance of aquatic life for human consumption.* Seafood will be safe for human consumption when collected or grown.	• **Fish species** - indices of health and analysis of seafood. • **Water quality** - Biological contaminants, chemical contaminants, algae.
Culture 	*Protection, restoration and maintenance of culture.* Cultural values include the values held by both indigenous and non-indigenous communities.	• **landuse landscape inventory category** - To be developed.
In the protected watercourses (the tributaries of the Swan and Canning rivers)		
Ecosystem Health 	*Protection, restoration and maintenance of ecosystem health.* Ecosystem health is considered in terms of ecological structure (the biodiversity, biomass and abundance of organisms), processes (interactions, changes and evolutionary development of the ecosystem) and function (food chains and nutrient cycles).	• **Water Quality** -Total phosphorous and nitrogen, dissolved oxygen, temperature, Chlorophyll *a*, turbidity, clarity, salinity, pH, chemical contaminants. • **Hydrology** - flow volume and seasonality of flow, environmental water provisions. • **Physical form** - stream bank and bed condition, stream form, presence of and access to physical habitat. • **Riparian zone** - structure and health of riparian vegetation, presence of weed species.
Biodiversity 	*Protection, restoration and maintenance of biological diversity* Biodiversity is considered in terms of diversity, abundance and habitat.	• **Aquatic flora and fauna** - population numbers and species composition of invertebrates, aquatic plants (including algae) and fish species. • **Terrestrial flora and fauna** - population numbers and species composition of birds, insects, reptiles, frogs, mammals.
Natural Landscape 	*Protection, restoration and maintenance of natural landscape.* The natural landscape will be protected.	• **Water quality** - Visual clarity and colour, surface films and litter, algal blooms. • **Landscape inventory categories** - To be developed based on landform, vegetation, waterform and landuse.

3 Management context

Implementing the environmental management framework requires identification of the framework principles, key initiatives, operational arrangements, roles and responsibilities, current activities and outstanding needs, partnerships and resourcing arrangements.

3.1 Framework principles

The principles listed in Table 2 will guide planning and implementing the environmental management framework. These principles include integrated catchment management, ecologically sustainable development, community involvement, shared responsibilities and partnerships, stewardship of natural resources, prioritising, accountability and adaptive management.

3.2 Key initiatives

Implementation of the environmental management framework within the context of key Federal, State, regional and subregional initiatives will contribute to the effective management of the Swan and Canning rivers.

Federal initiatives

Work undertaken for the National Action Plan for Salinity and Water Quality in Australia, the extension of Natural Heritage Trust funding and the National Land and Water Resources Audit will aid in the achievement of the EPP's purpose. The National Action Plan will implement targets and standards for the management of salinity and water quality, including associated water flows and stream and terrestrial biodiversity[9]. The extension of the Natural Heritage Trust funding has shifted towards a more targeted approach to natural resource management through delivering important resource condition outcomes including improved water quality and improved estuarine health[10]. The National Land and Water Resources Audit also provides a framework to link regional target setting and evaluation[11].

State initiatives

Western Australian State of the Environment reporting has established a State framework for reporting on key indicators that measure changes in the condition of the environment[12]. The next cycle in the State of the Environment reporting has been initiated by the Environmental Protection Authority and a review of the Government's response to the previous report has been undertaken[13,14]. The Western Australia State of Water Resources reports on the key indicators for salinisation, loss of fringing vegetation, eutrophication, sedimentation and contamination of inland waters identified in the State of the Environment Report[15].

A State Monitoring and Evaluation Framework has been developed by the Environmental Protection Authority and is in line with the National Monitoring and Evaluation Framework. The key elements of the framework include the establishment of environmental values, environmental quality objectives, targets, implementation, monitoring and reporting, evaluation and review and improvement. The information derived will link into reporting and performance evaluation, for example, for the Natural Heritage Trust, National Land and Water Resources Audit and the Western Australian State of the Environment reporting[16].

A State framework for the implementation of the Australian and New Zealand Guidelines for Fresh and Marine Water Quality and Water Quality Monitoring and Reporting has been developed. The framework will form part of the State Water Quality Management Strategy that implements the National Water Quality Management Strategy. To this end, the key elements of the State Monitoring and Evaluation Framework listed above will be developed for each of the State's significant water bodies, including the Swan and Canning rivers[7].

The Waterways WA program is developing a Strategy for statewide management of waterways in Western Australia. The Strategy will outline the need for an overall framework to manage and guide the long-term protection of our waterways. The Strategy will link in with the existing natural resource management framework and will highlight the importance of identifying waterway values to be protected[17].

The Western Australian State Sustainability Strategy highlights the need to identify environmental values and designate environmental quality objectives and criteria for the State's aquatic systems. The Strategy also outlines the importance of developing management plans to ensure protection of these systems[18].

Table 2. Principles for implementing the framework

Integrated Catchment Management (ICM)
Decisions affecting the Swan and Canning rivers must be made within an Integrated Catchment Management context: • recognising the integral relationship between the rivers and their catchments, their position within broader landscapes, and their linkages with and importance for coastal systems; • coordinating planning, use and management of water, land, vegetation and other natural resources on a catchment basis; and • involving the whole community in catchment management including State Government agencies, local government, industry and community groups, and individuals.
Sustainability
Decisions affecting the Swan and Canning rivers must be made within the context of Sustainability: • integrate social, economic and environmental needs; • be in accordance with the *Precautionary Principle*; • ensure intergenerational equity; • conserve biological diversity and ecological integrity; • be open and transparent, providing available information to all stakeholders and justifying decisions as they are made; • use the best available scientific information; and • use a risk-based approach.
Community Involvement
Communities and stakeholder groups will have the opportunity to be involved in all the major phases of planning and implementation of programs affecting the Swan and Canning rivers.
Shared Responsibility and Partnerships
All members of the community derive benefits from the use of the Swan and Canning rivers and share responsibility for managing the rivers sustainably. Ecologically sustainable management of the rivers can only be achieved through a long term partnership between all parties – government, communities and industry each with clear agreed roles.
Stewardship of Natural Resources
In determining roles and responsibilities, all river users and managers will recognise their dependence on the health of the Swan and Canning rivers and will have a duty of care to take all reasonable steps to protect the rivers.
Prioritising
Relative contributions to investment in the Swan and Canning river management and restoration will align with the long term private and public costs and benefits involved.
Accountability and Transparency
Roles and responsibilities for Swan and Canning river management will be identified and progress towards meeting goals will be measured. Those involved will be clearly accountable to the Environmental Protection Authority for river management and decisions will be made in a transparent manner with information being publicly reported.
Adaptive Management
Recognising the variability of natural systems and our incomplete knowledge of river and catchment processes requires that management of the Swan and Canning rivers should be adaptive, improving in response to knowledge gained through monitoring and research.

The Western Australian Planning Commission's *Statement of Planning Policy No. 2: Environment and Natural Resources Policy (2003)* sets out the broad environmental and resource management policies for sustainable development, including measures for the protection and use of water resources. It recognises that effective water quality and quantity management is essential as we work towards sustainability. Under the policy, it is expected that planning strategies, schemes and decision-making will identify, and where appropriate, include provisions to protect water resources[19]. A proposed Water Resources Statement of Planning Policy, consistent with and complementary to the Environment and Natural Resources Statement of Planning Policy, will further ensure water resource issues are considered in the land use planning decision making process.

Regional initiatives

Integrated catchment management is an integral process for coordinating the many activities involved in achieving regional natural resource management. Integrated catchment management in the Swan-Avon catchment has involved establishing a range of actions to improve land-use planning and management and addressing specific environmental issues. The Swan Catchment Council and Avon Catchment Council coordinate natural resource management activities and support catchment groups in the Swan region and Avon region respectively.

Box 6. Draft Swan and Avon Region NRM strategies

Regional natural resource management strategies are being developed and are required to meet Federal accreditation standards to enable access to Natural Heritage Trust funding. The Swan and Avon Catchment Council's Draft Regional Natural Resource Management Strategies are 50-year action plans for a coordinated approach to NRM in these Regions. The Strategies will provide direction for future investment in NRM and aim to ensure that the natural resources of the Regions will be protected and managed sustainably in their own right and for the enhancement of the quality of life for present and future generations[3, 20].

Sub-regional initiatives

The Swan River Management Strategy released in 1988 has guided management of the rivers and responsibility for implementation rested with the Swan River Trust. The Strategy identified the roles and responsibilities of various agencies in river management, highlighted major issues that needed to be addressed, outlined objectives for each of these issues, made general and area specific recommendations and outlined a means for implementing and monitoring the Strategy[21]. Two reviews of the Strategy have shown that most of the recommendations have been progressively implemented and those that have not are either still seen as a priority to be advanced or no longer relevant[22].

Box 7. Swan-Canning Cleanup Program

In May 1994, the State Government launched a project to study the rivers and to find ways of reversing the deterioration in water quality. Known as the Swan-Canning Cleanup Program (SCCP), responsibility for the study rested with the Swan River Trust. In 1999, the Trust published the Swan-Canning Cleanup Program Action Plan, a comprehensive document outlining recommendations and action steps aimed at improving the health of the Swan-Canning river system. The Action Plan packages previous work and initiatives to ensure it is communicated effectively to the community and stakeholders. It is implemented through co-operation between the many parties with responsibility for planning and managing the Swan and Canning rivers[23].

A proposed Swan-Canning River System Statement of Planning Policy will identify the key issues to be taken into account in land use planning in relation to the Swan-Canning rivers. It will also provide the context for the preparation of precinct plans for the Precinct Planning Project undertaken by the Swan River Trust and Western Australian Planning Commission.

Box 8. Proposed new legislation and park for the Swan and Canning rivers

The State Government recently recognised the iconic status of the rivers and proposed a range of initiatives to strengthen efforts to protect the rivers. The new legislation will amend or replace the *Swan River Trust Act 1988* and will create a Swan Canning Riverpark, enable the development of an overall river management strategy and allow the Trust to establish formal partnership agreements with other organisations. The legislation will allow the Swan River Trust to be a single agency accountable for river health and to better integrate management efforts by State and local government and the broader community[24].

There are numerous other management tools developed by State Government agencies, local governments, industry and community groups addressing issues on a catchment level. Appendix 4 identifies significant Federal, State, regional and subregional management tools.

3.3 Operational arrangements

For the environmental management framework to be effective, a co-ordinating mechanism extending over all statutory and non-statutory organisations with relevant capabilities, instruments or responsibilities needs to be established (see Figure 4).

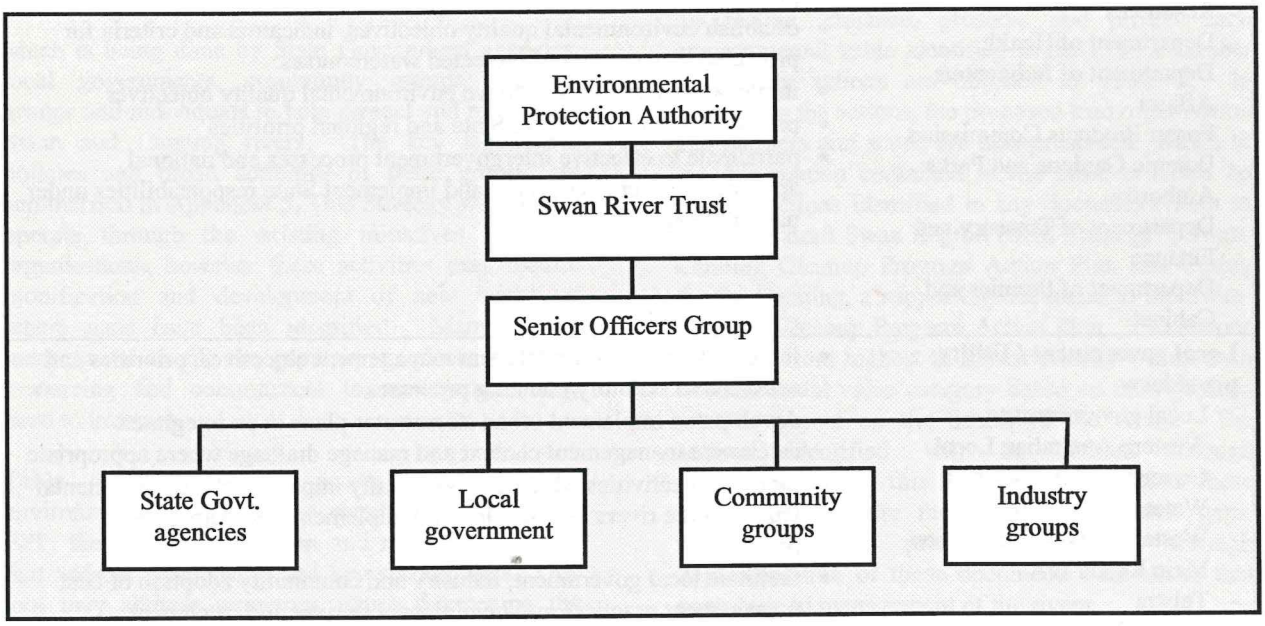
In this management structure the Environmental Protection Authority is responsible for the EPP and its implementation. The Swan River Trust, under delegation from the Environmental Protection Authority, will be responsible for the coordination of the Strategy and reporting to the Environmental Protection Authority on progress. A Senior Officers Group will guide this coordination and a Swan River Trust Riverplan Implementation Team has been established to manage implementation of the Strategy. State Government agencies, local governments, industry and community groups will be responsible for implementing management activities, addressing outstanding needs and reporting progress.

The role and membership of the Swan-Canning Cleanup Program Senior Officers Group has been broadened to include matters relating to Riverplan and the EPP. The new Senior Officers Group comprises of representatives from various agencies including:

- Swan River Trust;
- Department of Environment;
- Department for Planning and Infrastructure;
- Department of Agriculture;
- Department of Conservation and Land Management;
- Department of Fisheries;
- Department of Indigenous Affairs;
- Department of Health;
- Department of Premier and Cabinet;
- Department of Treasury and Finance;
- Water Corporation;
- Western Australian Local Government Association;
- Swan and Avon Catchment Councils; and
- Chamber of Commerce and Industry

In this group local governments are represented by the Western Australian Local Government Association, catchment and natural resource management groups are represented by the Swan and Avon Catchment Councils, and industry groups are represented by the Chamber of Commerce and Industry.

Figure 4. The management structure



3.4 Roles and responsibilities

The general roles of the various groups within this management structure are outlined in Table 3. These organisations have been grouped according to their role outlined under the programme for protection in the EPP. State Government agencies and local governments are responsible for cooperating and taking decisions and actions consistent with the EPP. State Government agencies include those with direct and indirect responsibility for achievement of the EPP and local governments with land area within the boundaries of protected waterways and watercourses and elsewhere within the EPP area. Industry and community groups with a strategic role in the implementation of the EPP are encouraged to cooperate.

The roles outlined in Table 3 are generic and individual organisations within a group may not be responsible for fulfilling all the roles identified for that group. For example, the Swan River Trust and Department of Environment have a greater role in river management than other agencies where river management is not their core business.

Table 3. General roles and responsibilities of organisations in the EPP area

Group	General Roles
To cooperate and take decisions and actions consistent with the EPP	
State Government / Regulators - Swan River Trust - Department of Environment/Environmental Protection Authority - Department of Conservation and Land Management/Conservation Commission of Western Australia/Marine Parks and Reserves Authority - Department of Agriculture WA - Department for Planning and Infrastructure/Western Australian Planning Commission - Department of Fisheries - Department of Industry and Resources - Department of Health - Department of Indigenous Affairs - Forest Products Commission - Botanic Gardens and Parks Authority - Department of Treasury and Finance - Department of Premier and Cabinet	• set policy and strategic directions for river and catchment management • establish legislative frameworks and effective catchment/regional institutional arrangements • incorporate river and catchment management objectives, priorities and actions into statutory planning processes • provide relevant advice, extension, referral and enforcement functions and undertake research and monitoring to support regional communities • participate in regional planning, priority setting and the coordination and implementation of on-ground activities related to river and catchment management and restoration • develop partnerships and facilitate local government, industry and community and adoption of best management practices and education and involvement in river and catchment management activities • modify all activities which can potentially impact on the environmental values of the rivers and develop and implement best management practices • establish environmental quality objectives, indicators and criteria for protected waterways and protected watercourses. • implement measures to achieve environmental quality objectives • provide funding to achieve State and regional priorities • participate in effective intergovernment processes and national approaches where necessary, and implement State responsibilities under nationally agreed strategies
Local government / Utility providers - Local governments - Western Australian Local Government Association - Water Corporation - Western Power Corporation - Main Roads WA - Telstra - Alinta Gas - Fremantle Ports	• incorporate river and catchment management objectives, priorities and actions into statutory planning processes • develop and implement urban stormwater plans in an integrated catchment management context and manage drainage where appropriate • modify all activities which can potentially impact on the environmental values of the rivers and develop and implement best management practices • facilitate local government, industry and community adoption of best management practices and involvement in river and catchment management activities • provide support for community groups

Group	General Roles
To cooperate with the implementation of the EPP	
Community groups / Catchment groups / Natural Resource Management groups - Swan Catchment Council / Avon Catchment Council - Catchment/Natural Resource Management groups - Land Conservation District Committees - Bushcare groups - Friends groups - Conservation groups - Environmental interest groups - South West Aboriginal Land and Sea Council - Indigenous community groups	• participate in regional planning, priority setting and the coordination and implementation of on-ground activities related to river and catchment management and restoration • develop partnerships with river and catchment managers, assist community involvement in river and catchment management and facilitate community education • facilitate local government, industry and community adoption of best management practices and involvement in river and catchment management activities • provide a focus for regional investment in river and catchment management and provide advice to the State Government on resourcing priorities at a regional level • act as a communication conduit between regional communities and government on issues relating to land and water management • participate with monitoring the condition and management of the land and water resources in their region and report changes
Industry groups / Private enterprise / land holders - Small to medium sized enterprises - Prescribed industry - Agricultural sector - Industry associations - Registered Training Organisations - Private investors	• recognise their dependence on a health resource base and their potential impact and manage in accordance with the principles of sustainability and 'cleaner production' principles • modify all activities which can potentially impact on the environmental values of the rivers and facilitate the development and implementation best management practices • act in partnership with river and catchment managers in the catchment to enhance project coordination and implementation

3.5 Current management activities and outstanding needs

Much is being done by State Government agencies, local governments, community groups, industry groups and individuals to help protect and restore the Swan and Canning rivers. The key legislation, policies and broad activities of these groups are summarised in Appendix 5. This Strategy will largely operate through the existing initiatives of these organisations, however these activities may require modification and development of new initiatives where gaps have been identified. Many of the mechanisms to fill the gaps are in place, however resourcing and commitment to management may need to increase.

Table 4 highlights the issues threatening the environmental values of the rivers identified in the EPP, the existing protection and management tools that address these issues and key stakeholders. One tool may address numerous issues threatening the values. For example, the Swan-Canning Cleanup Program principally addresses excessive nutrients in the rivers, however the program also addresses other issues such as chemical contamination and other values such as biodiversity and ecological health.

To restore, enhance, preserve and protect each environmental value identified in the EPP, a number of priority actions are outlined in Table 5. In addressing the actions, the proposed lead organisation and partners and status are also presented. Much of the information contained in the table is based on priority actions identified in key documents such as the initial draft Swan Region NRM Strategy[25], Swan-Canning Cleanup Program Action Plan and Caring for the Canning, a supporting document to the Swan-Canning Cleanup Program Action Plan. The actions are listed from highest to lowest priority within each environmental value category based on their greatest relative impact on the health of the rivers. The actions identified will be refined through implementation of this Strategy. In addition, these actions will require modification as further gaps, resources and priorities emerge through implementation of these documents and others that contribute to management of the rivers.

In both Tables 4 and 5 the management tools and actions for a specific environmental value have been

Table 4. Principal existing tools that ensure the protection and management of the environmental values of the protected waterways

Issues threatening values	Principal existing protection and management tools	Key Stakeholders
Ecosystem health		
• Algal blooms and eutrophication • Salinisation • Chemical and biological contamination • Altered flow regimes • Environmental water requirements • Seasonal inundation • Sedimentation and bank erosion • Loss of biological linkages and species diversity and abundance • Loss of riparian vegetation and wetlands • Disturbance of habitat • Competition and predation from exotics • Acid sulfate soils • Litter	**Land and river management**	
	Swan-Canning Cleanup Program – Swan-Canning industry project – Caring for the Canning – Local Government Natural Resource Management Policy project – Property Planning Project (Heavenly Hectares) – Swan Alcoa Landcare Program – Water quality monitoring and targets Integrated catchment management/Natural resource management – Catchment management plans – Land management plans – Draft Swan Region Strategy for Natural Resource Management – Draft Avon Natural Resource Management Strategy Waterways WA – Ribbons of Blue – Rivercare State Water Quality Management Strategy State Salinity Strategy Area management plans Licences under the Wildlife Conservation Act Clearing permits under the Environmental Protection Act Environmental Protection Policies under the Environmental Protection Act River*bank*	SRT, DoE/EPA, DAWA, DCLM/CCWA/MPRA, DPI/WAPC, LG/WALGA, SCC/ACC, Commonwealth Government, Catchment/NRM groups, Industry groups, Land holders, Tertiary education institutions
	Land use planning	
	Metropolitan Region Scheme Town Planning Schemes Statements of Planning Policy Environmental Impact Assessment under the Environmental Protection Act Development controls Precinct Planning Project	WAPC, SRT, DoE/EPA, LG/WALGA, DCLM, Land holders, Industry groups
	Source management	
	Prescribed premise licensing Cleaner Production Assistance Program Infill Sewerage Program Waterwise Riverwise Swan-Canning Cleanup Program – Swan-Canning industry project – Local Government Natural Resource Management Policy project	DoE, SRT, WC, LG/WALGA, SCC/ACC, CECP, Industry groups, Land holders, Catchment/NRM groups, Tertiary education institutions

Issues threatening values	Principal existing protection and management tools	Key Stakeholders
Ecosystem health cont.		
	Source management cont.	
	Fertiliser management Rubbish collection and street sweeping	
	Drain management	
	Drainage services Drainage Reform Group Water Sensitive Urban Design	WC, DoE, DPI/WAPC, DAWA, SRT, DCLM/CCWA, LG/WALGA, SCC/ACC, Catchment/NRM groups, Land holders, Industry groups
Biodiversity		
	Flora, vegetation and fauna management	
• Loss of biological linkages and species diversity and abundance • Loss of riparian vegetation and wetlands • Disturbance of habitat • Competition and predation from exotics • Algal blooms and eutrophication • Chemical and biological contamination • Environmental water requirements • Altered flow regimes	Bush Forever Land for Wildlife Licences under the Wildlife Conservation Act Area management and species recovery plans Urban Nature Ecoplan State Weed Strategy Swan Alcoa Landcare Program Perth Biodiversity Project Draft Swan Region Natural Resource Management Strategy Draft Avon Natural Resource Management Strategy Environmental Impact Assessment under the Environmental Protection Act Environmental Protection Policies under the Environmental Protection Act Development controls Area management plans Clearing permits under the Environmental Protection Act Mosquito management	DCLM/CCWA/MPRA, DPI/WAPC, DoE/EPA, SRT, LG/WALGA, SCC/ACC, Catchment/NRM groups, Land holders, Industry groups, Tertiary education institutions
Natural landscape		
• Maintenance of landscape amenity	**Land use planning**	
	Metropolitan Region Scheme Town Planning Schemes Statements of Planning Policy Environmental Impact Assessment under the Environmental Protection Act Development controls Precinct Planning Project Area management plans	DPI/WAPC, SRT, LG/WALGA, DCLM/CCWA/MPRA, Land holders, Industry groups

Issues threatening values	Principal existing protection and management tools	Key Stakeholders
Recreation		
• Noise, visual and odour problems • Litter • Chemical and biological contamination • Lack of provision for public access • Sedimentation and erosion • Disturbance of habitat	**Foreshore and river planning and management**	
	Local Government Natural Resource Management Policy project Precinct Planning Project Area management plans Bacterial sampling Marine Safety regulations Compulsory competency training Fisheries licensing and regulations Algal bloom and fish kill response	SRT, DoE, DPI/WAPC, DCLM/CCWA/MPRA, DoH, LG/WALGA, DoF, SCC/ACC, Catchment/NRM groups, Industry groups, Land holders, Tertiary education institutions
	Litter management	
	Waterways cleaning Waste Wise Cleanup programs Cleanup Australia day Rubbish collection and street sweeping	SRT, DoE, KABC, LG/WALGA, Catchment/NRM groups, Land holders, Industry groups
Water supply		
• Altered river flows • Over-abstraction • Environmental water requirements	**Water allocation**	
	Surface and groundwater water licensing Water allocation planning Environmental water requirements and provisions	DoE, SRT, WC, Industry groups, Land holders, LG/WALGA, Catchment/NRM groups
Navigation		
	Port and river management	
• Sedimentation and erosion • Chemical and biological contamination	Waterways cleaning Marine Safety regulations Management plans Compulsory competency training	SRT, DPI, Fremantle Ports, Yacht Clubs and Marinas, Industry groups, Tertiary education institutions
Fishing and Aquaculture		
• Loss of species diversity and abundance • Competition and predation from exotics • Disturbance of habitat • Chemical and biological contamination	**Fisheries management**	
	Fisheries licensing and regulations Environmental Impact Assessment under the Environmental Protection Act Codes of practice	DoF, AQIS, DoE/EPA, Community groups, Industry groups

Table 5. Proposed priority actions to protect and maintain the environmental values of the protected waterways

	Key actions	Proposed lead organisation and partners	Status
Ecosystem health			
Land and river management			
1.1	Catchment management plans prepared and integrated with land use planning processes	SCC/ACC, Catchment/NRM groups, DPI/WAPC, LG/WALGA	Build up current activity
1.2	Property management plans, integrated pest/weed management plans, best management practices and auditing measures in place for rural land	DAWA, LG/WALGA, DPI/WAPC, SRT, DoE, SCC/ACC, Land holders, Industry groups, Tertiary education institutions	Build on current actions
1.3	Promotion of best management practices and use of qualified personal for on-ground works in managing natural areas	DoE, SRT, DCLM, DAWA, DPI/WAPC, LG/WALGA, SCC/ACC, Catchment/NRM groups, Land holders, Industry groups, Tertiary education institutions	Build on current actions
1.4	Facilitate on-going support for community groups managing the rivers and riparian zone	SCC/ACC, Catchment/NRM groups, DoE, DCLM, DoF, LG/WALGA	Continue and enhance current support
1.5	Monitor, assess and report chemical contaminants (other than nutrients), aquatic flora and fauna, riparian condition for measuring biodiversity and ecosystem health values	SRT, DoE, DCLM, DoF, LG/WALGA, Land holders, SCC/ACC, Catchment/NRM groups, Tertiary education institutions	Build up current activity
1.6	Develop environmental water provisions for the protected waterways	DoE, WC, LG/WALGA, Catchment/NRM groups	Program is underway
1.7	Determine the current and predicted impact of rising salinity and salinity management on the upper reaches of the protected waterways	DoE, DAWA, DCLM, SRT, LG/WALGA, SCC/ACC	Continue current activity
Land use planning			
1.8	Local government development controls to fully incorporate environmental protection provisions and audit compliance	LG/WALGA, WAPC, SRT, DoE, Land holders	Increased action is required
1.9	Provide consistent advice to local governments and developers on best management practices in land development	DPI/WAPC, DoE, DAWA, LG/WALGA, SCC/ACC, WC, Main Roads, Western Power	Build on current actions
1.10	Land use planning recognises land capability and suitability information for broadacre development where appropriate	LG/WALGA, DPI/WAPC, DAWA, DoE, SCC/ACC, Catchment/NRM groups, Land holders	Activities required identified

	Key actions	Proposed lead organisation and partners	Status
Ecosystem health cont.			
Source management			
1.11	Continue the development of best management practices and coordination of environmental management and cleaner production programs for businesses and industry	DoE, SRT, WC, CECP, LG/WALGA, SCC/ACC, Industry groups, Tertiary education institutions, Catchment/NRM groups	Increase or build on current actions
1.12	Continue the In-fill sewerage program	WC, LG/WALGA, DoE, SRT, Land holders, Industry groups	In-fill program is currently delayed
1.13	Assess need to extend In-fill sewerage to industrial areas and other priority areas	DoE, WC, LG/WALGA, SRT, Land holders, Industry groups	There is no program in place to extend the in-fill program to industrial areas
1.14	Research and development programs that address minimization of water use, water harvesting, grey-water re-use, water and wastewater recycling and best management practices for domestic, commercial and industrial applications	DoE, DAWA, WC, CSIRO, Tertiary education institutions, LG/WALGA, Industry groups, Catchment/NRM groups	Need to build on existing actions
1.15	Water conservation programs in place for domestic and commercial users	DoE, WC, LG/WALGA, SCC/ACC, Industry groups, Catchment/NRM groups	Need to build on existing actions
1.16	Determine the significance of groundwater contamination in the rivers and tributaries (including drains)	SRT, LG/WALGA, WC	Additional action required
1.17	Investigate risk associated with historical landfills, contaminated sites and acid sulfate soils along the protected waterways and interventions to reduce the impacts of these	DoE, SRT, LG/WALGA, SCC, Catchment/NRM groups	Additional action required
1.18	Community education programs in place for source control	DoE, SRT, LG/WALGA, SCC/ACC, Industry groups, Tertiary education institutions, Catchment/NRM groups	Additional action required
Drain management			
1.19	Clarification of institutional arrangements in the management of drainage and ensure water quality considerations are recognised	DoE, WC, LG/WALGA, CSIRO, DPI/WAPC, DAWA, DCLM, SRT, Industry groups, SCC/ACC	Drainage Reform Group established and work is underway

	Key actions	Proposed lead organisation and partners	Status
Ecosystem health cont.			
Drain management cont.			
1.20	Review the overall drainage system and provide incentive and enforcement to progressively install (and retro-fit) best management practices treatment trains utilising proven technology, to constructed drainage systems	DoE, WC, LG/WALGA, WAPC, Industry groups, SCC/ACC, Catchment/NRM groups	Action is required - there is no program in place for this
1.21	Implementation of water sensitive urban design in new and existing developments with fully monitored trials to evaluate the effectiveness of the technology, the development of performance based objectives and appropriate training for practitioners	DoE, LG/WALGA, WAPC, WC, SCC/ACC, Industry groups, Land holders	Current effort needs to be enhanced over medium term
Biodiversity			
Fauna and flora management			
2.1	Facilitate increased investment in river and riparian zone flora and fauna research programs, through partnerships with key players and development of an investment strategy	DoE, DCLM, DPI/WAPC, NGOs, SCC/ACC, CSIRO, DoF, Tertiary education institutions, Catchment/NRM groups	Continue and expand current activities
2.2	Promote management needs of river and riparian zone fauna and flora with partners and seek external funding support	LG/WALGA, DCLM, DoE, SCC/ACC, Catchment/NRM groups, Industry groups	Build up current activity
Land and river planning and management			
2.3	Implement a system of clearing controls to retain riparian vegetation	DoE, WAPC, DAWA, LG/WALGA	Build up current activity
2.4	Implement of appropriate guidelines for local government, State Government agencies and developers for the protection and management of local biodiversity areas	LG/WALGA, DCLM, DoE, DPI/WAPC, SCC/ACC, NT, NGOs, Land holders	Build up current activity
2.5	Complete research and vegetation surveys for Bush Forever sites on the protected waterways, acquire funds for foreshore reserve acquisition and management and develop an investment strategy	WAPC, DCLM, DoE, LG/WALGA, WC, SCC, NT, NGOs, Land holders	Action underway to implement Bush Forever
2.6	The development of local biodiversity inventories and management plans to protect riparian vegetation managed by local governments through Perth Biodiversity Project	LG/WALGA, DPI, DCLM, NGOs, DoE, SCC	Continue and expand current effort

	Key actions	Proposed lead organisation and partners	Status
Biodiversity cont			
Land and river planning and management cont.			
2.7	Assess and consult on the adequacy of existing community partnership arrangements and establish formal partnership arrangements between community groups managing riparian vegetation and local and State Governments	SCC/ACC, DCLM, DoE, DAWA, LG/WALGA, Catchment/NRM groups	Continue and enhance current support
2.8	Undertake condition assessment of the Swan and Canning rivers foreshores linked to implementation plans for restoration works	SRT, DCLM, SCC, LG/WALGA, Tertiary education institutions	Additional action required
2.9	Develop and implement new and existing exotic species control strategies	DAWA, DoE, DCLM, CSIRO, LG/WALGA, DoF, Fremantle Ports, SCC/ACC, Tertiary education institutions, Catchment/NRM groups, NGOs	Continue current activity
2.10	Use of a range of incentive schemes to manage riparian vegetation	DCLM, NT, DoE, DPI/WAPC, DAWA SCC/ACC, LG/WALGA	Current activities to be continued
2.11	Development of an investment strategy for incentive schemes	DoE, DCLM, NT, DPI, DAWA, SCC/ACC, LG/WALGA	Additional action required
2.12	Increased corridor planting with local species that enlarges the area allocated for off-reserve conservation and the development of a strategic revegetation plan in consultation with key stakeholders	SCC/ACC, LG/WALGA, SRT, Main Roads, Western Power, WC, Catchment/NRM groups	Build up current activity
Natural landscape			
3.1	Facilitate implementation of Precinct Planning Project	SRT, WAPC, LG/WALGA	Increased action is required
Recreation			
4.1	Develop a litter strategy	SRT, DoE, KABC, LG, Catchment/NRM groups	A litter abatement strategy is currently being developed
4.2	Develop a river use/recreation strategy	SRT, DCLM, DPI, DoF, LG/WALGA, SCC, Catchment/NRM groups	Action is required
4.3	Develop drainage and nutrient management plans or guidelines for grassed recreational areas on the waterways	LG/WALGA, DoE, SRT, SCC, Catchment/NRM groups	Build up current activity
4.4	Assessment of the microbiological status of the rivers and tributaries and interventions to reduce sources of contaminants	DoH, SRT, LG/WALGA, SCC, Catchment/NRM groups	Additional action required

	Key actions	Proposed lead organisation and partners	Status
Water supply			
5.1	Licence conditions recognise environmental water provisions, best management practices and water efficiency measures	DoE, WC, LG/WALGA, Industry groups, Land holders	Program is underway
5.2	Licences require fees, measurement of use for large users and reporting	DoE, WC, LG/WALGA, Industry groups, Land holders	Additional action required
5.3	Develop water resource allocation plans	DoE, WC, Industry groups, Land holders	Build on current actions
Navigation			
6.1	Complete and implement Environmental Management Systems for yacht clubs and marinas	SRT, DoE, DPI, Fremantle Ports, Yacht clubs and marinas	Continue current activity
6.2	Manage the effects of boat wash and wake, noise and speed	DPI, SRT, DoE	Build on current actions
Fishing and Aquaculture			
7.1	Determine sustainable fishing practice and work towards compliance by recreational and commercial fishers	DoF	Continue and build up current activities
7.2	Provide education to recreational and commercial fishers on sustainable fishing practice	DoF, SRT, LG/WALGA	Build up current activity
7.3	Develop a program for fish stock/habitat enhancement	DoF, SRT	Additional action required
7.4	Investigate the effects of algal blooms on fish ecology	SRT, DoF	Additional action required

grouped according to the management theme. For example land-use planning tools and actions have been grouped within ecosystem health. It should also be noted that the management of the human oriented values of recreation, water supply, navigation, fishing and aquaculture will be achieved by protecting the ecologically-based values of ecosystem health, biodiversity and natural landscape. For example, to minimise the impact of overabstaction for water supply there is a need for the Department of Environment's water licensing to incorporate environmental water provisions.

3.6 Partnerships

In order to define roles and responsibilities and evaluate current management activities, various groups within the management structure are required to evaluate their current activities, identify gaps, form partnerships where necessary and establish agreements. Management groups must then be responsible for the development and implementation of action plans. Preliminary assessments undertaken by organisations will allow them to identify how they are contributing to the fulfilment of the EPP's purpose.

Partnership agreements and memoranda of understanding will formally acknowledge and recognise the contributions being made by relevant groups to the achievement of the EPP. It will involve a commitment to reviewing and enhancing existing activities so that actions identified in Table 5 are addressed.

Agreements will be between the Environmental Protection Authority and the management groups listed in Table 3. Separate levels of agreement are required for:

- State Government agencies with direct responsibility for achievement of EPP, eg. Department of Environment;
- State Government agencies that contribute through indirect actions to the achievement of EPP, eg. Department of Health;
- Local governments with land area adjoining the boundaries of protected waterways and watercourses, eg. City of Swan;
- Local governments elsewhere within the EPP area; and
- major industry and community groups with a strategic role in the achievement of the EPP, eg. Swan Catchment Council.

Agreements will be underpinned by action plans developed by the organisations to detail the tasks identified and work required to fulfil the purpose of the EPP. Action plans will also include responsibilities, funding requirements and sources of funding and reporting.

Box 9. Key actions to be undertaken by organisations for assessments

- Identify the environmental values they are responsible for
- Outline the current state of environmental values, threats and vulnerabilities
- Define the spatial extent of the environmental values and threats
- Define the actions required to protect or restore the environmental values
- Identify other relevant State Government agency, local government, industry and community organisation roles in implementing actions
- Identify existing agreements with other organisations
- Identify current activities in relation to the EPP's purpose
- Outline the resource and skill implications for implementing actions
- Establish arrangements for implementation of the required additional actions
- Establish performance auditing and reporting arrangements

3.7 Resourcing arrangements

It is recognised that while the strategy will largely operate through existing activities, the implementation of specific actions by organisations may require additional funding in which alternative funding sources will need to be sought.

4 Implementation and Review

The specific actions required for implementation of the Strategy and review of both the Strategy and the EPP are outlined in Table 6. These activities will be implemented over the next five years and the table will require modification as further actions emerge through implementation of the Strategy. As it is proposed that the Swan River Trust implement the Strategy, many of these activities will be undertaken by the Swan River Trust. However, the Swan River Trust's role is to occur within the context of further resourcing to coordinate the activities identified and recognising that the Swan River Trust's management of the rivers extends beyond the implementation of this Strategy.

There is a statutory requirement for the EPP to be reviewed by mid 2005. The review of the EPP will be undertaken and a Draft EPP developed by the end of 2004. This will enable public comment on the Draft EPP and a Revised Draft EPP being presented to the Minister for Environment by mid 2005. The review will focus on strengthening the EPP and will involve further defining environmental values identified in the current EPP and consider the appropriateness of legislating the environmental values and criteria.

Table 6. Implementation table

Implementation activity	Responsible organisations	Reporting to	Completion date
Establishment of the EPP working group	SRT	EPA	Jan 2004
Strategy amended and finalised	DoE	SRT, EPA	Aug 2004
Assessments by organisations on how they are fulfilling the requirements of the EPP	State Government agencies, LGs, Community & Industry groups	SRT	Dec 2004
Prioritisation of actions/needs derived from assessments	SRT, State Government agencies, LGs, Community & Industry groups	EPA	Dec 2004
Identification of resources, responsibilities and timelines for implementation of key actions derived from assessments	SRT, State Government agencies, LGs, Community & Industry groups	EPA	Dec 2004
Develop agreements to outline responsibilities	SRT, State Government agencies, LGs, Community & Industry groups	SRT, EPA	June 2005
Develop action plans to achieve implementation	State Government agencies, LGs, Community & Industry groups	SRT	June 2005
Further development of environmental values, environmental quality objectives, indicators and criteria	SRT	EPA	Dec 2004
Review EPP / Draft EPP	DoE	EPA	Feb 2005
Revised Draft EPP	EPA	Minister	July 2005
Review the Strategy	SRT	EPA	2005
Review agreements	SRT, State Government agencies, LGs, Community & Industry groups	EPA	2006
Annual reporting by organisations	State Government agencies, LGs, Community & Industry groups	SRT	Ongoing
Annual reporting by SRT	SRT	EPA	Ongoing
Annual reporting by EPA	EPA	Public	Ongoing
Periodic audits of organisations	SRT	EPA	Ongoing

It is intended that the Strategy will be reviewed in conjunction with the EPP in 2005, with a report to the Environmental Protection Authority on progress made and the effectiveness of implementation. Specific measures for the evaluation of the Strategy's implementation will be established.

Box 10. Key measures for the evaluation of the Strategy's implementation

- Satisfactory Senior Officer Group function and co-ordination;
- Satisfactory performance of member organisations in relation to agreements;
- Acceptable outcomes resulting from agreements;
- Satisfactory program achievement;
- Adequacy of budgetary provisions;
- Adequacy of available resources to achieve intended programs in a timely manner;
- Satisfactory progress on programs to address gaps in the management of the rivers; and
- Acceptable achievements in the overall protection, restoration and maintenance of the environmental values of the rivers.

Given the formative nature of the EPP and Strategy, initial agreements will require review after a period of time. Periodic audits of organisations will also be conducted to enable the Environmental Protection Authority to assess how organisations are fulfilling the requirements of the EPP. The Environmental Protection Authority will report publicly on these findings.

5 Application of the framework

Key tasks in applying the environmental management framework include establishing river and catchment zones, gathering baseline data, determining environmental values and setting indicators and criteria, progress reporting and prioritising action. For each of these tasks proposed methods of implementation are explored. The appropriateness of these methods will be determined by the Swan River Trust during the implementation of the Strategy. As highlighted previously, initial application of the framework will be through existing management activities, principally the Swan-Canning Cleanup Program and will focus on those activities and priority areas that impact on the protected waterways. However, it is recognised that there are gaps in these activities and the rivers are part of a wider catchment, therefore management options beyond current activites are also considered.

5.1 Establishing river and catchment zones

River channel, riparian and catchment zones will be established to identify environmental values, objectives and criteria in each zone. Zones are useful for identifying parts of the EPP area that have common features in terms of environmental conditions, types of ecosystems and range of current and future environmental values.

The initial river zones for the protected waterways will be generally based on the zones identified for the Swan and Canning Rivers Precinct Planning Project (Figure 5)[26]. The determination of the 23 precincts was based on the Swan River System Landscape Description that defined the landscape by geology, topography, waterbodies, vegetation, and the built and social environment[27]. The boundaries of these localities may need adjustments and actions may apply outside the boundaries to meet more fully the EPP's purpose.

The catchment zones should be consistent with existing catchment boundaries. Thirty-one major sub-catchments in the coastal portion of the Swan-Canning system have been identified. Many of the sub-catchments are based on urban drainage systems and have a number of small drainage catchments and drains that flow into the rivers.

5.2 Gathering baseline information

Once zones have been established, the ecological condition of the rivers needs to be assessed. Baseline information is required to identify environmental values, environmental quality objectives and criteria, determine priorities for action and measure the effectiveness of these actions. Ensuring ongoing baseline monitoring is undertaken is fundamental to determining the success of management activities.

The Department of Environment's Statewide Assessment of River Water Quality provides a summary of water quality in all currently monitored waterways in Western Australia. This includes a baseline assessment of water quality for the Swan and Canning rivers and monitored rivers and drains discharging to the rivers. It provides an indication of current baseline condition (status and trend direction) for eight key water quality parameters; salinity, nitrogen, phosphorus, turbidity, colour, pH, suspended solids and dissolved organic carbon[28].

For indicators beyond water quality, the Department of Environment has become the lead agency for the Australian River Assessment Scheme in Western Australia. Over the next five years, the Department of Environment will develop its expertise on the Scheme, initially assessing macroinvertebrates and expanding this to other flora and faunal groups such as diatoms, fish, riparian vegetation and possibly riparian vertebrates.

The Waterways WA program has established a foreshore condition assessment methodology that includes assessment of bank stability, foreshore vegetation, stream cover and habitat diversity. The Stream Condition Index can be derived from the assessment of these four parameters[29]. The focus of the assessment is on the riparian zone, however stream flow, water quality and aquatic organisms are considered to a limited extent in the river channel. As much of the assessment is based on observation, the survey methodology may need to be adapted slightly if more quantitative data on stream flow, water quality and aquatic organisms is to be included.

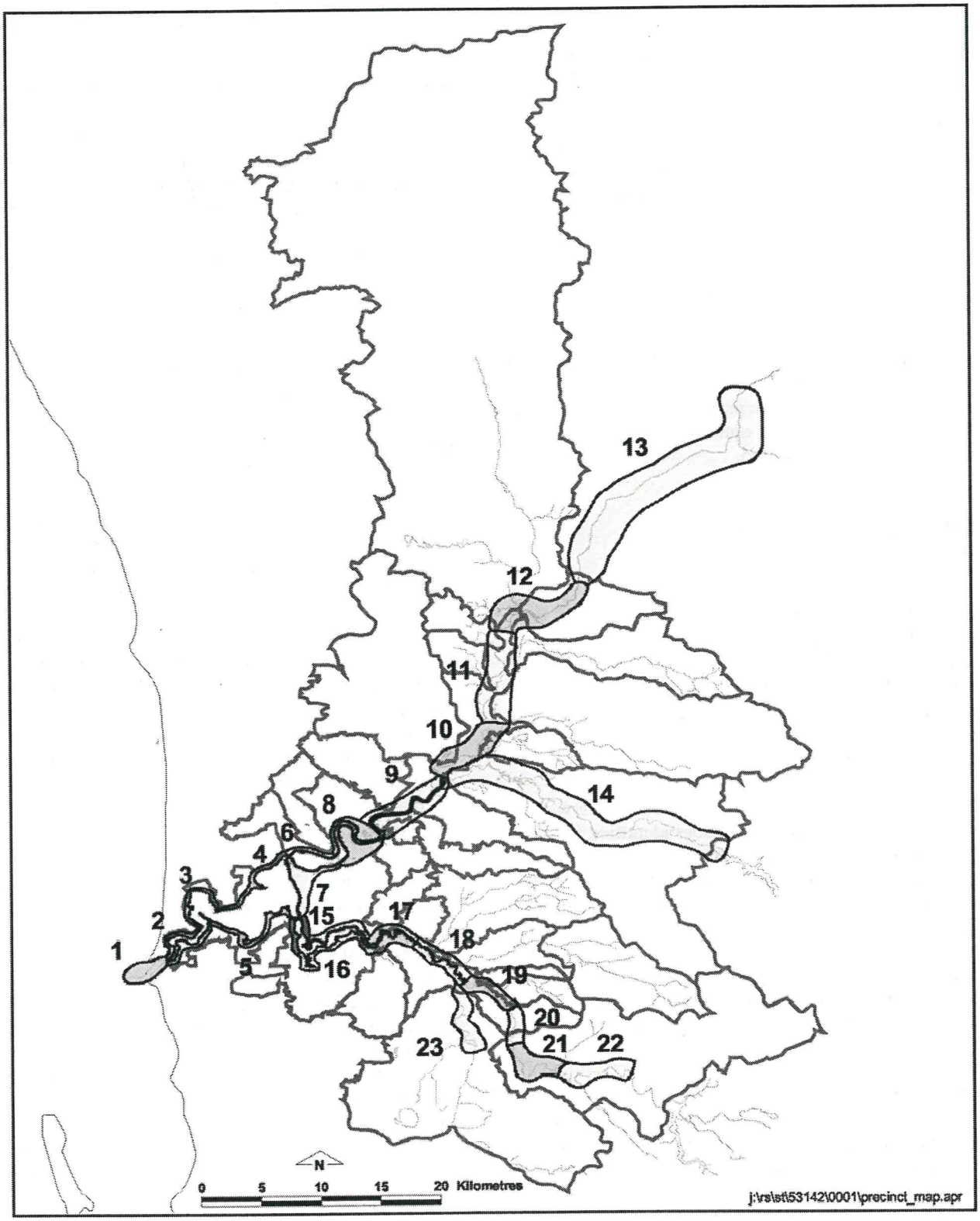


Figure 5. Example river and catchment zones for the Swan and Canning rivers

5.3 Determining environmental values and selecting indicators and criteria

Once baseline information has been gathered, environmental values and associated environmental quality indicators and criteria for river protection and restoration can be developed and used to measure progress over time.

Figure 6 provides an example of mapping proposed environmental values for the Swan and Canning rivers broadly. It is proposed that environmental values will be mapped for each river zone.

Box 11. Determining environmental values

The broad environmental values of ecosystem health, biodiversity, natural landscape, recreation, water supply, navigation, fishing and aquaculture have been set for the Swan-Canning rivers by the EPP. There is a need for further identification of environmental values for each river and catchment zone and the determination of these environmental values is to be a community derived process.

It is proposed the indicators and criteria for pollutants entering the river system are based on the Australian and New Zealand Environment and Conservation Council (ANZECC) Australian Water Quality Guidelines for Fresh and Marine Waters[30]. The ANZECC guidelines provide a comprehensive set of indicators and numerical criteria, however there is the need for guidelines to be adapted to reflect natural variation in water quality between systems and within large dynamic systems like the Swan-Canning Estuary. Localised water quality criteria must take into account these natural variations and those areas requiring priority action.

The Swan-Canning Cleanup Program has carried out routine water quality monitoring of the physical, chemical and biological parameters of the Swan and Canning rivers since 1996. Under the program, water quality targets have been set for the Swan-Canning Estuary and for tributaries discharging from priority catchments. These are management targets and are used as a measure of progress for the program in achieving its goals. The target levels are based on the number of times nutrient concentrations exceed set levels. Maximum concentrations are seen to be the most effective measure of whether catchment nutrient reduction activities are successful[31]. The selection of levels for the targets is closely linked with the Swan-Canning Cleanup Program management objectives. The targets are not necessarily set at ecologically significant levels, although any detectable decrease in phytoplankton levels has some ecological significance[32].

The targets set for the Swan-Canning Estuary include the following water quality indicators; total phosphorous, total nitrogen, dissolved oxygen and chlorophyll *a* as a measure of phytoplankton levels. Catchment targets have been developed that specify the median concentration of total nitrogen and total phosphorus allowable in 15 tributaries of the Swan-Canning catchment. Both short-term and long-term targets have been developed due to the long timeframes required for catchment management to affect nutrient levels in the tributaries[33].

5.4 Reporting and reviewing progress

Comparing environmental quality criteria to current data available for the rivers and reporting this information allows managers and the community to see the success of management responses and modify these responses if necessary.

Figure 6 outlines how performance can be reported by showing to what level selected environmental quality objectives for each environmental value are met in each river zone. A similar method of summarising and presenting information is a highlighted in Figure 7 with an example information report card that could be developed for each environmental value identified in a specific river zone.

Under the Swan-Canning Cleanup Program a series of Catchment Report Cards for the priority catchments of the Swan-Canning rivers are being developed. These report cards will be available over the Internet and allow the community to access catchment maps, a summary of nutrient levels, management activities in the catchment and other background information.

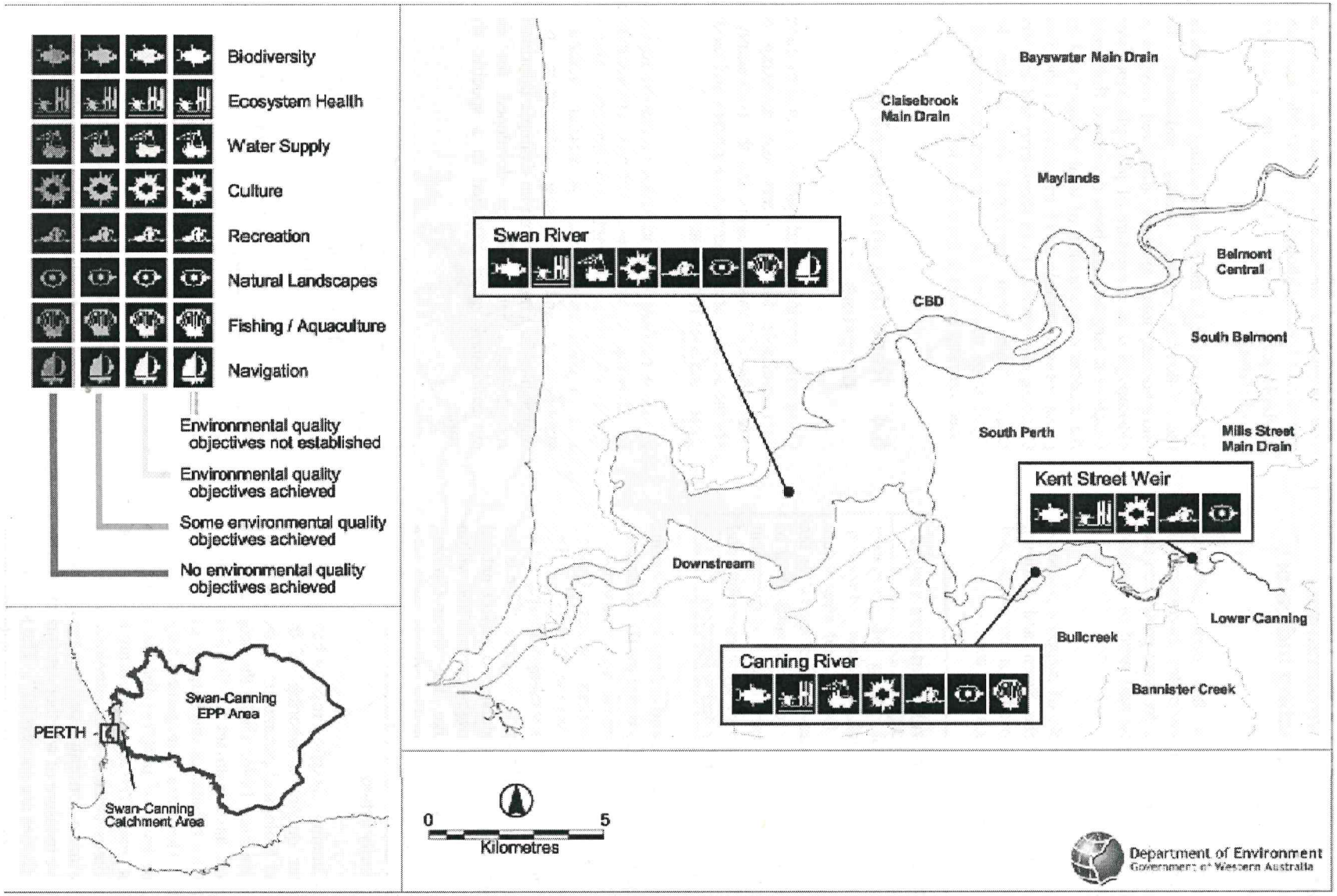
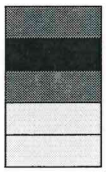
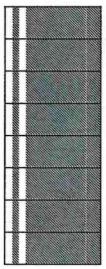


Figure 6. Example map of proposed environmental values for the Swan and Canning rivers

Interim Report Card 2004

Subject: Ecosystem health in river zone X

Environmental quality indicators		Management response	Comments
Physical & chemical measures	Total phosphorous Total nitrogen Dissolved oxygen Light attenuation Temperature		Management response required for total nitrogen and investigate total phosphorous and dissolved oxygen levels. Continue monitoring light attenuation and temperature.
Biological measures	Chlorophyll *a* Seagrass shoot density		Continue investigations and precautionary actions.
Toxicants in water	Metals and metalloids Non-metalic inorganics Organics Pesticides Herbicides and fungicides Surfactants Hydrocarbons Miscellaneous/others		For the range of water toxicants monitored to date levels are below normal detection limits.
Toxicants in sediments	Metals and metalloids Organometallics (eg.TBT) Organics		For the range of sediment toxicants monitored to date levels are below ANZECC guidelines. Additional sampling for TBT required.

Legend

- Monitor – below criteria, continue monitoring.
- Investigate – Above criteria, investigate and where necessary take precautionary action.
- Action required – Above criteria, initiate management response.
- Research – Additional information required to establish the state of the river and/or criteria.
- Below normal laboratory detection limits.

Figure 7. Example ecosystem health report card for a river zone

Box 12. Public reporting
All reported information will be transmitted to the Environmental Protection Authority and the Environmental Protection Authority will report publicly on these findings.

5.5 Prioritising action

When the ecological condition of the rivers has been assessed and progress reviewed and reported, the management actions must be prioritised. Priorities for management will be set on the basis of protection of existing high value areas or areas in good condition and restoration of those areas where there is the highest environmental and community gain for the resources invested.

To develop priorities the means of prioritising action could be based on the Waterways WA Program's Statewide Waterways Needs Assessment methodology[34]. The methodology describes the concepts, principles and planning process for prioritising investment to maximise environmental benefit.

Box 13. Priority environmental issues
Priority environmental issues requiring action have been identified. The priority issues include: • biodiversity; • chemical contaminants; • land use planning; • drainage management; • fisheries.

Sources

1. Hallam, S.J. (1987). *Aboriginal Resource Usage along the Swan River*, Proceedings of a symposium on the Swan-Canning River Estuarine System, Curtin University, Bentley.

2. Department of Conservation and Land Management (1999). *Swan Estuary Marine Park and Adjacent Nature Reserves Management Plan 1999-2009*, Perth.

3. Swan Catchment Council (2004). *Swan Region Strategy for Natural Resource Management Draft for Public Comment*, Perth.

4. Riggert, T.L (ed.) (1978). *The Swan River Estuary Development, Management and preservation*, Swan River Conservation Board, Perth.

5. Shean M (1987). *The Swan River Management Authority and its Functions*, Proceedings of a symposium on the Swan-Canning River Estuarine System, Curtin University, Bentley.

6. Government of Western Australia (1998). *Environmental Protection (Swan and Canning Rivers) Policy*, Perth.

7. Government of Western Australia (2004). *State Water Quality Management Strategy No. 6 Implementation Framework for Western Australia for the Australian and New Zealand Guidelines for Fresh and Marine Water Quality and Water Quality Monitoring and Reporting (Guidelines Nos 4 & 7: National Water Quality Management Strategy)*, Department of Environment, Perth.

8. Environmental Protection Authority (2002). *Environmental Protection Policy (Water Quality) Policy and Explanatory Report: Revised Draft*, Adelaide.

9. Environment Australia & Agriculture, Forestry and Fisheries Australia (2000). *Our Vital Resources: A National Action Plan for Salinity and Water Quality in Australia*, Canberra.

10. Environment Australia & Agriculture, Forestry and Fisheries Australia (2002). *Framework for the Extension of the Natural Heritage Trust*, Canberra.

11. National Land and Water Resources Audit (2002). *Australians and Natural Resource Management 2002*, Canberra.

12. Department of Environmental Protection (1998). *Environment Western Australia 1998: State of the Environment Report*, Perth.

13. Environmental Protection Authority (2003). *State of the Environment Reporting Public Consultation Paper*, Perth.

14. Government of Western Australia (2003). *Review of Government's Response to the 1998 State of the Environment Report*, Department of Environment, Perth.

15. Water and Rivers Commission (2002). *Water WA 2001: A State of Water Resources Report for Western Australia*, Perth.

16. Environmental Protection Authority (2003). *State Monitoring and Evaluation Framework Discussion Paper*, Perth.

17. Water and Rivers Commission (2001). *Draft consultation paper for the development of the Draft Statewide Waterways Management Strategy*, East Perth.

18. Government of Western Australia (2003). *Hope for the future: The Western Australian State Sustainability Strategy*, Department of the Premier and Cabinet, Perth.

19. Western Australian Planning Commission (2003). *Statement of Planning Policy No. 2: Environment and Natural Resources Policy*, Perth.

20. Avon Catchment Council (2004). *The Avon NRM Strategy: The Regional Natural Resource Management Strategy for the Avon River Basin: First Draft*, Northam.

21. Government of Western Australia (1998). *Swan River Management Strategy*, Perth.

22. Swan River Trust (1999). *Audit of the Swan River Management Strategy: A Status Report, Report No. 31*, East Perth.

23. Swan River Trust (1999). *Swan-Canning Cleanup Program Action Plan, An Action Plan to clean up the Swan-Canning Rivers and Estuary*, Perth.

24. Swan River Trust (2004). *New Legislation and park for the Swan and Canning rivers: Information paper.* March 2004, East Perth

25. Swan Catchment Council (2002). *Draft Natural Resource Management Strategy for the Swan Region*, Perth.

26. Swan River Trust (2002). *Swan and Canning Rivers Precinct Planning Project, Precinct Plan Handbook*, Western Australian Planning Commission and Swan River Trust, Perth.

27. Swan River Trust (1997). *Swan River System, Landscape Description*, Swan River Trust Report No.27, East Perth.

28. Department of Environment (2004) Statewide Assessment of River Water Quality web site: http://www.wrc.wa.gov.au/under/statewqassess/

29. Water and Rivers Commission (1999). *Planning and Management, Foreshore condition assessment in urban and semi-rural areas of south-west Western Australia*, River Restoration Series Report No. RR2, East Perth.

30. ANZECC & ARMCANZ (2000). *Australian and New Zealand guidelines for fresh and marine water quality*. National Water Quality Management Strategy Paper No 4, Australian and New Zealand Environment and Conservation Council and Agriculture and Resource Management Council of Australia and New Zealand, Canberra.

31. Swan River Trust (2003). *Estimating nutrient loads in the rivers and drains of the Swan-Canning catchment*, River Science 11, Unpublished.

32. Swan River Trust (2003). *Water Quality Targets for the Swan-Canning Estuary*, Swan-Canning Cleanup Program Report No. 29, East Perth.

33. Swan River Trust (2003). *Setting Targets: Measuring the success of the Swan-Canning Cleanup Program*, River Science 7, Unpublished.

34. Water and Rivers Commission (2002). *Statewide Waterways Needs Assessment, Prioritising Action for Waterways Management in Western Australia*, Water Resource Management Series Report No. WRM 31, East Perth.

Appendices

Appendix 1
Acknowledgments

This document was compiled by Jessica Dorricott, Policy and Sustainability Branch, Environmental Protection Authority Services Unit, Department of Environment. Thanks must go to those within the Branch who provided project support, edits and guidance.

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Appendix 2

Glossary of acronyms and terms

Acronyms

ACC	Avon Catchment Council
AQIS	Australian Quarantine Inspection Service
CCWA	Conservation Commission of Western Australia
CECP	Centre of Excellence in Cleaner Production
DAWA	Department of Agriculture
DCLM	Department of Conservation and Land Management
DoE	Department of Environment
DoF	Department of Fisheries
DoH	Department of Health
DPI	Department for Planning and Infrastructure
EPA	Environmental Protection Authority
EPP	Environmental Protection Policy
KABC	Keep Australia Beautiful Council
LG	Local government
NGO	Non Government Organisation
NT	National Trust
NHT	Natural Heritage Trust
MPRA	Marine Parks and Reserves Authority
SCC	Swan Catchment Council
SCCP	Swan-Canning Cleanup Program and Action Plan
SRT	Swan River Trust
WALGA	Western Australian Local Government Association
WAPC	Western Australian Planning Commission
WC	Water Corporation

Terms

Baseline data
Data which records the existing elements, characteristics and trends in an area to provide a measure against which progress can be assessed.

Benchmarks
Measures of progress toward a goal, taken at intervals prior to a program's completion or the anticipated attainment of the final goal.

Beneficial use
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; or
(b) identified and declared under section 35(2) of the *Environmental Protection Act* to be a beneficial use to be protected under an approved **environmental protection policy**.

Biological diversity or biodiversity
The variety of life forms: the different plants, animals and microorganisms, the genes they contain, and the **ecosystems** they form. It is usually considered at three levels: **genetic diversity**, **species diversity** and **ecosystem diversity**.

Ecological integrity
The ability of an **ecosystem** to support and maintain key ecological processes and organisms so that their species compositions, diversity and functional organisations are as comparable as possible to those occurring in natural habitats within a region.

Ecosystem
Any system in which living organisms and their immediate physical, chemical and biological **environment** are interactive and interdependent.

Ecosystem diversity
The diversity of all living organisms and non-living components within a given area and their relationships.

Ecosystem health condition
A condition of the **ecosystem** which is —
(a) relevant to the maintenance of ecological structure, ecological function or ecological process; or
(b) identified and declared under section 35(2) of the *Environmental Protection Act* to be an ecosystem health condition to be protected under an approved policy.

Environment
Means —
living things, their physical, biological and social surroundings, and interactions between all of these.

Environmental Protection Policy
Statutory policy on behalf of the Parliament of Western Australia of intentions and principles in relation to the conservation, preservation, enhancement and management of a portion of the **environment**, which provides a framework for action and the setting of **environmental values**, **environmental quality objectives** and **environmental quality criteria**.

Environmental quality criteria
Numerical values or narrative statements that serve as **benchmarks** for environmental performance or condition.

Environmental indicator
A characteristic of the **environment** that can provide information on environmental performance or condition.

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

Environmental value
Means —
(a) a **beneficial use**; or
(b) an **ecosystem health condition**.

Evaluation
Evaluation is the careful assessment of the merit, worth and value of the administration, output and outcomes of a policy or program, which is intended to foster improved future results and actions.

Fringing or riparian vegetation
Vegetation adjacent to the water body and directly dependent on the proximity of the **watercourse** or wetland.

Genetic diversity
Variation of genes/genetic information contained in all individual plants, animals and microorganisms both within and between populations of organisms that comprise individual species as well as between species.

Implementation
The process of putting all policy or program functions and activities into place.

Intergenerational equity
The present generation should endure that the health, diversity and productivity of the **environment** are maintained or enhanced for the benefit of future generations

Landscape
Made up of basic elements – climate, geology, topography, vegetation, fauna and humans – biophysical characteristics that can be used to identify differences between different landscapes.

Monitoring
All actions taken and equipment used for the purpose of detecting or measuring the presence, amount or level of any substance, characteristic or effect.

Natural Resource Management (NRM)
In Western Australia natural resource management is defined as the ecologically sustainable management of the land, water and biodiversity resources for the benefit of existing and future generations, and for the maintenance of the life support capacity of the biosphere. It does not include marine or mineral resources.

Policy area
The area comprising the Swan and Canning rivers and their catchments excluding water reserves and catchment areas constituted under Part IV of the *Metropolitan Water Supply, Sewerage, and drainage Act 1909*.

Precautionary principle
Lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.

Protected catchment
The catchments, being that part of the **policy area** other than the **protected waterway**.

Protected watercourse
A **watercourse** within a **protected catchment**.

Protected waterway
The waterways, being –
(a) the management area as defined in section 3 of the *Swan River Trust Act 1988*; and
(b) that part of the port as defined in section 2 of the *Fremantle Port Authority Act 1902* as comprises the waters of the Swan River between the Western extremities of the North and South Moles and the Fremantle Traffic Bridge.

Representative
Reflecting the characteristics or nature of the larger population in order to generalise.

Resources
Available or anticipated assets required for the development, **implementation** or **evaluation** of a policy or program including staff, equipment, or facilities.

Species diversity
This can be considered as the variety of individual species within a given area, such as a region.

Stakeholders
Those groups and organisations having an interest or stake in a policy or program, its implementation and outcomes (e.g. regulators, government agencies, industry, scientists, residents, indigenous people, community groups).

Sustainability
Meeting the needs of current and future generations through simultaneous environmental, social, and economic improvement.

Watercourse
Means —
(a) any river, creek, stream or brook in which water flows;
(b) any collection of water (including a reservoir) into, through or out of which any thing coming within paragraph (a) flows;
(c) any place where water flows that is prescribed by local by-laws to be a watercourse,
and includes the bed and banks of any thing referred to in paragraph (a), (b) or (c).

Appendix 3

The Comprehensive Management Plan outlined in the EPP

Under clause 10 (2) the Comprehensive Management Plan is to –

(a) delineate the beneficial uses;

(b) establish a framework for the coordinated management of the protected waterways and the protected catchments and specify the persons, bodies, agencies or organizations responsible for that management;

(c) identify areas within the protected waterways and the protected watercourses which require protection;

(d) identify critical areas within the policy area which require -
  (i) priority protection; or
  (ii) priority remedial action to achieve the environmental quality objectives;

(e) recommend indicators, parameters or criteria to measure the environmental quality of the policy area;

(f) develop a programme to achieve and maintain pollutant levels in accordance with the environmental quality objectives;

(g) develop on-going programmes for community involvement in achieving the environmental quality objectives;

(h) include strategies for the development of best management practices for the control of drainage, sewage and the disposal of wastewater and the discharge of nutrients, whether directly or indirectly;

(i) include strategies to prevent litter entering the protected waterways;

(j) review the existing drainage systems to identify opportunities for enhancement to minimise the environmental impact on the protected waterways arising from their design and operation;

(k) specify a data management policy for, and which reflects the data needs of, the departments, bodies and persons;

(l) specify the period or periods within which any action recommended in the plan is to be implemented; and

(m) specify a period within which it is recommended the plan should be reviewed and, if necessary, revised by the Authority.

Key initiatives to fulfil the requirements of the EPP

	Key management initiatives*			
Clause	Riverplan	Swan-Canning Cleanup Program	Draft Swan Region Strategy for Natural Resource Management	Other initiatives
a Beneficial uses	Section 2			
b Management framework	Section 2 and 3			
c Protected areas				Precinct planning project
d Critical areas		Action plan 1st and 2nd priority catchments		
e Indicators, parameters or criteria	Section 2 and 5			
f Pollutant program		Swan-Canning industry project; Local Government Natural Resource Management Policy Project; Water quality monitoring programs; Computer modelling project; Oxygenation project; Sediment remediation project; Constructed wetlands project; Drain retrofitting project	Management Action Target LM3, LM4, WM2, WM4, WM8	Draft Avon Natural Resource Management Strategy
g Community involvement program		Catchment group support; Property planning project; Swan Alcoa Landcare Program; Community awareness & involvement; Caring for the Canning; Local Government Natural Resource Management Policy Project; Swan-Canning industry project	Management Action Target LM5, WM5, TBM5, CHM5, RCM2	Swan Catchment Centre; Ribbons of Blue / Waterwatch WA, Draft Avon Natural Resource Management Strategy

Clause	Key management initiatives*			
	Riverplan	Swan-Canning Cleanup Program	Draft Swan Region Strategy for Natural Resource Management	Other initiatives
h Best management practices		Caring for the Canning; Local Government Natural Resource Management Policy Project; Swan-Canning industry project	Management Action Target LM5, WM5, TBM5, CHM5	Drainage reform group, Draft Avon Natural Resource Management Strategy
i Litter strategies				SRT waterways cleaning; Waste Wise WA; KABC programs; Clean Up Australia campaigns
j Review drainage system				Drainage reform group
k Data management policy				Western Australian Land Information System Policies
l Implementation of plan	Section 4			
m Review of plan	Section 4			

* These initiatives may need to be modified or new initiatives developed where there are currently gaps in river management.

Key initiatives

Caring for the Canning (Swan-Canning Cleanup Program)
A management plan guiding river management in the Canning Catchment. The focus of the plan has been the development of environmental water provisions in consultation with key stakeholders.

Catchment group support (Swan-Canning Cleanup Program)
Administrative and operational funding allocated to catchment groups to facilitate the implementation of on-ground activities and working with local government, industry and community to bring about behavioural change.

Clean Up Australia campaigns
The organisation raises awareness of environmental and litter issues through community education. The organisation's campaigns include Clean Up Australia Day, Litter Prevention in Schools/Leave Only Footprints and the Waste Reduction Program for Business.

Community awareness and involvement (Swan-Canning Cleanup Program)
Communication strategies to raise awareness of river and catchment issues and increase community involvement and corporate support.

Computer modelling project (Swan-Canning Cleanup Program)
Computer modelling of catchment and estuary conditions provides a way of assessing the changes in the estuary likely to occur in response to changes in water quality. Provides a mechanism for testing the effectiveness and relative cost benefit of different management strategies.

Constructed wetlands project (Swan-Canning Cleanup Program)

Well designed constructed wetlands have significant potential to improve the quality of water draining from modified landscapes.

Drainage reform group

State Government agencies, local government and industry working cooperatively to reform drainage management in WA. A Memorandum of Understanding has been signed and a Drainage Reform Group formed with the overall process being facilitated by CSIRO Land and Water.

Drain retrofitting project (Swan-Canning Cleanup Program)

Pollution control devices and other catchment measures to reduce levels of nitrogen and phosphorus entering the river system.

Property planning project (Swan-Canning Cleanup Program)

Assistance provided to semi-rural landholders to improve their land management and reduce nutrient and soil losses.

Keep Australia Beautiful Council (WA) programs

Programs to promote responsible community attitudes towards the disposal of litter. Programs include Tidy WA in May, Keep Australian Beautiful week; Tidy Towns, Perth Environment Awards, Best Beaches and Earth Schools competitions.

Local Government Natural Resource Management project (Swan-Canning Cleanup Program)

Outlines environmental management polices, guidelines and checklists for direct adoption by local governments and the provision of training in environmental management.

Oxygenation project (Swan-Canning Cleanup Program)

Oxygenation improves water quality by increasing dissolved oxygen concentrations and reducing the supply of nutrients that lead to algal blooms.

Precinct planning project

A policy framework for local governments making land use planning decisions in relation to the Swan and Canning rivers. The project manual provides guidance on land use, urban design and stormwater and land management.

Ribbons of Blue / Waterwatch WA

A community involvement, environmental water quality monitoring and awareness raising program for schools and community groups. Develops skills and understandings about water quality in a whole of catchment context.

Sediment remediation project (Swan-Canning Cleanup Program)

The application of Phoslock™, a modified clay to reduce dissolved phosphorus and inhibit phytoplankton growth.

Swan-Canning industry project (Swan-Canning Cleanup Program)

Provides operational support to achieve behavioural change in small to medium sized industry to ensure their management practices are environmentally acceptable and do not lead to the pollution of the Swan-Canning river system or groundwater resource. The Swan-Canning Industry Working Group is the steering group for the Swan-Canning Industry Project. The working group has diverse representation from industry, State, regional and local government, catchment and Natural Resource Management groups and tertiary education institutions.

Swan Catchment Centre

Provides essential information, support and resources to over 250 community conservation groups in the Swan-Canning catchment.

Swan Alcoa Landcare Program (SALP)

A joint initiative between Alcoa and the Swan-Canning Cleanup Program, the Swan Alcoa Landcare program provides funds to community groups and local government for on-ground restoration and environmental protection projects.

Swan River Trust waterways cleaning

Cleaning beaches, removing debris, reshaping eroded beaches, foreshore protection works and responding to pollution incidents are part of the continuous work undertaken by the Swan River Trust.

Waste Wise WA

Promotes waste minimisation and recycling in schools and community. Waste Wise includes programs such as eco-office, cleaner production, the green stamp program and so on.

Water quality monitoring programs (Swan-Canning Cleanup Program)

Monitoring programs measure performance against criteria and track trends in water quality and river health.

Western Australian Land Information System (WALIS) Policies

WALIS is a partnership of State Government agencies, local government and private organisations that enables co-ordination of the State's geographic information and establishes policies and standards that ensure the effective management of this information.

Appendix 4

Key International, National, State, regional and subregional plans and legislation

INTERNATIONAL

Convention on Biological Diversity (1993).
Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention).
General Agreement on Tariffs and Trade (1993).
Japan Australia and China Australia Migratory Bird Agreements (JAMBA & CAMBA).
Local Agenda (1992).
Ramsar Convention (1971).
United Nations for Framework Convention on Climate Change (1994).

NATIONAL

Action Plan for Australian Agriculture.
Australian Heritage Commission Act (1975).
Australian National Strategy for the conservation of Australian Species and Communities threatened with Extinction.
Bushcare Program.
Convention on Biological Diversity (1993).
Council of Australian Government's Water Reform Program.
Green Globe 21.
Key Wetlands and Natural Diversity Recovery Program.
Managing Natural Resources in Rural Australia for a Sustainable Future: A Discussion Paper for Developing a National Policy (1999).
Monitoring River Health Initiative.
National Dryland Salinity Program.
National Ecotourism Strategy (1994).
National Feral Animal control program.
National Forest Policy Statement (1992).
National Framework for the Management and Monitoring of Australia's Native Vegetation.
National Greenhouse Strategy (1999).
National Land and Water Resources Audit (2000).
National Landcare Program.
National Local Government Biodiversity Strategy (1999).
National Pollutant Inventory.
National Principles for the Provision of Water to ecosystems (1996).
National Riparian Lands Research and Development Program.
National Strategy for Agricultural and Veterinary Chemicals.
National Strategy for Ecological Sustainable Development (1992).
National Strategy for the Conservation of Australia's Biological Diversity (1996).
National Tourism Accreditation Program.
National Tourism Strategy.
National Water Quality Management Strategy (1998).
National Weeds Strategy (1997).
National Wetlands program.
Nationally Agreed Framework for the Establishment of a Comprehensive, Adequate and Representative Reserve System for Forests in Australia (1997).
Native Resources and Protection Act.
Native Title Act (1993).
Natural Heritage Trust Act (1997).
Natural Resources Management Strategy 1988.
Nature and Ecotourism Accreditation Program.
Plantations 2020.
Revised Strategy for Ozone protection in Australia
State of the Environment–Australia (1996).
Sustainable Agriculture– Assessing Australia's Recent Progress.
Sustainable Regional Development Final Report (1999).
The Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (2000).
Turfsustain project.
Wetlands Policy of the Commonwealth of Australia (1997).

STATE

Aboriginal Heritage Act (1972)
A Nature Conservation Strategy for Western Australia–Draft (1992).
Agricultural and Rural Land Use Planning Policy (2000).
Bush Fires Act.
Coastal Zone Management Policy for Western Australia–Draft (2001).
Community Support for Natural Resource Management–Future.
Conservation and Land Management Act (1984).
Country Coastal Policy DC6.1.
Draft Algal Bloom Management Strategy (1999).
Endangered Species Protection Act (1992).
Environment Water Provisions Policy for Western Australia (2000).

Environmental Protection Act (1986).
Environmental Weed Strategy for Western Australia (1999).
Final Report of the Native Vegetation Working Group (2000).
Fish Resources Management Act (1994).
Frameworks: Future Needs (2000).
Infinitree program.
Land Administration Act (1997).
Land Management Act (1984).
Memorandum of Understanding for the protection of remnant vegetation on private land in the Agricultural Region of Western Australia (1997).
Metropolitan Water Authority Act (1982).
Nature Based Tourism Strategy for Western Australia (1997a).
Protection of Ground Water from pollution in WA – Draft Regional Development Policy for Western Australia (2000).
Protection of Remnant Vegetation on private land in the Agricultural region of Western Australia (1997).
Representative Marine Reserve System for Western Australia (1994).
Rights in Water and Irrigation Act (1914).
Soil and Land Conservation Act (1945).
State Lime Strategy – Draft (2001).
State Marine Waters Policy, Draft Environmental Protection (1998).
Statement of Planning Policy No. 2: Environment and Natural Resources Policy (2003).
Statement of Planning Policy No. 2.6: State Coastal Planning Policy (2003)
State of the Environment (1998).
State Planning Strategy (1996a).
State Water Quality Management Strategy (1999).
State Water Use Strategy (1999).
State Weed Plan Draft (1999).
Town Planning and Development Act (1928).
Vegetation Management Act (1997).
WA Salinity Strategy (2000).
Water and Rivers Commission Act (1995).
Waterways Conservation Act (1976).
Waterways WA–Draft Statewide Policy #4 (2000).
Western Australian Government Framework for Natural Resource Management to assist in achieving sustainable natural resource management (2000).
Wetlands Australian Planning Commission Act (1994).
Wetlands Conservation Policy for Western Australia (1997).
Wildlife Conservation Act (1950).

REGIONAL

Agricultural and rural land use planning policy (1999).
AGWEST Sustainable Rural Development Program: Strategic Plan (1998-2003).
Bush Forever (2000).
Draft Avon River Basin natural resource management plan (2000).
Draft Environmental Protection (Swan Coastal Plain Wetlands) Policy (2000).
Environmental action: Government's response to the State of the Environment Report (1999).
Future Perth Indicators (1999).
State Water Quality Management Strategy
Swan Coastal Plain - A Strategy for a Sustainable Future (1999).
Swan-Canning Cleanup program and Action Plan.
Swan Region Natural Resource Management Strategy (2002).
WAste 2020 Draft Strategy (2000).
Western Australian Government Sustainable Cities Initiative (2000).
Working together – A recovery action plan for the Swan-Avon catchment (1997).

SUBREGIONAL

Brockman River Catchment Plan
Caring for the Canning, Southern and Wungong Rivers (2002).
City of Canning Integrated Catchment Management Strategy.
Conservation reserves for Western Australia -The Darling system - System 6 (1984).
Draft Pioneer Park Ecological Recovery Plan (2001).
Draft Southern River, Forrestdale, Brookdale, Wungong Structure Plan Urban Water Management Strategy (2002).
Eastern Metropolitan Regional Council Regional Environmental Strategy (2000).
Ellenbrook Catchment Management Plan.
Erosion and Sediment Control Manual for the Darling Range (2001).
Foothills Structure Plan (1992).
Draft Interpretation Plan for Canning River Regional Park (2002).
Local Government Natural Resource Management Manual (2002).
Draft Local Government Biodiversity Planning Guidelines (2002)
North East Catchment Committee 5 year NRM Implementation Plan
North-Eastern Corridor Extension Strategy (2000).
North-eastern Hills Settlement Pattern Plan (2000).
Perth's Greenways (1998)
Proposals for Darling Range Regional Park (1995).

Shire of Mundaring Environmental Management Strategy (1996).
Swan-Canning Industry Project Strategic Plan (2003).
Swan Estuary Marine Park and Adjacent Nature Reserves Management Plan 1999-2009 (1999).
Upper Canning Southern Wungong Catchment Management Plan (1999).

Appendix 5

Organisational arrangements in the EPP area

Organisation	Key Legislation	Key current activities	Monitoring and reporting
Department of Environment / Environmental Protection Authority / Swan River Trust / Keep Australia Beautiful Council	*Environmental Protection Act 1986* *Environmental Protection (Swan and Canning Rivers) Policy* *Environmental Protection (Swan Coastal Plain Lakes) Policy* *Waterways Conservation Act 1976* *Rights in Water and Irrigation Act 1914* *Swan River Trust Act 1988* *Litter Act 1979*	• Set environmental quality objectives and standards • Pollution control and regulation of industry through licensing • Implementation strategies for Environmental Protection Policies (EPPs) • National Pollutant Inventory • National Environment Pollutant Monitoring • Project assessment (EIA process) • State Salinity Strategy • Licensing of water use • Development of Environmental Water Provisions (EWPs) • Waterways WA Program • Information and advice to guide waterways management planning • Advice on wetland evaluation and management • Flood forecasting and advice • Strategic drainage planning • Awareness raising and technical support • Swan-Canning Cleanup Program and Action Plan • Planning river management • Promote responsible community attitudes towards the disposal of litter	• Annual reporting • State of the Environment Reporting • Reviews of EPPs • Industry audits • Ribbons of Blue • Frogwatch • Review of Swan-Canning Cleanup Program and Action Plan • Tidy Towns, Perth Environment Awards, Best Beaches and Earth Schools
Department for Planning and Infrastructure / Western Australian Planning Commission	*Town Planning and Development Act 1928* *Metropolitan Region Scheme Act 1963* *Western Australian Planning Commission Act 1994* Statements of Planning Policy	• State Planning Strategy • Metropolitan Region Scheme • Regional Strategies • Subdivision and Development Control Policies • Implementing Bush Forever (with other agencies) • Jandakot Land Use and Water Management Strategy • Gnangara Land Use and Water Management Strategy • Promotion of water sensitive urban design • Development of Urban Bushland • Statement of Planning Policy • Agricultural and Rural land use Statement of Planning Policy (No 11) • Finalisation of the Environment and Natural Resources Management	• Annual reporting • Audit of Bush Forever • Appeals process

Organisation	Key Legislation	Key current activities	Monitoring and reporting
		Statement of Planning Policy • Acquiring land for Comprehensive, Adequate and Representative (CAR) Reserve system (reserved for Parks and Recreation) • Metropolitan Region Scheme and Model Scheme Text	
Department of Conservation and Land Management / Conservation Commission of Western Australia / Marine Parks and Reserves Authority	*Conservation and Land Management Act 1984* *Wildlife Conservation Act 1950* *Wetlands Conservation Policy 1997*	• Finalisation of Biodiversity Conservation Act • Recommending conservation requirements • Management of State forest, national parks, regional parks, natue reserves and other public conservation lands including Comprehensive, Adequate and Representative Reserve System • Off-reserve conservation • Research, education and extension • Conservation activities with community groups • Protection of threatened species and ecological communities • State Salinity Strategy • Wildlife Conservation • Area management plans • Special areas management (e.g. State Salinity Strategy, State Wetland Conservation Strategy)	• Area conserved /reserved • Annual reporting
Department of Agriculture	*Soil and Land Conservation Act 1945* *Agriculture and Related resources Protection Act 1986*	• Completion of Agriculture Management Act • State Salinity Strategy • Property Planning for landholders in the Swan-Canning catchment • Regulating rural land degradation issues including remnant vegetation protection • Developing and extending Best Management Practices for rural land use • Biosecurity and management of pests and diseases • Management of the Natural Heritage Trust in WA • Agricultural resource management • Land Conservation District Committee administration	• Annual reporting • Best Management Practices in place • Natural Resource Management
Department of Fisheries	*Fish Resources Management Act 1994*	• Licensing and management of aquaculture, commercial and recreational fisheries • Volunteer Fisheries Liaison Officer (VFLO) program • Fish management plans • Recreational Fishing License regulations	• Annual reporting • State of the Fisheries Report

Organisation	Key Legislation	Key current activities	Monitoring and reporting
		• Codes of practice • Fish and fish habitat protection • Fishcare WA projects • Fish for the Future campaign	
Department of Industry and Resources	*Dangerous goods (Transport) Act 1998* *Mining Act 1978*	• Licensing and ministerial conditions on existing operations • Environmental assessment of new proposals	• Annual reporting
Water Corporation	*Water Corporation Act 1995*	• Environmental programs • Water supply • Drainage and sewerage • Management of vested land • In-fill sewerage progress	• Annual reporting to Minister • Condition on vested lands • Bi-annual Operating Licence audits
Department of Health / Department of Indigenous Affairs / Forest Products Commission / Botanic Gardens & Parks Authority / Main Roads / Department of Treasury and Finance / Department of Premier and Cabinet / Western Power / Telstra / Alinta Gas / Fremantle Ports	Various legislation	• Environmental programs • Management of health-related services • Indigenous affairs • Commercial revegetation • Conservation of Kings Park, Bold Park and the State's Botanic Garden • Road management • Management of public sector finances • Serving the Premier and Cabinet • Electricity supply • Telecommunications • Natural gas provider • Port management	• Annual reporting
Commonwealth Government	*Environmental Protection and Biodiversity Conservation Act 1999*	• National Biodiversity Strategy • Natural Heritage Trust investment to State Government agencies, local governments and community • Commonwealth EIA processes • National Pollutant Inventory • Setting guidelines and national benchmarks and strategies • National salinity and water quality management • International treaty obligations	• Annual reports • Natural Heritage Trust reviews • National Land and Water Resources Audit • State of the Environment Reporting
Local governments / Department of Local Government and Regional Development / Western Australian Local Government Association	*Local Government Act* and specialist Statutes *Town Planning and Development Act 1928* Statements of Planning Policy	• Regional development/planning • Waste collection/Recycling / waste minimization/street sweeping • Drainage • Town Planning Schemes • Rural land use strategies • Local planning policies • Local planning strategies • Development policies • Strategic environmental planning • Management of conservation reserve areas and public open space	• Annual reporting • State of the Environment Reporting • Local Agenda 21 reporting • Local Biodiversity Strategies • Input into Regional Natural Resource Management Strategies

Organisation	Key Legislation	Key current activities	Monitoring and reporting
		• Local Bushland Management Plans • Local Agenda 21 • Support for local groups	
Swan and Avon Catchment Councils / Catchment/Natural Resource Management groups / Land Conservation District Committees / Friends and conservation groups / Non Government Organisations / South West Aboriginal Land and Sea Council / Indigenous community groups		• Education and awareness building • Working together • Community development and training • Foster community-government partnerships • Representation to government • Group support and funding • Local environmental planning and community education • Influencing environmental change • Policy development • Monitoring • Environmental programs • Coordinating community, government and industry support • Support for community groups • Influencing environmental change and community education • Conservation activities on-ground	• Annual reporting to NHT and local government • Annual reporting to stakeholders • Regional NRM Strategies
Small to medium sized enterprises / Prescribed industry / Agricultural sector / Industry associations / Registered Training Organisations / Private investors		• Implementing best management practice, codes of practice and environmental management systems (ISO) • Monitoring impacts • Sponsorship to community groups and Landcare Trust	• Reporting to regulating bodies • Published environmental reports