



BARRIERS AND OPPORTUNITIES TO WSUD ADOPTION IN THE BOTANY BAY CATCHMENT

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EXECUTIVE SUMMARY

This project addresses a key requirement of the Botany Bay Coastal Catchments Initiative (BBCCI), and presents the findings of the *Barriers and Opportunities to WSUD Adoption* part of the Initiative.

A series of group interviews were conducted with officers from a sample of councils that represent 70% of the catchment in area (Campbelltown, Liverpool, Sutherland, Fairfield, Bankstown and Rockdale Councils). The interviews were complemented by interviews from similar and recent research with councils conducted by the authors, namely Blacktown, Kogarah, and Strathfield Councils.

In reviewing the barriers and drivers to the adoption and implementation of Water Sensitive Urban Design (WSUD) in the Botany Bay catchment, a Strengths, Weaknesses, Opportunities, and Threats (SWOT) analysis framework was used. The key findings of the interviews are summarised in Table 1, highlighting a number of distinct strengths, weaknesses, opportunities, and threats associated with advancing WSUD in the catchment.

Table 1: SWOT Analysis of interview responses

	Helpful to achieving the objective	Harmful to achieving the objective
Internal Origin (attributes of the organisation)	<p>Strengths</p> <ul style="list-style-type: none"> • Ongoing stormwater quality improvement works (GPTs, etc) • Officer interest and enthusiasm • WSUD 'entrepreneurs' in a number of councils • Stormwater management service charge (where established) • Adapting WSUD to policy windows (e.g. 'drought-proofing' and climate change agenda) • Pragmatism of WSUD 	<p>Weaknesses</p> <ul style="list-style-type: none"> • Low executive commitment and leadership • Low councillor awareness • Limited planning staff capacity • Limited construction and O&M¹ staff capacity • Policy deficits (no relevant, universal planning instruments) • Fear of failure (flooding, amenity, cost) • Saturated workloads of WSUD protagonists
External Origin (attributes of the environment)	<p>Opportunities</p> <ul style="list-style-type: none"> • WSUD developments (e.g. Landcom sites) • Standard LEP update process being undertaken by all NSW councils • Ongoing implementation of WSUD in Sydney Region capacity-building program • Comprehensive WSUD projects funded under the Urban Sustainability Program • BASIX as a policy platform for WSUD 	<p>Threats</p> <ul style="list-style-type: none"> • Insufficient maintenance research • Insufficient asset management research • Cost-benefit disincentives (price of water) • Limited inter-local knowledge transfer • Uncertainty of state government leadership • Community ignorance of WSUD • Engineering skills shortage • Weak water management provisions in LEP template

¹ Operations and maintenance

Analysing the identified opportunities and threats 13 key strategies were identified that should be taken in order to further WSUD practice in the Botany Bay catchment. These strategies were amended and clarified through discussion with key stakeholders, and participants of the interviews were asked to prioritise the 13 strategies. The outcomes of this prioritisation process is shown in Table 6, along with the average rank.

Table 2: Prioritised list of Strategies for further action

Strategy	Average Rank
1. Development of a WSUD DCP and supporting provisions/guidelines for Councils to facilitate the consistent implementation of WSUD in new developments throughout the catchment	3.8
2. Defining consistent WSUD Principles for insertion into each council's LEP template.	3.9
3. Securing Councillor awareness and commitment to WSUD. This could include Councillor awareness-raising through existing forums (e.g. floodplain management conferences)	4.9
4. Securing executive awareness and commitment to WSUD with targeted programs.	5.1
5. Disseminating tangible data on the operation and maintenance of WSUD elements. This would be prepared in consultation with council staff to ensure consistency with current council O&M practices.	5.1
6. Disseminating tangible data on cost-benefits of WSUD. This would be prepared in to consultation with council staff to ensure consistency with council accounting practices.	6.3
7. Endorsement of an independent capacity self-assessment tool by the "BBCCI" and "WSUD in the Sydney Region" programs to determine the specific WSUD needs of each council. The results of this assessment could be addressed through council programs under the Stormwater Management Service Charge.	7.3
8. Moral and resource support from the program for council officers that are pushing the WSUD agenda within their Council	7.7
9. Continued inter-local capacity-building with the WSUD in the Sydney Region project and its 'Sustainable Water Challenge'	8.5
10. 'Conversants' – 1/2-day workshops shared between councils to address questions and issues that councils have in the undertaking of WSUD	8.5
11. Political lobby – the use of the Botany Bay council mayors or SSROC/WSROC to establish a consistent regulatory approach for WSUD	8.6
12. The promotion of common adoption of the Stormwater Management Service Charge throughout the catchment.	8.7
13. Promoting the concept of 'flying squads' (Fairfield City Council) that specifically target the motivated construction and O&M staff within council and provide workplace incentives for innovations such as WSUD.	9.8

While we acknowledge the limitations of the BBCCI and others to fund new programs we strongly recommended that at least the top seven items are pursued by the BBCCI and other programs.

Two key identified needs for councils are the development of a WSUD DCP and standard provisions, and WSUD principles for an LEP. It is clear that councils and other stakeholders consider the need for the provisions in local planning instruments (LEPs and DCPs) to be strengthened to facilitate WSUD.

Other important findings include the need for:

- Councillor and executive support for WSUD
- Tangible data on operation and maintenance as well as the cost-benefits of WSUD.

The opportunities and threats recognised in this research are similar to other institutional capacity assessments of councils in both Sydney and Melbourne. What is evident is that while common external attributes can be identified for the councils throughout the catchment, each

council's approach to WSUD is a response to a range of internal and external factors. Consequently, while there are strategies to address skill and knowledge issues common to most councils, there does need to be a more specific assessment of the current strengths and weaknesses of councils on an individual basis, so as to tailor appropriate solutions for each council. It is suggested that there is an endorsement of an independent capacity self-assessment tool by the "BCCCI" and "WSUD in the Sydney Region" programs to determine the specific WSUD needs of each council. The key areas covered by such an assessment should include identifying needs and gaps according to the following issues / headings:

1. Knowledge and skills
2. Council Commitment
3. Organisational Structure
4. Policy and Planning Mechanisms
5. Planning and design of water projects
6. Implementation of water projects
7. Operation and maintenance of water projects
8. Corporate Reporting
9. Community Involvement
10. Intra-government / institutional relationships

This assessment could follow a similar process to that undertaken by Melbourne Water in assessing barriers and gaps in each local government's capacity to implement WSUD, based on a series of questions posed to a representative group within each council. Melbourne Water is applying this framework to prioritise and fund projects through their urban stormwater programs to overcome the identified barriers, and thereby increase the institutional capacity of local government.

1 INTRODUCTION

This report presents the findings of the *Barriers and Opportunities to WSUD Adoption* project undertaken by EDAW and Monash University for the Botany Bay Coastal Catchments Initiative (BBCCI).

The project sought to investigate the opportunities and threats to the implementation of Water Sensitive Urban Design (WSUD) among the local government organisations within the Botany Bay catchment. WSUD constitutes best practice for stormwater runoff and quality control and is considered, as part of the BBCCI, a necessary practice to maintain and improve the ecology of Botany Bay and its tributaries.

This report presents the findings of the project, namely the opportunities and threats for local councils implementing WSUD. The report specifically outlines the findings of the interview research conducted with six councils (and supplementary data from three additional councils from previous research) and recommends a series of practical and strategic actions for consideration by the BBCCI program stakeholders so as to facilitate the adoption of WSUD throughout the Catchment.

1.1 Program and Project Objectives

The BBCCI Program is majority funded by the Commonwealth Government and is part funded and project managed by the Sydney Metropolitan Catchment Management Authority. The key objectives of the Program are to:

- Seek long-term protection of the surface waters of Botany Bay, its estuaries and its catchment,
- Produce a scientifically derived ecological response model of Botany Bay that can be used to model the impact that changes in the catchment will have on the Bay's ecological communities,
- Focus on the pollutants washing off the hard surfaces in the catchment (suspended solids, nitrogen and phosphorus), and
- Engage with councils and key stakeholders in the Catchment so they can participate in finding and implementing innovative solution is to improve water quality in the Bay and catchment.

As a key component of the BBCCI Program, this project to identify the opportunities and threats to the adoption of WSUD in the catchment was identified. This project addresses a specific need of the program, with this report presenting the findings of the project.

2 PROJECT METHODOLOGY

Adopting a modified Delphi technique the project team developed a milestone based methodology to meet the aims of the project. The methodology identified five key tasks as shown in Figure 1 that represent best practice in institutional capacity assessment and are consistent with the project specification identified by the BBCCI Program.

A key component of the project is a series of group interviews (Task 3). Smith defined group interviewing to be "...limited to those situations where the assembled group is small enough to permit genuine discussion among all its members" (Smith, 1954, p.59 cited in Stewart, Shamdasani et al. 2007). When time and finances are constrained, group interviews are an effective approach for scoping and clarifying current opportunities and threats as experienced by the key stakeholders in their day-to-day activities. According to Patton (2002), group interviews are important and can be conducted during the different phases of the evaluation process: as part of a needs assessment, during a program, at the end of the program, or months after the completion of a program to gather perceptions on the outcome of that program. In this project, we used the group interview approach as a form of needs assessment, after a thorough literature review.

The process for the interviews and interviewees are detailed in the next section.

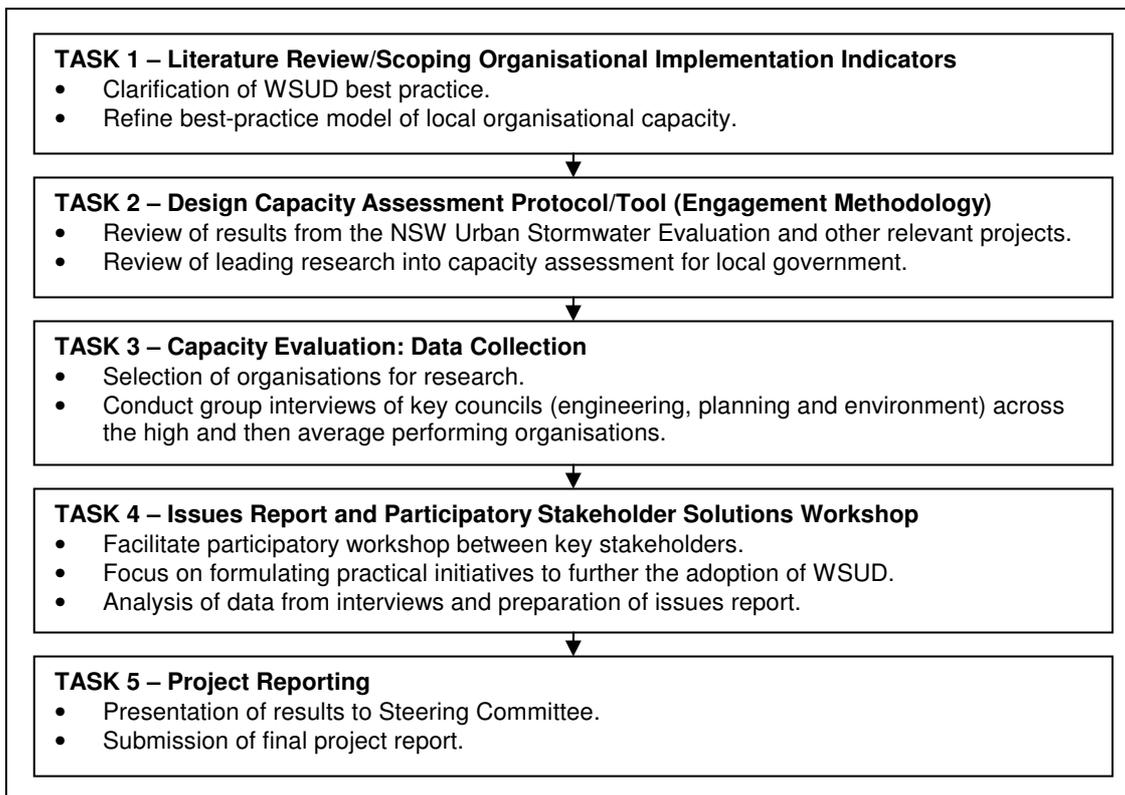


Figure 1: Framework developed for undertaking this project

This report presents the rationale for the office interviews in section 3, and a policy overview in section 4. The council insights are presented in section 5, while the strategies to address WSUD implementation constraints in section 6. Ranking of these strategies is presented in section 7 of this report. Appendix A contains a literature review of current research on opportunities and threats to Council implementing WSUD throughout Australia.

3 COUNCIL OFFICER INTERVIEWS

Twenty-five councils comprise the Botany Bay Catchment, as outlined in Table 3. Each of the councils make up a varying percentage of the catchment area, with councils such as Campbelltown, Sutherland and Liverpool representing 24.5%, 15.3% and 14.3% respectively, whereas councils such as Parramatta and Woollahra include only a negligible fraction of the catchment.

A series of group interviews were allowed for in the funding and timing of the project and interviews were conducted with six councils in the catchment (Table 3). While these councils represent 70% of the land area of the catchment, the project team acknowledged limitations in not being able to interview all of the councils in the catchment.

To address this limitation, we sought advice from the manager of the BBCCI Program as to the relative maturity of each of the twenty-five councils in implementing WSUD². The ratings (high, medium, low, as shown in Table 3) were linked to the percentage of total proportion of each Local Government Area in the Botany Bay catchment and five councils were selected as tier one councils, representing approximately 70% of the catchment, and with some level of maturity of WSUD adoption. To extend the interview base and build on the past work of the project team, this project incorporates data from councils that had provided information for similar projects, namely, Blacktown, Kogarah and Strathfield Councils. This strengthened the dataset and ensured the spread of data was representative of councils within the whole catchment by including nine councils with varying experience in WSUD (Table 3). A total of 31 people were interviewed through this process.

3.1 Interview Questions

Based on a review of the international and local academic and supporting literature, themes that shape the institutional setting and underpin the barriers and drivers to the adoption of Water Sensitive Urban Design were identified. Based on this understanding, we asked the interviewees about:

- *Civic Environmentalism*: their local community's priorities and political expectations for the environment generally, water quality and waterways health.
- *Environmental Geography*: any obvious drivers for water management in the locale, e.g. floodplain management, water conservation, environmentally sensitive areas, water quality.
- *Municipal Commitment*: the priority of their council and whether it reflects the community's perspective; the level of implementation of WSUD; the attractiveness of WSUD to the council; internal influences for instituting WSUD; senior management support; councillor support; the challenges they face (open-ended question).
- *Municipal Cognition*: their definition of WSUD; how they learn about WSUD as a concept and its implementation.
- *Municipal Capacity*: the perceived level of WSUD expertise in the council; the challenges they face (open-ended question).
- *Inter-local Cognition and Capacity*: their knowledge of neighbouring initiatives, recognition of the leading councils for WSUD practice, and willingness to share and develop extra-municipal skills and knowledge.
- *Solutions*: their suggestions on how to improve the current situation and accelerate (implementation of) and escalate (administrative commitment to) WSUD.
- *Strategic Locus*: their views on the future of WSUD implementation by their council (over the next five years).

² This information is based on the 'maturity matrix' developed under the WSUD in the Sydney Region project.

Table 3: Ranking of councils and interviewed councils within the Botany Bay Catchment³

Tier	LGA	Total LGA area (hectares)	Area of LGA in Botany Bay Catchment (hectares)	Proportion of LGA in Botany Bay Catchment (%)	Percentage of total proportion of LGA in Botany Bay Catchment	Ranking according to Percentage of total proportion of LGA in Botany Bay Catchment
1	Campbelltown City Council	31,218	27,340	88%	24.5%	H
1	Sutherland Shire Council	33,444	17,047	51%	15.3%	H
1	Liverpool City Council	30,535	16,000	52%	14.3%	H
1	Fairfield City Council	10,164	7,545	74%	6.8%	M
1	Bankstown City Council	7,680	6,660	87%	6.0%	M
2	Randwick City Council	3,643	3,620	99%	3.2%	L
2	Canterbury City Council	3,356	3,296	98%	2.9%	L
2	Rockdale City Council	2,813	2,740	97%	2.5%	L
2	Hurstville City Council	2,282	2,264	99%	2.0%	L
2	The Council of the City of Botany Bay	2,208	2,156	98%	1.9%	L
2	Kogarah Municipal Council	1,555	1,544	99%	1.4%	L
2	Holroyd City Council	4,024	1,339	33%	1.2%	L
2	Council of the City of Sydney	1,781	1,281	72%	1.1%	L
2	Marrickville Council	1,653	1,230	74%	1.1%	L
2	Strathfield Municipal Council	1,387	735	53%	0.7%	L
2	Burwood Council	715	221	31%	0.2%	L
3	Waverley Council	917	184	20%	0.2%	L
3	Wollongong City Council	68,403	8,003	12%	7.2%	M
3	Wollondilly Shire Council	255,745	7,488	3%	6.7%	M
3	Blacktown City Council	23,993	887	4%	0.8%	L
3	Ashfield Municipal Council	829	56	7%	0.1%	L
3	Auburn Council	3,243	93	3%	0.1%	L
3	Camden Council	20,129	37	0%	0.0%	L
3	Parramatta City Council	6,098	6	0%	0.0%	L
3	Woollahra Municipal Council	1,242	2	0%	0.0%	L

³ Councils directly interviewed through this project are shaded in blue and include Campbelltown, Sutherland, Liverpool, Fairfield, Bankstown and Rockdale. Councils who have been interviewed in related projects are identified in yellow and include Kogarah, Strathfield and Blacktown Councils.

4 POLICY LANDSCAPE

This project identified a range of policy instruments in which councils operate, and which can enable or deter the uptake of WSUD. As identified in Figure 2, these policy instruments include:

- Environmental Protection – legislation governing environmental protection such as the Protection of the Environment Operations Act and environmental objectives established by NSW Department of Environment and Climate Change and the recently updated *Managing Urban Stormwater* documents.
- Landuse Planning – Planning process including SEPPs, LEPs and DCPs. This includes the BASIX Scheme, water quality objectives in the development code under the Growth Centres Commission, as well as Councils' LEPs and DCPs. Some councils have water quality provisions in these documents, however they are inconsistent and often difficult to interpret in practice.
- Academic Institutions – research and development into the further advancement of the technical and policy elements of WSUD is largely directed by academic institutions. Most notably eWater CRC (MUSIC), Monash University (Facility for Advanced Water Biofiltration, Water Studies Centre and National Urban Water Governance Program), University of NSW, and UTS.
- Short-term innovations – short term programs that provide mentoring, direction or funds and include programs such as the BBCCI, the Cooks River Sustainability Initiative and the Stormwater Trust.
- Bridging organisations – there are a series of organisations in the Sydney Region that act as a bridge between organisations and include WSUD in the Sydney Region Program, the Sydney Metropolitan CMA, ROCs, and the Georges River Combined Councils Committee.
- Urban Water Resource Management – represent major policy drivers in the region such as the Metropolitan Water Plan and the NSW Water Reforms.
- Local Government – the *Local Government Act 1993* requires each council to properly manage, develop, protect, restore, enhance and conserve the environment in a manner that is consistent with and promotes the principles of ecologically sustainable development. This requirement places a strong onus on local councils to promote more sustainable management of the urban water cycle. Local government activities of particular importance include: environmental planning, service delivery, public land management, community partnerships, and environmental reporting. Councils are also able to raise a Stormwater Service Charge of \$25/property to facilitate improved stormwater management within their LGA.
- Catchment Management – including Sydney Metropolitan Catchment Management Authority which is responsible for the coordination and management of Sydney's natural resources including land, rivers, estuaries and coastal systems.

While there appears to be a range of policy instruments to assist Councils in the implementation of WSUD, these tools are not uniformly adopted and sometimes not acknowledged at all by councils. The interview process found that the strongest drivers for stormwater management and WSUD were water restrictions, the stormwater management service charge, and the unique initiative of the individual organisation to improve waterway health.

What is clear, from the interviews, is that there is no strong focus or direction on stormwater management and/or WSUD from State government and consequently, councils operate in a policy vacuum.

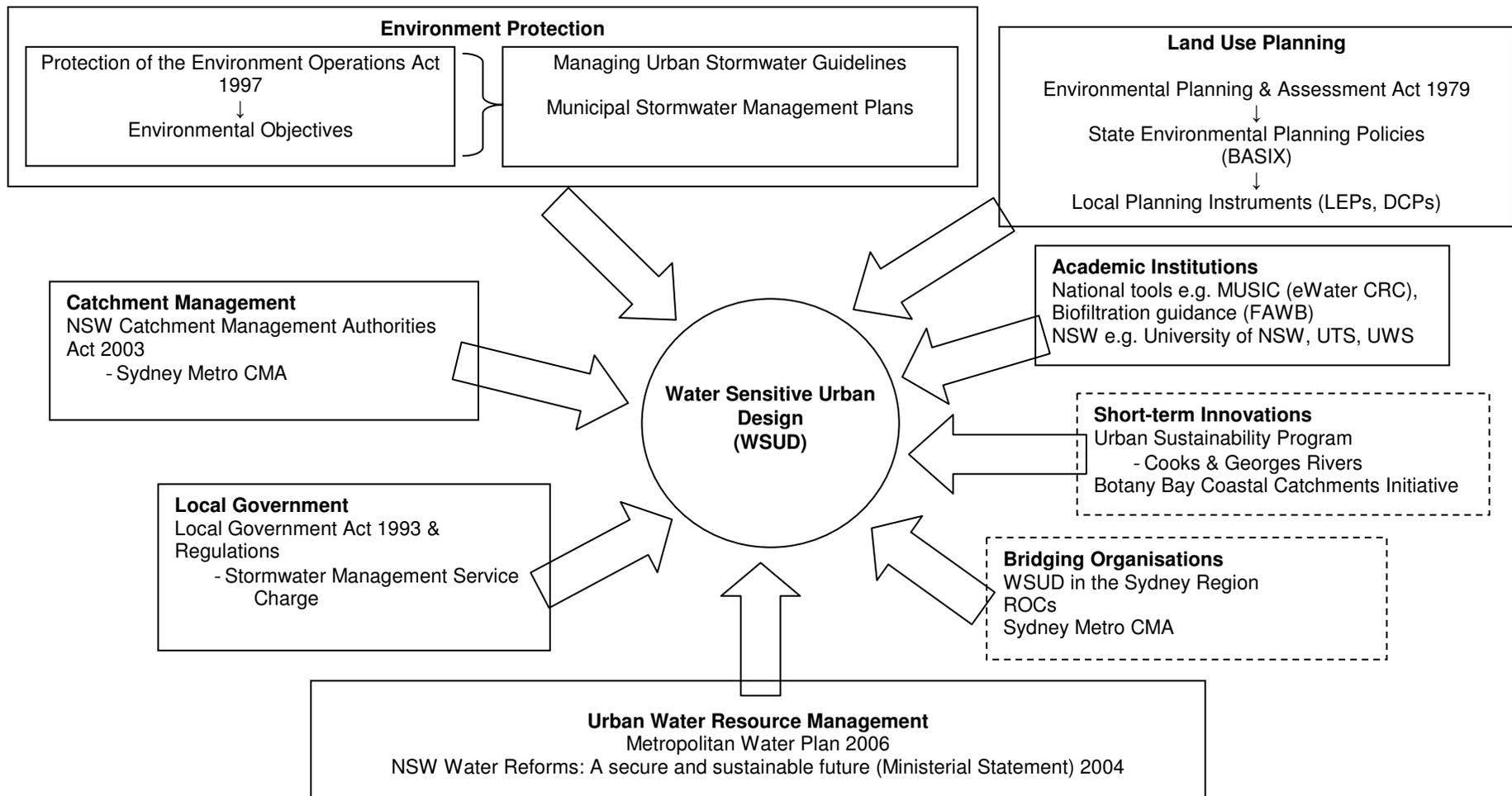


Figure 2: Policy Instruments for WSUD implementation

5 PROJECT INSIGHTS

In reviewing the barriers and drivers to the adoption and implementation of WSUD in the Botany Bay catchment, it is important to employ a framework that is pragmatic, easy to decipher, and relevant to the future planning of catchment activities. The SWOT analysis framework⁴ meets all of these criteria in its familiarity to most professionals that have undertaken some form of management and strategic planning training, its utility to compartmentalise the internal and external barriers and drivers to meeting the objective of the project (in this case, to mainstream the practice of WSUD in the Botany Bay catchment), and by setting a benchmark for monitoring and mapping longitudinal progress.

For the purposes of this project, SWOTs are:

- **Strengths:** attributes of the councils that are helpful to achieving the objective.
- **Weaknesses:** attributes of the councils that are harmful to achieving the objective.
- **Opportunities:** *external* conditions that are helpful to achieving the objective.
- **Threats:** *external* conditions that are harmful to achieving the objective.

By analysing each of the following four questions, the SWOT analysis is performed in an iterative fashion:

1. How can we **Use** each Strength?
2. How can we **Stop** each Weakness?
3. How can we **Exploit** each Opportunity?
4. How can we **Defend** against each Threat?

In our review, we have deliberately composited the four attributes according to similarities among the sample councils. While this approach is most relevant to the requirements of this project, it also ensures confidentiality among the interviewees, given some of the responses were candid and potentially controversial. Trust is a necessary ingredient in the progression of new innovations such as WSUD.

As summarised in Table 4, there were a number of distinct strengths, weaknesses, opportunities, and threats associated with advancing WSUD in the catchment.

5.1 Strengths

All of the councils examined in this research employed some form of stormwater quality improvement program, albeit the majority of actions relating to ‘first generation’ stormwater quality improvement devices, such as gross pollutant traps and sediment interception devices. It was clear to us that the councils that exploited the Stormwater Management Service Charge provisions of the Local Government Act were more able to implement a stormwater quality improvement program. This is because the charge institutes a quasi-utility function for councils, where: the revenue generated by the charge is restricted exclusively for stormwater management; local councils are accountable for transparent expenditure of the charge-generated funds (with specific annual report disclosures); and the revenue is expected under the Department of Local Government guidelines associated with the charge to be supplementary and complementary to the existing allocations of each local council for stormwater management. The quasi-utility function provides a platform for innovation, as local councils are prepared to fund projects they would not otherwise fund, such as the newer and more risky WSUD projects. The innovation of a stormwater utility for water quality improvement has been reported elsewhere (see McLemore and Rose 1997). We noticed a few of the councils interviewed had apportioned funds for small WSUD demonstration projects as part of the project portfolio associated with the charge.

⁴ devised by Albert Humphrey at Stanford University.

Table 4: SWOT Analysis of interview responses

	Helpful to achieving the objective	Harmful to achieving the objective
Internal Origin (attributes of the organisation)	<p>Strengths</p> <ul style="list-style-type: none"> • Ongoing stormwater quality improvement works (GPTs, etc) • Officer interest and enthusiasm • WSUD ‘entrepreneurs’ in a number of councils • Stormwater management service charge (where established) • Adapting WSUD to policy windows (e.g. ‘drought-proofing’ and climate change agenda) • Pragmatism of WSUD 	<p>Weaknesses</p> <ul style="list-style-type: none"> • Low executive commitment and leadership • Low councillor awareness • Limited planning staff capacity • Limited construction and O&M⁵ staff capacity • Policy deficits (no relevant, universal planning instruments) • Fear of failure (flooding, amenity, cost) • Saturated workloads of WSUD protagonists
External Origin (attributes of the environment)	<p>Opportunities</p> <ul style="list-style-type: none"> • WSUD developments (e.g. Landcom sites) • Standard LEP update process for all NSW councils • Ongoing implementation of WSUD in Sydney Region capacity-building program • Comprehensive WSUD projects funded under the Urban Sustainability Program • BASIX as a policy platform for WSUD 	<p>Threats</p> <ul style="list-style-type: none"> • Insufficient maintenance research • Insufficient asset management research • Cost-benefit disincentives (price of water) • Limited inter-local knowledge transfer • Uncertainty of state government leadership • Community ignorance of WSUD • Engineering skills shortage • Weak water management provisions in LEP template

As witnessed in relevant research (see Appendix A), the presence of ‘knowledge facilitators’ or organisational champions are essential for the progression of WSUD in local government. There was no difference in this research – the councils that were advancing WSUD employed strategic, politically-aware officers, who ventured vertically and horizontally across the organisation to influence commitment to, and implementation of, WSUD. The same people, often two or three in strategic positions across the organisation, deliberately used different language for WSUD and extended its application to coalesce with the ‘drought-proofing’ agenda that is currently the fixation of most local councils. Hence, water tanks coupled with rain gardens and other WSUD elements that treated the overflow or other site runoff were proposed for sites where the primary objective is to conserve water.

In the same and in other cases, WSUD was implemented pragmatically without resorting to the appeal of its objectives *per se*. For example, a number of urban landscape improvements incorporated WSUD (e.g. rain gardens) but were not overtly promoted as water quality improvement systems. The staff used the opportunity for new gardens within urban centres and public open spaces to be WSUD where budgets were sufficient. It was also noticed that some councils use projects that address issues such as localised flooding as a driver to implement WSUD.

⁵ Operations and maintenance

5.2 Weaknesses

The weaknesses of the councils in promoting and implementing WSUD were generally no different to those observed in previous research.

In the large majority of councils examined in this project, senior management commitment was not apparent. In only one case was a director present in the interview. Moreover, a total of two managers (at level 3) were present in the interviews. In all other cases only officers were present. The officers of these organisations freely acknowledged the 'support' of their senior staff but were uncertain that WSUD was an important concept, let alone their knowledge of the concept. Similar views were expressed by the interviewees about the councillors, although a number of officers felt the councillors were not supportive at all, or they had such little to do with them that they could not ascertain their concerns and priorities. As reported by Dr. Rebekah Brown and others, councillor and senior management commitment are indeed necessary ingredients to engendering WSUD in local government.

An ongoing problem suffered by local councils is the capacity of their planning and operations and maintenance staff, the former affected by a marketplace shortage and the latter by a lack of practical experience and knowledge of WSUD. WSUD affects the private domain, which is primarily the responsibility of planners in local government to regulate and the operations and maintenance staff to manage in the case of public infrastructure. WSUD is also implemented within the public domain, involving capital projects undertaken by each council and maintained by the same. Clearly, the capacity of these two groups of staff is an important variable for ensuring the success of WSUD in local government. While staff shortages are apparent, the councils face a dilemma in deferring the secondary priorities of policy development in favour of development control and other core responsibilities. In one case, a council officer reported preparing a local stormwater management policy over a two-year period because there were insufficient resources to prepare the policy. While these policy deficits prevail, councils cannot go about the business of efficiently controlling the private domain and requiring WSUD and other stormwater management imperatives without considerable negotiations with development proponents. And with the imperative to undertake the perceived core functions of councils, few are willing to step out in confidence and explore the innovations of WSUD for fear of failure and its attendant political consequences.

5.3 Opportunities

Fortunately for WSUD, some important external drivers exist that are influencing and improving local government commitment and capacity in the Botany Bay catchment. There are four drivers that were clearly identified by the interviewees:

1. the presence of Landcom (and to a lesser extent other developers) illuminated WSUD in both the broad acre and institutional landscapes by their commitment to the concept;
2. the success of the WSUD in the Sydney Region program that has developed the skills and knowledge of the council officers, raised awareness of the concept generally and stimulated action through the 'Sustainable Water Challenge' and other program initiatives;
3. Although yet to be realised, the opportunities afforded by the NSW Government's Urban Sustainability Program, which includes three projects wholly or partly within the Botany Bay catchment (Georges and Cooks Rivers). All projects involve WSUD components and capacity-building, the Cooks River project including a dedicated PhD research project in association with Monash University.
4. The policy platform established by the NSW Government's Building Sustainability Index (BASIX) that, while not addressing stormwater quality objectives directly, may provide an opportunity for negotiation for WSUD. Some interviewees saw BASIX in this light, and in the case of Rockdale and Fairfield Councils, developed complementary policies to implement WSUD. However, others were disappointed that BASIX provided a minimum standard and only set down water conservation objectives, providing limited scope for WSUD. Hence, in the latter case, BASIX may be a threat to the evolution of WSUD.

5.4 Threats

In all interviews we found maintenance to be an ongoing challenge for the councils. Little information was available to councils regarding the life cycle costs of WSUD. This was a serious impediment to WSUD progression as councils were reluctant to invest in the technology without some assurance of the asset life, replacement time and costs, depreciation, and requisite maintenance provisions. It is important to appreciate the asset management framework within which local governments operate. All assets within the jurisdiction of local government are accounted for in terms of these criteria. While WSUD continues to lack the research that will enable councils to confidently compare the asset management criteria for decision and investment, it will remain a novelty that is generally only implemented by councils with dedicated budgets (e.g. stormwater management service charges) or with specific-purpose grants.

While building a business case for WSUD in local government remains precarious with such limited asset management information, it is also difficult to justify while the price of potable water is relatively inexpensive. At \$1.32 for a kilolitre of Sydney water, WSUD in the form of rainwater tanks and other water conservation infrastructure is not economically competitive. Some interviewees saw this as a significant threat to mainstreaming WSUD in their councils.

Nonetheless, a broader problem was identified by the council officers: the external environment was not ripe for WSUD. This applies to the local communities, where most interviewees were either adamant that there was little WSUD knowledge or receptivity or they were at minimum under no political pressure to implement WSUD.

Moreover, council officers were frustrated by the perceived lack of state leadership exemplified by the omission of WSUD principles in the Local Environmental Plan (LEP) standard template and the limited policy guidance beyond the recently-released guidance documents (the updated *Managing Urban Stormwater* series). As long as this state policy deficit prevails, councils may continue to ignore or only pay lip service to WSUD.

This is compounded by the shifting focus of state government between elements of the urban water cycle – potable mains water, wastewater and stormwater, and the lack of any integration. Most noticeably the NSW Government ran the Stormwater Trust from 1997-2003 (Department of Environment and Conservation (stormwater focus)), the Water Savings Action Fund from 2005 to present (Department of Water and Energy (council and large consumer potable water focus)), the BASIX scheme 2004 to present (Department of Planning (residential potable water focus)).

Finally, the capacity limitations brought about by a limited supply of professional engineers and planners and a large cohort of shortly retiring, highly skilled, and experienced local government professionals poses an important threat to the viability and increased uptake of WSUD in councils. Together with a mineral resource boom in Australia that is attracting significant numbers of qualified engineers and technical staff, recruiting suitable staff is currently a key challenge for local government. But furthermore, Councils are limited in their capacity to recruit qualified staff – the award salaries offered by local government are below average professional salaries offered by the industry and there are few inducements for professionals beyond a 'package' vehicle. Many of the senior and highly qualified local government staff are carrying burdensome workloads; why would a professional work for council when s/he could be considerably better rewarded working for a consultancy?

6 STRATEGIES FOR FURTHER ACTION

Looking at the opportunities and threats (outlined above), there are a number of key measures that should be taken in order to advance the mainstreaming of WSUD practice in the Botany Bay catchment. Indeed the interviewees confirmed the following strategies as critical steps for WSUD advancement:

- The development of a common WSUD development control plan to regulate and enhance new developments in the catchment
- Strengthening of LEP template or guidelines to include WSUD.
- Moral and resource support for the WSUD entrepreneurs
- Securing executive awareness and commitment
- Disseminating tangible data on cost-benefits of WSUD
- Continued inter-local capacity-building with the WSUD in the Sydney Region program and its 'Sustainable Water Challenge'
- Promoting the concept of the 'flying squad' of motivated construction and O&M staff to provide incentives for WSUD innovation.
- Endorsement of DECC's MUS capacity self-assessment tool or Melbourne Water's 'Needs Analysis' by the BBCCI and WSUD in the Sydney Region programs with the provision of independent support and encouragement.
- Institutionalised funding arrangements: the promotion of common adoption of Stormwater Management Service Charges throughout the catchment.

At a WSUD solutions workshop held as a component of this project an additional suite of initiatives was discussed, namely:

- Policy learning forums and Instrument hubs – e.g. task groups for policy, design, maintenance, approvals, etc.
- 'Conversants' – ½-day workshops shared between councils
- Political lobby – the use of the BB council mayors or SSROC/WSROC to establish a consistent regulatory approach for WSUD
- Raising awareness and securing councillor commitment to WSUD through new and existing forums (e.g. floodplain management conferences)

The following strategies are presented with two common criteria for program implementation: efficiency and effectiveness, in this case, in relation to the achievement of common WSUD implementation throughout the Botany Bay catchment. While effectiveness relates to the production of the required effect or result (a quality-related measure), efficiency is about performance in reaching the intended result (a time-related measure). Each action is scored as a percentage for effectiveness and efficiency based on the insights from the interviews, previous research, the solutions workshop discussion, and our combined experience. By no means are these scores academic; rather, they are provided to guide discussion and assist the program in assembling its strategies and funding bids.

These strategies were ranked by the BBCCI Reference Committee and councils officers that were interviewed through this project, with the results listed in section 8.

6.1 A common WSUD Development Control Plan (DCP)

Effectiveness: 80%

Efficiency: 70%

While there is limited policy guidance from the NSW Government for implementing WSUD, particularly in relation to its promotion and regulation in the private (development) domain, councils are left to prepare their own individual WSUD policies and planning instruments. A WSUD DCP is currently being prepared by Blacktown City Council, Parramatta City Council is implementing a stringent deemed-to-comply WSUD objectives instrument in concert with its DCP, Kogarah Council has prepared an online calculator that requires WSUD within the drainage system for proposed developments, and a number of other councils in the Botany Bay catchment have developed policies that cite WSUD objectives.

What remains are councils throughout the catchment, and indeed throughout the Sydney Metropolitan Region, that have WSUD DCP provisions which vary significantly in terms of both the objectives (inconsistent load based targets through to concentration based targets), level of prescription (some councils being very specific on requirements while others seek innovation), and application of the provisions for a range of varying landuses.

By developing and promoting a DCP template, the BBCCI would reduce unnecessary duplication and cost to local councils and ensure consistency and clear guidance to developers. The template could still be adapted to fit local circumstances and settings.

6.2 Strengthening of the LEP template or guidelines to include WSUD principles.

Effectiveness: 90%

Efficiency: 70%

While the state policy vacuum prevails, a pragmatic opportunity exists for the BBCCI to assist councils in amending their Local Environmental Plans to include WSUD principles and objectives of significance. The concerns raised by many of the interviewees provide sufficient rationale for the expediting of this strategy.

6.3 Moral and resource support for local WSUD entrepreneurs

Effectiveness: 50%

Efficiency: 60%

Champions for WSUD exist in many of the local councils throughout the Botany Bay catchment. These entrepreneurs can suffer from fatigue and frustration as they try to promote a relatively innovative concept to conservative colleagues and officials. By providing a safe and energising space for these staff, the BBCCI could help to retard these symptoms. The space should be an independent, informal venue where WSUD protagonists can meet and discuss their learning and provide mutual moral support. While this action may be difficult to practically implement, due consideration should at least be given to this problem and the entrepreneurs recognised informally and formally for their efforts.

6.4 Securing executive awareness and commitment

Effectiveness: 60%

Efficiency: 60%

While it may be clear there is need for increased executive commitment to WSUD, the tactics to engage executives must be highly sophisticated and founded on the principles of social capital, i.e. trust and reciprocity. The strategy, by employing an executive opinion leader and WSUD protagonist, may relevantly engage with local council executives using short-term promotional functions (e.g. business breakfasts) and executive meeting pitches. This action may provide mixed results but the potential to improve executive awareness and possibly enlist some executives to the WSUD agenda is high.

6.5 Disseminating tangible data on the cost-benefits and asset management implications of WSUD

Effectiveness: 70%

Efficiency: 70%

As previously stated, we found the commonest of problems shared by councils involved in this research is the operation, maintenance, and replacement of WSUD assets. Council officers in our interviews were dissatisfied with the scarcity of maintenance and asset management data associated with WSUD and consequently were reluctant to promote it among their peers. The Facility for Advancing Water Biofiltration (FAWB) at Monash University is currently preparing guidelines to this effect. However, local data is virtually nonexistent given most WSUD projects are not monitored. Another challenge is the variability of WSUD; most applications are tailored to the physical and social settings associated with the installation. Nonetheless, the BBCCI could produce a simple online compendium of WSUD costs and guidance for asset managers that is compliant with AAS 27 accounting practices. Following Fairfield City Council's lead, the

BBCI could also create template maintenance plans for peculiar WSUD techniques using the maintenance provisions within the WSUD Guidelines for Western Sydney as a foundation.

6.6 Continued inter-local capacity-building with the WSUD in the Sydney Region project and its 'Sustainable Water Challenge'

Effectiveness: 80%

Efficiency: 60%

Inter-local capacity is often overlooked by public administrators and policy professionals, who generally focus on the vertical administration associated with traditional policy implementation. Yet the inter-local capacity is necessary for sustaining WSUD. Often the complexity associated with two tiers of administration (state and local) is a barrier to advancing sustainability ideals, and WSUD is not exempt from this problem. The benefits of the Sustainable Water Challenge facilitated by the WSUD in the Sydney Region program have been acknowledged by the local councils. The initiative provides a congenial setting for healthy competition and showcasing of local projects that culminates each year in a seminar, field trip and showcase of those attracting awards. We see this initiative as a driver for WSUD in the catchment; without it, little opportunity would exist for local councils to share their WSUD experiences, to promote, and be recognised for, their WSUD accomplishments.

6.7 Promoting the concept of the 'flying squad' of motivated construction and O&M staff to provide incentives for WSUD innovation

Effectiveness: 60%

Efficiency: 70%

Fairfield City Council has adopted an innovative management approach that endeavours to promote the motivated staff within council. Within Council's construction team exists a 'flying squad' of dedicated officers who devote their time to continuous improvement in their approaches to construction. WSUD is part of this setting. The concept is novel by deliberately forming an elite group of field staff that are recognised for their drive. We see the utility of this approach in other councils where conservatism is cited as an ongoing barrier within the operations and maintenance divisions of councils.

6.8 Local Capacity Assessment

Effectiveness: 70%

Efficiency: 80%

Recently the Department of Environment and Climate Change released new documents within the Managing Urban Stormwater series. Within the revised council handbook is a capacity self-assessment tool for councils. A similar but more comprehensive tool is currently being applied by Melbourne Water with the thirty-eight local governments in its region to determine their program needs associated with stormwater quality improvement. Both approaches have their merits – the DECC self-assessment tool is inexpensive and simple to apply, the Melbourne Water 'needs analysis' tool is independently conducted and directly linked to program initiatives. While we favour the latter tool, we encourage the BBCI to endorse either approach to the catchment councils and provide support to each council in applying the tool. Notwithstanding either approach is not valid without programmed improvements and related strategic projects.

6.9 Universal adoption of the Stormwater Management Service Charge

Effectiveness: 90%

Efficiency: 70%

As discussed in section 5.1, adoption of the stormwater management service charge establishes the function of a quasi stormwater utility with three clear benefits:

1. *Accountability* – the regulations under the Local Government Act clearly set out the purpose of the charge, the services that can be funded under the charge, and a reporting requirement that is included with the annual report of the council.

2. *Flexibility* – the opportunity to undertake functions that relate to the total water cycle and the availability of recurrent funds to underwrite innovative projects that would otherwise be excluded from the capital works program.
3. *Demonstrability* – the creation of a strategic program funded by the charge increases local confidence in the practice of WSUD as works are undertaken and progressively maintained.

Therefore, the BBCCI should promote the charge to the catchment councils that are yet to consider it. We suggest Fairfield City Council is promoted as an exemplar in its development of targeted community engagement methods and materials associated with the charge.

6.10 Policy learning forums and instrument hubs

Effectiveness: 60%

Efficiency: 50%

Much discussion in the academic literature (e.g. Senge 1990; Meppem and Gill 1998; Innes and Booher 1999; Meppem 2000; Rogers, Roux et al. 2000; Bellamy, Walker et al. 2001; Senge and Scharmer 2001; Connor and Dovers 2004; Hahn, Olsson et al. 2006; van Roon, Greenaway et al. 2006) and other related literature (e.g. Roughley and Dart 2005) revolves around policy learning forums that involve an inter-disciplinary group of practitioners and researchers searching for better ways to improve policy and its implementation. Unfortunately, few practical examples exist to date. The WSUD in the Sydney Region program included an expert reference group but this was not integrated with the overseeing program steering committee. Nonetheless, the BBCCI provides a unique opportunity to establish such a forum while the ecological response modelling and associated environmental improvement plan is a key focus of the initiative. Integrating social and physical scientists with practitioners within this context will increase the credibility of the approach and provide a forum for engagement of fresh ideas for WSUD and other relevant initiatives.

6.11 ‘Conversants’

Effectiveness: 80%

Efficiency: 60%

In reviewing the attendance record for the recent WSUD conference in Sydney, it was found that local government was insignificantly represented. The reasons are possibly varied: limited training and conference budgets, staff time constraints and workloads, and relevance to local practitioners. Conferences occurring over two days or more tend to be an imposition on human resources, particularly in local councils. Their specific subject matter and cost do not often accord with council business needs. A suggested way of addressing this problem is to pilot ‘conversants’ – half-day, focussed forums for WSUD practitioners within councils that include both theory and practice (such as on-site discussions) and are staged at council venues for a low fee. The Sustainable Urban Water Challenge partly meets these criteria but is only an annual function. The conversant concept should be considered at a catchment rather than regional level and hosted by councils for councils.

6.12 Regional political lobby

Effectiveness: 80%

Efficiency: 50%

Some of the most successful environmental initiatives were borne out of the Regional Organisations of Councils, such as SSROC and WSROC. Recently it seems these organisations have not been as explicit in their environmental policy endeavours. Yet WSUD requires a sustained policy drive and cannot rely on short-term programs like the BBCCI to gain the momentum necessary for ongoing ecological improvement in the catchment. It is our view that the BBCCI should initiate alliances with SSROC, WSROC and MACROC to position the WSUD agenda for the longer term. By doing so, the concept may gain further traction and be fuelled by local political stewards rather than the more removed regional initiatives.

6.13 Councillor awareness-raising

Effectiveness: 70%

Efficiency: 50%

When we compare the current state of attention given to local government urban water issues, without doubt the 'issue-attention cycle' described by Downs (1972) is focussed on the prevailing drought and the aspirations for improved water frugality. For the more static issues such as water quality, it is difficult to gain momentum when there is little public perception and concern to cling to. However, ongoing organised advocacy coalitions can be instrumental in driving and maintaining the momentum of these more complex and 'wicked' problems (Rittel and Webber 1973). A good example is the NSW Floodplain Management Authorities that actively engages with the elected officials as well as the technical staff of councils. This model provides utility in being politically relevant and active while drawing upon the technical expertise of the local officers. Such a model does not exist for WSUD, or water quality improvement for that matter. Using the FMA model could induce a salience of WSUD as a concept among councillors and its application, and piggy-backing its performance as a successful engager of local officials is noteworthy for mainstreaming WSUD as local government practice.

7 RANKING OF THE STRATEGIES FOR FURTHER ACTION

Participants of the interviews and stakeholders were asked to prioritise the thirteen strategies as outlined in Section 7, which could be used to advance WSUD practice in the Botany Bay catchment. The strategies were ranked by 19 stakeholders in order of importance from 1 to 13, with 1 being the most important. The outcomes of the ranking by the organisations are shown in Table 5, along with the average rank.

While we acknowledge the limitations of the BBCCI and others to fund new programs we strongly recommend that at least the top seven items are pursued by the BBCCI and other programs.

Table 5: Prioritised list of Strategies for further action

Strategy	Average Rank
1. Development of a WSUD DCP and supporting provisions/guidelines for Councils to facilitate the consistent implementation of WSUD in new developments throughout the catchment	3.8
2. Defining consistent WSUD Principles for insertion into each council's LEP template.	3.9
3. Securing Councillor awareness and commitment to WSUD. This could include Councillor awareness-raising through existing forums (e.g. floodplain management conferences)	4.9
4. Securing executive awareness and commitment to WSUD with targeted programs.	5.1
5. Disseminating tangible data on the operation and maintenance of WSUD elements. This would be prepared in consultation with council staff to ensure consistency with current council O&M practices.	5.1
6. Disseminating tangible data on cost-benefits of WSUD. This would be prepared in to consultation with council staff to ensure consistency with council accounting practices.	6.3
7. Endorsement of an independent capacity self-assessment tool by the "BBCCI" and "WSUD in the Sydney Region" programs to determine the specific WSUD needs of each council. The results of this assessment could be addressed through council programs under the Stormwater Management Service Charge.	7.3
8. Moral and resource support from the program for council officers that are pushing the WSUD agenda within their Council	7.7
9. Continued inter-local capacity-building with the WSUD in the Sydney Region project and its 'Sustainable Water Challenge'	8.5
10. 'Conversants' – ½-day workshops shared between councils to address questions and issues that councils have in the undertaking of WSUD	8.5
11. Political lobby – the use of the Botany Bay council mayors or SSROC/WSROC to establish a consistent regulatory approach for WSUD	8.6
12. The promotion of common adoption of the Stormwater Management Service Charge throughout the catchment.	8.7
13. Promoting the concept of 'flying squads' (Fairfield City Council) that specifically target the motivated construction and O&M staff within council and provide workplace incentives for innovations such as WSUD.	9.8

Other projects suggested by others include schools education program, improved reporting of stormwater management projects, and supporting information and promotion of the DECC *Managing Urban Stormwater documents* on WSUD, namely *Urban Design, Treatment Techniques, Council Handbook, Stormwater Reuse*.

While it may not be feasible for the BBCCI Program to address all of the strategies identified in Table 5, seven top strategies are recommended to be implemented to further WSUD within the catchment.

Two key identified strategies for Council is the development of a WSUD DCP and standard provisions, as well as WSUD principles for an LEP. It is clear that councils and other stakeholders consider the need for the provisions in local planning instruments (LEPs and DCPs) to be strengthened to facilitate WSUD. Currently the local planning instruments have limited consistency through the catchment and often there is a lack of ability to provide advice to applicants on the requirements of how to meet the provisions. Consequently within council there is often an inability to assess WSUD aspects of development applications. These issues should be addressed in this comprehensive DCP. Blacktown Council who is currently rewriting their DCP with a supporting handbook should be looked to as an example.

Councillor and executive support is a key enabler for WSUD. It was noted in the interviews that there is a range of views on WSUD, spanning from often limited support and or desire for WSUD initiatives through to even an obstructionist position, where WSUD is seen as “too difficult” or “an impost” for developers. Councillors are often focused on environmental issues but have limited grasp of WSUD. It is clear there needs to be increased executive commitment to WSUD.

A key gap identified in the interviews and reinforced through the ranking of these strategies is for tangible data on operation and maintenance as well as the cost benefits of WSUD. The interviews showed that some councils are operating in a knowledge vacuum and those who take the obstructionist position use this lack of knowledge as a reason for lack of action. It is suggested that projects to address these knowledge gaps are started immediately and build on current information available. Importantly there is a need to ensure that any information is appropriate to council accounting processes.

While this project has sought to broadly identify gaps and constraints to the implementation of WSUD through the Botany Bay Catchment, there is a more fundamental need for assessment of the needs of each council in the barriers that they face in the implementation of WSUD. It is suggested that there is the endorsement of an independent capacity self-assessment tool by the BBCCI and WSUD in the Sydney Region Programs to determine the specific WSUD needs of each council. The key areas covered by such an assessment should include identifying needs and gaps according to the following issues / headings:

1. Knowledge and skills
2. Council Commitment
3. Organisational Structure
4. Policy and Planning Mechanisms
5. Planning and design of water projects
6. Implementation of water projects
7. Operation and maintenance of water projects
8. Corporate Reporting
9. Community Involvement
10. Intra-government / institutional relationships

This assessment could follow a similar process to that undertaken by Melbourne Water in assessing barriers and gaps in each local government’s capacity to WSUD, based on a series of questions posed to a representative group within each council. Melbourne Water is applying this framework to prioritise and fund projects through their urban stormwater programs to overcome the identified barriers, and thereby increase the institutional capacity of local government.

8 CONCLUSIONS

This project has sought to determine the constraints and opportunities for WSUD implementation among local councils within the Botany Bay Catchment. While there have been similar projects to assess the councils' capacity to implement WSUD, this is the first for the Botany Bay Catchment. This project enhances the existing body of knowledge on institutional inertia and capacity development for WSUD within a local context.

Group interviews of six councils, representing 70% of the catchment area, were supplemented by extensive interviews undertaken separately with three other councils in the catchment. The interviews assessed the constraints and opportunities for councils through a SWOT framework, which identified the following variables:

- *Strengths* – Ongoing stormwater quality improvement works (GPTs, etc), officer interest and enthusiasm, WSUD 'entrepreneurs' in a number of councils, stormwater management service charge (where established), adapting WSUD to policy windows (e.g. 'drought-proofing' and climate change agenda), pragmatism of WSUD
- *Weaknesses* – low executive commitment and leadership, low councillor awareness, limited planning staff capacity, limited construction and O&M staff capacity, policy deficits (no relevant, universal planning instruments). fear of failure (flooding, amenity, cost), saturated workloads of WSUD protagonists
- *Opportunities* – WSUD developments (e.g. Landcom sites), ongoing implementation of WSUD in Sydney Region capacity-building program, comprehensive WSUD projects funded under the Urban Sustainability Program, standard LEP template, BASIX as a policy platform for WSUD
- *Threats* – insufficient maintenance and asset management research, cost-benefit disincentives (price of water), limited inter-local knowledge transfer, uncertainty of state government leadership, community ignorance of WSUD, engineering skills shortage, and weak water management provisions in LEP template.

The threats and opportunities found through this research are similar to other institutional capacity assessments of councils in both Sydney and Melbourne. What is evident is that while common threats can be identified for the councils throughout the catchment, each council's approach to WSUD is a response to a range of internal and external factors. Consequently, while there are strategies to address skill and knowledge issues common to most councils, there does need to be a more specific assessment of the current threats and opportunities of councils on an individual basis, so as to tailor appropriate solutions for each council.

The following strategies were ranked by the stakeholders in order of preference and we strongly recommend each is pursued by the BBCCI and other programs:

1. Development of a WSUD DCP and supporting provisions/guidelines for Councils to facilitate the consistent implementation of WSUD in new developments throughout the catchment
2. Defining consistent WSUD Principles for insertion into each council's LEP template.
3. Securing Councillor awareness and commitment to WSUD. This could include Councillor awareness-raising through existing forums (e.g. floodplain management conferences)
4. Securing executive awareness and commitment to WSUD with targeted programs.
5. Disseminating tangible data on the operation and maintenance of WSUD elements. This would be prepared in consultation with council staff to ensure consistency with current council O&M practices.
6. Disseminating tangible data on cost-benefits of WSUD. This would be prepared in to consultation with council staff to ensure consistency with council accounting practices.
7. Endorsement of an independent capacity self-assessment tool by the BBCCI and WSUD in the Sydney Region Programs to determine the specific WSUD needs of each council. The results of this assessment could be addressed through council programs under the Stormwater Management Service Charge.

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APPENDIX A PREVIOUS RELEVANT RESEARCH

This appendix the results of a literature review undertaken as a component of the Project. This review of relevant academic and supporting literature was undertaken to inform the methods of the project and to provide a basis for analysis of the project results. There are seven main bodies of research that are highly relevant to this project:

1. The report, "Assessment of barriers to uptake of water sensitive design / development in Australia, NSW and the Lower North Coast", by Batkin Walkerden Associates (Walkerden 2007);
2. The report, "Water sensitive urban design: Barriers to Adoption and Opportunities in SEQ", by Water by Design (Anon. 2005);
3. The review of Stormwater Management Planning in NSW undertaken by Rebekah Brown and Dr. Roberta Ryan then of the University of New South Wales for the NSW Environment Protection Authority (2000);
4. The PhD dissertation by Rebekah Brown on the institutionalisation of integrated urban water management (2003), focusing on the capacity of local governments in NSW to implement urban stormwater management plans;
5. A contracted research project undertaken by Richard McManus and Dr. Rebekah Brown (2005) investigating local government capacity to implement the State Environmental Planning Policy (Waters of Victoria)
6. The evaluation of the 'Clearwater' local government capacity building program in Victoria (e.g. Keath and White 2006); and
7. Chapter 5 of Australian Runoff Quality entitled "Institutional Capacity" which synthesises key insights into institutional capacity for practitioners with guidance on improving an organisation's capacity for implementation of sustainable urban water management (Brown et al 2006).

The first two sources are reports prepared specifically for Coastal Catchment Initiatives projects in the Lower North Coast of NSW and South East Queensland. The findings in the reports are similar and are summarised briefly as:

- *Institutional barriers:*
 - A policy paradox – while the state government controls the planning regulations and instruments, there is a lack of policy leadership from state governments evidenced by no formal policy, limited guidelines and regulations, and administrative procedures.
 - Poor administrative integration between agencies and councils, and between departments within local councils, to implement WSUD.
 - Limited councillor and senior staff commitment to WSUD
- *Community barriers:*
 - Cost concerns for building, maintaining and replacing WSUD-related infrastructure by private industry and government that are couched around the 'affordable housing' viewpoint.
 - Lack of awareness by stakeholders and the community about the benefits and practicalities of water sensitive urban design, and lack of suitable training programs and access to relevant information.
 - Lack of consumer demand for water sensitive design developments, and lack of appropriate marketing about their costs, benefits and rewards.
- *Technical barriers:*
 - Limited quantification of the benefits of WSUD in terms of cost and maintenance.
 - Little regional and local data on water quality parameters for MUSIC and other modelling tools to design WSUD systems.

Opportunities summarised from the reports relate to the above-listed constraints, i.e. strengthened planning instruments and controls, education programs for industry and community, and knowledge integration between research institutions, governments, and professional associations.

The findings of these two reports specifically undertaken for the Coastal Catchments Initiative are relevant to this project. Much of the results and recommendations, summarised above, coincide with the findings for the Botany Bay catchment.

The review of the NSW Stormwater Management Planning process by Brown and Ryan (2000) provides useful insights into the conditions necessary to achieve improved stormwater quality. These conditions, summarised in Table 6 and reinforced in other investigations of intergovernmental cooperatives (e.g. Wondolleck and Yaffee 2000; Steelman and Carmin 2002; Koontz, Steelman et al. 2004; Ryan and Klug 2005)^{vi}, could be applied more generally to other initiatives, such as planning and implementation of regional-scale WSUD, and, more specifically, provide a basis for consideration in reviewing the conditions required to implement WSUD in the Botany Bay catchment.

Table 6: Summary of conditions required to achieve expected outcomes of the NSW Stormwater Management Planning Process (Brown and Ryan 2000).

	Influential Resource Conditions	Influential Time Conditions	Influential Expertise Conditions
Council	<ul style="list-style-type: none"> ◆ Quality and existence of baseline information ◆ Level of significance & value given to environmental assets ◆ History of experience and expertise ◆ Officers' levels of skill, knowledge and enthusiasm ◆ Political priority placed on protecting the environment ◆ Level of inter-departmental participation 	<ul style="list-style-type: none"> ◆ Level of existing information available ◆ Level of support from Councillors ◆ Participation by senior executive in steering committee meetings 	<ul style="list-style-type: none"> ◆ Breadth of Inter-departmental officer access & engagement
Catchment Stormwater Managers & Stakeholders	<ul style="list-style-type: none"> ◆ History of positive state-local & local-local inter-governmental relations ◆ Existence of coordination assistance by catchment committee ◆ Level of existing capacity for engagement of community groups & residents ◆ Complementary resource priorities of other catchment stormwater managers 	<ul style="list-style-type: none"> ◆ Time to build and establish the coordination and relationships of all stakeholders ◆ Number of issues and conflicts for negotiation between the stakeholders ◆ Availability and potential of stakeholders to contribute to the process 	<ul style="list-style-type: none"> ◆ Council officers' level of skill for conducting urban stormwater management planning ◆ Breadth of disciplinary input from catchment steering committees into the planning process ◆ Available opportunities and skills for community engagement
Funds for Implementation	<ul style="list-style-type: none"> ◆ Size of council's budget for urban stormwater management ◆ Council's capacity to gain access to external or additional funding sources 		

^{vi} Ryan and Klug (2005), in reviewing collaborative watershed planning in Washington state, USA, refer to money, technical expertise and time as the 'ubiquitous three' capacity measures.

	Influential Resource Conditions	Influential Time Conditions	Influential Expertise Conditions
The EPA (now part of the NSW Department of Environment and Climate Change)	<ul style="list-style-type: none"> ◆ Dedicated time to, and involvement with, the catchment planning process 	<ul style="list-style-type: none"> ◆ Time frame allocated in the Section 12 direction for preparing stormwater management plans ◆ Quality of feedback and guidance from EPA 	

Following the PhD research undertaken by Brown (2003), fourteen case studies of Sydney metropolitan councils were summarised and formulated into a typology of organisational development identifying five development phases (see Brown 2004 for a summarised account). Each of the five stages had common and distinguishable levels of stormwater commitment and action, political capital, expertise, organisational structure and organisational culture. In reviewing these factors, Brown (2003) identified only five local councils to be implementing leading edge urban stormwater management practices as an outcome whilst the large majority (>100) of councils experienced no on-ground change and adaptation towards sustainable urban stormwater management (Brown, Ryan et al. 2001).

A key finding in the research conducted by Brown (2003) highlighted the intergovernmental working relationships and relative increase in local government knowledge of urban stormwater quality management imparted by the program were outweighed by broader socio-political and expertise impediments. The identified impediments included fragmented knowledge and responsibility, inadequate capacity for implementation, predominating technocratic solutions, and limited community engagement abilities. This should be considered in the context of a significant and rapid paradigm shift from stormwater considered as a low priority waste product for efficient conveyance to a high priority that is instrumental to facilitating sustainability (Brown 2005). Thus, urban water reform programs require an explicit recognition of the existing and/or potential for professional and institutional inertia that impedes a complete paradigm shift and consequently an agreed vision for sustainable water management cannot be realised (Brown, Mouritz et al. 2006).

The findings have supported the following capacity building premises outlined by Brown et al (2001):

- *political support*: necessary for redistributing funding, promoting organisational change, facilitating broader community awareness and maintaining professional and organisational momentum for innovation and focus on preventative strategies through process empowerment. Stormwater management tends to lack the high-level bureaucratic commitment and support for an ongoing transition towards sustainability (Brown 2005) via modes such as Water Sensitive Urban Design;
- *commitment to communities*: a disposition necessary for securing local political support. This requires appropriate training and skilling of staff and an appreciation of the power of shaping local social norms and behaviours for effectively addressing urban water problems;
- *transdisciplinarity*: necessary for promoting a climate in which a range of expertise is valued including local, community and indigenous knowledge. Also important for addressing the professional inertia in the urban water industry and being a catalyst for developing innovative sustainable solutions;
- *institutional capacity*: necessary for strengthening the key relationships between all the players in the catchment and developing a common focus on the health of the aquatic environment. This capacity has the potential to create and shape existing decision-making frameworks that can create action and change to improve urban water management. The way decision-making is enacted and the degree to which power and influence are distributed between the officers are the roots for transition from traditional forms of participation to truly collaborative styles of environmental management (Koontz, Steelman et al. 2004).

In a review of local government capacity to implement the integrated water management (WSUD) aspects of the State Environmental Planning Policy (Waters of Victoria)^{vii}, McManus and Brown (2005) concluded that 'a significant majority of the ... councils [interviewed] appear to be in the developmental phases of sustainable water management and struggle with key issues such as attracting and/or maintaining skilled staff, lack of internal political will and resources, and confusion over roles and responsibilities'.

Table 7 summarises the results of a series of six half-day group interviews involving 4-5 officers from 18 councils of varying locations and sizes across Victoria, reported by McManus and Brown (2005). Only the results relevant to this Botany Bay study are included in Table 5. It should be noted that this research was not qualitatively or quantitatively validated but provides a stimulus for further investigation.

Comments made by interviewees involved in the research reinforce a diagnosis of local government capacity for WSUD, outlined by Keath and White (2006):

- 'Environmental management is a State Government responsibility'.
- 'The industry is on a steep learning curve'.
- 'Council's face significant problems of re-skilling, attracting and/or keeping staff with the relevant knowledge and skills'.
- 'Councils don't have the basic cash resources needed to implement best practice'.
- Still a traditional 'command and control' relationship between state and local government.
- The eyes of the Councillors would 'glaze over' at the mention of the SEPP
- 'Current funding programs are too limited – don't account for the different needs between councils'.

Although these findings are associated with research conducted with local government in Victoria, the conditions and context are similar. Recently, research undertaken by Peter Morison as part of his PhD is identifying correlations between the Melbourne and Sydney contexts for WSUD. Hence, the SEPP findings are relevant to the current project.

^{vii} The State Environmental Planning Policy (Waters of Victoria) is a statewide policy developed by the Victorian Environment Protection Authority (EPA) to address the growing community concerns of ecological damage to catchments and receiving waters across the state. The SEPP provides policy guidance to state agencies, mainly the EPA, and local government to control diffuse and point-source water pollution. The SEPP cites the Stormwater Best Practice Environment Guidelines, published by the Victorian Stormwater Committee (CSIRO 1999), which, accordingly, establish WSUD as best practice for urban runoff management.

Table 7: Identified capacity issues for councils implementing the SEPP (adapted from McManus & Brown, 2005)

Sphere of institutional capacity	Capacity issues identified by councils
Human resources	<ul style="list-style-type: none"> • Low level of knowledge and understanding of range and specifics of council obligations across organisation and amongst councillors. • Environmental health and planning sections of councils appear to be most familiar with their obligations. • When a council has a 'direct connection with a receiving water body of significance to the community', there is a 'collective consciousness' aimed at protecting receiving waters that informs local priorities. • A significant 'de-skilling' of council engineering and planning capabilities in the late 1980s and early 1990s and the increasing environmental agenda has led to a current skills shortfall. This may worsen over the next 10 years with up to 70% of engineers and technical staff reaching retirement.
Intra-organisational capacity	<ul style="list-style-type: none"> • Sustainable water management is one of a large number of competing responsibilities for councils • A small number of councils possess strong stakeholder relationships, good internal skills, resources, political will and are highly successful with water-related state grants. • A significant majority of the remaining councils are in the developmental phases of sustainable water management, struggling to attract and/or maintain skilled staff, with nil or negligible political will and resources, and confusion over roles and responsibilities. • Specific impediments include a lack of reliable and long-term funding, limited staff resources, 'short-term thinking' of state government funding programs, limitations with managing the increasing and competing directions of state agencies and the maintenance burden not realised and resourced by program funding bodies. • Reinforcing the lack of political will, many councils and their executive did not think the obligations were core business and some referred to it as a state government responsibility.
Inter-organisational capacity	<ul style="list-style-type: none"> • There is perceived no 'common and long term framework' for all the different agencies, departments, and organisations that play a role in the water cycle. • Specifically, the roles of the state agencies responsible for environmental and catchment management are unclear to councils with regard to sustainable water management. • Catchment Management Authorities do not have the capacity to assist local councils in clarifying inter-organisational roles and responsibilities. This restricts councils from effectively managing their 'obligations and risks'. • There is a fundamental lack of understanding by state government officers of the role, operational context and needs of local government and often the intergovernmental cultural relations are poor.

Sphere of institutional capacity	Capacity issues identified by councils
External institutional rules and incentives	<ul style="list-style-type: none"> • The state stormwater management program (VSAP) and particularly the capacity building program (Clearwater) had been important in raising the profile of sustainable stormwater management for many senior executives and elected officials across local government. This was evidenced in the skill development and political advocacy effected by the program. • However, the inertia of change appears to be slowing with the transfer to a new broader water management program overseen by the DSE. Councils are unconvinced of the new program's objectives and its deviation from stormwater management interventions. • Many council officers feel unappreciated by state government for their achievements sustainable urban stormwater management. Since the programs have changed, their concern broadens to maintaining political support from councillors that have been encouraged and persuaded over the last few years to prioritise stormwater management.

Interestingly, the key ingredients for local government implementation of integrated urban water management identified by McManus and Brown (2005) generally correspond with those of Brown et al (2001), namely senior executive support and interest (*organisational commitment*); councillor commitment to positive environmental outcomes (*political will and support*); and well-skilled, politically-astute champions at the senior officer level (*knowledge facilitators*).

There are three other important findings of Brown et al (2001) that relate to the SEPP project findings: pro-active relationships with the community and environment groups that are developed by organisational champions for improving the water environment; relationships with influential developers and builders that are advancing Water Sensitive Urban Design (driving political will and support); and a history of successful grant applications that raise awareness and increase the profile of sustainable stormwater management (driving political support, the ensuing organisational commitment and visa versa).

Koontz et al (2004) acknowledged the power of governmental officers (e.g. champions) to moderate the limiting impact of governmental institutions. The officers can perform in ways that foster the equality of power and influence among their networks. Significantly, as a result of their individual roles and their influence in determining group structure and decision-making processes, these individuals may largely determine the character of inter-organisational collaborations.

Previous research has identified that legitimate networks (such as the champion-initiated interest groups of above) thrive when the participants are appropriate and credible. The persistence of relationships and perceptions formed in these networks are often social outcomes as well as trust, enhanced communication, increased knowledge and improved policy awareness (Beierle 1999; Cortner and Moote 1999; Wondolleck and Yaffee 2000). These small 'hubs' of interest can serve as a basis for future larger, cooperative ventures (Koontz, Steelman et al. 2004).

Chapter 5 of ARQ offers a holistic synthesis of the key factors which influence the capacity of local government to implement sustainable water management. These key factors relate to themes which have been raised in the above sections and include knowledge building, professional development, organisational strengthening, directive reforms and facilitative reforms, as outlined in Table 8. It is noted that focusing efforts in one area such as teaching officers new skills does not necessarily overcome obstacles in intra- and inter organisational issues, nor does it develop and sustain the capacity of an organisation to undertake WSUD (Brown and others 2006). Rather, a holistic approach is needed whereby WSUD is addressed across the organisation.

The capacity building themes identified through this research represents the continuum of the implementation of sustainable water management from individual officers to capacity and reform through both local and state government, and as suggested within ARQ could represent a checklist / guide to start collectively diagnosing the quality of current institutional capacity (Brown et al 2006).

Table 8: Summary of capacity building themes and interventions (Brown et al 2006).

Capacity Building Theme	Capacity Building interventions
Knowledge building	<ul style="list-style-type: none"> • Knowledge of performance and cost of water management measures • Knowledge of social acceptance / expectations with respect to urban water management practices and designs • Knowledge of natural resources in the region • Knowledge of water governance issues and research • Knowledge / skills of professions dealing with water in the region • Knowledge of technical assessment tools to support water management decisions • An ongoing, coordinated R&D program
Professional development	<ul style="list-style-type: none"> • Technical knowledge and skill development • People Skill development
Organisational strengthening	<ul style="list-style-type: none"> • Political and managerial commitment • Reform of legislation, organisational structures and key processes to clarify responsibilities and efficiently deliver WSUD • Cultural management • Fostering champions / leaders • Improvements in inter-agency structures, networks and collaboration
Directive reforms	<ul style="list-style-type: none"> • Establish clear policy statement, regulations and standards • Using design objectives and technical guidelines • Adopting enforcement strategies
Facilitative reforms	<ul style="list-style-type: none"> • Mobilising community and political support • Creation of adequate funding mechanisms, financial resources and incentive structures • Using market based instruments • Providing organisational incentives • Using cross-stakeholder networks and stakeholder participation • Improving the way information is managed and shared. • Ensuring accountability for peoples actions • Auditing and reporting performance • Providing conflict resolution resources to stakeholders