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# CANNING PLAIN CATCHMENT

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## MANAGEMENT ACTION PLAN

AN ACTION PLAN FOR MANAGEMENT OF  
SURFACE WATER AND GROUNDWATER IN  
THE CANNING PLAIN PROJECT AREA

Prepared for the South East Regional Centre for Urban Landcare  
with support from the Swan River Trust and the Canning Plain  
Management Plan Steering Committee

**March 2007**

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### **Canning Plain Management Plan Steering Committee**

#### **Organisation**

City of Belmont

City of Canning

Department of Environment and Conservation

Department of Planning and Infrastructure

Department of Water

East Metropolitan Regional Council

Main Roads WA

South East Regional Centre for Urban Landcare Inc.

Swan Catchment Council Inc.

Swan River Trust

Two Rivers Catchment Group Inc.

Water Corporation

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See Canning Plain Catchment Management Plain Volume 2

## Executive Summary

The existing drainage systems in the Canning Plain catchment area receive considerable input of nutrients and pollutants from their surrounding residential and industrial land uses. These drainage systems were built many years ago and were designed and constructed to reduce flooding and inundation of land for urban development. Therefore, they have little ability to process or reduce these contaminants and consequently they convey them to downstream receiving waters.

Community and government have expressed concern about the impacts of stormwater on ecological and social values, which have prompted the need to improve the management of the quantity and quality of water within and discharging from the catchment.

To address these concerns, a number of government agencies and natural resource management groups formed a partnership to prepare a strategic plan with the aim of developing solutions to manage surface water and groundwater issues in this catchment. This resulted in the preparation of the Canning Plain Catchment Management Plan (Parsons Brinckerhoff, 2004, Implementation of Actions and Strategies to Manage Water Quality in the Canning Plain Catchment).

The Catchment Management Plan was prepared as a trial of a stormwater management plan framework. It contains important and useful risk assessment information, but it has limitations in its practical application by the partner organisations.

This Action Plan details an innovative partnership approach between community and government, seeking to improve the health of the Swan & Canning Rivers. They aim to do this through implementation of current best practice actions to improve water quantity and quality management in the catchment. The Action Plan aims to take the information from the Catchment Management Plan and consolidate it into a useable document that outlines clear long term and short term actions for the partner organisations. This Plan also sets context with the recent changes in natural resource management.

Declining rainfall has increased the attention of water management in Australia and the need to conserve and manage it as a valued resource. Ideally, the principles of integrated water cycle management should be applied in this catchment, whereby water contained within these drainage networks can be used as a resource for reuse and recycling before reaching its receiving waters in an acceptable condition.

This document outlines the concept of integrated water cycle management, but the actions are limited to a focus on surface water and groundwater management. As the concept and application of integrated water management grows in Western Australia, so will the ability to apply its principles to catchments such as the Canning Plain.

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<sup>1</sup> Integrated water management: the integration of water supply, sewerage and stormwater, so that water is used optimally within a catchment resource, state and national policy context. It promotes the coordinated planning, development and management of water, land and related resources (including energy use) that are linked to urban areas and the application of WSUD principles within the built urban environment (National Water Commission, 2006).

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The Action Plan outlines recommendations for;

- \* Setting and outlining a strategic context;
- \* Clear identification of all partners and stakeholders and their roles and responsibilities;
- \* Modelling and generation of up to date information to assist with risk assessment;
- \* Updating and finalising risk assessment information;
- \* Development of catchment management targets, relevant management strategies and management action targets to address the risks;
- \* Developing and fostering current best management practices in the catchment;
- \* Investment planning; and
- \* Evaluation.

The Action Plan is characterised by effective involvement by partner organisations and representatives of community. It is expected that many of the proposed actions will be delivered through these organisations. SERCUL is listed in Table 4 to lead many of the actions however, it is recognised by the partner organisations that this role is one of 'co-ordination'. Resources and a management structure for appointment of a Project Manager employed through SERCUL is a high priority to enable successful delivery of this Plan.

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Mill Street Compensating Basin Outlet 2007



Welshpool Drain

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Leige St Wetlands Drain Inlet (North East)



Leige St site (South East)

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Manley Compensation Basin Before Restoration



Manley Compensation Basin Post Restoration

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Mills Street Basin 2007



Mills Street

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Anvil Way Drain





Wilson Wetlands



Black Swan on Wilson Wetlands

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McDowell Street

## **1 Introduction**

### **1.1 Background**

In 1999, the Swan-Canning Cleanup Action Plan identified Mills Street Main Drain as one of the major contributors of nutrients to the Swan-Canning river system.

To strategically address these challenges, the Canning Plain Catchment Group was established in 2000. The catchment group has since amalgamated with others to form the Two Rivers Catchment Group Inc.

To assist the Catchment Group in its endeavours, State and local government agencies formed a partnership agreement to assist in preparing a strategic plan for this catchment. The partners are the City of Canning (CoC), the City of Belmont (CoB), Department of Water (DoW), Swan River Trust (Trust), Water Corporation (WC), Swan Catchment Council (SCC) and the South East Regional Centre for Urban Landcare (SERCUL).

The Department of Planning and Infrastructure (DPI), including Main Roads WA, and the Department of Environment and Conservation (DEC) are also key stakeholders and are represented along with the partner organisations on the Project Steering Group (PSG).

The Project Steering Group engaged the services of Parsons Brinckerhoff in 2002 to prepare the Canning Plain Catchment Management Plan (Implementation of Actions and Strategies to Manage Water Quality in the Canning Plain Catchment, June 2004).

The Canning Plain Catchment Management Plan was prepared as a trial of a stormwater management plan framework developed for adoption by local government through SCCP. The Catchment Management Plan provides a catchment description, an adapted risk assessment framework and a ranked range of best management practice (BMP) strategies. The plan also includes an implementation program that summarises the risk and BMP assessments and lists the priority management actions.

Natural resource management structures and arrangements have changed somewhat since the Catchment Management Plan was developed by the consultants. Therefore, this report provides a framework for on-going implementation of the Catchment Management Plan, taking into account these changes.

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## 1.2 Project setting

The *Canning Plain Management Action Plan* provides a framework for implementation of actions to improve water quality by an integrated approach to management of storm water and groundwater resources within the catchment area for five artificial drainage systems known as Mills Street, Cockram Street, Wharf Street, Liege Street and Wilson Main Drains.

The Project Area was divided into seven sub catchments in the Catchment Management Plan (Parsons Brinckerhoff, 2004), as required by the original project brief. Three of which are surface water and four are groundwater sub catchments. This division was based on differences in environmental values, sensitivities and threats.

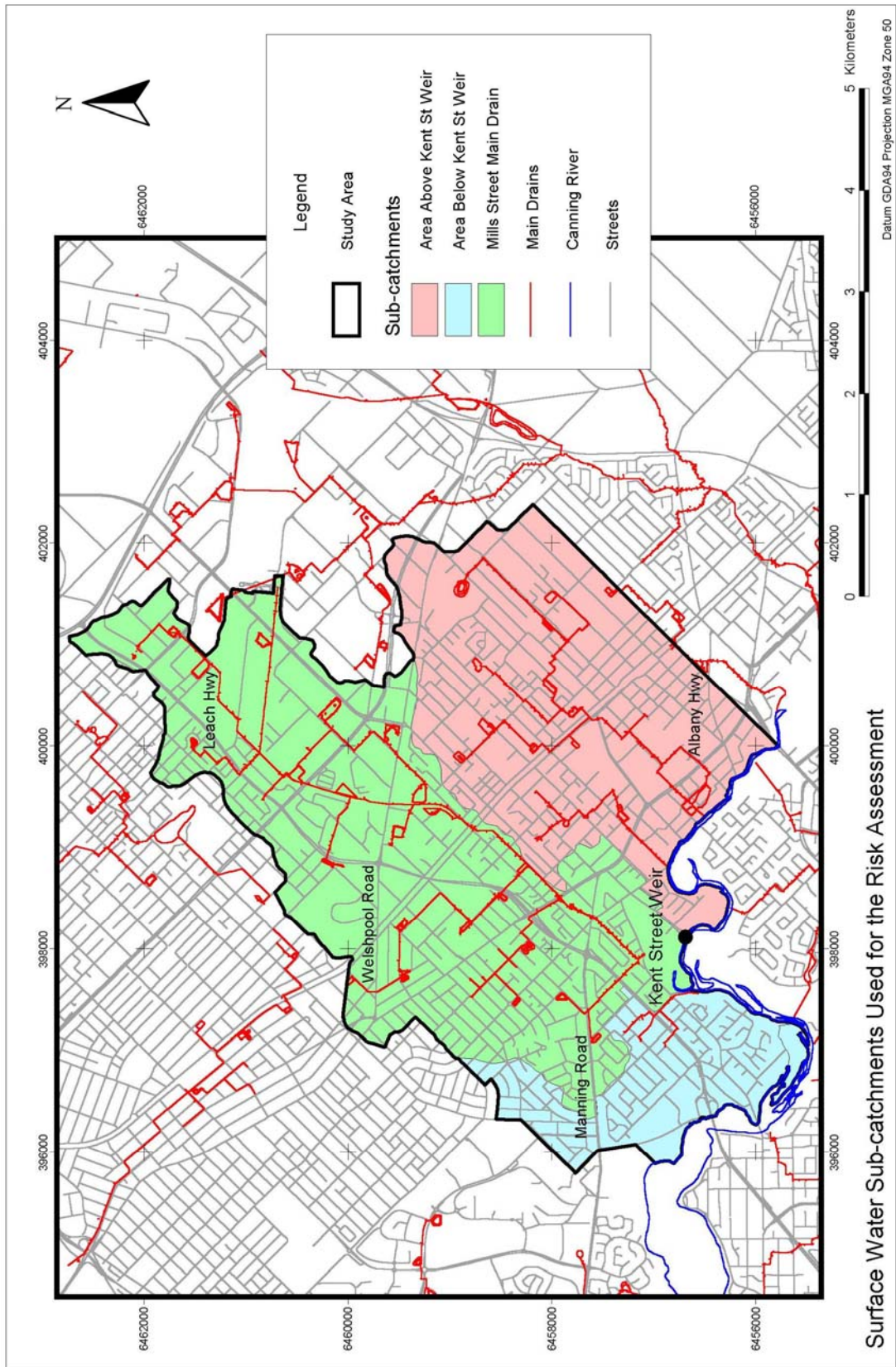
The tables below give a brief description of the seven sub catchments and their associated drainage networks, which are visually detailed in Figures 1 and 2.

Surface water sub-catchment	Description of drainage network
Freshwater section of Canning River	The area draining to the Canning River upstream of the Kent Street Weir including; <ul style="list-style-type: none"> <li>•1 Wharf St Main Drain;</li> <li>•2 Cockram Street Main Drain;</li> <li>•3 Part of Lacey Street Main Drain; and</li> <li>•4 Local drains near the river.</li> </ul>
Estuarine section of Canning River	The area draining to the Canning River downstream of the Kent Street Weir including; <ul style="list-style-type: none"> <li>•1 Wilson Main Drain;</li> <li>•2 Local drains near the river.</li> </ul>
Mills Street Main Drain	•3 Mills Street Main Drain, draining through Wilson Wetland.

**Table 1** Description of surface water sub catchments

Groundwater sub-catchment	Description
Freshwater section of Canning River	Shallow groundwater discharging into the Canning River upstream of the Kent Street Weir.
Wilson Wetland and Canning River	Shallow groundwater discharging into: <ul style="list-style-type: none"> <li>•4 Wilson Wetland; and</li> <li>•5 Canning River downstream of the Kent Street Weir to Bow Street.</li> </ul>
Estuarine section of Canning River	Shallow groundwater discharging into the Canning River downstream of Bow Street.
Tomato Lake and Swan River	Shallow groundwater discharging into Tomato Lake and ultimately into the Swan River near Burswood.

**Table 2** Description of groundwater sub catchments



**Figure 1** Surface water sub catchments in the Study Area  
(sourced from Parsons Brinckerhoff, 2003)

### **1.3 Aim of Plan**

This Action Plan is based on the information in the Catchment Management Plan (Parsons Brinckerhoff, 2004). It provides a revised structure for implementation and adds new opportunities that are now available through partner organisations.

The concept of 'total water cycle management' has been adopted as a principle by the project partners since the commencement of this project. However, this action plan does not address all components of the 'total water cycle' but principally refers to surface water and groundwater management issues.

The requirements of this Action Plan are that it:

- identifies short and long-term outcomes;
- provides for clear and achievable actions that are linked to operations of the partner organisations;
- integrates with existing or ongoing projects, programs or operations of partner organisations;
- is compatible with the budget cycles and processes of partner organisations;
- links to the Swan Regional NRM Strategy and Investment Plan and the Healthy Rivers Action Plan; and
- leads towards formal partnership arrangements for implementation of the Plan.

The Action Plan is prepared as a 'living' document. It is not intended to provide comprehensive information or analysis. It does provide an implementation framework for development of actions based on the original planning documents and negotiated arrangements. Proposed actions are listed within sections of the framework with explanatory notes and cross-referencing. Links to existing programs or new opportunities are listed.

A schedule of proposed actions is provided in Section 5. This provides tabulated information for implementation based on priorities, roles and responsibilities, estimated costs, time period, outputs and contribution to targeted short and long-term outcomes.

The Action Plan is structured for annual review of proposed actions and addition of new actions.

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<sup>2</sup> Total water cycle management – consideration of water in its whole cycle of use, including rainfall, stormwater, wastewater and groundwater with an emphasis on recycling and reuse.

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## 1.4 Implementation framework

The implementation framework for the Action Plan is based on a structure of three 'focus areas'. The importance of these is in separating the functions of implementing actions without losing the 'common thread' of integrated catchment planning.

### 'Focus Area A' – Information and Engagement

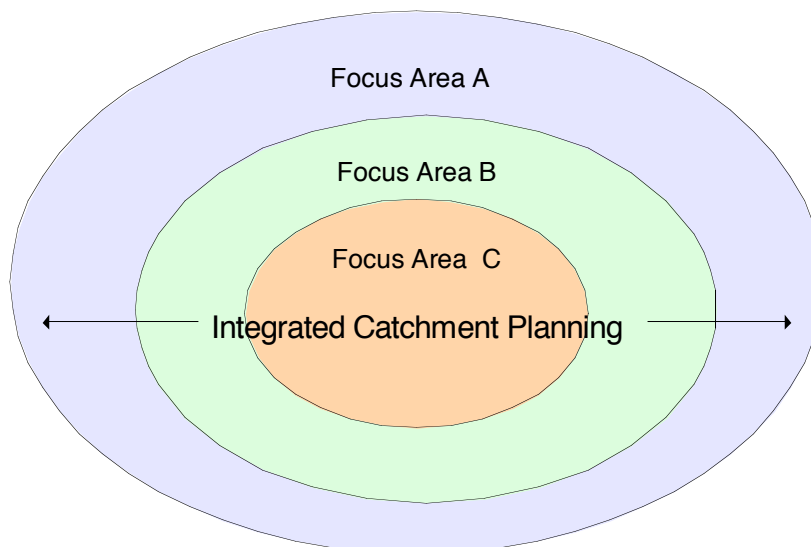
This set of actions provides clear statements about the context and scope of planning, the environmental situation, who is involved, existing projects and investment and broader stakeholder engagement.

### 'Focus Area B' – Analysis and Planning

Actions are derived from existing documentation, including the Catchment Management Plan (Parsons Brinckerhoff, 2004) and partner organisation initiatives. The range of actions includes concept development, risk assessment, evaluation of 'best practice' and identification of management strategies, programs and actions.

### 'Focus Area C' – Practice Change Delivery

Delivering change outcomes through planned actions requires review and evaluation of implementation processes. Actions are arranged within sets of practice change pathways with clear identification of the expected level of effectiveness. Cost-sharing arrangements and provision for 'triple bottom line' evaluation and accounting is made. Ongoing information and knowledge management is outlined.



**Figure 3** Diagrammatical explanation of the implementation framework

Monitoring and evaluation for change in the catchment is structured within a simple 'adaptive management' framework. The intent is to review program performance against outcome targets annually in a way that facilitates improvement and efficiency and enables planning within the budget cycles of partner organisations.

Longer-term monitoring and evaluation of change in the catchment should be linked to the targets set by partner organisations for the Perth Metropolitan Area and local targets for the study area.

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## 2 'Focus Area A' – Information and Engagement

### 2.1 Strategic Context

Catchment planning requires clear strategic context. The purpose of planning is in deciding what to do and when. Guidelines are required for these decisions.

The strategic context should include:

- *The planning context and scope* – a statement of what is to be considered, the scale of planning, who is involved and a time-frame. The title of the plan should reflect the context and scope;
- *Values and perceptions* – description of aspirations and cultural values or concerns that are driving the need for change through planning;
- *Purpose, vision and goals* – clear statements about the purpose of the plan, a vision for how the future may appear (a simple 'word picture') and long-term goals to which the catchment group, partners and stakeholders (including the broad community) might aspire; and a
- *Management framework* – a structured approach for delivery of planned actions.

Arrangements for a 'project manager' and 'steering committee' are to be established.

#### **Existing Initiatives**

- Strategic context set previously by CPCG;
- Regional NRM strategic context developed by SCC and SERCUL;
- Environmental planning developed by local government; and
- Sustainability strategies (state, regional and local).

Code	Action	Lead organisation	Support organisation
A1.1	Prepare a statement of scope and context for the Action Plan.	SERCUL	
A1.2	Prepare a statement of values and perceptions of partners and the local community.	SERCUL	
A1.3	Revise statements of purpose, vision and goals considering existing initiatives.	SERCUL	
A1.4	Develop an action delivery framework.	SERCUL	

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## 2.2 Situation Statement

A clear statement of the situation being addressed by the Action Plan is required. The 'Situation Statement' will assist in developing the strategic framework, and it will clarify the purpose of involvement for partners and stakeholders.

The 'Situation Statement' should be derived from science-based information and include:

- *Description of the bio-physical environment* – focused on soils, landform, riparian/aquatic ecosystems and water resources;
- *Previous and current land use* – an overview of development and change from the natural environment;
- *Natural resources and related cultural assets* – listing and evaluation of key assets;
- *Key resource use issues* – trends in declining groundwater levels, surface and groundwater quality and impacts on receiving environments (assets);
- *Major threatening processes* – identification and explanation of key threatening processes and potential impacts; and
- *Key stakeholder groups* – listing of those who are or should be involved.

While the statement is for the study area, it should be related to resource condition within the Swan NRM region.

The 'Situation Statement' should be presented in a concise format (4-6 pages with graphics) suitable for wide distribution and understanding.

### Existing Initiatives

- Vol. 1 and 2 of the Catchment Management Plan (Parsons Brinckerhoff, 2004) (Table 2.8 in Vol. 2 lists Issues, Table 3.2 lists the receiving water bodies, Appendix C lists the environmental values of these bodies, Appendix D assesses the significance of these values, and Appendix E provides an assessment of threatening processes);
- Appendix A of the Catchment Management Plan (Parsons Brinckerhoff, 2004) (note refs. SRT 2002 a and b); and
- Swan NRM Region and SERCUL sub-regional planning documentation.

Code	Action	Lead organisation	Support organisation
A2.1	Prepare a 'Situation Statement' for the study area.	SERCUL	

### 2.3 Stakeholder Analysis

The Action Plan has been convened by SERCUL. Partners include CoC, CoB, DoW, SRT, WC, SCC, SERCUL, EMRC, DPI and DEC. Stakeholder groups identified in the 'Situation Statement' should include industry organisations, commercial groups, residents, conservation groups and a wide range of others.

An analysis of each partner or stakeholder grouping should be based on:

- Legitimacy (seen by others as the 'right' organisation to be involved);
- Power (regulations or policy); and
- Alignment of interest (resulting in synergistic outcomes for resource condition).

The processes of stakeholder mapping and analysis should be undertaken by the project manager and steering committee. It should be undertaken over time during which there are initial engagement meetings with key representatives. These negotiations will provide the basis for analysis (the above criteria) and subsequent engagement. This is particularly significant for industry groups.

#### **Existing Initiatives**

- SCC stakeholder lists and analysis processes.

Code	Action	Lead organisation	Support organisation
A3.1	Prepare a map and analysis of identified stakeholder groups.	SERCUL	
A3.2	Undertake initial engagement meetings with key stakeholder groups.	SERCUL	

### 2.4 Existing Investment Inventory

The Canning Plain Catchment Management Plan (Parsons Brinckheroff, 2004) identified a wide range of previous studies and plans and provided a review of existing management practices used by partner organisations in managing urban stormwater.

In addition to this, there is a need to identify past or current projects and operations relevant to the Action Plan for each partner organisation. A spreadsheet list should be developed for:

- Reports (listed in Appendix A of the Catchment Management Plan (Parsons Brinckerhoff, 2004));
  - Management Plans (e.g. Healthy Rivers Action Plan, local environment plans and many others);
  - Strategies and policy documents;
  - Projects (including demonstration sites such as artificial wetlands);
  - Statutory plans (e.g. Town Planning Schemes);
-

- Auditing processes (e.g. industry audits);
- Operations (e.g. street sweeping); and
- Monitoring.

The spreadsheet should identify the key partner organisations, the date or period of relevance for respective investments or actions. The purpose of the spreadsheet is to ensure that previous studies or information are considered and that current projects or initiatives are linked to this Action Plan.

Table 8 of this document provides a list of existing partner actions.

### **Existing Initiatives**

- Vol. 2 and Appendix A of the Catchment Management Plan (Parsons Brinckerhoff, 2004).

<b>Code</b>	<b>Action</b>	<b>Lead organisation</b>	<b>Support organisation</b>
A4.1	Prepare a spreadsheet of previous or current plans, operations and actions relevant to the Action Plan.	SERCUL	

## **2.5 Base-line Spatial Information**

Engagement of stakeholders for practice change or other involvement in the Action Plan is substantially assisted by spatial presentation of information (e.g. annotated maps). The Catchment Management Plan (Parsons Brinckerhoff, 2004) includes some relevant spatial information but there is further requirement for this to be arranged for effective use by partners and stakeholders. Adoption of a geographic system (GIS) format is required. The database for this Action Plan should be linked to regional NRM information (through SCC and SERCUL).

Information should be presented as thematic overlays to an ortho-photo map based (scale of 1:2,500 suggested although the scale can vary according to intended use). The minimum dataset should include:

- Sub catchments (7 described in Section 3.3.3, Volume 2 of the Catchment Management Plan (Parsons Brinckerhoff, 2004));
  - Soils and landform (detailed information required for water quality management);
  - Fringing vegetation and foreshore condition;
  - Surface Water monitoring (flow and quality);
  - Groundwater monitoring (levels, quality, superficial flows);
  - Cadastre and current land use;
  - Historical land use;
  - Regional and local statutory planning boundaries;
-

- DEC Licensed sites and contamination assessment;
- DOW licensed sites; and
- Drainage infrastructure (WC & LG).

This information is a critical requirement for risk analysis. It is also important for clear spatial representation of current and proposed actions (e.g. a map showing the location of works).

### **Existing Initiatives**

- Maps provided in Catchment Management Plan (Parsons Brinckerhoff, 2004);
- DEC, DOW, SCC and SERCUL databases; and
- Local government databases.

<b>Code</b>	<b>Action</b>	<b>Lead organisation</b>	<b>Support organisation</b>
A5.1	Prepare and maintain a spatial information database.	CoC	

## **2.6 Catchment Management Targets**

Targets are objective measures of achievable outcomes for the short and long term. Targets should be specific, measurable, achievable, realistic and time-bound (SMART) and should direct the focus of management efforts. Longer-term targets should relate to 'goals' (i.e. about resource condition) and short-term targets should be focused on management actions (specifically how to go about achieving the long-term targets).

Any targets that are developed should relate to the management of the catchment and be consistent with any existing targets and timeframes developed by partner organisations, including the South East Regional Centre for Urban Landcare, Swan River Trust, Department of Water, Swan Catchment Council, Water Corporation, Local Government, Department of Environment and Conservation, Department of Planning and Infrastructure and Main Roads WA.

The Catchment Management Plan (Parsons Brinckerhoff, 2004) adopts broad targets (e.g. a 50% nutrient reduction) although these are not substantiated nor meet the SMART criteria. Targets for catchment management that relate to resource condition for the local area are required. These may include targets for surface water quality and quantity, groundwater quality, riparian vegetation and aquatic biodiversity. It is important to note that resources also include stakeholders, businesses and the community. Therefore, capacity building may also be a target for the catchment.

**Existing Initiatives**

- Swan Regional NRM Strategy;
- SCCP Action Plan and Healthy Rivers Action Plan; and
- Local Environment Plans or Strategies (LGAs).

<b>Code</b>	<b>Action</b>	<b>Lead organisation</b>	<b>Support organisation</b>
A6.1	Set long-term targets for catchment management for the local area.	SERCUL, SRT	SCC, CoC, CoB, DoW, DEC

### 3 'Focus Area B' – Analysis and Planning

#### 3.1 Management Concept Development

The Action Plan provides a strategic focus for surface water and groundwater management. This provides for a holistic approach that is not adequately represented in the 'seven-step' stormwater planning approach adopted for the Catchment Management Plan (Refer to Section 4.2, Parsons Brinckerhoff, 2004).

Water management is an important issue in Australia and there is an increasing need for governments and the community to adopt 'integrated water cycle management'. This concept involves the integration of water supply, sewerage and stormwater so that water is used optimally within a catchment, State or National context. It also promotes the coordinated planning, development and management of water and the application of Water Sensitive Urban Design (WSUD) principles. (National Water Commission, 2006).

Integrated water cycle management is similar to the concept of total water cycle management, except that it considers it in context with planning processes and WSUD. Managing natural resources is likely to be more effective if linked with other planning and management issues (e.g. health, education, regional development).

The concept of integrated water cycle management should be applied to this catchment, to maximise the value of stormwater as a potential water resource in an increasingly drying climate. Application of Water Sensitive Urban Design principles would assist in achieving this aim and should be applied for when any new or retrofitted developments are planned in the project area.

Greater emphasis is required on surface water and groundwater flow pathways through the Project Area. There should also be investigation into the required flows to maintain ecological function and ensure flood protection.

#### ***Existing Initiatives***

- 'Total Water Cycle' concepts in statutory planning (e.g. for Southern River);
- WSUD principles for planning; and
- New WAter Ways Program: capacity building in integrated water cycle management.

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<sup>3</sup> Flow pathways - natural pathways of water movement

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Code	Action	Lead organisation	Support organisation
B1.1	Prepare brief notes and graphic representation of the 'flow pathways' for water and nutrients with the aim of providing data for surface water and groundwater modelling (Refer to Action B2.1).	LGAs & WC	DoW
B1.2	Review and document WSUD principles relevant to the catchment and locate potential areas in the catchment where these principles may be applied.	SERCUL	
B1.3	Describe and list opportunities for application of integrated water cycle management through state and local government statutory planning processes.	DPI	DoW

### 3.2 Risk Assessment

The Catchment Management Plan (Parsons Brinckerhoff, 2004) provides a detailed assessment of risk to water resources based on a rating matrix approach to a list of identified threat types. This is applied to the seven sub catchments (Tables 3.2 – 3.19 in Appendix E) and is related to environmental values, stormwater function and other values (amenity, cultural and economic) in Appendix F. The results of this are shown in Table 4.1 in Volume 1 of the Catchment Management Plan (Parsons Brinckerhoff, 2004).

The risk assessment provides a useful list of threat types and although it provides a structured process of prioritising risks, it also has its limitations. These were identified by the consultants in the Catchment Management Plan, Volume 2, Section 3.6.

One of the main concerns of Parsons Brinckerhoff was that the risk assessment process was a very time consuming process and catchment managers should consider whether resources would be better spent on delivering management actions, especially if you are working in a catchment where the highest priority risks are obvious.

Table 4.1 (Catchment Management Plan (Parsons Brinckerhoff, 2004)) identifies the highest priority threats occurring in the Mills St. Main Drain (the one exception being for septic tank effluent in residential areas) and to a lesser extent in the Wilson Wetland groundwater sub-catchment and the surface water sub-catchment draining downstream of the Kent St. Weir.

However, the assessment does not identify which of the eleven highest priority threat types should have early response compared with others, nor does it specify where in sub catchments that action is required.

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The ratings matrix approach was based on very limited risk assessment information and was a trial of a new methodology for evaluating stormwater related risks. There were only 4 long-term groundwater monitoring wells, six additional wells recently installed near the Wilson Wetlands, four monitoring sites for groundwater contamination and one relatively comprehensive 'snapshot survey' for water quality (reported in 1987) available for the assessment.

Some threat types have very limited information (e.g. historic contamination plumes, heavy metals in detention basin sediments) so are not adequately addressed in the Catchment Management Plan (Parsons Brinckerhoff, 2004). The matrix is effectively based on qualitative assessment rather than empirical information.

More recently, there have been 20 shallow groundwater wells installed within the Mills St. catchment to monitor levels of nutrients and heavy metals, and 12 wells installed for nutrient monitoring in the Wilson Wetlands. In addition, there has been increased water and sediment sampling in both the Mills St. and Liege St. catchments since 2003. This increased level of monitoring was not available for the matrix risk assessment and would assist in future assessments.

Considering the recognised high threat posed by the Mills St. Main Drain sub-catchment to receiving water bodies (Wilson Wetlands and the Canning River), there is a need for better discrimination between the major threat types than is provided by the rating matrix approach. Risk assessment should address a set of key points:

- The scale of the current risk (providing a sense of proportion between each of the threat types);
- The locations of highest risk (more specific spatial assessment and a sense of proportional contribution between sub catchments and comparatively with the whole region);
- The trend of the risk (increasing, decreasing or stable);
- The estimated time to full impact (or cessation) of the risk; and
- The responsiveness to intervention (works to reduce the risk).

Investment to reduce high priority threatening processes should be based on this level of risk assessment. This will require initial investment in surface and groundwater modelling. There does not need to be significant investment in further modelling, rather enough to equip an expert panel with sufficient information to prioritise future works and management actions.

Prioritisation of actions should also take into account:

- Level of community interest;
- Likelihood of success;
- Cost/benefit of undertaking action/project; and
- Condition of asset.

However, the existing risk assessment provides an initial high priority for the Mills St. Main Drain sub-catchment and until further modelling and risk assessment is conducted, Mills Street should be considered the priority area for action.

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### Existing Initiatives

- Risk assessment in the Catchment Management Plan (Parsons Brinckerhoff, 2004);
- Modelling of proposed sewerage infill for Mills St. catchment by DoW;
- SCC-funded project through DoW to develop a strategic Water Quality Monitoring and Evaluation Framework for the Swan Region (suitable for linking water quality monitoring activities); and
- SCCP Action Plan and Healthy Rivers Action Plan.

Code	Action	Lead organisation	Support organisation
B2.1	Develop and apply surface and groundwater models for risk assessment and management of 'nutrient pathways' for the sub catchments of the Project Area.	DoW/WC	
B2.2	A strategic approach to monitoring water quality to be developed, initially for the Mills St. Main Drain.	WC	SRT
B2.3	Present the risk assessment and modelling information to an expert panel in a workshop format to enable prioritisation of future work.	SERCUL	SRT, SCC, CoC, CoB, DoW, DEC, WC, DPI

### 3.3 Developing Current – 'Best Practice'

The Catchment Management Plan (Parsons Brinckerhoff, 2004) provides a useful list of existing practices relevant to stormwater management for the project partners (Section 4.5, Vol 2). This list could be extended for other partner organisations (e.g. Trust) and requires updating for those already listed. It shows differences within the study area in management methods (e.g. between the two LGA's).

The Catchment Management Plan also identifies 'Best Management Practices' and 'Priority Management Issues' (Table 4.1, Vol. 2). There is some linkage of current practice with the processes for change. The need for practice change is recognised and is discussed in Section 4.1 of this plan. It is important to note the difference between current best management practice and practice change pathways. Essentially, practice change pathways are how individuals or organisations move from existing practices to current best practice (the 'pathway').

There has been considerable work to date on documenting current best management practices in a number of different sectors, from residential to industrial. These documents focus on reducing pollutants, including nutrients, to the environment and many also cover issues such as water and energy efficiency. These documents are useful but rarely adopted unless accompanied with a capacity building component that encourages individuals and businesses to change.

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Although there is considerable information available on current best practice, there has been little consolidation and compilation of this information in Western Australia. Compiling relevant best practice information for land uses and activities within this catchment would be useful for this catchment and other similar catchments in the Metropolitan area. This would highlight the gaps in information and assist in developing capacity building projects for high impact land uses. The Department of Water is currently developing an Urban Water Capacity Building Program that aims to consolidate this information and develop options for capacity building in WA.

There is also an identified need to build the capacity of practitioners (i.e. planners, landscape architects, engineers) to increase the understanding and application of integrated water cycle management and water sensitive urban design in Western Australian. The New WAtEr Ways Program is a recent initiative linked to the Urban Water Capacity Building Program that aims to build the capacity of key stakeholders in these areas and will also aim to improve the cooperation between various levels of government and the private sector (Essential Environmental Services, 2006).

### Existing Initiatives

- Stormwater Manual Chapter 7: Non Structural Controls;
- Stormwater Manual Chapter 9: Structural Controls;
- Existing statements of practice (e.g. for nursery industries);
- SCC and SERCUL through NRM regional delivery programs;
- SRT and DEC (e.g. residential and industry waste management initiatives);
- Industry organisations (e.g. the Motor Trades Association);
- Research organisations (e.g. Centre for Excellence in Cleaner Production);
- Phosphorus Action Group, Switch Your Thinking, Great Gardens; and
- New WAtEr Ways Program: capacity building in integrated water cycle management.

Code	Action	Lead organisation	Support organisation
B3.1	Support the development of the New WAtEr Ways website that lists all current capacity building and best management practice information	WALGA	SRT, SCC, CoC, CoB, DEC, WC, DPI, SERCUL
B3.2	Using the data collated for the New WAtEr Ways Program and Urban Water Capacity Building Program, identify gaps in supplying and engendering best management practice in the catchment.	SERCUL	SRT, SCC, CoC, CoB, DoW, DEC, WC, DPI
B3.3	Promote the New WAtEr Ways Program and DoW's Urban Water Capacity Building Program within the catchment.	SERCUL	SRT, SCC, CoC, CoB, DoW, DEC, WC, DPI WALGA

### 3.4 Existing Initiatives and Priorities

The Catchment Management Plan (Parsons Brinckerhoff, 2004) identifies issues for each sub-catchment and suggests a management response for each issue. Many of these issues are being dealt with by existing programs and/or new initiatives administered by other organisations. It is important to identify and link into existing initiatives that could assist in achieving the actions of this plan and identify gaps where further work is required.

Based on the risk assessment in the Catchment Management Plan, the Management Strategies that should be developed are:

1. *Industrial & commercial waste management including:*
  - a. Surface water run-off (into drains) and groundwater discharge,
  - b. Source prevention and site remediation,
  - c. Leakage and spillage.
2. *Drainage Management including:*
  - a. Stormwater design and maintenance, including reducing the interception of groundwater flows
  - b. Water Sensitive Urban Design (WSUD)
  - c. Drainage 'retrofitting' for hydrological efficiency and Living Streams concepts.
3. *Septic tank effluent (known or potential)*
4. *Nutrient runoff from residential areas and public open space*
5. *Nutrients and contaminants from minor and major roads and car parks*
6. *Historic contamination including:*
  - a. Contaminated sites,
  - b. Groundwater nutrient plumes,
  - c. Contaminated sediments in detention basins.
7. *Fringing vegetation and weed management.*
8. *Sedimentation management*

Strategies that link water management with other natural resource or community asset management (multiple-benefit management) will be beneficial. The management strategies should also be subject to a cost-benefit analysis (also considering social factors) and be prioritised for each sub-catchment using the risk matrixes of the Catchment Management Plan (Parsons Brinckerhoff, 2004).

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These strategies should include specific management action targets that relate directly to the catchment management targets outlined in Section 2.6. Management action targets should also abide by the SMART criteria outlined in Section 2.6. Table 3 provides a hypothetical example of the relationship between catchment management targets, strategies and management action targets.

Theme/Issue	Catchment Management Target	Strategy	Management Action Target
Lack of fringing vegetation and weed proliferation	By 2018, maintain or improve percentage of native fringing vegetation in surface water sub catchments	Revegetation of waterways with native species	By 2009, develop revegetation plans for all surface water sub catchments

**Table 1** Hypothetical example of relationship between issues, targets, strategies and actions

**Existing Initiatives**

- Urban Drainage Initiative (DoW);
- The Phosphorus Action Group (PAG), coordinated through SERCUL, is undertaking Local Government Survey's of fertiliser use. This is relevant to nutrient and irrigation management planning;
- Local government policy and regulations;
- Many partner organisation management guidelines; and
- Healthy Rivers Action Plan.

Code	Lead organisation	Support organisation
B4.1	SERCUL	SRT
B4.2	DoW, WC	
B4.3	LGAs	
B4.4	LGAs	FESA, DEC, WA Police

## 4 'Focus Area C' – Practice Change Delivery

### 4.1 Practice Change Pathways

The Catchment Management Plan (Parsons Brinckerhoff, 2004) (Vol. 1 and Vol. 2) identifies the importance of practice change (i.e. moving from existing practices to 'current best practice') but does not detail how or when this will occur (i.e. the pathway).

The ways in which practice change can occur in this catchment are:

1. *Integrated management planning* – linking actions to existing planning initiatives, including state and local government statutory planning processes such as Town Planning Schemes (TPS). Initiatives taken through local and regional environmental sustainability strategies should be considered (e.g. environmental plans for the Cities of Belmont and Canning),
  2. *Environmental planning for industrial areas* – review of opportunities for eco-industrial parks for waste management control through eco-efficiency initiatives,
  3. *Social behaviours and values* –gaining an understanding of the local factors (barriers) that motivate change (often related to public health, information, assistance, security, or financial issues) by collecting survey data and directing industry engagement programs to address identified barriers to the desired change.
  4. *Audits and self-regulation* – industry audits are effective when linked to statutory regulation to create an enforced standard or a 'level playing field'. Self-regulation is not effective in gaining practice change by those that are unwilling to change,
  5. *Statutory controls and regulations* – adoption of a regulatory approach is reviewed by Gunningham et al (2004) showing limitations due to capacity for compliance auditing and control. Some opportunities are available through delegation of powers under the Environmental Protection Act (1986) to local government for Un-authorized Discharge Regulations (UDR's). An environmental risk management approach allows for practical suggestions for policies and procedures to avoid penalty from the non-prescriptive UDR's
  6. *Demonstrating credible 'best practice'* – adoption will be increased if the effectiveness of the actions expected are clearly demonstrated (e.g. the Liege Street Wetland project to demonstrate stormwater management),
  7. *Information, communication and awareness-raising* – designed and delivered in a format that is acceptable and understood (established through survey data) by the receiving audience, and personalised where possible,
  8. *Engaging industry organisations* – increasing credibility of the change required by working with the organisations (i.e. linking water management change with their industry practice),
  9. *Cost-sharing and other market mechanisms* – the costs of implementing best practice may limit change. Options for cost-sharing should be considered,
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1. *Capacity building programs* – for staff and local residents. Firstly, capacity building programs should seek to adequately skill and resource staff who are expected to coordinate and participate in industrial and residential capacity building programs. Secondly, capacity building programs should be administered long term and include robust evaluation processes. Examples of current residential capacity building programs include Great Gardens, Cities for Climate Protection, Phosphorus Action Group and Switch Your Thinking.

The above options need to be analysed for relevance to the seven sub catchments on the basis of their effectiveness for delivering practice change to achieve the catchment management targets.

Other options for changes in State Government policy or legislation may be required but should be considered to be beyond the scope of this project.

**Existing Initiatives**

- Many examples through partner organisations.

Code	Action	Lead organisation	Support organisation
C1.1	Identify and review the effectiveness of relevant practice change pathways.	SERCUL	
C1.2	Review all relevant state and local government planning process for each of the seven sub catchments to identify relevance for integrating surface water and groundwater management planning.	SERCUL	DPI/ LGAs
C1.3	Co-ordinate an industry engagement program using Incentive, Education, Regulation, and Enforcement drivers in a predominantly support and education approach.	SCC	SERCUL, LGAs, Universities
C1.4	Undertake regular surveying and auditing of light industrial SME's using a risk management approach incorporating legislative compliance.	LGAs	DEC
C1.5	Analyse survey and audit data to constantly evaluate the success of the SME engagement program and refine the approach taken.	SERCUL	Universities
C1.6	Identify and promote current best practice demonstration projects in surface water and groundwater management.	DoW, SRT	WC, LGAs, SERCUL

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## 4.2 Partner Roles and Responsibilities

The roles and responsibilities for partner organisations to this project are generally well-defined but need to be stated in a way that is engaging to stakeholder groups (e.g. residents or industry organisations). This should be simple public documentation of 'who does what' within the Action Plan.

There are several areas of management that are less clear:

- Management of stormwater infrastructure; and
- Water quality management in drains.

These roles need to be clarified for effective stormwater management, but resolution of these roles and responsibilities are a Statewide issue and lie outside the scope of this plan.

The Action Plan needs to be linked and continuously revised in relation to the relevant plans and strategies of partner organisations, including:

- The Healthy Rivers Action Plan;
- SERCUL Business and Work Plan; and
- Local Government Authority Environment Plans.
- The Swan NRM Strategy and Investment Plan

### **Existing Initiatives**

- Relevant policies and strategies of partner organisations; and
- Urban Drainage Initiative (DoW).

Code	Action	Lead organisation	Support organisation
C2.1	Identify partner roles and responsibilities relevant to the Action Plan to inform stakeholder groups and to develop formal partnership arrangements.	SERCUL	
C2.2	List and review relevant policies and strategies of partner organisations.	Support organisations to conduct own review	
C2.3	Workshop process to prepare 'Partner Benefit Statements' to identify benefits of their involvement and engender on-going commitment.	SERCUL	

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### 4.3 Information and Knowledge Management

Recommendations for compilation of base-line information are included in Section 2.5 of the Action Plan. In addition, to date, there has been considerable information and knowledge generated, through preparing the risk assessment in the original catchment management plan and preparing this document. There will also be additional information and knowledge produced in the future through implementation of this Action Plan, including setting targets and monitoring and evaluation.

A framework and process for managing this information and knowledge is required. The arrangements should ensure that the information remains relevant and accessible.

The concepts of 'knowledge sharing' should be adopted. The successes and mistakes of implementation should be documented and reviewed for continuous improvement of adoption, and for benefit to other similar organisations.

#### **Existing Initiatives**

- Many examples through partner organisations

Code	Action	Lead organisation	Support organisation
C3.1	Prepare an information and knowledge management framework and processes.	SERCUL	
C3.2	Develop the concepts and processes for the Action Plan to be delivered as part of a 'learning organisation'.	SERCUL	
C3.3	Using the developed information and knowledge framework, document and share the 'lessons learnt' (successes and mistakes) to date and continue to document through the life of the project.	SERCUL	DoW, WC, LGAs, SRT, DEC, Main Roads WA, DPI

### 4.4 Building Practice Change Capacity

The resources and capacity (skills, knowledge, experience, networks etc.) needs to be suitable and available for implementing the actions of the plan. The range of partners and stakeholder organisations relevant to the Action Plan suggests that the capacity for practice change probably exists but needs to be organised and coordinated according to the priority actions.

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Code	Action	Lead organisation	Support organisation
C4.1	Arrange appointment of a suitable Project Manager and an appropriate Steering Committee to support the role.	SERCUL	DoW, WC, SRT, SCC, LGAs, DEC, DPI
C4.2	Identify the resources and capacity required for implementing the priority actions.	SERCUL	

#### 4.5 Investment Planning

An Investment Plan is required for implementation of the Action Plan. This should be a 3-year plan that shows the estimated costs for priority actions aligned with partner contributions and external funding opportunities (including NHT2).

Principles of investment are to be considered, including requirement for ‘polluters’ or ‘beneficiaries’ to pay, and criteria for cost-sharing arrangements. The investment plan should be developed in a way that is suitable for ‘triple bottom line’ accounting.

The Investment Plan provides the basis for *Memoranda of Understanding* (MOU’s) – or Partnership Agreements – between the partner organisations.

#### **Existing Initiatives**

- SCC NRM Investment Plan; and
- Partner budget cycle processes.

Code	Action	Lead organisation	Support organisation
C5.1	Prepare the ‘Canning Plain Investment Plan’.	SERCUL	
C5.2	Review cost-sharing arrangements relevant to implementation of priority actions.	SERCUL	

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## 4.6 Evaluation

Evaluation is the best way to improve our knowledge about what works and what needs improving. This includes:

1. *Monitoring and reporting* - monitoring is a process of continuous evaluation throughout the life of a project to ensure the project is effective and achieving its objectives. Continuous evaluation helps to ensure the project stays on track and can be adjusted or improved as it goes along. Annual monitoring and reporting of this plan and relevant documents and strategies to be produced as a result of this plan is required. Monitoring is also required to measure a change in resource condition, using the local catchment management targets (Section 2.6) and management action targets (Section 3.4) as reference.
2. *Performance evaluation* – periodic evaluation of this plan is required. Tables 5, 6 & 7 outline the actions in order of priority for three years. The plan should follow an adaptive management approach and it is recommended that these actions be reviewed annually at a time suitable to be included in the budget planning cycles of partner organisations. At this time, any new actions should be proposed, if required.

### Existing Initiatives

- SCC monitoring and evaluation strategy,
- SCC-funded project through DoW to develop a strategic Water Quality Monitoring and Evaluation Framework for the Swan Region (suitable for linking water quality monitoring activities),
- Healthy Rivers Action Plan monitoring program,
- Many other current monitoring initiatives (e.g. groundwater and surface water monitoring)

Code	Action	Lead organisation	Support organisation
C6.1	Prepare a targeted monitoring and reporting strategy for the seven sub catchments of the project.	SERCUL	

## **5 Schedule of Actions**

The actions identified for Focus Areas A-C are collated in Table 4. The proposed actions are developed in the preceding sections. Each action is identified as being 'short term' (ST) or 'long term' (LT). Short term projects are those that can commence in Year 1 and are generally achievable within a 12 month period. Long term projects may commence in the first year or at a later stage. Completion of long term projects is expected to take more than the first year.

A preliminary estimate of costs is also provided. This is based on the approximate value of time for provision of the services for the action required. Many of the actions can be undertaken by an appropriately skilled Project Manager. It should be noted that annual costs for a Project Manager are included.

Most actions are contingent upon commencement or completion of other actions, which are noted in Table 4. Tables 5-7 provide some direction for the prioritisation of actions for years 1-3 of implementation. A Project Management Framework will specifically identify the sequence of implementation for all actions.

The 'outputs' for each action are suggested in Table 4 as the deliverable product that could be expected as a result of the action. The proposed Project Management Framework should also relate these outputs to 'project outcomes' (i.e. targets for catchment management and management actions).

Table 8 lists actions or other relevant initiatives undertaken by partner organisations. Comments in this table are intended to ensure that the noted actions have direct relevance to the Project Area. This table is not a comprehensive inventory of relevant activity and is based on input from some partner organisations.

All tables are intended to be used for on-going review of the Action Plan.

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Table 4 : Schedule of Proposed Actions

Code	Action	Lead organisation	Support organisation	ST/LT	Year	Costs (\$'000)	Contingent Actions	Outputs	Comments
A1.1	Prepare a statement of scope and context for the Action Plan*.	SERCUL		ST	1	Task for Project Manager	None	One-page stakeholder statement of scope and context	Workshop process with partner organisations.
A1.2	Prepare a statement of values and perceptions of partners and the local community*.	SERCUL		ST	1	Task for Project Manager	None	One-page stakeholder statement of values and perceptions	<ul style="list-style-type: none"> <li>- Workshop process with partner organisations and stakeholder groups.</li> <li>- Consider 'Place Planning' processes with LGA's.</li> </ul>
A1.3	Revise statements of purpose, vision and goals considering existing initiatives*.	SERCUL		ST	1	Task for Project Manager	A1.3	One-page stakeholder statement of purpose, vision and goals.	Workshop process with partner organisations and stakeholder groups.
A1.4	Develop an action delivery framework*.	SERCUL		ST	1	Task for Project Manager	A1.1- A1.3	<ul style="list-style-type: none"> <li>- Flow-diagram showing partner roles and commitments and timeframe for delivery.</li> <li>- Confirm arrangements for project management (manager, steering committee).</li> </ul>	<ul style="list-style-type: none"> <li>- Based on this document with further development for 'adaptive management' processes.</li> <li>- Linked to partnership agreements.</li> </ul>
A2.1	Prepare a 'Situation Statement' for the study area*.	SERCUL		ST	1	Task for Project Manager	A1.1	Four-page 'situation statement' for stakeholders (with graphics).	<ul style="list-style-type: none"> <li>- Use for engagement of stakeholders.</li> <li>- Include an update of current projects and works.</li> <li>- Existing documentation contains relevant information.</li> <li>- The local information needs to be related to regional information.</li> </ul>
A3.1	Prepare a map and analysis of identified stakeholder groups*.	SERCUL		ST	1	Task for Project Manager	A1.1	'Stakeholder Mapping and Analysis' process	Consider current and future roles and responsibilities.
A3.2	Undertake initial engagement meetings with key stakeholder groups*.	SERCUL		ST	1	Task for Project Manager	A2.1	Key stakeholder group engagement meetings	More important for non-partner organisations in the initial stages.
A4.1	Prepare a spreadsheet of previous or current plans, operations and actions relevant to the Action Plan*.	SERCUL		ST	1	Task for Project Manager	None	Spreadsheet for continuous update of current actions (using implementation framework structure).	Table 8 (of this document) provides initial listings. Also refer to Catchment Management Plan.
A5.1	Prepare and maintain a spatial information database.	CoC		ST	1	Partner input	A1.1, A2.1	Minimum spatial data sets as overlays to Project Area.	<ul style="list-style-type: none"> <li>- Data sets linked to management themes.</li> <li>- Include project area ortho-photo (1:2,500) in hardcopy and digital format.</li> <li>- Include map of licensed premises. Link to 'Information and Knowledge Management'.</li> </ul>
A6.1	Set long-term targets for catchment management for the local area#.	SERCUL, SRT	SCC, LGAs, DoW, DEC	ST	1	5	A1.1 – A1.3 A2.1, A3.2	Catchment management targets for local area that are linked to the management strategies and actions (Action B4.1)	<ul style="list-style-type: none"> <li>- Indicators for monitoring to be correlated with targets.</li> <li>- Link to relevant targets and goals of partner organisations</li> <li>- DoW Swan Avon Region can provide support in this area.</li> </ul>

Code	Action	Lead organisation	Support organisation	ST/LT	Year	Costs (\$'000)	Contingent Actions	Outputs	Comments
B1.1	Prepare brief notes and graphic representation of the 'flow pathways' for water and nutrients with the aim of providing data for surface water and groundwater modelling (Refer to Action B2.1)	LGAs, WC	DoW	ST	1	20 Partner input	A1.1	Stakeholder notes showing nutrient and contaminant flow paths relevant to the seven sub catchments (one-page for each).	<ul style="list-style-type: none"> <li>- Link to partner roles and responsibilities (statutory and non-statutory).</li> <li>- Include DPI and industry group policies. Separation between the 7 sub catchments would be useful.</li> <li>- Consider surface water, groundwater, drainage and also nutrient and contaminant flows.</li> </ul>
B1.2	Review and document WSUD principles relevant to the catchment and locate potential areas in the catchment where these principles may be applied#.	SERCUL	DoW	ST	2	10	B1.1	<ul style="list-style-type: none"> <li>- Document describing WSUD concepts with specific relevance to the seven sub catchments (i.e. showing where it applies).</li> <li>- Share information with Stormwater BMP Technical Working Group.</li> </ul>	<ul style="list-style-type: none"> <li>- Linked to current revision of WSUD and stormwater management guidelines undertaken by DoW.</li> <li>- Brief documentation that will communicate the concept to many stakeholders.</li> <li>- DoW Drainage and Waterways Branch.</li> </ul>
B1.3	Describe and list opportunities for application of integrated water cycle management through state and local government statutory planning processes.	DPI	DoW	LT	>3	10 Partner inputs	A1.1	<ul style="list-style-type: none"> <li>- Brief document outlining scope and benefits of multi-benefit planning.</li> <li>- Map of each sub-catchment showing current or potential statutory planning processes with descriptions of potential for integration with Action Plan.</li> </ul>	<ul style="list-style-type: none"> <li>- Closely linked to Existing Town Planning Scheme and SPP processes.</li> <li>- DoW Aquatic Science Branch are able to provide support in this area</li> </ul>
B2.1	Develop and apply surface and groundwater models for risk assessment and management of 'nutrient pathways' for the sub catchments of the Project Area.	DoW/ WC		LT	1	50-70 (modelling only – see comments) Partner inputs	B1.1	<ul style="list-style-type: none"> <li>- Surface and groundwater models relevant to the seven sub catchments to assist with risk assessment, management and monitoring.</li> <li>- Strategic pathway for risk management.</li> <li>- Benchmarking for level of risk management linked to resource condition change targets.</li> <li>- Framework for continuous improvement of risk management.</li> </ul>	<ul style="list-style-type: none"> <li>- Estimated cost is for modelling only. Actual cost will be dependent upon availability of data.</li> <li>- Link to 'nutrient pathways study' identified in B1.2.</li> <li>- Review use of existing tools and undertake 'gap analyses for current modelling initiatives.</li> <li>- Link to review of risk analysis for 'Southern River' project.</li> <li>- Support from CSIRO to be sought.</li> <li>- DoW Aquatic Science Branch and Water Resource Assessment Branch responsibility</li> </ul>

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Code	Action	Lead organisation	Support organisation	ST/LT	Year	Costs (\$'000)	Contingent Actions	Outputs	Comments
B2.2	A strategic approach to monitoring water quality to be developed, initially for the Mills St. Main Drain.	DoW/ WC	SRT SERCUL SCC	LT	2	15	None	A plan (map and brief notes) for comprehensive monitoring in the Mills St. Main Drain Sub-catchment to meet requirements for risk assessment, management response and resource condition monitoring.	<ul style="list-style-type: none"> <li>- Review of existing monitoring processes.</li> <li>- Include monitoring of major roads.</li> <li>- Based on the priorities derived from the ratings matrix approach.</li> <li>- DoW Regional responsibility.</li> </ul>
B2.3	Present the risk assessment and modelling information to an expert panel in a workshop format to enable prioritisation of future work.	SERCUL	SRT, SCC, LGAs, DoW, DEC, WC, DPI		2	Task for Project Manager to coordinate (plus operational costs)	B2.1	Prioritisation of future work	<ul style="list-style-type: none"> <li>- This information could be presented in a half day workshop to an expert panel such as the Stormwater BMP Technical Working Group.</li> <li>- DoW Regional and Aquatic Science Branch can offer support in this area.</li> </ul>
B3.1	Support the development of the New WATER Ways website that lists all current capacity building and best management practice information	WALGA	SRT, SCC, LGAs, DEC, WC, DPI, SERCUL	LT	2-3	60 Partner inputs	None	Provision of a one-stop shop for best practice information. Consistent messages provided to stakeholders.	Also refer to the New Water Ways Program
B3.2	Using the data collated for the New WATER Ways Program and Urban Water Capacity Building Program, identify gaps in supplying and engendering best management practice in the catchment.	SERCUL	SRT, SCC, LGAs, DoW, DEC, WC, DPI	LT	2-3	Task for Project Manager	B3.1	Knowledge of gaps in capacity building and best practice information. This will assist in developing actions to address these gaps.	
B3.3	Promote the New WATER Ways Program and DoW's Urban Water Capacity Building Program within the catchment.	SERCUL	SRT, SCC, LGAs, DoW, DEC, WC, DPI	LT	Ongoing	Task for all Partners	None	Improved knowledge of integrated water cycle management	
B4.1	Undertake a gap analysis of existing Management Strategies targeting; <ul style="list-style-type: none"> <li>• Industrial and commercial waste management;</li> <li>• Drainage asset management;</li> <li>• Septic tank effluent management;</li> <li>• Fertiliser use;</li> <li>• Management of contaminants and nutrients from roads and car parks;</li> <li>• Management of historic contamination;</li> <li>• Fringing vegetation and weed management; and</li> <li>• Sedimentation management.</li> </ul> Develop new strategies and initiatives to target priority issues where required.	SERCUL	SRT, SCC, LGAs, DoW, DEC, WC, DPI	LT	2-3	50 Partner inputs	B2.3 & linked to B2.1		<ul style="list-style-type: none"> <li>- The order in which these strategies should be developed should be based on the risk assessment and prioritisation of the expert panel (refer to Action B2.3).</li> <li>- Link to SRT initiatives.</li> </ul>

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Code	Action	Lead organisation	Support organisation	ST/LT	Year	Costs (\$'000)	Contingent Actions	Outputs	Comments
B4.2	Investigate whether the unsewered industrial areas within the sub catchments are having a significant impact on receiving waters.	DoW, WC		ST	2-3	20 Partner inputs	None	Statement of 'in-fill sewerage' program for key stakeholder groups.	<ul style="list-style-type: none"> <li>- Clarify intended position for sewerage in industrial areas.</li> <li>- DoW Regional and Aquatic Science Branch responsibility</li> </ul>
B4.3	Review and document use of Nutrient and Irrigation Management Plans and opportunities for stormwater re-use for parks and public open space in relation to the seven sub catchments with recommendations for further action.	LGAs		LT	2	30 Partner inputs	None	Recommended use of Nutrient and Irrigation Management Plans.	Link these to statutory planning processes.
B4.4	Revise 'Emergency Management Arrangements' for spills and contamination with clarification of roles for respective partner organisations relevant to the seven sub catchments	LGAs	FESA, DEC	LT	Ongoing	Partner input		Revised roles and responsibilities for emergency response for spills and contamination.	Many of these plans have recently been developed and may only require occasional revision.
C1.1	Identify and review the effectiveness of relevant practice change pathways*.	SERCUL		ST	1	Task for Project Manager	None	Critical analysis of practice change pathways.	<ul style="list-style-type: none"> <li>- Link to SCC processes.</li> <li>- Link to DoE review for the 'Southern River' project.</li> </ul>
C1.2	Review all relevant state and local government planning process for each of the seven sub catchments to identify relevance for integrating surface water and groundwater management planning.	DPI/ LGAs		ST	1	15 Partner inputs	None	Documentation of relevant state and local government policy and planning processes (including TPS's, DSP's, DA's and other statutory and non-statutory processes) and urban renewal/redevelopment proposals with recommendations for TWC management and WSUD for the seven sub catchments.	- A priority list of similar planning opportunities should be developed for the sub catchments.
C1.3	Co-ordinate an industry engagement program using Incentive, Education, Regulation, and Enforcement drivers in a predominantly support and education approach.	SERCUL Sustainable Production officer	<b>Participating LGAs, Universities, SCC DEC</b>	ST	Ongoing	36 pa (0.4FTE) Partner inputs	None	Conceptual model for adaptive management of SME environmental management.	<ul style="list-style-type: none"> <li>- Establish theoretical and implementation frameworks.</li> <li>- Provide training and troubleshooting.</li> </ul>
C1.4	Undertake regular surveying and auditing of light industrial SME's using a risk management approach incorporating legislative compliance.	LGAs	DEC (particularly Pollution Audit and Response Group)	ST	Ongoing	125 per 1000 premises initially	None	Environmental legislative compliance and engagement in voluntary sustainability initiatives.	Cost per premises expected to decrease over time as compliance is achieved and inspection frequencies are established
C1.5	Analyse survey and audit data to constantly evaluate the success of the SME engagement program and refine the approach taken.	SERCUL Sustainable Production officer	Universities	LT	Ongoing	TBA Partner inputs	C1.3, C1.4	Evaluation of program performance and effectiveness.	Adaptive management guidance(see C1.3).
C1.6	Identify and promote current best practice demonstration projects in surface water and groundwater management	DoW, SRT	WC, LGAs, SERCUL	LT	Ongoing	Partner input			May occur through New Water Ways Program

Canning Plain Management Action Plan

Code	Action	Lead organisation	Support organisation	ST/LT	Year	Costs (\$'000)	Contingent Actions	Outputs	Comments
C2.1	Identify partner roles and responsibilities relevant to the Action Plan to inform Stakeholder Groups and to develop formal partnership arrangements*.	SERCUL		ST	1	Task for Project Manager	None	<ul style="list-style-type: none"> <li>- Statement of relevant partner and key stakeholder roles and responsibilities</li> <li>- Memorandum of Understanding (MoU) identifying partner responsibilities, key actions and resource commitments according to the Investment Plan.</li> </ul>	<ul style="list-style-type: none"> <li>- Include statutory responsibilities.</li> <li>- Key partner organisations to SERCUL include CALM, Cities of Canning, Belmont and Victoria Park, Departments of Environment, Planning and Infrastructure, Main Roads WA, Swan Catchment Council, Swan River Trust and the Water Corporation</li> <li>- Statements that relate to actions of the plan rather than 'core business' are required.</li> </ul>
C2.2	List and review relevant policies and strategies of partner organisations.	Support organisations to conduct own review		ST	2	Partner input	None	Stakeholder statement of relevant partner policies and strategies and review and recommend on links to the Action Plan (including the Swan NRM strategy, Healthy Waterways Action Plan, WA Sustainability Strategy, LGA strategies and plans, and many others).	<ul style="list-style-type: none"> <li>- Link to Action C1.1.</li> <li>- Link review to annual reporting processes.</li> </ul>
C2.3	Workshop process to prepare 'Partner Benefit Statements' to identify benefits of their involvement and engender on-going commitment*.	SERCUL		ST	1-2	Task for Project Manager plus operational costs	C1.1	Information statements to assist with development of formal Partnership Arrangements.	<ul style="list-style-type: none"> <li>- Link to 'WA Water Strategy' information.</li> <li>- Identify synergistic benefits of partnership arrangements.</li> </ul>
C3.1	Prepare an information and knowledge management framework and processes#.	SERCUL		LT	2-3	45 Partner input	A5.1	<p>Diagram and four-page document as preliminary information and knowledge management framework.</p> <p>Meta-data document and thematic spatial data sets in GIS format clipped for Project Area boundary.</p>	<ul style="list-style-type: none"> <li>- Link to SCC Communication Strategy.</li> <li>- Include 'capacity' information.</li> </ul>
C3.2	Develop the concepts and processes for the Action Plan to be delivered as part of a 'learning organisation'	SERCUL		LT	1-3	Task for Project Manager		Shared learning processes, including a 'learning set', 'project log' and review processes.	Link to initiatives undertaken through SCC.

Canning Plain Management Action Plan

Code	Action	Lead organisation	Support organisation	ST/LT	Year	Costs (\$'000)	Contingent Actions	Outputs	Comments
C3.3	Using the developed information and knowledge framework, document and share the 'lessons learnt' (successes and mistakes) to date and continue to document through the life of the project*.	SERCUL	DoW, WC, LGAs, SRT, DEC, DPI	LT	2-3	Task for Project Manager		Sharing of information to enable better understanding of catchment management in an established residential and industrial setting	
C4.1	Arrange appointment of a suitable Project Manager and an appropriate Steering Committee to support the role.	SERCUL	DoW, WC, SRT, SCC, LGAs, DEC, DPI	ST	1-3	95 pa (1.0 FTE) 20 operational	N/A	Roles of Project Manager and Steering Committee.	<ul style="list-style-type: none"> <li>- Clear 'Duty Statement' required ascertaining the level of skills and experience required.</li> <li>- Separation required between 'partner contribution' and 'service providers' (i.e. the first is 'in kind' support; the second requires a budget allocation).</li> </ul>
C4.2	Identify the resources and capacity required for implementing the priority actions*.	SERCUL		LT	2-3	Task for Project Manager	Many	Spreadsheet with lists of the key actions of this Action Plan and identification of the 'human capacity' (including skills, experience and available time) required for each.	Align with partner organisation capacity.
C5.1	Prepare the 'Canning Plain Investment Plan'#.	SERCUL		ST	2-3	15	Many	An Investment Plan for Year 1 set within a 3-year framework with commitments for internal funding through Partnership Arrangements and opportunities for external funding.	
C5.2	Review cost-sharing arrangements relevant to implementation of priority actions.	SERCUL		LT	2-3	25	C5.1	Review of cost-sharing principles and opportunities for implementation of planned actions.	
C6.1	Prepare a targeted monitoring and reporting strategy for the seven sub catchments of the project#.	SERCUL		LT	2-3	25		A preliminary four-page statement of monitoring, evaluation and reporting requirements (based on a needs assessment) for the seven sub catchments.	<ul style="list-style-type: none"> <li>- Initial focus for the Mills St. Main Drain.</li> <li>- Link to DoW(including WIN database), SCC, SRT M&amp;E strategies.</li> </ul>

\* Indicates that the action should be a task performed by a Project Manager. The cost of these actions are included in the cost of employing a Project Manager and are therefore dependent upon funding this position. (Action C4.1)

# Indicates that the action should be coordinated by a Project Manager but may be performed by a contractor or consultant to maximise benefit of Project Manager's coordinating role and time.

LT – long term ST – short term

Table 5 : Schedule of Proposed Actions in Order of Priority for Year 1 of Implementation

Code	Action	Lead Organisation	Cost (\$'000)	Contingent Actions
C4.1	Arrange appointment of a suitable Project Manager and an appropriate Steering Committee to support the role.	SERCUL	95 pa (1.0 FTE) 20 operational	None
A1.1	Prepare a statement of scope and context for the Action Plan*.	SERCUL	Included in Project Manager role	None
A1.2	Prepare a statement of values and perceptions of partners and the local community*.	SERCUL	Included in Project Manager role	None
A1.3	Revise statements of purpose, vision and goals considering existing initiatives*.	SERCUL	Included in Project Manager role	A1.3
A1.4	Develop an action delivery framework*.	SERCUL	Included in Project Manager role	A1.1-A1.3
A2.1	Prepare a 'Situation Statement' for the study area*.	SERCUL	Included in Project Manager role	A1.1
A3.1	Prepare a map and analysis of identified stakeholder groups*.	SERCUL	Included in Project Manager role	A1.1
A3.2	Undertake initial engagement meetings with key stakeholder groups*.	SERCUL	Included in Project Manager role	A2.1
A6.1	Set long term targets for catchment management for the local area.	SERCUL, SRT		A1.1-A1.3, A2.1, A3.2
B1.1	Prepare brief notes and graphic representation of the 'flow pathways' for water and nutrients with the aim of providing data for surface water and groundwater modelling (Refer to Action B2.1)	LGAs & WC		A1.1
B2.1	Develop and apply surface and groundwater models for risk assessment and management of 'nutrient pathways' for the sub catchments of the Project Area.	DoW/ WC		B1.1
A4.1	Prepare a spreadsheet of previous or current plans, operations and actions relevant to the Action Plan*.	SERCUL	Included in Project Manager role	None
A5.1	Prepare and maintain a spatial information database.	CoC		A1.1, A2.1
C1.1	Identify and review the effectiveness of relevant practice change pathways*.	SERCUL	Included in Project Manager role	None
C2.1	Identify partner roles and responsibilities relevant to the Action Plan to inform Stakeholder Groups and to develop formal partnership arrangements*.	SERCUL	Included in Project Manager role	None
C2.3	Workshop process to prepare 'Partner Benefit Statements' to identify benefits of their involvement and engender on-going commitment*.	SERCUL	Included in Project Manager role	C1.1
C1.3	Co-ordinate an industry engagement program using Incentive, Education, Regulation, and Enforcement drivers in a predominantly support and education approach.	SERCUL Sustainable Production officer	36 pa (0.4 FTE)	None
C1.4	Undertake regular surveying and auditing of light industrial SME's using a risk management approach incorporating legislative compliance.	LGAs	125 per 100 premises initially	None
C1.5	Analyse survey and audit data to constantly evaluate the success of the SME engagement program and refine the approach taken.	SERCUL Sustainable Production officer		C1.3, C1.4
C1.2	Review all relevant state and local government planning process for each of the seven sub catchments to identify relevance for integrating surface water and groundwater management planning.	DPI/ LGA's	15	None
C1.6	Identify and promote current best practice demonstration projects in surface water and groundwater management	DoW, SRT		None
C3.2	Develop the concepts and processes for the Action Plan to be delivered as part of a 'learning organisation'*	SERCUL	Task for Project Manager	None

\* Indicates that the action should be a task performed by a Project Manager. The cost of these actions are included in the cost of employing a Project Manager upon funding this position. (Action C4.1)

# Indicates that the action should be coordinated by a Project Manager but may be performed by a contractor or consultant to maximise benefit of Project time.

Table 6 : Schedule of Proposed Actions in order of priority for Year 2 of implementation

Code	Action	Lead Organisation	Cost (\$'000)	Contingent Actions
B2.3	Present the risk assessment and modelling information to an expert panel in a workshop format to enable prioritisation of future work.	SERCUL	Task for Project Manager	B2.1
C4.2	Identify the resources and capacity required for implementing the priority actions*.	SERCUL	Task for Project Manager	Many
C5.1	Prepare the 'Canning Plain Investment Plan'#.	SERCUL	15	Many
C5.2	Review cost-sharing arrangements relevant to implementation of priority actions.	SERCUL	25	C5.1
C6.1	Prepare a targeted monitoring and reporting strategy for the seven sub catchments of the project#.	SERCUL	25	C5.1
B1.2	Review and document WSUD principles relevant to the catchment and locate potential areas in the catchment where these principles may be applied#.	SERCUL	10	B1.1
B2.2	A strategic approach to monitoring water quality to be developed, initially for the Mills St. Main Drain. (if required)	DoW/ WC		None
B4.1	Undertake a gap analysis of existing Management Strategies targeting; <ul style="list-style-type: none"> <li>• Industrial and commercial waste management;</li> <li>• Drainage asset management;</li> <li>• Septic tank effluent management;</li> <li>• Fertiliser use;</li> <li>• Management of contaminants and nutrients from roads and car parks;</li> <li>• Management of historic contamination;</li> <li>• Fringing vegetation and weed management; and</li> <li>• Sedimentation management.</li> </ul> Develop new strategies and initiatives to target priority issues where required.	SERCUL	50	B2.3
B4.2	Investigate whether the unsewered industrial areas within the sub catchments are having a significant impact on receiving waters.	DoW, WC	20	None
B4.3	Review and document use of Nutrient and Irrigation Management Plans and opportunities for stormwater re-use for parks and public open space in relation to the seven sub catchments with recommendations for further action.	LGAs	30	None
B3.1	Support the development of the New WATER Ways website that lists all current capacity building and best management practice information	WALGA	60	None
B3.2	Using the data collated for the New WATER Ways Program and Urban Water Capacity Building Program, identify gaps in supplying and engendering best management practice in the catchment.	SERCUL	Task for Project Manager	B3.1
C2.2	List and review relevant policies and strategies of partner organisations.	Support organisations to conduct own review		None
C3.3	Using the developed framework, document and share the 'lessons learnt' (successes and mistakes) to date and continue to document through the life of the project*.	SERCUL	Task for Project Manager	None

\* Indicates that the action should be a task performed by a Project Manager. The cost of these actions are included in the cost of employing a Project Manager and are therefore dependent upon funding this position. (Action C4.1)

# Indicates that the action should be coordinated by a Project Manager but may be performed by a contractor or consultant to maximise benefit of Project Managers coordinating role and time.

Table 7: Schedule of Proposed Actions in order of priority for Year 3 and ongoing

Code	Action	Lead Organisation	Cost (\$1000)	Contingent Actions
B1.3	Describe and list opportunities for application of integrated water cycle management through state and local government statutory planning processes.	DPI	10	A1.1
B3.3	Promote the New Water Ways Program and DoW's Urban Water Capacity Building Program within the catchment.	SERCUL	Task for all partners	None
B4.4	Revise 'Emergency Management Arrangements' for spills and contamination with clarification of roles for respective partner organisations relevant to the seven sub catchments	LGAs	Partner input	None
C3.1	Prepare an information and knowledge management framework and processes#.	SERCUL	30	A5.1

# Indicates that the action should be coordinated by a Project Manager but may be performed by a contractor or consultant to maximise benefit of Project Managers coordinating role and time.

Table 8 Existing Partners Actions			
Partner	Action Code (Bold = lead)	Existing Actions (occurring or confirmed in budget)	Comments
<b>CoB</b>	<b>A5.1</b>	Spatial information for the City of Belmont is maintained through ArcView GIS.	
	A6.1	The City of Belmont's targets for water quality align with Healthy Rivers Action Plan targets and ANZEC guidelines.	
	<b>B1.1</b>		
	B2.3		
	B3.1	The City of Belmont's website contains 'Environmental Fact Sheets', several of which relate to water conservation and water quality. There is potential to create links to additional information.	
	B3.2		
	B3.3	N/A. Various environmental events are held throughout the year, with potential to incorporate an education session on the new 'Waterways' programme.	
	B4.1		
	<b>B4.3</b>	Nutrient and Irrigation Management Plans will be developed for all active reserves (with fertiliser and/ or irrigation schedule) by 2010, as per the Environment Plan.	
	<b>B4.4</b>		
	<b>C1.2</b>		
	C1.3	The City is a participant in the Swan Catchment Council's Light Industry Risk Assessment Project, aimed at improving the environmental practices of small- medium sized enterprises.	
	<b>C1.4</b>	Audits of industrial businesses will be conducted as part of the Light Industry Risk Assessment Project.	
	C1.6		
C3.3			
<b>DoW</b>	A6.1		
	B1.1		
	B1.2	The Stormwater Management Manual provides information on WSUD principles. The Drainage and Waterways Branch can provide advice in this area.	
	B1.3	<ul style="list-style-type: none"> <li>Through the Urban Drainage Initiative the DoW is currently linking water management planning in with state and local government statutory planning processes.</li> <li>An existing initiative is the recently released WAPC State Planning Policy 2.9 Water Resources.</li> </ul>	
	<b>B2.1</b>		
	<b>B2.2</b>		
	B2.3		
	<b>B3.1</b>		
	B3.2		
	B3.3	DoW is a partner in this program	
	B4.1		
<b>B4.2</b>			

Table 8 Existing Partners Actions			
Partner	Action Code ( <b>Bold = lead</b> )	Existing Actions (occurring or confirmed in budget)	Comments
	<b>C1.6</b>	Drainage and Waterways Branch are scoping a Best Management Practice Research and Development Project for WSUD	
	C3.3		
<b>SRT</b>			
	<b>A5.1</b>	Foreshore Assessment program	
	<b>A6.1</b>	Draft Health Rivers Action Plan <ul style="list-style-type: none"> <li>Nutrient reductions <ul style="list-style-type: none"> <li>Interim target 2008</li> <li>30% reduction by 2015</li> </ul> </li> <li>Non contaminant reductions <ul style="list-style-type: none"> <li>Interim targets 2009</li> </ul> </li> </ul>	
	B1.3	As part of Riverplan, SRT are assessing Local Government' activities that may impact the river. Consider changes to policies, strategies and on ground works.	
	B2.1 & B2.2	<ul style="list-style-type: none"> <li>Groundwater snap shot for Mills Street Drain.</li> <li>Nutrient and contaminant assessment for the Mills Street Main Drain Catchment.</li> <li>Drainage improvement framework for the Mills Street Main Drain catchment.</li> <li>Swan River Trust Report (March 2003) – <i>Swan Canning Cleanup Program: Canning River Drain Study- 1999: Water quality in five urban main drains.</i></li> <li>Liege Street Monitoring Plan.</li> <li>Annual Monitoring Report for 2005 data.</li> <li>Sampling and Analysis Plan for Anvil Way Basin.</li> <li>Sampling and Analysis Plan for Bickley Way Basin.</li> </ul>	
	B2.3	<ul style="list-style-type: none"> <li>Prioritisation Workshop 2004 focus on nutrient impacts.</li> </ul>	
	B3.1	<ul style="list-style-type: none"> <li>SRT Website contains relevant information that can be linked to SERCUL website.</li> </ul>	
	B3.2	<ul style="list-style-type: none"> <li>Ongoing trials for intervention technologies e.g oxygenation and previous phoslock trials.</li> <li>SRT fund Phosphorus Action Group who survey LGAs and implement education program.</li> </ul>	
	B3.3		
	B4.1		No modelling – only data
	B4.2		
	B4.3		
	<b>C1.4</b>	DEC	
	<b>C1.6</b>	<ul style="list-style-type: none"> <li>Liege Street Wetland and other works as part of HRAP.</li> </ul>	
	<b>C4.1</b>	<ul style="list-style-type: none"> <li>Currently fund an officer to implement DNIP projects in the Canning Plain Catchment area – no guarantee of ongoing funding.</li> <li>Currently fund implementation of the CPCMP (\$20,000)</li> </ul>	

## 6 References

Department of Water and Swan River Trust (2007), *Stormwater management plans, Management Manual for Western Australia* [www.portal.water.wa.gov.au/.../Stormwater/StormwaterMgtManualStormwater](http://www.portal.water.wa.gov.au/.../Stormwater/StormwaterMgtManualStormwater), Department of Water and Swan River Trust, Perth, Western Australia.

Essential Environmental Services 2006, *New Water Ways: Enabling excellence in integrated water cycle management - building capacity of government and industry practitioners. Business Plan*, Prepared for the Department for Planning and Infrastructure.

National Water Commission (2006) *Review of Institutional and Regulatory Models for Integrated Urban Water Cycle Management: Draft Issues and Scoping Paper*, Canberra, ACT.

Parsons Brinckerhoff (2004) *Implementation of Actions and Strategies to Manage Water Quality in the Canning Plain Catchment* Volume 1: Final Report and Action Plan. Unpublished report prepared for the Two Rivers Catchment Group and its partner organisations, including:

Appendix A *Summary of relevant information from background reports on surface water quality, stormwater-related threats and environmental values of receiving waters.*

Appendix B *Photographic plates – some waterways and drainage infrastructure within the Study Area.*

Appendix C *Receiving water bodies and their environmental values.*

Appendix D *An assessment of the receiving water's environmental values.*

Appendix E *An assessment of the significance of threats to stormwater and shallow groundwater in the Study Area.*

Appendix F *Risk matrices for the seven sub catchments in the Study Area.*

## 7 Acronyms

DEC	Department of Environment and Conservation
CoB	City of Belmont
CoC	City of Canning
DoW	Department of Water
DPI	Department of Planning and Infrastructure (including MRWA)
EMRC	East Metropolitan Regional Council
GPT	Gross Pollutant Trap
SCC	Swan Catchment Council
SERCUL	South East Regional Centre for Urban Landcare
SRT	Swan River Trust (Trust)
ToVP	Town of Victoria Park
TWC	Total Water Cycle
WALGA	Western Australian Local Government Association
WC	Water Corporation

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## 8 Definitions

*Integrated water management* - the integration of water supply, sewerage and stormwater, so that water is used optimally within a catchment resource, state and national policy context. It promotes the coordinated planning, development and management of water, land and related resources (including energy use) that are linked to urban areas and the application of WSUD principles within the built urban environment.

*Flow pathways* – natural pathways of water movement

*Stormwater* - runoff generated by rainfall

*Total water cycle management* – consideration of water in its whole cycle of use, including rainfall, stormwater, wastewater and groundwater with an emphasis on recycling and reuse.

*Wastewater* - runoff generated by waste streams

## 9 Contributors

The following people are acknowledged for their contribution to the development and preparation of this plan.

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