Stormwater Management Authority

Stormwater Management Planning Guidelines

Approved by the Natural Resources Management Council July 2007

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1. Stormwater Planning Context

1.1 South Australian Urban Stormwater Management Policy

In May 2005, the State Government and Local Government Association (LGA) released the Urban Stormwater Management Policy for South Australia (USI, 2005). This policy provides a forward looking, multi-objective framework for management of stormwater in the urban areas of the state. The policy was developed to lead the way in which state and local government undertake their respective programs in partnership and set their priorities as they relate to urban stormwater management.

The policy sets out a number of principles and identifies six key policy goals for achieving collaborative and forward looking urban stormwater management in South Australian local government council areas as follows:

- Apply a risk management framework for hazards / flooding based on catchment characteristics and rigorous data collection;
- Facilitate more productive use of stormwater;
- Manage the environmental impacts of stormwater as a conveyor of pollution
- Manage stormwater as part of the urban water cycle recognising natural watercourse and ecosystems where feasible;
- Achieve responsible stormwater management locally by making better use of the statutory development planning system
- Gain innovative stormwater policy outcomes through the most effective funding and procurement arrangements

The principles and goals set out in the policy were used to develop a series of strategies aimed at ensuring that both state and local government would deliver outcomes meeting the purpose of the policy. The strategies were grouped under five main headings as follows:

- Risk Minimisation
- Governance
- Planning
- Environmental Sustainability
- Funding

Details of the actions under each strategy can be found in the Urban Stormwater Management Policy for South Australia.

1.2 Integrated stormwater planning for natural resources management outcomes

Traditionally, stormwater has been planned for and managed as a nuisance and a hazard to be removed as quickly and cheaply as possible. The wisdom of a single-focus consideration of stormwater is increasingly being questioned as community awareness grows about some of the adverse impacts of traditional stormwater management on aspects of the economy and the environment. Communities have become more conscious of the value and scarcity of natural resources and natural landscapes, which has fostered a developing public interest in ways to use stormwater to achieve better outcomes for public and environmental benefits. Therefore, an integrated multi-objective approach to stormwater planning that recognises the potential for delivering these benefits is a considerable improvement over traditional stormwater management.

Future planning and management that recognises interconnectivity between communities, catchments and waterways will increasingly assist to protect our human and natural environments from degradation and promote opportunities for future riparian-scale restoration of degraded natural resources to functional systems. Such activities are best undertaken in a manner that promotes South Australia's vision[1] for natural resources management:

"South Australia, a capable and prosperous community, managing natural resources for a good quality of life within the capacity of our environment for the long term."

1.3 Stormwater Management Plans

A key element of the strategies described in the Urban Stormwater Management Policy for South Australia is the development of Stormwater Management Plans for catchments or specified areas (refer Section 1.4 below). The purpose of these plans is to ensure that stormwater management is addressed on a total catchment basis with the relevant NRM board, various local government authorities and state government agencies responsible for the catchment working together to develop, implement and fund a coordinated and multi-objective approach to management of stormwater for the area.

The Stormwater Management Plans will provide a template for more consistent management of stormwater in individual catchments that is aimed at addressing existing problems and capitalising on opportunities for providing a range of benefits through multi-objective planning, including reuse where feasible. The plans will be used as the basis for developing budgets, specifying cost apportionment arrangements between councils where needed and allocating state support funds (matched by councils) across those catchments that are covered by such plans.

[1] *State Natural Resources Management Plan 2006*

In order to achieve this outcome, Stormwater Management Plans are to:

- Set out clearly the objectives for managing stormwater in the catchment;
- Identify actions (both structural and non-structural) required to manage stormwater to achieve beneficial outcomes and meet the specified objectives;
- Provide a justification for any proposed catchment studies, works, measures or actions;
- Estimate capital and recurrent costs and assign priorities and timeframes to each of the actions; and,
- Define the obligations of the relevant parties in funding, implementing and communicating the plan.

As a result of developing the plans, it is expected that the management of urban stormwater within the incorporated areas of the State will be further enhanced by providing a consistent framework within which planning and implementation of projects and measures are able to occur that provide for community and environmental benefits.

This document provides the guideline framework within which the plans are to be prepared, with such a framework approved by the Natural Resource Management Council.

State support funding for stormwater works and measures will not be available unless a Stormwater Management Plan for the catchment has been prepared and approved under this guideline framework.

1.4 What is a Catchment

The Urban Stormwater Management Policy for South Australia specifies that Stormwater Management Plans are to be catchment based. For the purposes of preparation of Stormwater Management Plans, a hydrological catchment is a catchment in which the stormwater drainage system serves an area that is only affected by stormwater drainage from an adjoining catchment at any defined point of downstream discharge from that adjoining catchment.

However, an individual hydrological catchment may be too small or not sensible for catchment based stormwater management planning purposes. In order to ensure a consistent catchment based approach, a local council or councils are to consult with and gain agreement from the relevant NRM board on the catchment area to be covered by the Stormwater Management Plan.

This catchment planning approach is intended to focus stormwater management at a scale larger than the local street drainage network but the catchment need not be an entire hydrological catchment from headwaters to discharge into receiving waters.

Accordingly a catchment may be a sub-catchment of the entire hydrological catchment, in which case the drainage flow leaving the catchment should not impact as drainage flow into an adjoining catchment but rather contribute as drainage flow into the major drainage line into which all catchments issue their drainage flows.

1.5 Responsibility for Preparation of Stormwater Management Plans

Stormwater Management Plans are to be prepared by the Local Government council or jointly by councils within a catchment. Support from the State Government may be available for the preparation of the plans.

1.6 Stormwater Management Agreement

The Agreement between the State of South Australia and the Local Government Association on Stormwater Management dated 14 March 2006 provides improved finance and governance arrangements for stormwater management throughout South Australia. These arrangements are based on the Urban Stormwater Management Policy for South Australia dated May 2005. The Agreement provides for creation of a Stormwater Management Authority (Authority) with representation from State and Local Government to implement the Agreement.

1.7 Overview of this Document

This document provides a concise framework for the preparation of Stormwater Management Plans for urban areas within the incorporated areas of South Australia. It contains:

- A description of the required contents of the plans (refer Section 2);
- A description of the techniques to be used for preparing some specific aspects of the plan content (refer Section 3);

It also acknowledges past work by local councils and former Catchment Water Management Boards in preparing plans described as Urban Stormwater Master Plans. The planning framework provided by this document seeks to incorporate this previous work where relevant.

2. Content of Stormwater Management Plans

2.1 Overview of Plan Content

Stormwater Management Plans are to contain the following:

- An identification of objectives and outcomes for management of stormwater in the catchment
- An identification of strategies to meet specified management objectives for the catchment
- A definition of the area to which the plan applies
- A description of all known existing stormwater assets, including identification of current condition and ownership where known
- An identification of stormwater management problems and opportunities for achieving outcomes for public and environmental benefit in the catchment
- Determination of capital and maintenance (including recurring) costs associated with the management strategies and how those costs will be apportioned between councils and government agencies if relevant;
- An assessment of the benefits to be derived by implementation of the proposed management strategies;
- Prioritisation of the strategies and a timeframe for implementation
- Assignment of responsibilities for implementing the strategies and meeting any costs
- Relevant implications of any of the above for adjoining catchments
- A communication / consultation strategy for the plan
- Impact of the plan on the environment, economy, community and water resources management in the catchment(s) affected by the plan

The following sections describe in more detail the minimum content required in the plan under each of these elements.

2.2 Description of Catchment Area

The Stormwater Management Plan is to contain a clear description of the area to which the plan applies. This is to be provided by a scaled map delineating the catchment boundary in relation to features such as roads, contours, allotment boundaries and other land marks.

Within the metropolitan area, catchments for which a Stormwater Management Plan is prepared must be complete hydrological catchments. The relevant NRM Board is to be consulted prior to the preparation of a plan to obtain agreement as to the boundaries of the catchment.

Within areas outside of metropolitan Adelaide, Stormwater Management Plans are to be prepared where needed for complete townships, again in consultation with the relevant NRM Board.

2.3 Description of All Known Existing Stormwater Assets

Prior to preparation of a Stormwater Management Plan, local councils within the catchment are to have assembled sufficient information regarding stormwater infrastructure assets within their respective portions of the catchment (including those owned by other parties), such that information regarding the location, type and size of these assets are readily available, preferably within a geographical information system (GIS) format.

This information is considered to be base data for preparation of the Stormwater Management Plan and its acquisition should be funded by local councils outside of funding for preparation of the plans.

2.4 Identification of Problems and Opportunities

Identification of risk issues and opportunities for outcomes of public and environmental benefit associated with stormwater management in the catchment is to be undertaken. This is to be based on analysis using accepted hydrological, hydraulic, water quality and yield modelling techniques as described in publications such as *Australian Rainfall and Runoff* and *Australian Runoff Quality.*

As a minimum, the risk issues and opportunities to be assessed are to include:

- The potential for flooding within the catchment;
- The nature and impact of flooding on properties and the potential for economic loss and environmental impact;
- The positive and negative impacts of future development on flooding;
- Stormwater quality issues within streams and receiving waters both within the catchment and downstream from the catchment;
- Opportunities for better managing flood risk (where such risk is identified), including non-structural flood mitigation measures such as flood warning and preparedness and better integration between stormwater management and local council development plans;
- Opportunities for stormwater use, including aquifer storage;
- Opportunities for environmental enhancement in association with construction of stormwater infrastructure including managing stormwater to enhance water dependent ecosystems where feasible.

The results of analyses of the above points are to be supported by input from local council staff and elected members (refer Section 2.10 below).

2.5 Stormwater Management Objectives

Catchment specific objectives for the management of stormwater within the area are to be set and are to be based on the problems and opportunities identified. The objectives should provide measurable goals for the management of stormwater in the catchment.

As a minimum, the objectives are to set goals for:

- An acceptable level of protection of the community and both private and public assets from flooding;
- Management of the quality of runoff and effect on the receiving waters, both terrestrial and marine where relevant;
- Extent of beneficial use of stormwater runoff;
- Desirable end-state values for watercourses and riparian ecosystems;
- Desirable planning outcomes associated with new development, open space, recreation and amenity;
- Sustainable management of stormwater infrastructure, including maintenance.

2.6 Identification of Strategies and Outcomes

A coordinated and multi-objective strategy involving studies (if needed), works and actions is to be developed and described in the Stormwater Management Plan.

Sufficient analysis needs to be undertaken to demonstrate that the proposed strategy will achieve the outcomes defined in Section 2.5 in a cost effective and sustainable manner. It is possible that as a part of the development of the strategy that the objectives set in Section 2.5 may need to be modified to achieve a cost effective feasible solution that takes account of constraints within the catchment and other socio-political factors.

Possible strategies that may be adopted are described in publications such as the *Guidelines for Stormwater Management (Planning SA 2003)* and the *Water Sensitive Urban Design Guidelines (UWRC 2005)*. In developing the proposed strategy, consideration of the works and actions to be applied at an allotment, local and catchment scale is to be made.

The strategy is to clearly define linkages to the Development Plan and regional natural resources management plan(s) and is to identify any amendments to the Development Plan (or any amendments being contemplated) necessary to ensure

that stormwater is properly managed in the catchment including beneficial use where feasible.

2.7 Costs, Benefits and Funding Arrangements

The costs of implementing the multi-objective strategy described in 2.6 are to be clearly set out in the plan. The costs are to be broken down into the various elements of the plan and are to include the capital costs and also a desirable timeframe for investment, along with any recurring costs, including maintenance needs, flood warning and preparedness programs.

Benefits produced as a result of implementing the plan are to be identified. It is anticipated that the benefits that will be able to be quantified will include reductions in flood damage and stormwater use. However, qualitative benefits are also to be presented such as environmental improvements and improvements in water quality.

Funding arrangements for any proposed works and their maintenance are to be decided by the local councils within the catchment and are to be an integral part of preparing the plan. This approach reflects the preference for councils making this decision based on mutually agreed principles of cost sharing for their particular circumstances. Principles for cost sharing as set out in Part 3 of the Metropolitan Adelaide Stormwater Management Study may be used by councils in the absence of inter-council agreement. The Authority will only become involved in resolving cost sharing by councils where those councils are unable to agree.

2.8 Priorities and Timeframes

Priorities are to be assigned to the actions and strategies identified in the plan. The highest priorities are for works and measures that address reduction of flood hazard and protect lives and the community from property damage. Assignment of project priorities is discussed in more detail in Section 3.3.

A program for complete implementation of the actions identified in the plan is to be set out over no more than a 10 year planning horizon.

2.9 Responsibilities

Responsibilities for actions identified in the Stormwater Management Plan are to be clearly defined.

The Agreement on Stormwater Management referred to in Section 1.6 sets out a number of over- arching responsibilities for the management of stormwater within South Australia. These responsibilities are to be reflected within the Stormwater Management Plans and are to be tied to specific actions in the plan.

Where partner organisations and community groups are expected to be involved, the responsibilities of these organisations are also to be defined.

2.10 Communication and Consultation

It is expected that as a part of the preparation of a Stormwater Management Plan, the staff and elected members of local councils within the catchment as well as the local community, the relevant NRM Board and other relevant government agencies will be consulted in relation to the perceived stormwater management problems and opportunities within the area, and the proposed solutions to those problems.

The nature and methods of consultation adopted for the preparation of plans in each catchment will vary depending on factors such as:

- the size of the catchment;
- the nature and complexity of stormwater management issues;
- the nature of the adopted management strategies; and
- the impact of the strategies on the local community.

The processes and outcomes of consultation carried out during the preparation of the plan are to be documented.

The plan will not be considered to have been finalised until this consultation has been carried out to the satisfaction all parties involved in the development of the plan.

2.11 Review of the Stormwater Management Plans

It is anticipated that the Stormwater Management Plans will be 'living documents' that are periodically reviewed to take account of current knowledge, changing conditions within the catchment and changing community attitudes to the management of stormwater and other water resources making up the urban water cycle.

To ensure that this occurs, it is expected that the Stormwater Management Plans will be reviewed at least every 5 years and that the proposed works and strategies to be adopted for the subsequent 10 year period will be identified.

It is recognised that despite the best planning, on occasion, proposed works within a catchment need to be modified or elevated in priority as a result of unforseen circumstances. Amendment of the Stormwater Management Plan may be undertaken to account for these circumstances, provided that the proposed changes are consistent with the overall strategy and properly integrate with any existing or proposed infrastructure, including any Stormwater Management Plan for an adjoining catchment.

3. Preparing the Plan Contents

This section provides a more detailed description of the processes / methods that are to be used for preparing certain portions of the Stormwater Management Plan.

3.1 Plan Preparation and Approval Process

A flow chart showing the process for commencement, preparation and approval of a Stormwater Management Plan for a catchment is shown in Figure 3.1.

The plan preparation process is preferably initiated either by a local council or group of councils within a catchment. Alternatively, where a Stormwater Management Plan is clearly needed but councils have not yet sought to initiate its preparation, the Authority may direct councils within the catchment to prepare a plan.

Where the preparation of a plan is initiated by the catchment councils, approval is to be gained from the relevant NRM Board for the extent of the catchment area for which the plan is to be prepared. This approval process is to ensure that catchments are appropriately sized to ensure that the planning process is able to be carried out in an effective manner, that the catchment boundaries encompass a complete hydrological catchment wherever feasible and that the downstream boundary of the selected catchment is extended to a point that will ensure that appropriate discharge criteria (whether these be peak flow, volume or quality) are able to be defined.

A Steering Committee comprising representatives of all the constituent local councils within the catchment as well as an appropriate representative of each of the relevant NRM Board and other State government agencies is to be formed to overview the preparation of the Plan.

Preparation of the Stormwater Management Plan is to be undertaken by appropriately qualified personnel, having experience in stormwater and catchment management. It is envisaged that the plan preparation process will essentially follow the sequential order of items set out in Section 2. However, it is recognised that the process of setting management objectives, developing strategies to achieve these objectives and then testing these strategies against physical, financial, environmental and social constraints may involve a number of iterations. Once the elements of the proposed strategy have been determined, funding arrangements, priorities, timeframes for implementation and responsibilities are to be defined.

Throughout the plan preparation process it is envisaged that an appropriate consultation process will be carried out. The manner and extent of consultation is expected to vary from catchment to catchment.

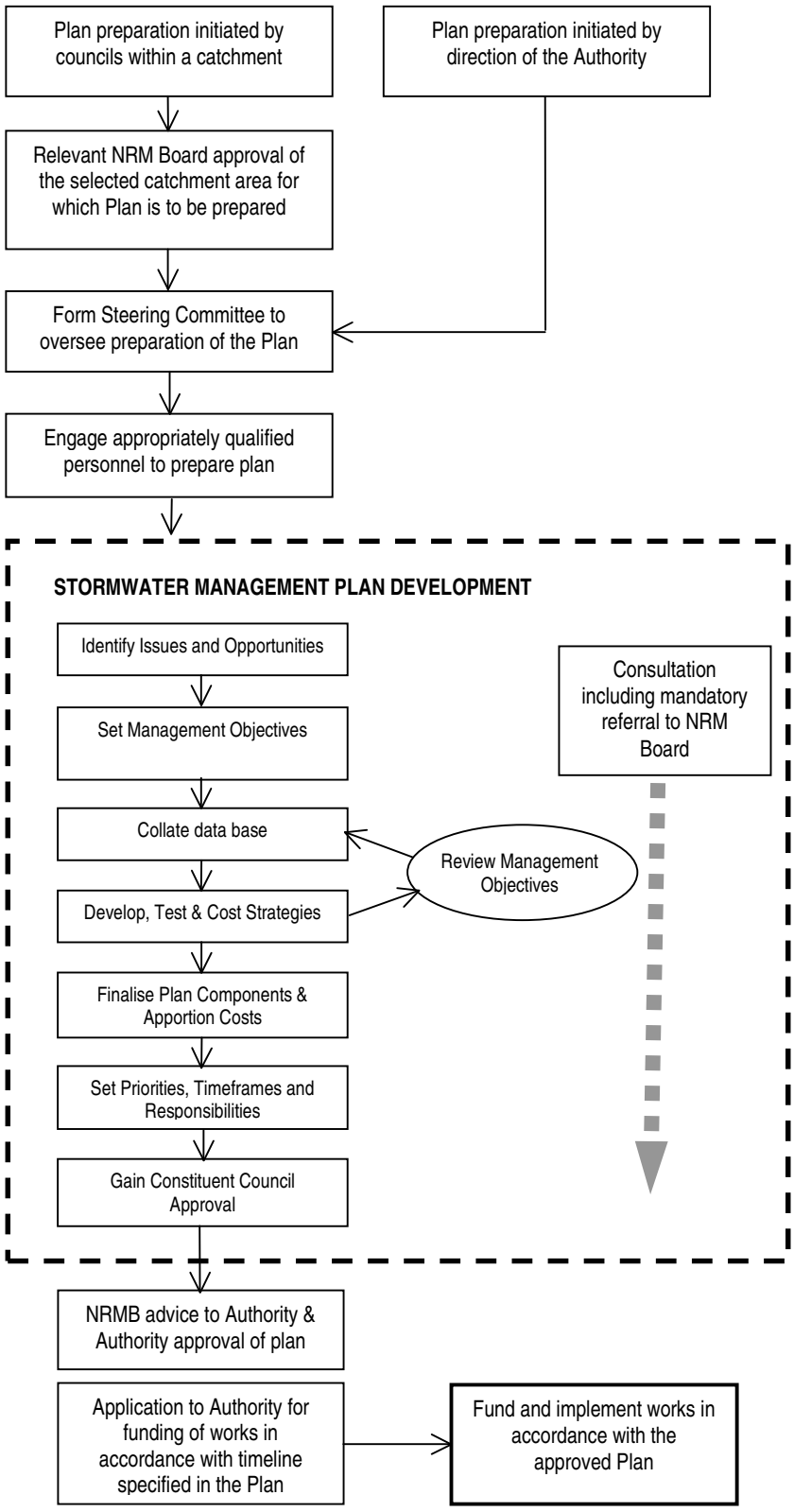

Figure 3.1 Stormwater Management Plan Preparation Process

The plan will be considered to have been completed once endorsement is gained from each of the constituent councils in the catchment.

Final approval of the plan will be required from the Authority, at which point works described in the plan may become eligible for funding from the Authority.

3.2 Identifying Strategies

The Urban Stormwater Management Policy for South Australia clearly advocates the adoption of a multi-objective approach to the management of stormwater from urban areas within the State in which:

- Flood risk to existing and future development is minimised;
- Stormwater use opportunities are maximised;
- Adverse impacts on watercourses and receiving waters are reduced; and
- Desirable development planning outcomes associated with open space, recreation and amenity are achieved.

Due to the varying nature of urban catchments and the existing level of development in many of these catchments, the degree to which these objectives can be achieved in any particular catchment will also vary. Similarly, appropriate strategies to achieve these objectives will vary from catchment to catchment.

A number of documents have been published locally and interstate in which strategies for management of stormwater to achieve various outcomes are described. These strategies may involve devices or planning controls implemented at the allotment level, works constructed on minor catchments or larger regional scale facilities.

This document neither advocates nor precludes any particular management strategy. However, any strategy that is recommended within the Stormwater Management Plan must be shown to meet the specified objectives for management of stormwater in that catchment in a reliable, sustainable and cost effective manner which achieves the outcomes for flood management and other objectives where feasible.

3.3 Determining Relative Priorities

Priorities for the various actions identified within a catchment are to be set as a part of the preparation of the Stormwater Management Plan. In assessing priorities, highest priority is to be given to those actions that address reduction of flood hazard and protect life and property.

The Urban Stormwater Management Policy for SA specifies a multi-objective approach to the management of stormwater from urban areas in the State. As a result, in setting the priorities for works and measures within a catchment, greater weighting should be placed on those works and actions which also provide for water use, water quality improvement, and enhanced development planning outcomes

associated with open space provision, environmental enhancement and recreation. The degree to which these benefits are achieved should be used as a basis for elevating the priority of works and actions that achieve them in conjunction with flood mitigation.

The information contained within the Stormwater Management Plan will be used by the Authority to assess the relative priority of projects between catchments in various areas of the State. As a result, information describing the outcomes of implementation of any proposed works needs to be presented in a consistent manner within each of the Plans.

In order to facilitate the presentation of this information, a standard worksheet for summarising the benefits associated with implementation of the proposed works has been prepared and is shown in Table 3.1. This worksheet is to be included in the Stormwater Management Plan.

The worksheet lists each of the projects identified within the Plan, ranked in order of priority. For each project, costs (both capital and recurring) and key benefits are presented.

For those projects having a flood mitigation benefit, the benefits are to be preferably stated in terms of a quantifiable measure, such as reduction in average annual flood damage (AAD) or reduction in number of properties affected by flooding. Where such a measure has not been determined, a qualitative assessment of the impact of the work is to be provided.

For those projects having a water harvesting benefit, the benefits are to be preferably stated in terms of a quantifiable measure such as the amount of water harvested in an average year. Where such a measure has not been quantified, a qualitative assessment of the impact of the work is to be provided.

Other benefits derived from the project are to be rated using a subjective ranking (high / medium / low) with an accompanying description which provides the basis for the assigned ranking.

3.4 Cost Apportionment between Local Government Bodies in a Catchment

Costs associated with capital and ongoing expenditure are to be presented for all projects identified in the Stormwater Management Plan. The apportionment of these costs between local councils and other funding bodies (where known) is to be set out in the Plan for each project.

3.5 Timeframe for Preparing and Implementing the Plan

The completed Plan is to specify a start date (subject to funding) and an estimated completion date. This information will assist the Authority and show local council expectations for progressing the Plan's content.

Table 3.1 Worksheet Template for Presentation of Work Priorities for a Catchment

Priority	Project/Activity Title	Capital Cost ($)	Recurrent Cost ($ / annum)	Flood Mitigation Benefit		Water Harvesting Benefit		Water Quality Benefit		Other Benefits	
				Measure Used ?	Quantification or Description of Benefit	Measure Used ?	Quantification or Description of Benefit	Rating		Rating	
				(D) - AAD Reduction (P) - Properties Affected (Q) - Qualitative		(V) Volumetric (Q) Qualitative		(H) – High (M) – Med (L) - Low	Qualitative Description of Benefit	(H) – High (M) – Med (L) - Low	Qualitative Description of Benefit
1											
2											
3											
4											
5											
6											
7											

In the past, the failure to reach an agreement on the apportionment of costs between local councils in a number of catchments has inhibited the implementation of key stormwater management works. As a result, guidance is provided in this section of the document as the basis for an equitable method for allocating costs.

The Metropolitan Adelaide Stormwater Management Study - Part C (KBR 2004) provides a detailed assessment and discussion on a number of potential cost apportionment models that could be applied to stormwater management projects. Each of these models has inherent advantages and disadvantages making them suitable to varying degrees across a range of catchment situations. A recommended model was developed, which was based on:

- The allocation of costs to those local government bodies in the catchment causing the need for any proposed works, and additionally
- Allocating costs to those local government bodies in the catchment receiving any flood mitigation benefit of the works.

The method therefore recognises the need for those contributing to a flooding problem to also contribute to the solution to that problem, as well as recognising that those who receive the benefit of any flood mitigation work should also contribute to the solution.

The basic steps required to allocate local government costs according to the proposed model are as follows:

- Identify the proportion of the overall project costs that are to be borne by other funding bodies (where known). The remaining projects costs are to be borne by local government bodies in the catchment (referred to in the following as the 'local government cost')

- Agree on the proportion of the local government cost that is attributable to the reduced flooding benefit that the local council carrying out the works will receive. There is no quantitative method by which this proportion can be determined. The proportion is to be based on negotiation and should take into account qualitative factors such as the extent to which development policy within the council may have enhanced the risk. This component of the cost is termed the 'future costs avoided component'

- Divide the remaining portion of the local government cost between the various local councils based on the proportion by which each of them contributes to the flooding problem. This portion can be quantified and should be based on an agreed parameter such a contributing impervious area or direct calculation of the flow that each council contributes at the location of the proposed works.

  The cost proportion calculated for each council may be adjusted to further account for factors such as previous works undertaken by upstream

councils to limit flows, implementation of development planning policies to reduce flood risk and so on to arrive at the final cost apportionment.

The calculation of the cost apportionment according to the proposed model is based on the presumption that the funding contributed by local government is primarily focussed on issues of flood mitigation and as a result, the model is based on flow contributions and flood reduction benefits.

It is recognised that all catchments have varying issues and as a result, while the above method is provided as a basis, local councils within a catchment may elect to adopt an alternative arrangement for allocating costs. Any alternative model and the parameters to be adopted in that model needs to be agreed by all councils within a catchment. Such alternative models could, for example, include an allowance for the benefits that may be derived by a council in the catchment through the harvesting of stormwater as a resource.

Regardless of the above, in the event of agreement being unable to be reached by councils on the cost apportionment method, then the provisions of part 2.7 above (*Costs, Benefits and Funding Arrangements*) will apply .

4. References

1. GOVERNMENT OF SOUTH AUSTRALIA (2005) 'Urban Stormwater Management Policy for South Australia. May 2005.

2. KBR (2004) "Metropolitan Adelaide Stormwater Management Study – Part C" Local Government Association of SA 2004

3. PLANNING SA (2003) 'Guidelines for Urban Stormwater Management' Planning SA 2003

4. URBAN WATER RESOURCES CENTRE (2005) "Water Sensitive Urban Design: A Handbook for Australian Practice" University of South Australia in association with the Stormwater Industry Association and the Australian Water Association. April 2005.