ADVANCING THE ADOPTION OF URBAN STORMWATER QUALITY MANAGEMENT IN AUSTRALIA:

SURVEY RESULTS OF STAKEHOLDER PERCEPTIONS OF INSTITUTIONAL DRIVERS AND BARRIERS

A CASE STUDY OF BRISBANE, MELBOURNE AND PERTH

Rebekah Brown and Megan Farrelly
Report No. 07/05 – September 2007

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Advancing Urban Stormwater Quality Management in Australia:
Survey Results of Stakeholder Perceptions of Institutional Drivers and Barriers

A Case Study of Brisbane, Melbourne and Perth

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Preface

The National Urban Water Governance Program comprises a group of social science research projects that are examining the changing governance of Australian urban water management. This interim data report is part of the first stage in a broader program of research aimed at investigating and identifying the institutional factors most important for enabling Water Sensitive Australian Cities. While the analysis in this report is mostly descriptive, future reports will provide analysis that is more detailed.

Throughout 2006 and 2007, the Program focused on collecting various types of data from urban water professionals including online survey data (reported here), oral histories of the sector, interviews and focus groups with contemporary urban water professionals and associated stakeholders, industry and scientific literature reviews and project case studies.

This interim data report is one of two presenting the quantitative, online questionnaire survey data, which focuses on understanding professional receptivity to urban stormwater quality management. The other interim data report focuses on professional receptivity to diverse water supplies and should be read in conjunction with this report. A summary report has also been produced which presents a combination of the key findings from both interim data reports. Each report is available online at the Program's website: www.urbanwatergovernance.com.

The complete analysis of all the different types of data collected within each case study city will be collated and presented in three case study reports (Brisbane, Melbourne and Perth), and will culminate in one final comparative report on the Program's institutional analysis across the three case study cities. These reports will be released throughout 2008.

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Acronyms

GPTs	Gross Pollutant Traps
Qld	Queensland
SWQ	Stormwater Quality
SWQM	Stormwater Quality Management
TWCM	Total Water Cycle Management
Vic	Victoria
WA	Western Australia
WSUD	Water Sensitive Urban Design

Glossary of Terms

Existing Sites: Refers to re/development areas within established suburbs of a metropolitan region. This includes housing extensions, building redevelopment etc.

Greenfield Sites: New urban development areas typically located on the periphery of existing metropolitan areas.

Local scale: Individual gardens, streetscapes and local parks

Perception: Defined by the New Shorter Oxford Dictionary in a number of ways including: 'the state of being or process of becoming aware or conscious of a thing, specifically through any of the senses

Precinct scale: Greater than 100 housing lots – suburb level

Receptivity: Draws from research on 'innovation and technology transfer policy' studies and provides strategic guidance on the focus of 'change interventions' required to enable the adoption of new technologies and practices. Furthermore, the New Shorter Oxford Dictionary defines 'receptivity' as 'having the quality or capacity for receiving esp, able, willing, or quick to receive impressions, new ideas'

Regional scale: Catchment level scale

Water Sensitive Urban Design: Evolved from its early association with stormwater management and aims to ensure that water is given due prominence within urban design processes. This is through the integration of total urban water cycle thinking in the detailed planning and design of the built form. In particular, WSUD reintroduces the aesthetic and intrinsic values of waterways back into the urban landscape.

1. Introduction

This report presents a comparative assessment of the 'receptivity' of urban water professionals across Brisbane, Melbourne and Perth to stormwater quality management practices. The assessment is based on the findings of an online survey of urban water professionals conducted between October and November 2006. This research forms part of the *National Urban Water Governance Program* (the Program) focused on identifying current institutional drivers and barriers, and the future institutional ingredients for advancing more sustainable urban water futures. Contrasting professional perspectives and experiences between Brisbane, Melbourne and Perth is the focus of the Program's research because these cities:

1) share similar drivers for re-examining their water management options including drought, climate change, waterway degradation and increasing populations, and
2) collectively represent the breadth of differing urban water governance structures and systems across Australian cities.

This is in addition to differences in traditional water supply sources, where Perth's supply is predominantly sourced from confined aquifers (groundwater), and Melbourne and Brisbane sourced from surface, freshwater systems.

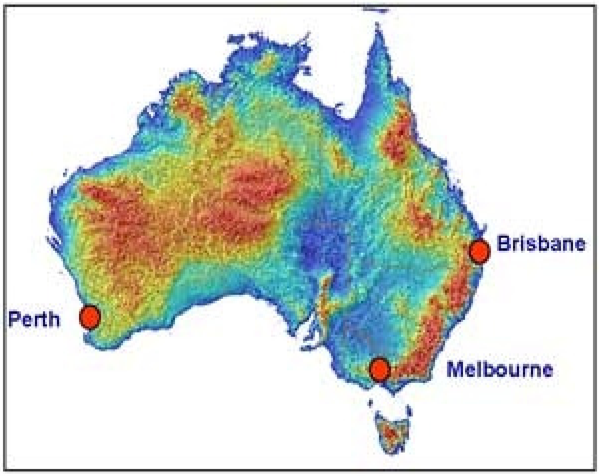

Figure 1.1: Case Study Cities Location Map

It is hoped that this research will inform the design of current and ongoing national, state and local reform efforts, as well as improving the targeting of various policy programs and capacity development interventions. Australian cities, like others around the world, have been subjected to a number of significant national reform efforts over the last 15 years or so. In the mid-1990s the Australian Government in collaboration with State Governments, initiated a process of sectoral reform with the objective of improving the efficiency, regulation and of delivery of urban water services, which remains ongoing (McKay, 2005). More recently, the National Water Initiative[1] was launched to undertake further reforms in water management (rural and urban). In relation to cities, this national reform also involves review of the suitability of current administrative arrangements and assessment of industry capacity building and training needs, as set out in Clause 92 of the National Water Initiative outlining action directed at 'Innovation and Capacity Building to Create Water Sensitive Australian Cities'.

It is the proposition of this research that to ensure the success of such reform efforts, incorporating the knowledge and perspectives of professionals currently working within urban water sector is essential. However, so far, there has been limited research that draws explicitly from these experiential insights,

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[1] The National Water Initiative is an intergovernmental agreement formalised on the 25th June 2004 between the Commonwealth Government and State Governments, available at: http://www.coag.gov.au/meetings/250604/iga_national_water_initiative.pdf. (CoAG, 2004: pg 20)

to understanding the institutional factors that encourage or prevent professionals, and/or their organisations, from advancing the practice of SUWM. This report, and others produced by the Program[2], is an attempt to address this knowledge gap. Through directly capturing the perspectives and experiences of practitioners from different organisations and disciplines, this report provides a broad statistical understanding of the perceived drivers and barriers to adopting improved stormwater quality management approaches.

This report includes an assessment of professional:

- perceptions of community, state politician and organisational receptivity to receiving waterway health;
- receptivity to the adoption of stormwater treatment technologies including porous pavements, bioretention systems, treatment wetlands, sedimentation basins, swales, gross pollutant traps and infiltration systems;
- perceptions regarding the level of commitment from various urban water organisations to advancing the practice of water sensitive urban design, and
- ratings of the perceived impact of a list of institutional factors that could constrain and/or enable the uptake of treatment technologies at local , precinct and regional scales.

1.1 Drivers and Barriers to Advancing SWQM: What do we know?

Urban stormwater quality management has undergone a transformation in recent years; from identifying stormwater as a nuisance that requires immediate and efficient drainage, to a potential water supply source for supplementing conventional supplies. This shift in thinking challenges conventional technologies and management practices and requires new, innovative approaches to ensure urban stormwater is of high quality, not only for potential anthropogenic uses, but also for the intrinsic environmental benefits.

Traditional water resources management, particularly in urban environments, employs a reductionist approach whereby water supply, sewage and stormwater are controlled and managed separately through linear, engineered systems. Newman (2001) termed these as ‘19th century solutions’ designed to collect, store, treat and then discharge water within a framework of expansion and efficiency. However, as urban population densities increase, demand for and use of water increases (Birrell *et al.* 2005), and as variable climatic conditions continue (Howe *et al.*, 2005), a fundamental shift in the way urban water issues are perceived and managed will be necessary. Furthermore, improved management practices are required to enhance the quality of stormwater and receiving waterway health. Indeed, in a recent report released by the Prime Ministers Science, Engineering and Innovation Council (2007) suggested we need a diverse portfolio of water supply options, thus stormwater should be viewed as a potential resource rather than as a waste product. One such innovation with growing appeal among urban water professionals is an Australian concept, water sensitive urban design (WSUD) WSUD aims to reintroduce the aesthetic and intrinsic values of waterways back into the

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[2] This report should be read in conjunction with: *Advancing the Adoption of Diverse Water Supplies in Australia: a survey of stakeholder perceptions of institutional drivers and barriers*, which is publicly available with other Program research reports at www.urbanwatergovernance.com.

landscape through urban design[3]. To transition from the 'old-world' management approach to one that operates in a 'total water cycle' requires a cooperative management framework. As proposed by Niemczynowicz (1999:12):

> *The future challenges within urban water management during the next decades will be to organize cross-sectorial cooperation between several actors in order to introduce innovative water technologies, management systems and institutional arrangements which are able to meet the multiple objectives*

Progress in applying these new concepts has been at best slow and a number of urban water industry commentators are now suggesting that a range of institutional barriers must be addressed to overcome implementation inaction. This leads to the question – what constitutes a socio-institutional barrier to SUWM? To begin, one must understand the definition of what an institution is. Cortner *et al.* (1998), although referring more broadly to ecosystem-based management, considered an institution to be the cumulative expression of the formal and informal rules and norms that shape the interactions of humans with each other and with the environment. To this we would separate out the built and natural environment considered the focus is on urban (constructed) environments. Therefore, a socio-institutional barrier would be one that is influenced by political, social, legal or managerial constraints (Lee, 1999:186).

Several commentators have attempted to explain the resistance to shifting to more SUWM practices and importantly, commentators are beginning to identify that major impediments are not purely technological, but are also social and institutional (for example, Maksimović and Tejada-Guibert, 2001). Indeed, Wong (2006:1) argues that, 'institutional impediments are not well addressed, and are often beyond current concerns of many sectors of the urban water industry, which are more concerned with strengthening technological and planning process expertise.' Similarly, Brown (2005) argues the fragmented administrative framework constrains the way urban water management is implemented, which in turn limits the development of institutional learning. Mitchell (2004:16) also observed that current institutional structures are "known to constrain integration and innovation". A recent review of reported institutional impediments across cities in developed countries highlighted barriers such as insufficient skills and knowledge, organisational resistance to change, lack of political will and limited regulatory incentives (Brown and Farrelly, 2007a). Importantly, there are also international commentators who have identified the problem of institutional inertia and its significant impact on the transition towards more SUWM practices (see, for example, Lundqvist *et al*., 2001; Rauch *et al*., 2005; Brown *et al.,* 2006a).

While the scope of socio-institutional drivers and barriers are being increasingly characterised in the literature, there is little empirical and/or statistical evidence revealing the significance of such socio-institutional drivers and barriers. Therefore, this report presents the perspectives of urban water professionals on a series of socio-institutional factors, drawn from the literature, on how these factors may constrain and/or enable the application of non-traditional, stormwater treatment technologies.

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[3] See glossary for a comprehensive definition of water sensitive urban design.

1.2 Understanding the 'Receptivity' of Urban Water Professionals

To test the professional community's readiness to develop a diverse water source approach, the social research model of 'receptivity' was employed to guide the analysis. The model of receptivity, originally devised by Jeffrey and Seaton (2003/2004), draws from 'innovation and technology transfer policy' studies and offers an important institutional and policy perspective for understanding possible change ingredients for the 'mainstreaming' of an innovative technology and/or process. The concept is based on the perspective that 'change interventions', such as new technologies and practices, are most likely to be successful when the policy programs to support new practices are designed from the perspectives of the 'users' or 'recipients'. Hence, understanding the current levels of 'receptivity' of individuals and/or organisations is a critical starting point.

As shown in Figure 2.1, receptivity can be considered to comprise four key attributes from the 'users' perspective including:

- *Awareness:* the recipient is aware that a problem needs to be addressed and that a range of possible solutions exists.
- *Association:* the recipient identifies enough associated benefits with their own current agenda so that they will expend the necessary effort to address the problem.
- *Acquisition:* the recipient must have ready access to the necessary skills, resources and support to be able to address the problem.
- *Application:* the recipient should be exposed to an appropriate set of enabling incentives, such as regulatory and market incentives, to assist in implementing the new solution.

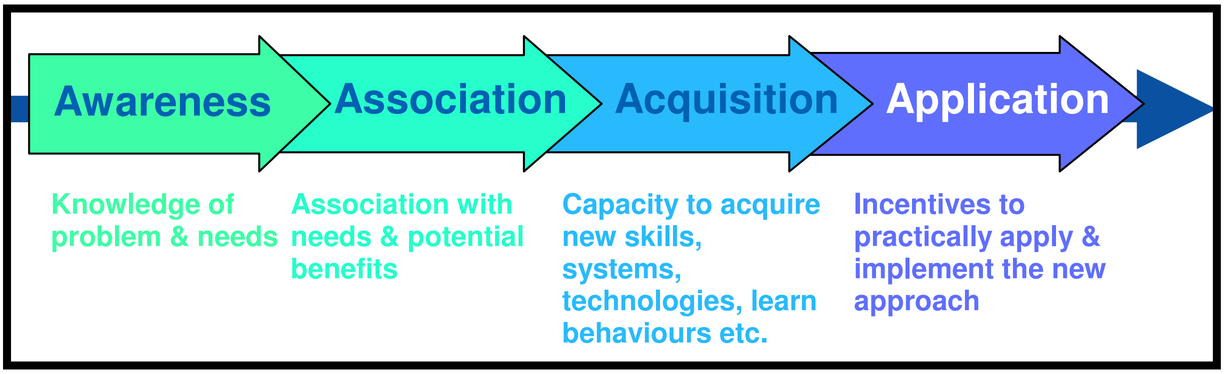

Figure 1.2: Model of Receptivity
Modified from: Jeffrey and Seaton (2003/04); Brown and Keath (2007)

The idea behind receptivity is that, for change to successfully occur, such as moving from an 'idea' through to mainstream on-ground operation (i.e. the implementation of a new technological solution), the recipient (i.e. an individual and/or organisation and/or region etc.) needs to represent each of these four attributes in relation to the newly proposed practice. Recent work by Brown and Keath (2007) highlighted that many existing water reform programs focus on the awareness (i.e. education campaigns) and application stages (i.e. new regulations and policies), but often do not target the association (influencing values) and acquisition (capacity building) stages.

Table 1.1 provides an example of the four receptivity attributes for the application of urban stormwater quality treatment technologies from a local government perspective. Thus, the role of the strategist, policy maker and/or capacity builder, is to understand the current receptivity level of their audience through testing the strengths of these four attributes and to invest effort in targeting the receptivity deficits. It is essential that any program of change investigates the pre-existing receptivity across the range of stakeholders to inform new interventions (Brown and Keath, 2007).

Table 1.1: Definition and Examples of the Four Phases of the Receptivity Model

Phase	Definition	Example –local govt. engineering unit
Awareness	Knowledge of a problem and a range of possible innovative solutions	– Knowledge of waterway health degradation – Knowledge of stormwater treatment technologies
Association	Recognition of the importance of this knowledge and being able to relate it to current needs	– Knowledge and recognition that waterways offer important ecological and social functions that should be preserved – Knowledge and recognition that stormwater treatment technologies contribute to improving waterway health and amenity – Knowledge of the future financial and time savings and possible environmental benefits resulting from the implementation of these stormwater treatment technologies today
Acquisition	Capacity to develop and/or acquire new skills, systems, processes and behaviours to apply the innovative solutions	– Ability to seek reliable support (financial, human, technical) and guidance (access to expertise) to help install, operate and maintain the stormwater treatment technologies
Application	Motivation and incentives to practically apply and implement the new approach	– Knowledge and understanding of relevant (internal and external) policies, regulations and processes that assist in the application of stormwater treatment technologies by local governments
Source: adapted from Jeffrey and Seaton (2003/04); Brown and Keath (2007)		

1.3 Institutional Arrangements at Time of Survey

The Australian urban water sector is undergoing various institutional reforms under the direction of the National Water Initiative, and concurrently, State governments are revising water policies and plans to reflect the need for a greater diversity of supply sources. As change was projected to occur throughout the course of this research a context report was compiled for each case study city (Brisbane, Melbourne and Perth) detailing the governance arrangements, biophysical environment and water infrastructure status. The following provides a brief overview of the institutional framework in Brisbane, Melbourne and Perth as of October 2006, when the questionnaire was first made available. Further detailed information regarding the case study city's context can be found on the Program's website, www.urbanwatergovernance.com.

1.3.1 Brisbane

The City of Brisbane is located on the southeast coast of Queensland on the Brisbane River. Building on a current population exceeding 950,000, Brisbane is the fastest growing capital city in Australia. The city is located on a coastal plain traversed by over 800 km of waterways and is subjected to periodic drought. Brisbane's potable water supply comes from surface water sources and mainly contained in three major reservoirs. The reservoirs and their catchments are managed on a regional basis within South East Queensland (SEQ) by SEQWater (Figure 1.3). However, Brisbane City Council, the largest local government authority in Australia, is responsible for managing water supply, wastewater and stormwater services for the whole metropolitan area. As water management becomes more regionalised, Brisbane City Council is working closely with state and regional bodies (Figure 1.3).

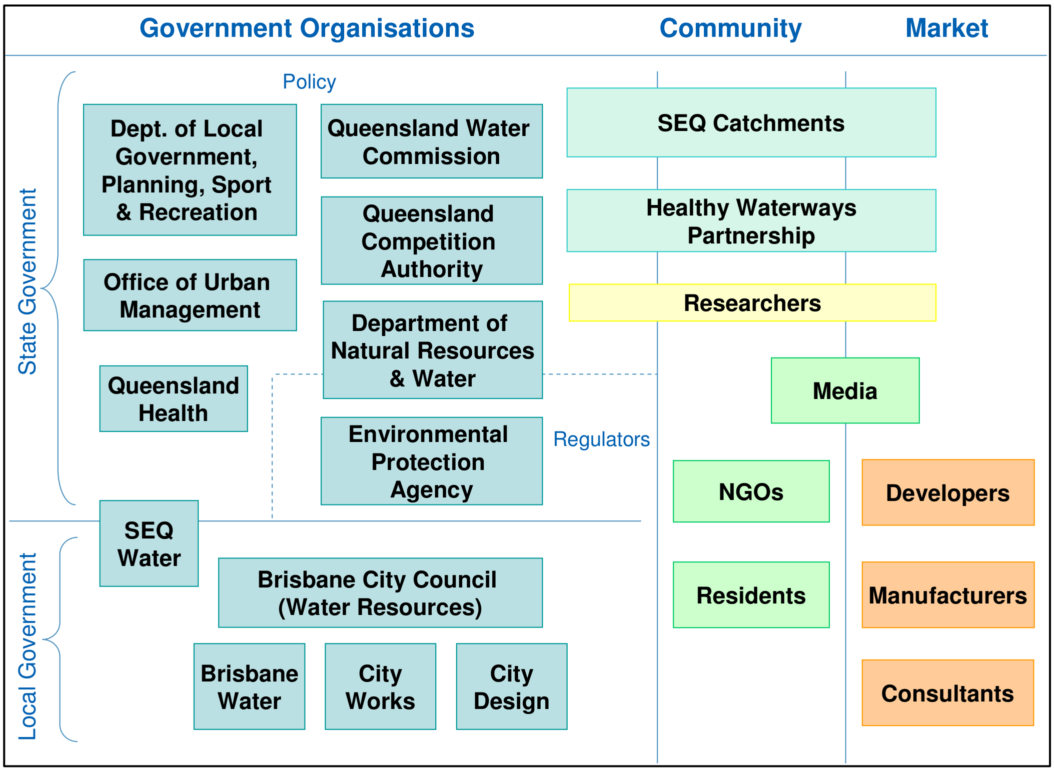

Figure 1.3: Institutional Arrangements for Water Management in Brisbane as of October 2006

Catchment management, water quality and waterway health are responsibilities shared between state government, local government, non-governmental organisations and SEQWater, and facilitated with the assistance of partnership organisations (Figure 1.3). In response to Brisbane's longest drought on record, the Queensland Government established the Queensland Water Commission to oversee water security and demand management. In addition, new dams, desalination plants, recycled water and groundwater sources were considered as part of a regional 'water grid' for SEQ.

Drivers for Brisbane include recurrent drought conditions, climate change predictions, waterway health issues, and consistent increases in population. These have resulted in state government, local government, government-owned corporations, and non-governmental organisations working towards greater water security. Total Water Cycle Management and Water Sensitive Urban Design are current approaches to sustainable urban water management that are shaping organisational change and design standards within the City of Brisbane. A range of policies and planning requirements are encouraging the adoption of these approaches in new urban developments.

1.3.2 Melbourne

Melbourne is the second largest city in Australia, with a population of 3.6 million. The population relies entirely upon surface water supplies sourced from catchments east of the city. There are nine major supply reservoirs within the region with a total design capacity of 1,773 GL. The two main wastewater treatment plants at the bottom of the catchment treat most of the city's wastewater before discharging a minimum of secondary treated effluent to Port Phillip Bay and Bass Strait. Currently these wastewater treatment plants recycle approximately 11% of the annual flow. The stormwater system is separate from the wastewater system and includes drainage infrastructure that is largely untreated and directed to receiving waterways within the city.

The Victorian government sets the water policy and regulatory framework agenda for the urban water cycle, stipulates water business obligations, and monitors and audits water business performance. Melbourne Water is a single bulk water wholesaler and is responsible for water supply headworks, regional drainage and wastewater treatment services (Figure 1.4). There are three retail water and sewerage businesses, all remaining under the corporatised ownership of the State government (Figure 1.4). Local government is responsible for local drainage networks and stormwater systems maintenance and connect to the regional drainage systems owned by Melbourne Water. A major restructure of Victorian local government occurred in the early 1990s, resulting in the reduction in the number of councils from 210 to 79 across the State.

The land use planning system and responsibilities determined by the *Planning and Environment Act 1987* are shared between state and local government authorities. The State determines the State Planning Policy Framework and the Victorian Planning Provisions. Local government, as the local planning authority, determines the Local Planning Policy framework in line with the State framework, part of the local planning scheme and, as Responsible Authority, determines planning permit applications.

Melbourne is currently facing a significant water supply challenge, with ongoing dry weather conditions and reduced inflows into the water storages. Water storages are currently around 42% as the summer weather approaches and consequently, the Victorian Government has recently introduced Stage 2 water restrictions, which limits household outdoor water use activities.

Urban stormwater runoff is a significant source of pollution contributing to the degradation of Port Phillip Bay and Melbourne's waterways, including the lower sections of the city's major rivers, the Yarra and Maribyrnong Rivers. As of October 2006, the Victorian Planning Provisions have been amended (*Clause 56: Residential Subdivisions*) which now mandates Water Sensitive Urban Design criteria to be considered in all residential subdivisions.

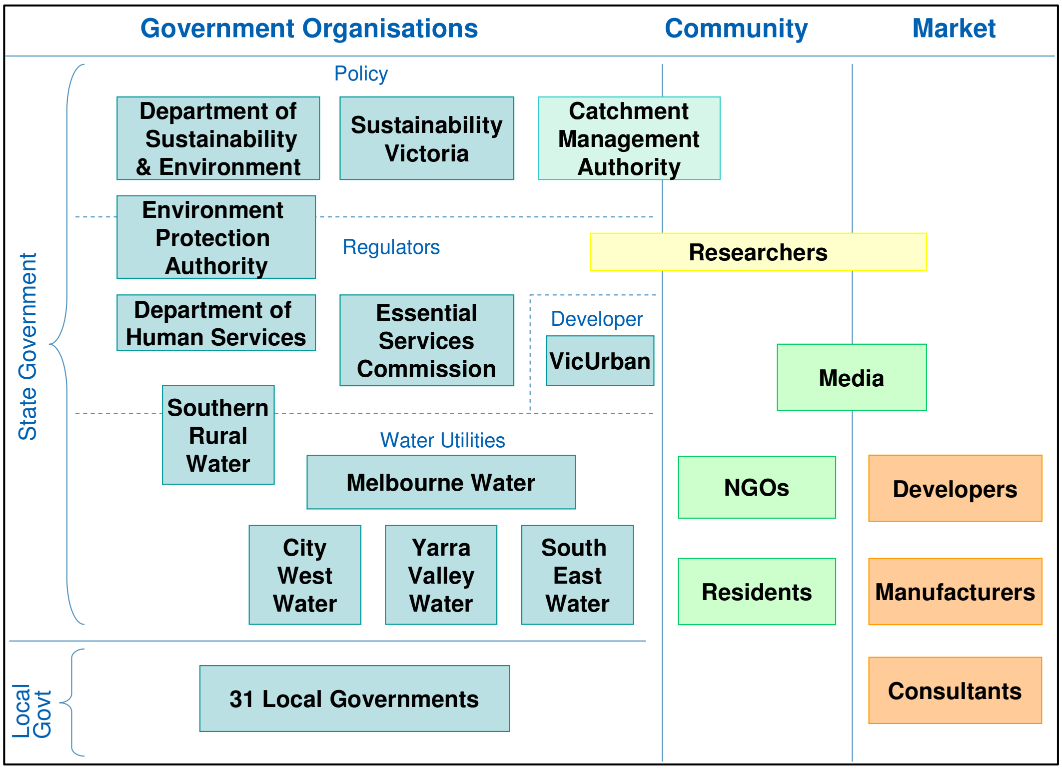

Figure 1.4 **Institutional Arrangements for Water Management in Melbourne as of October 2006**

1.3.3 Perth

Perth is the fourth largest city in Australia, carrying a population of approximately 1.5 million and experiencing the highest growth rate of Australian cities (2.1% in 2006). Situated along the Swan River, Perth experiences a Mediterranean climate, characterised by hot, dry summers and mild, wet winters. The city is located on a sandy coastal plan along the Swan River and Perth's principal potable water supply comes from groundwater and supplemented with surface water as part of the Integrated Water Supply Scheme (IWSS). The IWSS consists of a network of dams and weirs, reservoirs, bores, treatment plants, pumping stations and water mains. In addition to this, unregulated backyard groundwater bores (not accounted for in the IWSS and is unregulated) also represents a significant proportion of Perth's urban water supply budget.

Overarching policy, regulation and planning are provided by the State Government through various agencies and have been the subject of significant and ongoing reform efforts over the last 10 years. The recently established Department of Water has the lead strategic, policy and regulation role (Figure 1.5). The State Government-owned Water Corporation, established in 1996 and one of Australia's largest water service providers, supplies water, sewerage and drainage services to Perth. In addition, there are a number of industries that also hold entitlements to bulk water supply. Local government typically partners the Water Corporation in managing the stormwater system as well as delivering functions in land use planning (Figure 1.5).

Persistent climatic change since the mid-1970s has significantly reduced rainfall in the region, resulting in a 50% decrease in surface water flowing to the major reservoirs. This phenomenon, in combination with the booming economy and rapid population growth, has resulted in water security and waterway quality issues. To tackle this issue, the state government has established a collaborative initiative known as the Southern River Catchment Integrated Land and Water Management Plan.

The government's guiding strategy, *Securing our water future – A water strategy for Western Australia 2003,* identifies new and alternative sources of water to increase water security for Perth. As a result of the strategy, the city possesses Australia's first desalination plant, a major industrial water recycling plant, as well as a trial to increase water supply using Managed Aquifer Recharge schemes. Notwithstanding the additional infrastructure, Level 4 water restrictions prevail.

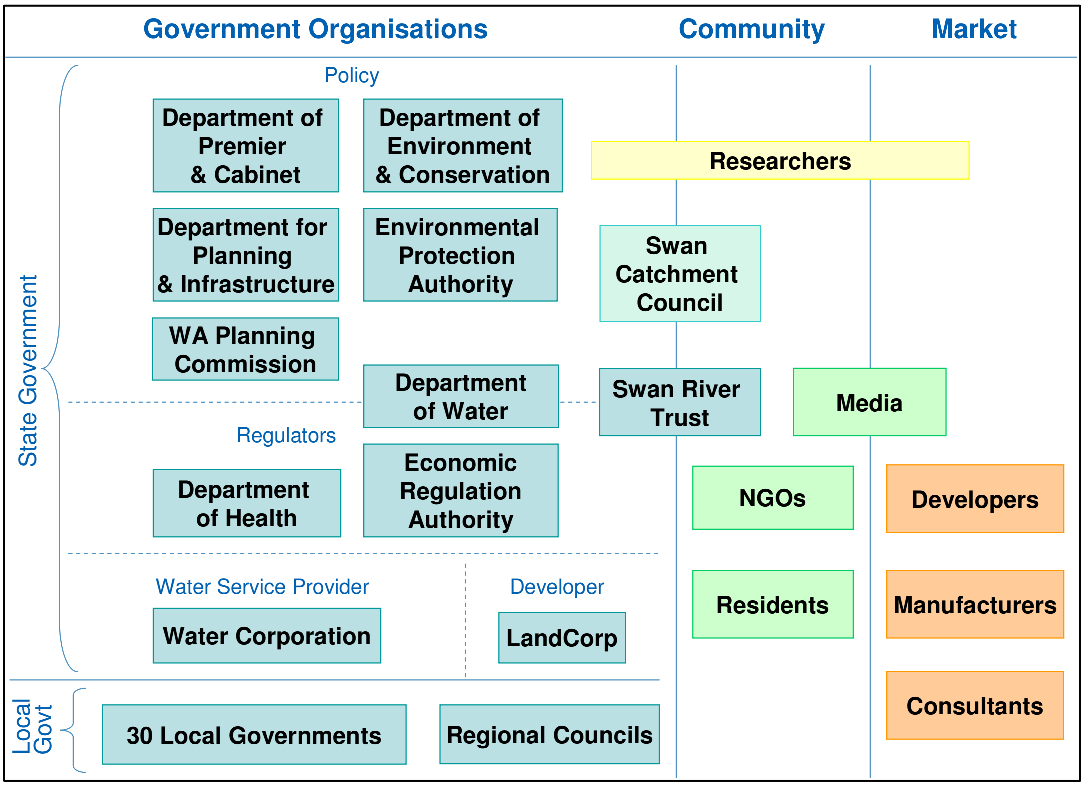

Figure 1.5 Institutional Arrangements for Water Management in Perth as of October 2006

1.4 Outline of this report

The structure of the report is outlined in Table 1.2. The research draws on the concept of receptivity (described in Section 1.2) and as such, the report presents the data in relation to the professional community's association, acquisition and application to improving urban stormwater management practices.

Table 1.2: Chapter Outline and Description of Report Content

Chapter	Heading	Description of content
Chapter 1	Introduction	Presents the context and purpose behind the report: to provide insights into the socio-institutional barriers preventing the urban water industry of Australia from advancing SQWM practices (including WSUD)
Chapter 2	Methods	Describes how the online questionnaire survey instrument was designed and how the social science concept of 'receptivity' is used as a research framework and analysis tool. The statistics used during data analysis are also described.
Chapter 3	Association with stormwater quality management practices	Details the importance of receiving waterway health as identified by urban water professionals and their perceptions of the receptivity to SWQM by 'the community', 'their organisation' and 'state politicians'. The level of influence four factors have on the adoption of stormwater treatment technologies at varying scales is also presented.
Chapter 4	Factors Influencing the Uptake of Stormwater Quality Treatment Technologies	Presents the key barriers and drivers to adopting stormwater treatment technologies at local, precinct, and regional scales.
Chapter 5	Perceptions of Institutional Arrangements and Stakeholder Commitment	Focuses on the perceived effectiveness of current institutional arrangements and reveals professionals' perceptions about stakeholder commitment to 'water sensitive urban design'.
Chapter 6	Projected Implementation Timeframes	Emphasises the projected development timeframes for adopting treatment technologies by urban water professionals in greenfield and existing areas.
Chapter 7	Concluding Remarks	Provides a short summary of the document and presents an overview of the next phase in the Program's research plan.

2. Methods

The design of this social research is based on a comparative quantitative survey of urban water professionals across Brisbane, Melbourne and Perth. While the research reported here has value on its own, it contributes to a broader multi-method approach also involving semi-structured face-to-face interviews and documentation analysis to understand how urban water professionals perceive their current institutional context. The following sections provide an overview of the design and administration of the online survey instrument, the statistical analyses undertaken and the demography of the survey respondents.

2.1 Survey Instrument

The development phase of the survey[4] involved a number of pilot processes to test its design and 'usability'. It was important that the survey made sense to the user and did not take too long to complete, but at the same time, it needed to elicit the necessary data for a receptivity analysis. With the scope of the research focused on the total water cycle, the original questionnaire was designed into two separate online surveys, one focussed on future water source supplies and the other on urban stormwater quality management and treatment technologies. Following a detailed pilot process with over 50 industry experts from each of the three cities, the feedback resulted in the two surveys being amalgamated (as many respondents perceived this was perpetuating the traditional approach that isolates the components of the water cycle). Other feedback led to the addition of an 'I don't know' response category to the standard Likert-response categories and an improvement in the overall user-friendliness of the survey.

The next stage involved securing the appropriate ethics approval from Monash University to administer the survey and identifying an appropriate tool for allowing respondents, from Brisbane, Melbourne and Perth, to have simultaneous access to the questionnaire. An online questionnaire internet site called *Survey Monkey*[5] was chosen because it provided efficient and effective data management capabilities. To increase the survey response rate, prior to the online survey going live, the heads of relevant organisations, steering committee representatives and partner organisations, were contacted and asked to encourage their staff to participate in this survey.

The final survey was made available online in October 2006 and remained open until 24 November 2006[6]. Appendix A presents the questionnaire, including the introductory and explanatory statements. Each case study city was presented with a slightly different questionnaire to accommodate the inherent variability within their institutional arrangements and conventional water sources[7] (see Section 1.3). The survey was presented in three major sections including demography, diverse water

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[4] See Appendix A for a copy of the survey
[5] Survey Monkey www.surveymonkey.com
[6] The original closing date was the 10th November 2006 but was extended until the 24th November 2006.
[7] For example, each city has different government agencies responsible for similar actions, such as the Department of Sustainability and Environment in Victoria, the Department of Water and the Department of Conservation and Environment in Western Australia and the Department of Natural Resources and Water in Queensland.

source questions, and stormwater quality questions. The seven demographic questions, as detailed in Section 2.3, focused on which stakeholder group the respondent represented, the main type and field of work the respondent was responsible for, their professional background/training, and the length of time in a) their current position and b) the urban water industry.

As summarised in Table 2.1, different themes of the stormwater quality management survey were designed to test professional receptivity to specific stormwater quality management practices (Theme A) and their perceptions on drivers and barriers to adopting specific treatment technologies at a range of different scales (Theme C). Professionals were asked to contrast their perceptions of the importance of receiving waterway health in relation to their perception of the importance the community, state politician's and their organisation places on environmental protection of receiving water bodies (Theme A). This was to test how inline professionals feel their perspective aligns with their socio-political context, and to identify whether professionals feel supported by the perceived agenda of their own organisation. In addition, this data could be used in future assessments of how well urban water professionals understand the perspectives of the community that they serve, by comparing these results against existing data on community receptivity to waterway health.

Theme C asked respondents to rate what they perceived to be the impact of a range of institutional factors that could constrain and/or enable the implementation of stormwater quality treatment technologies at varying scales (local, precinct and regional). The factors identified in the literature that were tested included:

- socio-political context factors including perceived 'community acceptance', 'public health outcomes', 'environmental outcomes' and 'social amenity';
- human resource factors of perceived 'technical feasibility' and 'professional knowledge';
- current 'management arrangement' context and 'government policy';
- formal rules including 'regulation and approval processes' and 'property access rights', and
- costs including 'capital' and 'maintenance'.

In addition, each survey respondent was asked to rate the level of stakeholder commitment, from their perspective, for each significant organisation in relation to each case study city (Theme D).

The structure of the survey design was explicitly based on testing the 'receptivity' of professionals in urban water management as discussed in Section 1.2. Table 2.2 shows how each of the survey themes (as shown in Table 2.1) have been analysed in relation to the logic of the receptivity model which includes awareness, association, acquisition and application attributes (see Figure 1.2). This generic model of receptivity has been adapted here based on current understandings of institutional capacity in the urban water sector (see Brown *et al.,* 2006b) and applied to the design of the online survey. Based on the target audience being urban water professionals, the survey did not ask questions on 'awareness', for it was assumed a high level of 'awareness', regarding the problem of waterway degradation and the range of potential solutions. Therefore, the survey focuses on understanding the level of urban water professionals' 'association' and 'acquisition' to a stormwater quality management practices (Table 2.2). It is more difficult to test 'application' without actual data of real on-ground implementation rates in each city (which is so far not readily available) therefore, professionals were asked to anticipate implementation timeframes of different technologies as well as identify any technologies that they perceived to be current practice.

Table 2.1: Survey Instrument: Purpose and Description

SURVEY INSTRUMENT		
Theme		**Purpose / Description**
A	Stormwater Quality Management for Waterway Health	This section involved a four-part question. First, respondents were asked about their personal rating of the importance of receiving waterway health. The next three questions asked respondents to indicate ***their*** perceptions about what level of importance 'their organisation', 'the community' and 'state politicians' placed on receiving waterway health.
B	Timeframes for Stormwater Quality Treatment Technologies	The question asked what the projected timeframes for implementation of eight stormwater treatment technologies would be.
C	Factors Influencing Stormwater Quality Treatment Practices	The question asked what influence 12 factors had on implementation of treatment technologies at local, precinct and regional scales. Factors included community perception, capital and maintenance costs, technical feasibility and performance, professional knowledge and expertise, government policy, management arrangements and responsibilities, regulation and approval processes, property rights, environmental outcomes, public health outcomes and social amenity.
D	Stakeholder Commitment	Two questions were posed in this section. 1. Respondents were asked to rate the level of commitment to total water cycle management from organisations involved in the urban water sector. 2. Respondents were asked to rate the effectiveness of current institutional arrangements for achieving total water cycle management.

Table 2.2: Using the Logic of the Receptivity Framework to help Design Questions and Structure the Data Analysis

AWARENESS	**ASSOCIATION**	**ACQUISITION**	**APPLICATION**
Assumed there is widespread knowledge and understanding of the need for stormwater quality management	• Importance of using stormwater quality management practices for receiving waterway health **(A)** • Influencing factors: – Community Perceptions – Environmental Outcomes – Public Health Outcomes – Social Amenity **(C)**	Influencing factors: – Capital & Maintenance Costs – Technical Feasibility & Performance – Professional Knowledge & Expertise – Government Policy – Management Arrangements & Responsibilities – Regulation and Approval Processes – Property Access Rights **(C)**	• Adequacy of current institutional arrangements for WSUD **(D)** • Implementation timeframes before treatment technologies become mainstream practice in greenfield and existing areas **(B)**
	Stakeholder Commitment **(D)**		
Note // A, B, C, D and E relate to the Question themes in Table 3			

2.2 Analysis Framework and Limitations

The survey was designed to elicit a mix of ordinal (ranked data) and nominal (categorical) data, with an emphasis on the former. The best way to analyse and present ordinal data is to compile absolute frequency graphs (percentage responses) for each question and to conduct cross-tabulation tests in relation to demographic variables. Likert-scale response categories were generally used for this allows respondents to select their preference along a continuum. However, these categories also create some difficulty in analysing the differences between, for example, 'slightly prevents' and 'strongly prevents'. Therefore, chi-square tests were relied upon for the analysis because they determine whether two categorical measures are related, and if there is an association (link) between two value sets (perceptions or opinions in this report). By using chi-square tests the data could also be examined for any statistically significant differences among specified variables. For example, how do local government, state government and water utility professionals' responses differ from each other for a specific question, or does having more experience in the urban water sector mean there are differences in perception/opinion?

The next stage in the data analysis involved hypothesis testing through statistical inference and co-relationship testing. As part of an external data validation process, absolute response frequencies were compiled and presented to the National Urban Water Governance Program's steering committee members and other industry in December 2006. This workshop also provided an opportunity to develop the basis for statistical inference and co-relationship testing. This process involved identifying categories from the demographic data to identify differences, if any, amongst respondents. Through a process of data testing, and trial and error, the list of demographic variables needed some recoding and respondent 'groups' created. The major demographic categories and inferential statistical tests included:

- **Level in organisation**: respondents were grouped based on the position held in their organisation: junior, middle, senior or executive.
- **Field of work**: respondents were grouped by their main field of work undertaken including stormwater, water supply, sewage, total water cycle management, land development, administration, information technology and 'other'.
- **Professional Group**: using the demographic data, respondents were grouped into the following three categories to identify differences of opinion based on professional background and training: 1) Engineering and Science, 2) Planning, Humanities, Urban Design and Landscape Architecture and 3) 'Others' including education, law, trades (see Section 2.3.4).
- **Experience in urban water management**: respondents were grouped based on the length of their experience in the urban water sector, ranging from 0-1, 2-5, 6-10, 11-15, 16-20 and 20 plus years.
- **Government Status**: respondents were grouped according to whether they represented state government, local government or non-government organisations and tested for significance in response trends.
- **Stakeholder Group**: water utility respondents in each city were separated out to compare their point of view with 'others' (all other respondents).

Table 2.3 presents the chi-square tests undertaken for each case study. Also, where possible, data were examined using Spearman rank correlation coefficient, which is designed to test the direction and strength of the relationship between two variables, effectively identifying whether one variable has an influence on another set of variables. If the R value is zero then there is no correlation, if the number is -1 then perfect negative correlation and +1 is the direct opposite (perfect positive correlation) between the two sets of data.

Table 2.3: The Chi-square Tests Undertaken on Data Collated from the Online Questionnaire Survey.

QUESTION FROM SURVEY	VARIABLES TESTED					
	Level in Organisation	Field of work	Professional Grouping	Exp. in UWM	Government Status	Stakeholder Group
Who sees [influencing factor] as a Barrier to LOCAL-scale SWQM, by city?						
Management arrangements	✓	✓	✓	✓	✓	
Regulation & Approvals	✓	✓	✓	✓	✓	
Government Policy	✓	✓	✓	✓	✓	
Professional Expertise	✓	✓	✓	✓	✓	
Technical Feasibility	✓	✓	✓	✓	✓	
Social Amenity	✓	✓	✓	✓	✓	
Who sees [influencing factor] as a barrier to PRECINCT-scale SWQM, by city?						
Management arrangements	✓	✓	✓	✓	✓	
Regulation & Approvals	✓	✓	✓	✓	✓	
Government Policy	✓	✓	✓	✓	✓	
Professional Expertise	✓	✓	✓	✓	✓	
Technical Feasibility	✓	✓	✓	✓	✓	
Social Amenity	✓	✓	✓	✓	✓	
Who sees [influencing factor] as a Barrier to REGIONAL-scale SWQM, by city?						
Management arrangements	✓	✓	✓	✓	✓	
Regulation & Approvals	✓	✓	✓	✓	✓	
Government Policy	✓	✓	✓	✓	✓	
Professional Expertise	✓	✓	✓	✓	✓	
Technical Feasibility	✓	✓	✓	✓	✓	
Social Amenity	✓	✓	✓	✓	✓	
Do respondents differ on views about timeframes for implementation of [technology types], by city?						
Third-Pipe Existing						✓
Third-Pipe Greenfield						✓

There are a number of limitations with relying on a survey instrument designed to collect a quantitative ‘snapshot in time’ of the broad statistical trends and expectations of professional receptivity to improved urban stormwater quality and the application of treatment technologies. Thus, the data does not provide in-depth explanations regarding *why* professional respondents identified, for example, 'management arrangements and responsibilities' as a major impediment to advancing SUWM. Nor does the data provide insights into the current and ongoing changes occurring in the industry, such as the institutional reform underway in South East Queensland or the development of a desalination plant in Perth.

Other limitations of the research data collection and analysis techniques relate to interpreting and explaining the professional perceptions of other stakeholder groups including 'their organisations', 'the community' or 'state politicians'. Without qualitative investigation of these types of results only a superficial interpretation can be developed. While the participation rate in a survey such as this was very successful, it was originally hoped to capture 100 respondents per city. It remains difficult to specifically establish the representativeness of these survey findings in relation to the urban water sector because, while there are absolute human resource numbers available per organisation, there is a lack of information on the specific number of urban water professionals and their relevant disciplines. Moreover, readily available information on the current implementation rates of the technologies tested limited our scope to reliably determine the accuracy of the respondents' assessment of current implementation rates.

These limitations have been addressed as much as possible through a series of validation processes with the Program's organisational partners and other industry experts.

2.3 Who are the Survey Respondents?

Questions pertaining to urban stormwater quality management were situated at the end of the questionnaire, following on from the diverse water supply sources section (see Brown and Farrelly, 2007b). The positioning of the stormwater quality management questions meant there was a reduction in the number of respondents who answered these questions in comparison to the number who responded at the beginning of the survey. The original number of respondents totalled 1041 (307, Brisbane; 424, Melbourne; 310, Perth) and the overall attrition rate, at the start of the stormwater quality section was 21 per cent (n = 818). By the end of the stormwater section the attrition rate had increased to 24 per cent (n = 794). The following presents the demographic variables for the entire questionnaire. These results do not take into account the number of people who dropped out of the survey.

The 'professional' demographic questions asked included:

1. Which stakeholder group do you represent?
2. At what level are you positioned within your organisation's hierarchy?
3. Broadly, what is the main type of work that you do?
4. Which area of water management do you primarily work in?
5. What is your primary professional background and training?
6. How long have you been working in your current position?
7. How many years experience do you have working in the area of urban water management?

The representation achieved from stakeholder groups in Brisbane, Melbourne and Perth is presented below. Overall, there is good representation from the breadth of organisations involved in urban water management. Indeed, the percentage weightings of respondents from the various organisations reflect the day-to-day operating environment in urban water management. For example, those organisations with a 'core focus' on urban water management are well-represented such as the water utilities/retailers and local governments, whereas organisations with an 'interest' (stake) in urban water management (such as the health and economic regulators and researchers) are less well-represented in total numbers. Following presentation of the stakeholder group breakdown for each city, the overall population characteristics are highlighted including respondents' field of work, length of experience in UWM and position (level) in their organisation.

2.3.1 Brisbane Stakeholder Groups

As shown below in Figure 2.1, the majority (over 37 per cent) of survey respondents were from Brisbane City Council. Other local governments of the South East Queensland region were the next well-represented 'organisation' (with 13 per cent of respondents), followed by consultants (12 per cent), the Maroochy Shire Council (10.7 per cent) and the Department of Natural Resources and Water (with almost 9 per cent of respondents). Despite fewer responses from other stakeholder groups, the survey achieved a good cross-section of relevant stakeholder groups involved in the urban water sector.

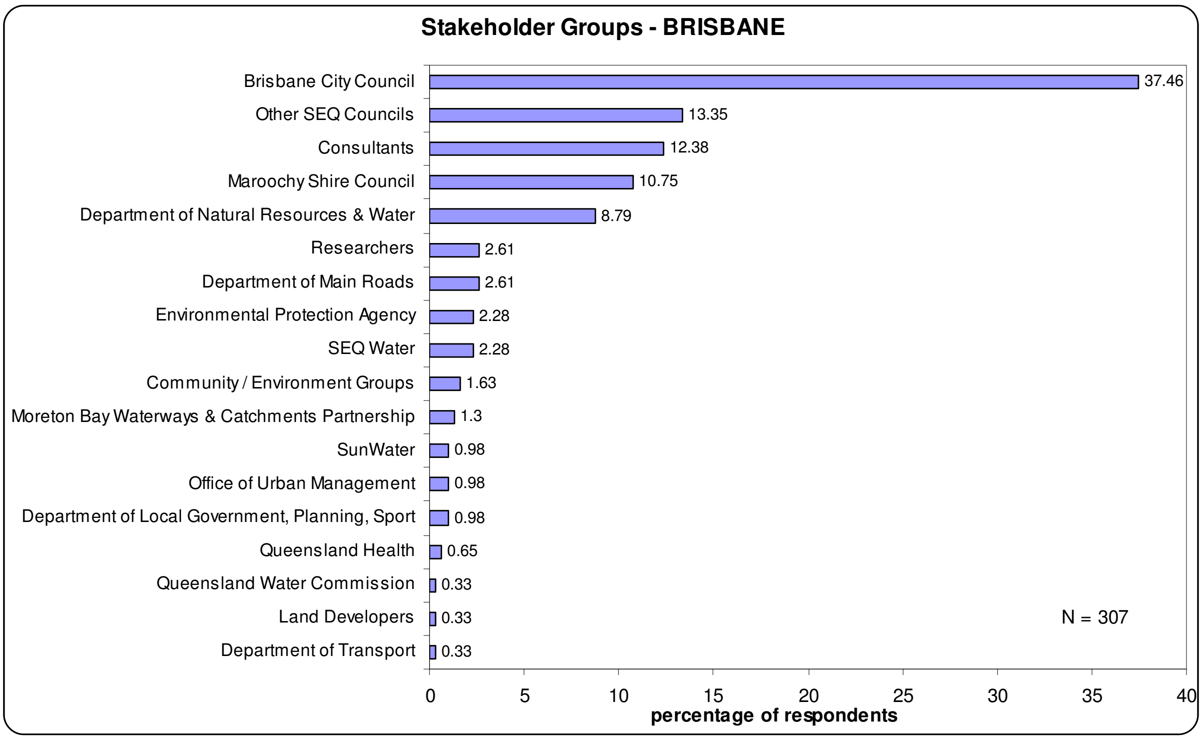

Figure 2.1: Stakeholder Groups Represented by Questionnaire Respondents from Brisbane

2.3.2 Melbourne Stakeholder Groups

The water utilities of metropolitan Melbourne were well represented[8], in particular, South East Water with 26.6 per cent of respondents (Figure 2.2). Overall, 39.4 per cent of respondents represented the water businesses of Melbourne. Consultants (16.7 per cent), local government (15.8 per cent) and the Department of Sustainability and Environment (7 per cent) were also well represented (Figure 2.2). Like the Brisbane survey, while there are fewer respondents from other categories, a good cross section of stakeholder groups was achieved.

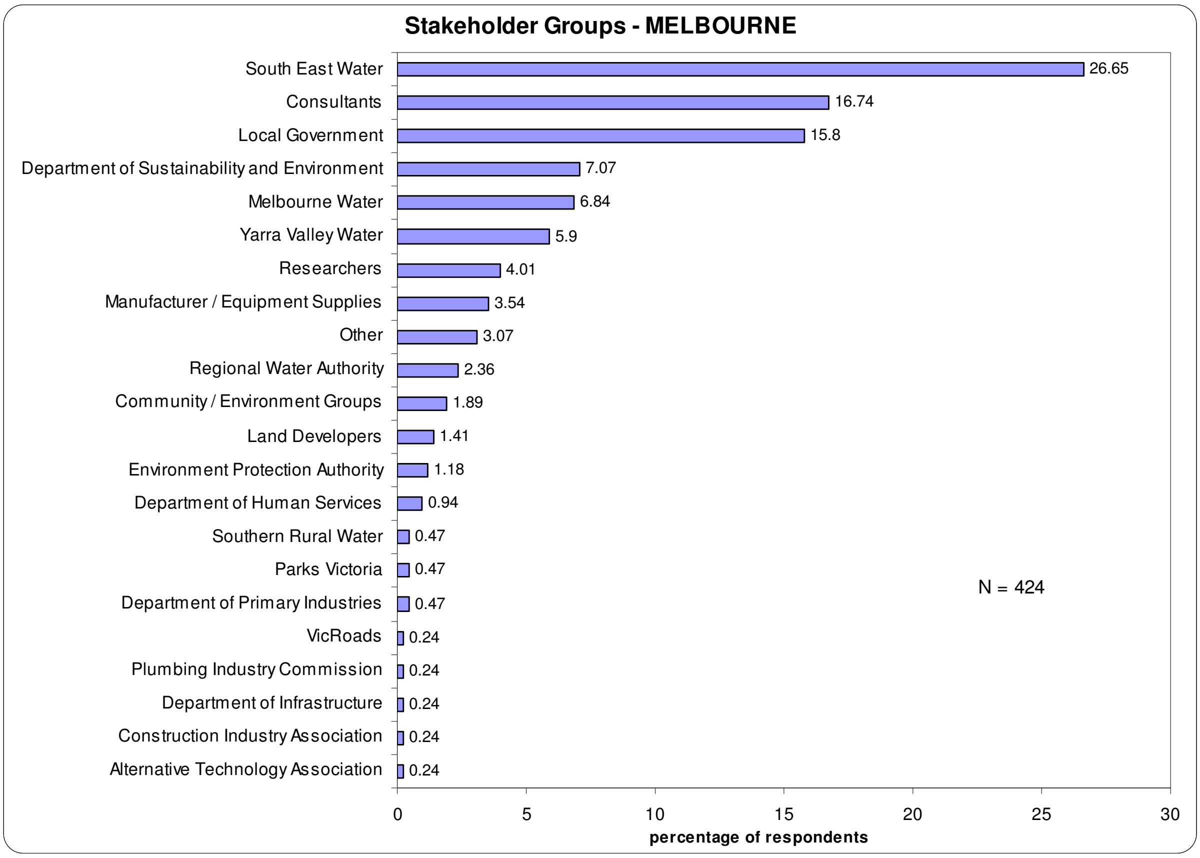

Figure 2.2: Stakeholder Groups Represented by Questionnaire Respondents from Melbourne

2.3.3 Perth Stakeholder Groups

Respondents were predominantly from the only water utility in Perth, the Water Corporation, with 32 per cent of respondents (Figure 2.3). The next well-represented stakeholder group were Consultants (at 15 per cent) and local government representatives (with 14 per cent). Figure 2.3 also highlights a substantial contribution from individuals representing the State Departments for Planning and Infrastructure, and Water. Across the three cities, Perth has the largest contribution from the stakeholder group 'Land Developers', representing eight per cent of all respondents (Figure 2.3).

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[8] City West Water nominated to be represented by the other metropolitan Melbourne water retailers: Yarra Valley Water and South East Water.

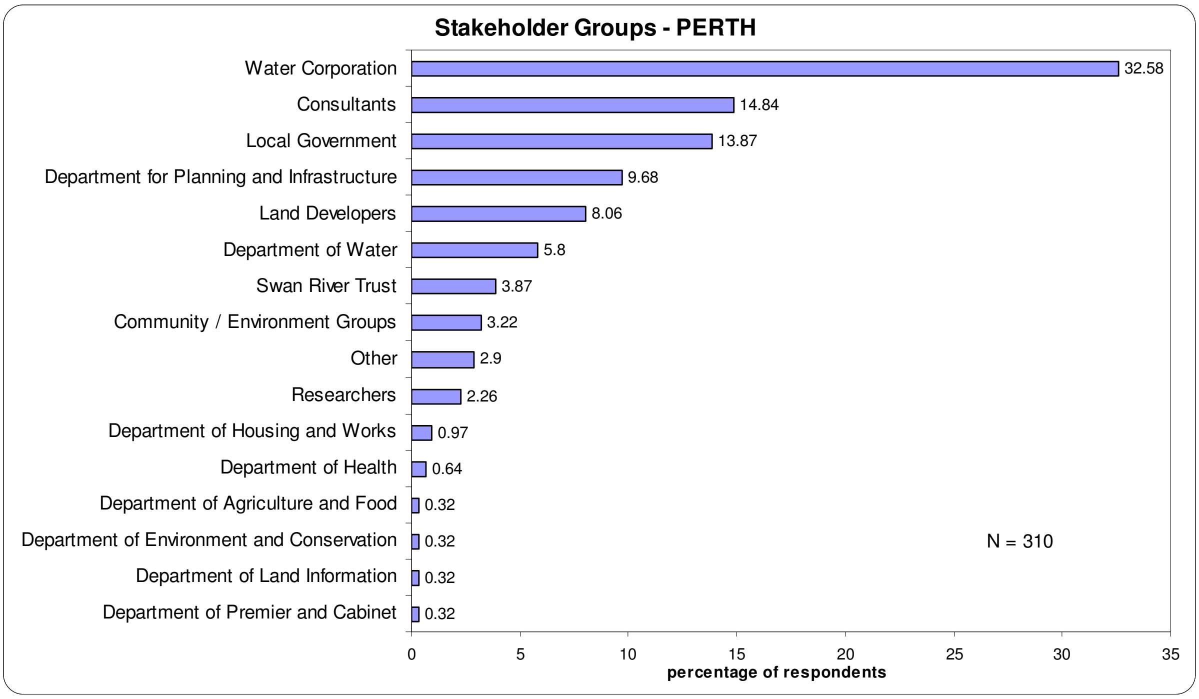


Figure 2.3: Stakeholder Groups Represented by Questionnaire Respondents from Perth

2.3.4 Overall Respondent Population

Across the three cities, the distribution of stakeholder groups as represented by respondents generally reflects the comparative level of involvement in the urban water sector. The overall respondent population was dominated by individuals with a professional background or training in engineering and/or science, the 'hard' sciences (Figure 2.4). On the other hand, there was a smaller representation of individuals with a background or training in 'softer' social sciences including economics and planning. Note that respondents could identify more than one formal area of professional training as reflected in the higher number of overall responses.

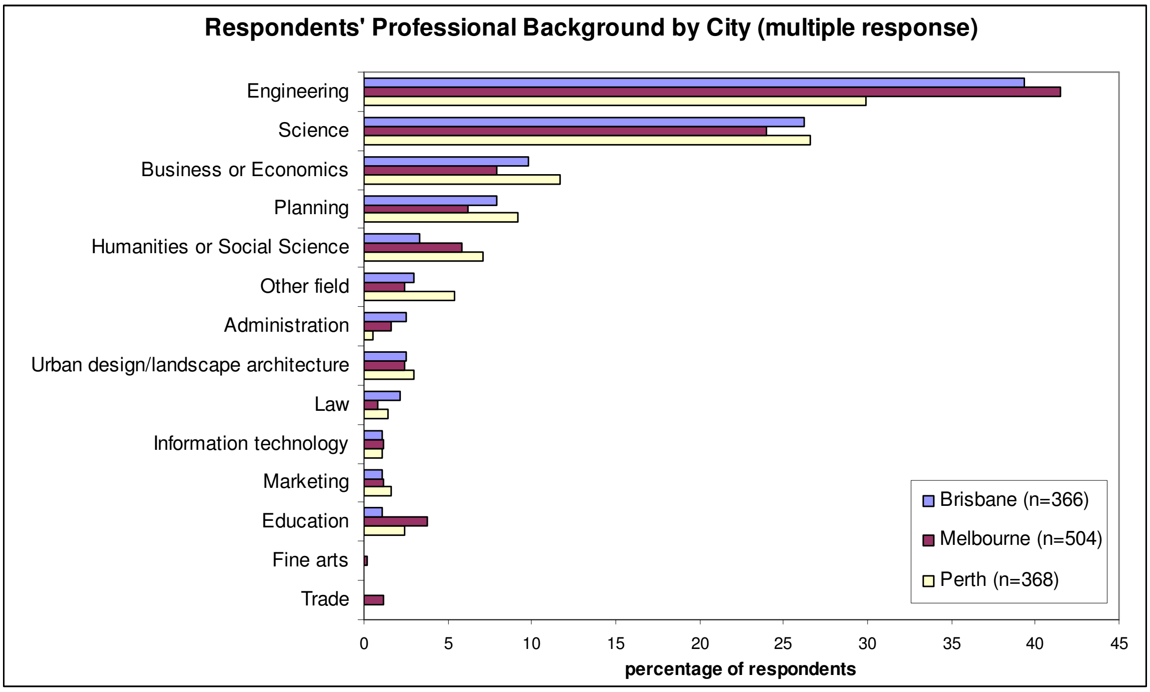


Figure 2.4: Professional Background and Training of Respondents from Brisbane, Melbourne and Perth

Figure 2.5 indicates that the majority of respondents (almost 70% in each city) have only been in their current position for 0-1 to 2-5 years. However, this somewhat masks the overall level of experience respondents have achieved in the urban water sector, as recent institutional reforms may have led to internal restructuring of various organisations. Indeed, Figure 2.6 demonstrates that the survey did capture a considerable number of individuals with over 11 years experience in urban water management and five per cent of respondents who have 20 plus years experience. Similarly, these results are also reflected in the level of position respondents hold within their organisation, where the majority of respondents have either middle or senior management roles, and between 10-15 per cent of respondents have executive positions (Figure 2.7). In Perth, for example, over 75 per cent of respondents held middle to senior positions (Figure 2.7).

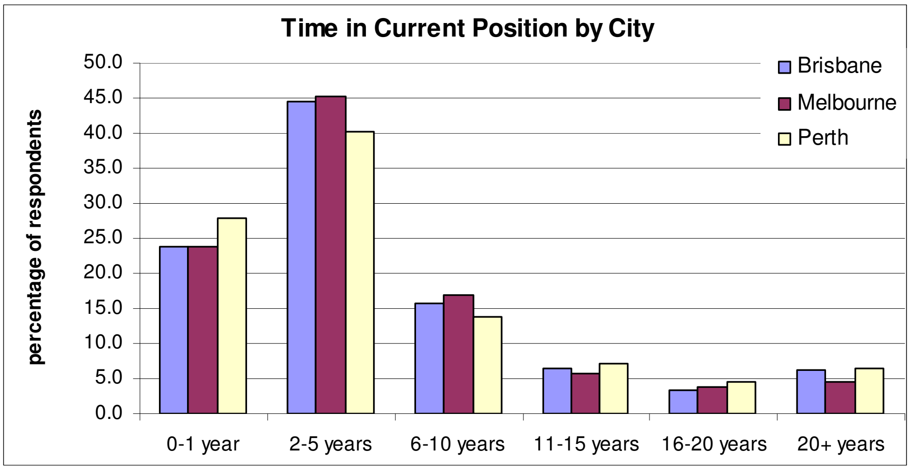


Figure 2.5: **The Length of Time Respondents have held their Current Position in Brisbane, Melbourne and Perth**

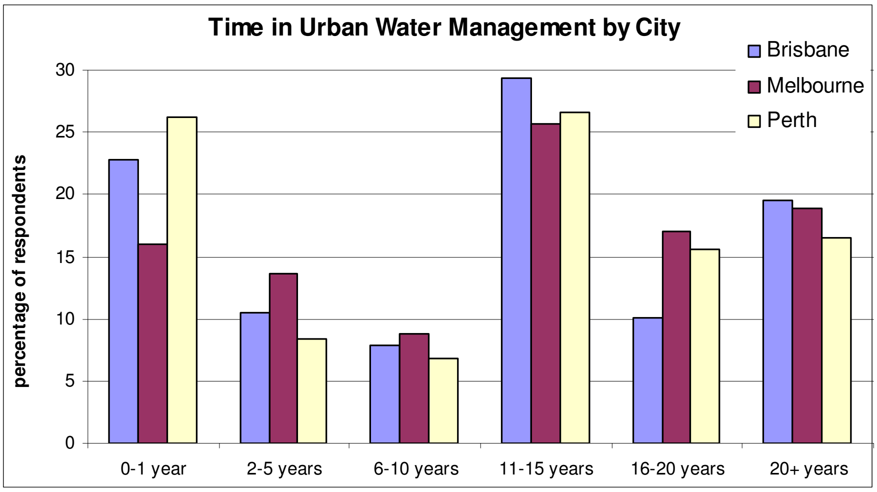


Figure 2.6: **The Length of Time Respondents have been Involved in Urban Water Management in Brisbane, Melbourne and Perth**

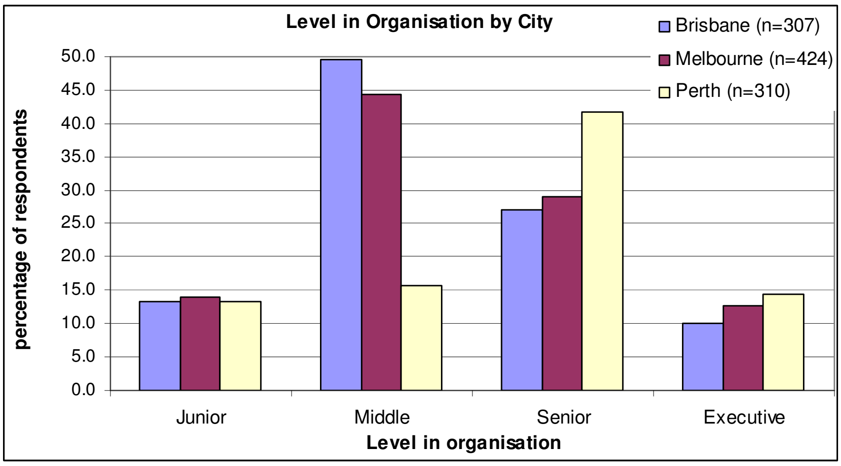


Figure 2.7: Brisbane, Melbourne and Perth Respondents' Position in their Organisation

Respondents were asked to identify what field (e.g. water supply, sewage) and type (e.g. design, technical, planning) of work they undertake. Figure 2.8 presents the broad field of work undertaken by respondents in Brisbane, Melbourne and Perth. Overall, there was a good representation, in each city, from respondents who are involved in three traditional areas of urban water management: water supply, stormwater/waterways and sewage. Interestingly, 13 per cent of respondents across all three cities indicated they work in the broader area of 'total water cycle management' (Figure 2.8). There were a large proportion of respondents in Perth who suggested they were involved in land development (Figure 2.8); this reflects the higher proportion of land developers who responded to the survey than in other case study cities.

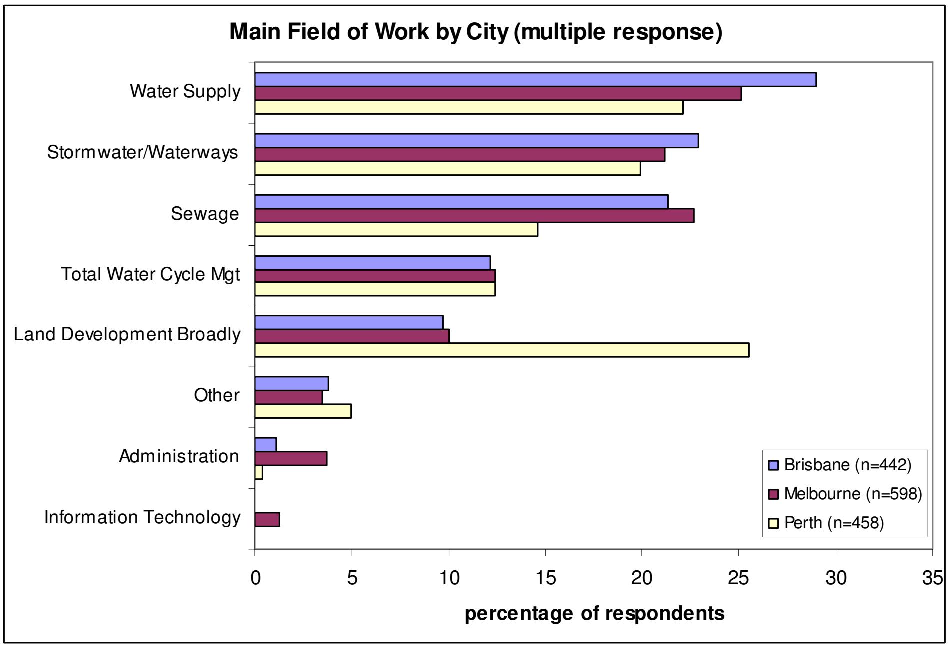


Figure 2.8: Brisbane, Melbourne and Perth Respondents' Main Field of Work

Within these broad fields of endeavour (Figure 2.8), respondents were also asked to identify whether they held, for example, a position in policy, research, education or technical operations. Figure 2.9 indicates the majority of respondents across each city were principally involved in the design, technical and operations division(s), closely followed by individuals with positions in strategy and/or policy.

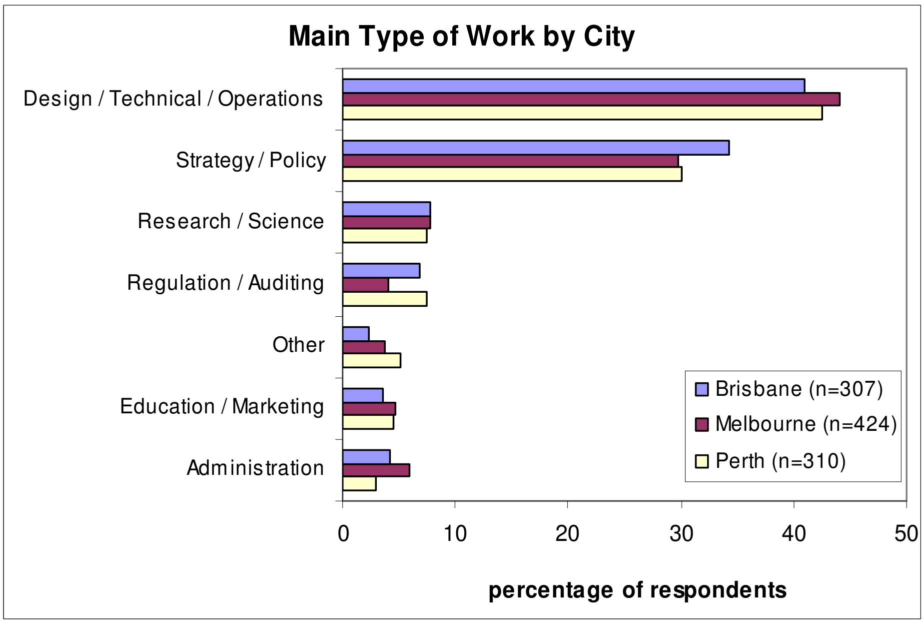


Figure 2.9: Brisbane, Melbourne and Perth Respondents' Main Type of Work

2.3 Assessment of Survey Respondent Representativeness

The questionnaire survey was targeted at professionals who work in the broader urban water sector which include, among others, local government officers, consultants, engineers, planners, and policy/strategy officers. Therefore, it is difficult to assess how representative our respondent numbers are based on the number of diverse professions involved in urban water management. In an effort to determine how representative our data were, water retailers in each of the three case study cities were asked to provide an assessment of their total number of employees (excluding contractors). Table 2.4 provides an indication of how representative the respondent numbers were. It is important to note that the total number of employees provided from each organisation did not separate out administrative staff, therefore the sample size may in fact be greater. Another difficulty was encountered with determining the representation of Brisbane City Council respondents. Brisbane Water employees were not separated out from Brisbane City Council; therefore, it is difficult to accurately determine how representative the respondent totals were.

Another validation process was undertaken, where the Program's steering committee members were asked to comment on how representative they believed the number of respondents from their organisation were in relation to the total number of individuals who work in urban water management services. All steering committee members agreed that the numbers adequately reflected a good representation from their respective organisations (i.e. South East Water, Water Corporation, Yarra Valley Water etc).

Table 2.4: An Assessment of the Representativeness of the Respondent Population

Water Business/ Organisation	Number of Employees (excluding contractors)	Number of Survey Respondents from Organisation	Date Recorded	Percentage of Retailer/Utility (%)
Water Corporation	2519	101	25/07/2007	4
Brisbane Water	825	115 (BCC)*	26/07/2007	14
Melbourne Water	642	29	25/07/2007	4.5
Yarra Valley Water	392	25	30/06/2006	6.4
South East Water	391	113	30/06/2006	29
City West Water**	246	-	30/06/2006	-
Melbourne Consolidated	1671	167	-	10

* Brisbane City Council was the only stakeholder group we provided, Brisbane Water was not an option but is incorporated within Brisbane City Council
** City West Water declined to participate in the online survey
Data Courtesy Mr R.Young (WSAA).

3. Association with Stormwater Quality Management Practices

The nature of highly urbanised areas means substantial increases in impervious areas through the network of houses and roads. Therefore, standard urban water management practices have traditionally involved removing stormwater quickly and efficiently to prevent localised flooding. This has typically involved draining our urban environments with deleterious effects on our natural waterways, through not only channel deformation but also declining water quality. If we are to consider stormwater as a potential resource then the quality of this water must be improved, not only for human uses, but also for ecological reasons. Based on this understanding, this Chapter presents how important receiving waterway health is to professionals in the urban water sector, and how important the professionals perceive waterway health is to 'their organisation', 'the community' and 'state politicians'. To further test the level of association to stormwater quality management practices, the perceived level of influence of 'community perceptions', 'environmental outcomes', 'public health outcomes' and 'social amenity' on the uptake of stormwater treatment technologies is presented.

3.1 Key Findings

There was a high level of association amongst urban water professionals to the importance of good stormwater quality management practices. Indeed, over 80 per cent of respondents, in each case study, indicated that protecting receiving waterway health was of high to very high importance (Figure 3.1). Yet, professionals suggested they did not feel supported by their state politicians (Figure 3.1).

Importantly, Brisbane, Melbourne and Perth urban water professionals considered all four association factors (community perceptions, environmental outcomes, social amenity and public health outcomes) to be 'drivers' in the adoption of stormwater treatment technologies at local, precinct and regional scales. Even public health outcomes, although not considered a strong influence, were perceived to encourage rather than discourage technology adoption. While Brisbane respondents clearly identified public health outcomes as a driver, Melbourne and Perth respondents were more cautious at the local scale (Table 3.1).

Table 3.1: Drivers and Barriers to the Uptake of Stormwater Quality Treatment Technologies and Local, Precinct and Regional Scales.

Receptivity Matrix Attributes	BRISBANE			MELBOURNE			PERTH		
	local	precinct	region	local	precinct	region	local	precinct	region
ASSOCIATION FACTORS									
Community Perceptions	Driver	Driver	Driver	Driver	Driver	Driver	Driver	Driver	Driver
Environment Outcomes	Driver	Driver	Driver	Driver	Driver	Driver	Driver	Driver	Driver
Public Health Outcomes	Driver	Slight Driver	Driver	Neutral	Neutral	Slight Driver	Neutral	Neutral	Slight Driver
Social Amenity	Driver	Driver	Driver	Driver	Driver	Driver	Driver	Driver	Driver

Barrier Majority > 25%	**Slight Barrier** Majority >10%<24%	**Mixed** <10% difference, Driver & Barrier	**Slight Driver** Majority >10%<24%	**Driver** Majority > 25%	**Neutral** (N) Receptivity factor not important

3.2 *Importance of SWQM Practices for Receiving Waterway Health*

Respondents were asked to identify the level of importance they personally placed on the environmental protection of receiving waterways in terms of stormwater quality management practices. Furthermore, respondents were also asked to identify the perceived level of importance placed on receiving waterway health by 'their organisation', 'the community' and 'state politicians'. The question asked respondents to rate the perceived importance on a scale from 'I don't know', very low, low, average, high and very high. Table 3.2 presents the percentage of respondents from each case study city.

Table 3.2: Perceived Importance of Advancing Stormwater Quality Practices across Brisbane, Melbourne and Perth for Protection of Receiving Waterways.

BRISBANE							
N=239	Very Low %	Low %	Average %	High %	Very High %	I don't know %	Total %
You	0	2.5	10.9	33.9	51.5	1.3	100
Your Organisation	2.1	7.1	20.9	33.1	33.9	2.9	100
The Community	2.1	18.4	23.8	32.2	21.3	2.1	100
State Politicians	15.5	27.6	26.4	15.9	9.2	5.4	100
MELBOURNE							
N=344	Very Low %	Low %	Average %	High %	Very High %	I don't know %	Total %
You	1.7	4.1	12.2	32.0	48.3	1.7	100
Your Organisation	2.3	8.7	21.5	32.8	31.7	2.9	100
The Community	1.2	15.7	27.9	33.4	18.9	2.9	100
State Politicians	4.4	25.3	36.0	17.4	11.6	5.2	100
PERTH							
N=235	Very Low %	Low %	Average %	High %	Very High %	I don't know %	Total %
You	0	3.8	6.4	32.8	57.0	0	100
Your Organisation	0.9	4.7	18.3	31.1	44.7	0.4	100
The Community	0.4	9.8	23.8	32.8	32.3	0.9	100
State Politicians	4.3	16.6	34.5	21.3	21.3	2.1	100

There was a clear trend across all three cities; individual respondents considered they personally value the health (environmental protection) of receiving waterways as more important than 'their organisation', 'the community' and 'state politicians'. As Figure 3.1 highlights, over 80 per cent of respondents in each city identified that advancing stormwater quality management practices were of high to very high importance for maintaining receiving waterway health. Perth respondents, in comparison to Melbourne and Brisbane respondents, seemingly place a higher level of importance on the environmental protection of receiving waterway health for each category (Figure 3.1). Interestingly, respondents perceived that 'state politicians' consider receiving waterway health as less of a priority in comparison to urban water professionals, 'their organisations' and even 'the community' (Figure 3.1).

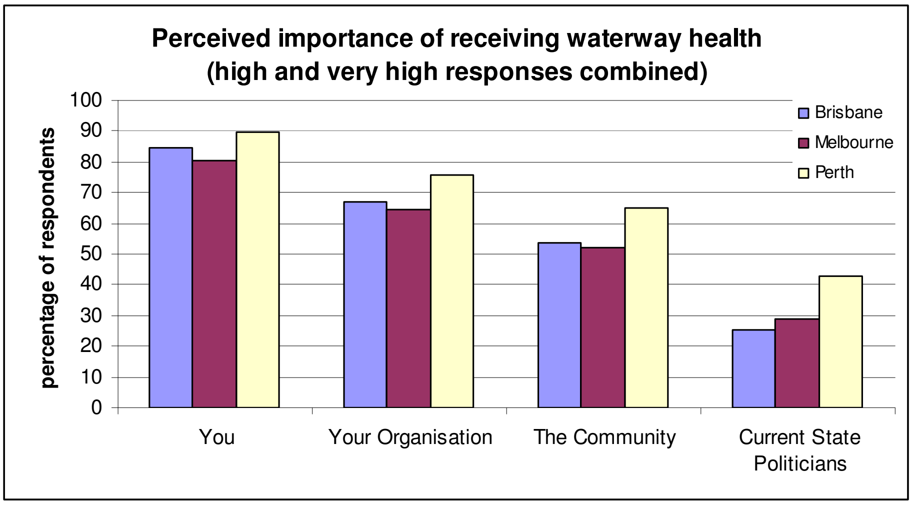


Figure 3.1: Valuing Stormwater Quality Management Practices in Brisbane, Melbourne and Perth (high & very high responses).

3.3 Community Perceptions and Social Amenity

Community perceptions were rated across all three cities and all three scales (local, precinct and regional) as an encouraging factor (driver) in the uptake of stormwater treatment technologies. Brisbane and Perth respondents demonstrated very little variation across the three scales; only Melbourne respondents were slightly less certain of the impact at local scales in comparison to precinct or regional scales (Figure 3.2).

Social amenity is an important consideration in applying stormwater quality treatment technologies for they often result in changes to the aesthetics of a suburb, streetscape or private garden. While a substantial proportion of professional respondents from each case study city remained neutral, the overall majority of respondents indicated that for each scale (local, precinct and regional), social amenity was a driver for implementation (Figure 3.2).

Responses were compared against a range of demographic variables to identify if there were any key differences among those who suggested social amenity was a negative factor. There were no key differences among respondents based on their ‘field of work’ or ‘government status’ (see Chapter 2), but there were significant differences according to level of experience in urban water management. For example, Melbourne respondents with limited experience (0-1 and 2-5 years) were more likely to suggest that social amenity would not limit implementation of treatment technologies, whereas respondents with extensive experience (20 plus years) indicated this factor would act as a barrier to implementation. Although a similar trend was exhibited at the local scale, this was only considered significant for the regional and precinct scales. Further, although not statistically significant, local government respondents were more likely to be negative about the social amenity impacts at all three scales in comparison to state and non-government respondents.

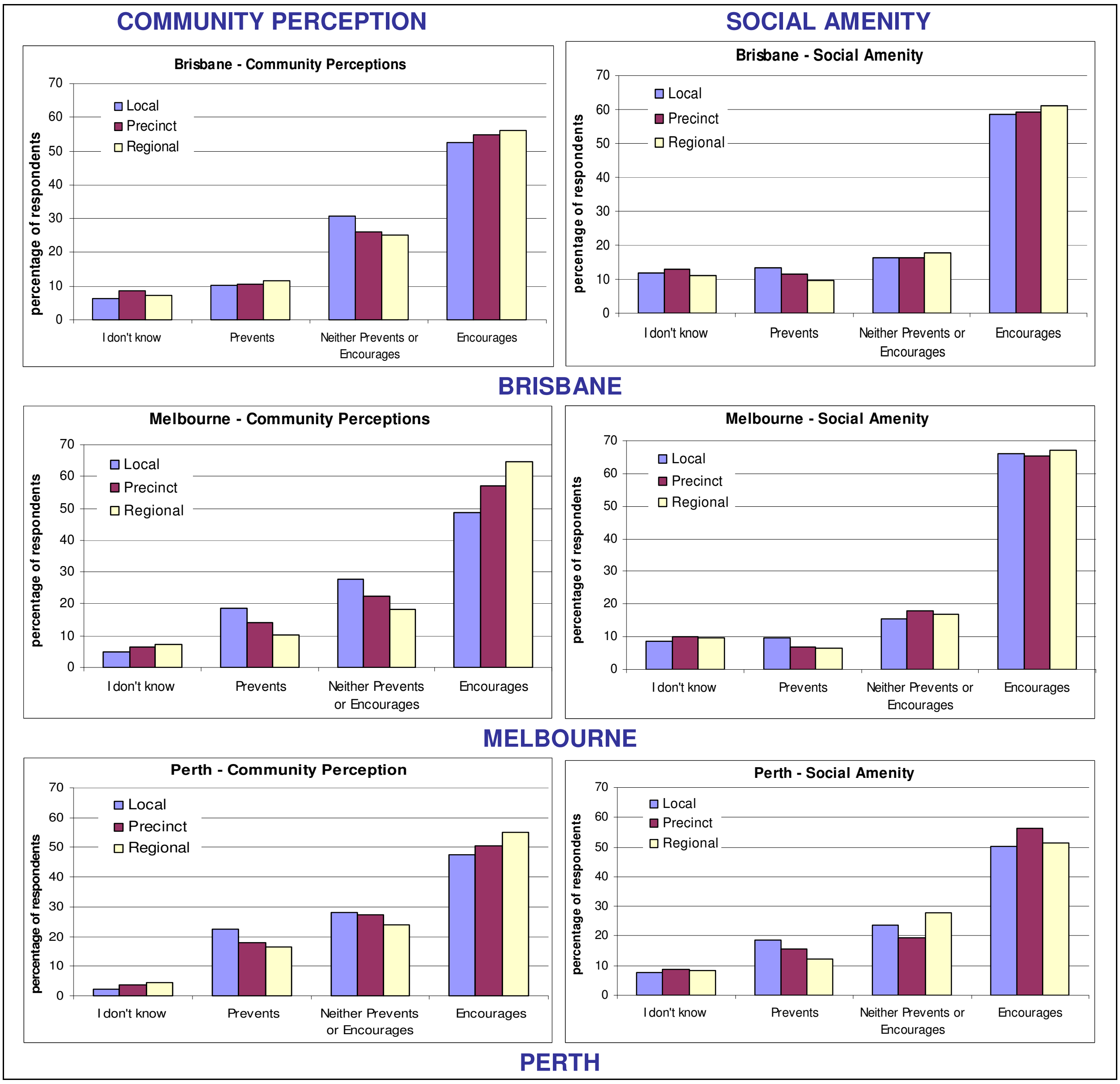


Figure 3.2: Perceived Influence of Community Perceptions and Social Amenity on the Uptake of Stormwater Quality Treatment Technologies in Brisbane, Melbourne and Perth.

3.3 Environmental and Public Health Outcomes

Environmental outcomes were considered an important factor in influencing the decision to implement technologies in each case study city. Indeed, the clear majority of respondents considered potential environmental outcomes, as a result of implementing stormwater quality treatment technologies, as a driver for uptake at local, precinct and regional scales (Figure 3.3).

Public health outcomes, however, were considered by a substantial proportion of respondents in Brisbane, Melbourne and Perth, to have little impact on the implementation of stormwater quality treatment technologies. However, Figure 3.3 highlights, that when comparing the ‘prevents’ and ‘encourages’ responses, the large majority of Brisbane and Melbourne respondents find public health outcomes encourages implementation of stormwater treatment technologies at local, precinct and regional scales. Perth respondents were more polarised, however, at the precinct and regional scales;

public health outcomes were considered to encourage implementation. However, at the local scale, respondents were equally negative and positive regarding this factor.

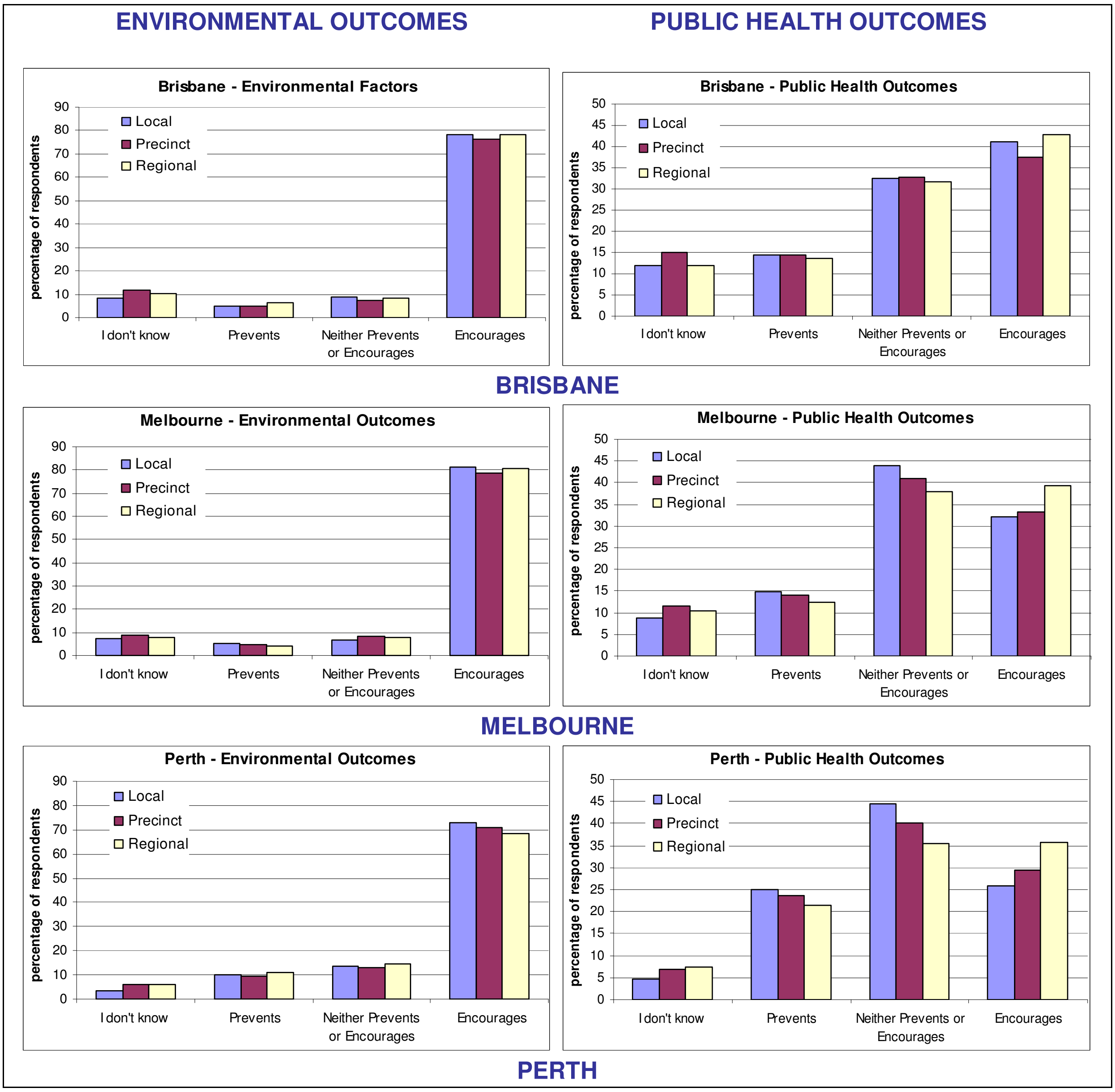


Figure 3.3: Professionals' Opinions on the Influence of Environmental and Public Health Outcomes on the Uptake of Stormwater Quality Treatment Technologies in Brisbane, Melbourne and Perth.

4. Factors Influencing the Uptake of Stormwater Quality Treatment Technologies

The level of professional receptivity to the uptake of stormwater quality treatment technologies was tested using eight institutional factors drawn from the literature (see Section 2.2). This section presents the perceptions of urban water professionals regarding these factors, i.e. how capital and maintenance costs, technical feasibility and performance, professional knowledge and expertise, regulation and approvals processes, property rights access, government policy and management arrangements and responsibilities influence the uptake of treatment technologies. Each influencing factor was rated on a scale from I don't know, through strongly prevents, slightly prevents, neither prevents nor encourages, slightly encourages, to strongly encourages.

4.1 Key Findings

In comparison to the high levels of association, the corresponding levels of acquisition are much less. The survey results point to the fact that the wholesale acquisition of stormwater quality management practices is still developing. The majority of 'influencing factors' were perceived to limit treatment technology adoption. Interestingly, urban water professionals suggested there is little difference among the drivers and barriers for treatment technology adoption at local, precinct and/or regional scales.

Perth generally has very low levels of acquisition, with most factors considered to be barriers to adopting treatment technologies. Melbourne and Brisbane respondents, on the other hand, had a slightly higher level of receptivity to the adoption of treatment technologies, particularly around 'technical feasibility and performance' and 'professional knowledge and expertise' (Table 4.1). Overall, in each of the case study cities, 'management arrangements and responsibilities', 'regulation and approvals processes' and the influence of capital and maintenance 'costs' were perceived as barriers to advancing stormwater quality management practices.

The main 'field of work' of urban water professionals appears to impact upon perceptions regarding what limits implementation of treatment technologies as there were differences in viewpoints between those who work in either total water cycle management and stormwater compared to those who work in sewage or water supply.

Table 4.1: Drivers and Barriers to the Uptake of Stormwater Quality Treatment Technologies at the Local, Precinct and Regional Scales.

ACQUISITION FACTORS									
Receptivity Matrix Attributes	BRISBANE			MELBOURNE			PERTH		
	local	precinct	region	local	precinct	region	local	precinct	region
Technical Feasibility & Performance	Slight Driver	Slight Driver	Slight Driver	Mixed Barrier/ Driver	Slight Driver	Slight Driver	Slight Barrier	Slight Barrier	Mixed Barrier/ Driver
Professional Knowledge & Expertise	Slight Driver	Slight Driver	Driver	Mixed Barrier /Driver	Slight Driver	Driver	Slight Barrier	Mixed Barrier/ Driver	Mixed Barrier/ Driver
Government Policy	Driver*	Driver*	Driver*	Mixed Barrier/ Driver	Mixed Barrier/ Driver	Driver	Slight Barrier	Slight Barrier	Slight Barrier
Management Arrangements & Responsibility	Slight Barrier	Slight Barrier	Barrier	Barrier	Barrier	Slight Barrier	Barrier	Barrier	Barrier
Regulation & Approvals Processes	Barrier	Barrier	Barrier	Barrier	Barrier	Slight Barrier	Barrier	Barrier	Barrier
Property Access Rights	Neutral	Neutral	Slight Barrier	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral
Capital Costs	Barrier	Barrier	Barrier	Barrier	Barrier	Barrier	Barrier	Barrier	Barrier
Maintenance Costs	Barrier	Barrier	Barrier	Barrier	Barrier	Barrier	Barrier	Barrier	Barrier

* responses only refer to Brisbane City Council's policy.

Barrier Majority > 25%	Slight Barrier Majority >10%<24%	Mixed <10% difference, Driver & Barrier	Slight Driver Majority >10%<24%	Driver Majority > 25%	Neutral (N) Receptivity factor not important

4.2 Technical Feasibility and Professional Knowledge

While there were a substantial proportion of 'I don't know' and 'neither prevents nor encourages' responses, Brisbane and Melbourne respondents indicated that, overall, 'technical feasibility and performance' encourages the uptake of treatment technologies, particularly at the precinct and regional scales (Figure 4.2). However, at the local scale there was less certainty, with similar results for both encouraging and preventing, particularly in Melbourne. Perth respondents, on the other hand, indicated that 'technical feasibility and performance' prevented the implementation of treatment technologies at all scales (Figure 4.2).

Appropriate 'professional knowledge and expertise' is required for successful implementation of stormwater quality treatment practices. Similar to the results for 'technical feasibility and performance', Brisbane and Melbourne respondents identified that 'professional knowledge and expertise' does encourage implementation, whereas in Perth, respondents indicated this limited implementation, particularly at the local scale (Figure 4.2). Despite Brisbane and Melbourne respondents identifying this was an encouraging factor, both city's respondents were less certain about having the necessary 'professional knowledge and expertise' at local scales.

Further analysis identified no significant differences among respondents in Brisbane or Melbourne. In Perth, however, there were key differences according to the experience of professionals in urban water management and their' main field of work. Perth respondents, with industry experience of between 11-15 years, were more negative than, for example, the 0-1 year group at all three scales. While not significant, similar trends were demonstrated in the Brisbane and Melbourne data. Interestingly, Perth respondents who indicated their main 'field of work' was total water cycle management considered the professional body of knowledge prevents implementation, whereas land developers and respondents working in the area of stormwater were more positive across local, precinct and regional scales.

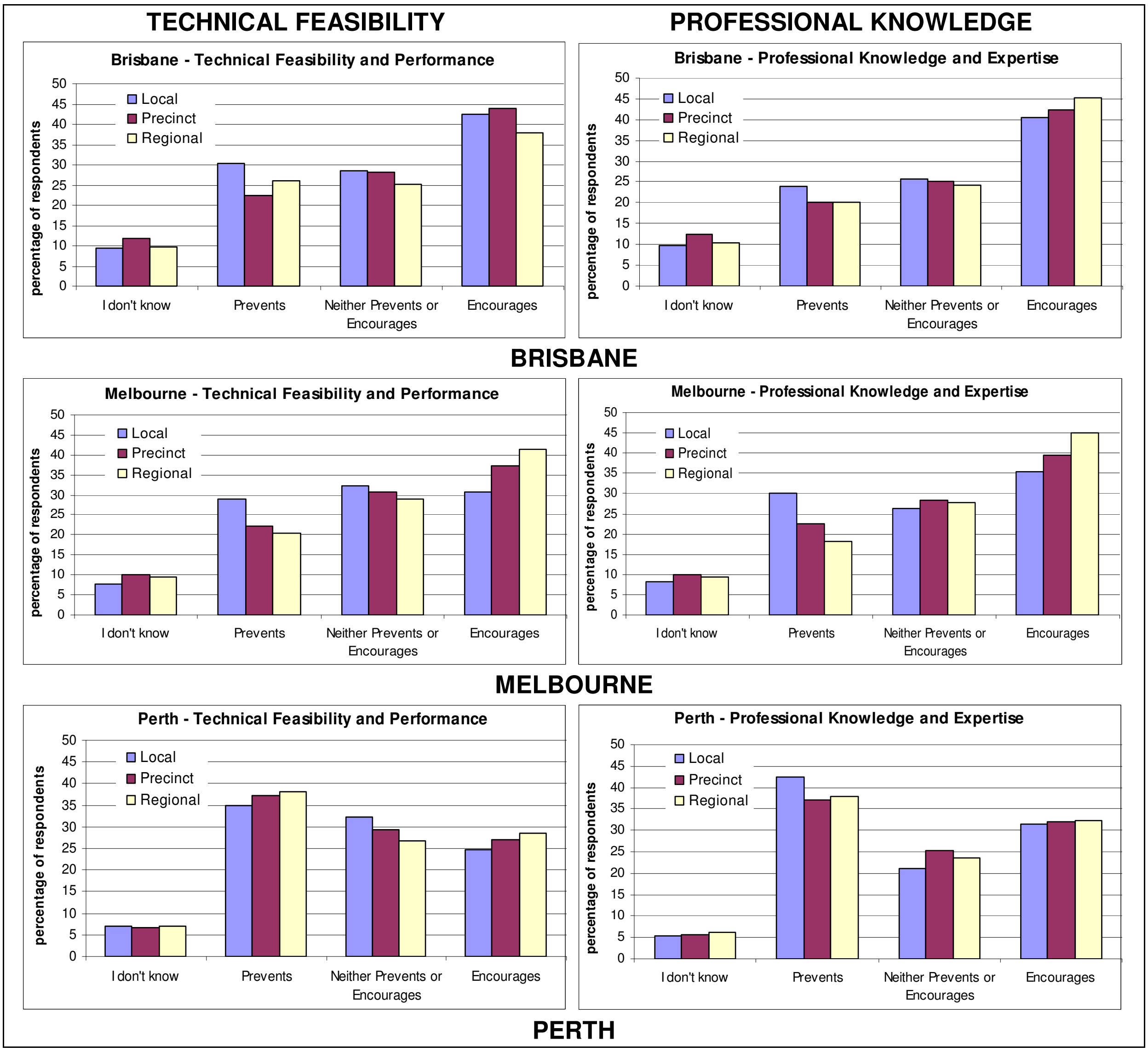


Figure 4.2: Perceived Influence of Technical Feasibility and Performance, along with Professional Knowledge and Expertise, has on the Uptake of Stormwater Quality Treatment Technologies.

4.3 *Regulation/Approvals Processes and Property Access Rights*

Overall, existing 'regulation and approvals processes' were considered a barrier in the uptake of stormwater quality management practices at local, precinct and regional scales. This trend was more pronounced in Perth and Brisbane as compared to Melbourne (Figure 4.3) where around 30 per cent of respondents suggested that 'regulation and approvals' neither prevents nor encourages implementation. While there were no key differences when examining the data according to 'field of work', in Perth, land developers were more likely than other 'fields of work' to regard regulations as a barrier to implementation. In relation to the position held by respondents within their organisation, executives were more likely to consider regulations as a barrier as compared to junior co-workers. This trend was exhibited at each scale and considered significant in Melbourne. Similarly, this trend is also reflected in the level of experience in urban water management. For example, respondents with 0-1 and 2-5 years experience were more inclined to be positive regarding the influence of regulation and approvals processes, whereas individuals with 11 years or more experience were considerably more negative. For each scale and in each city, local government respondents considered regulation and approvals to be an encouraging factor, whereas non-government respondents suggested this was a preventative factor in relation to implementation.

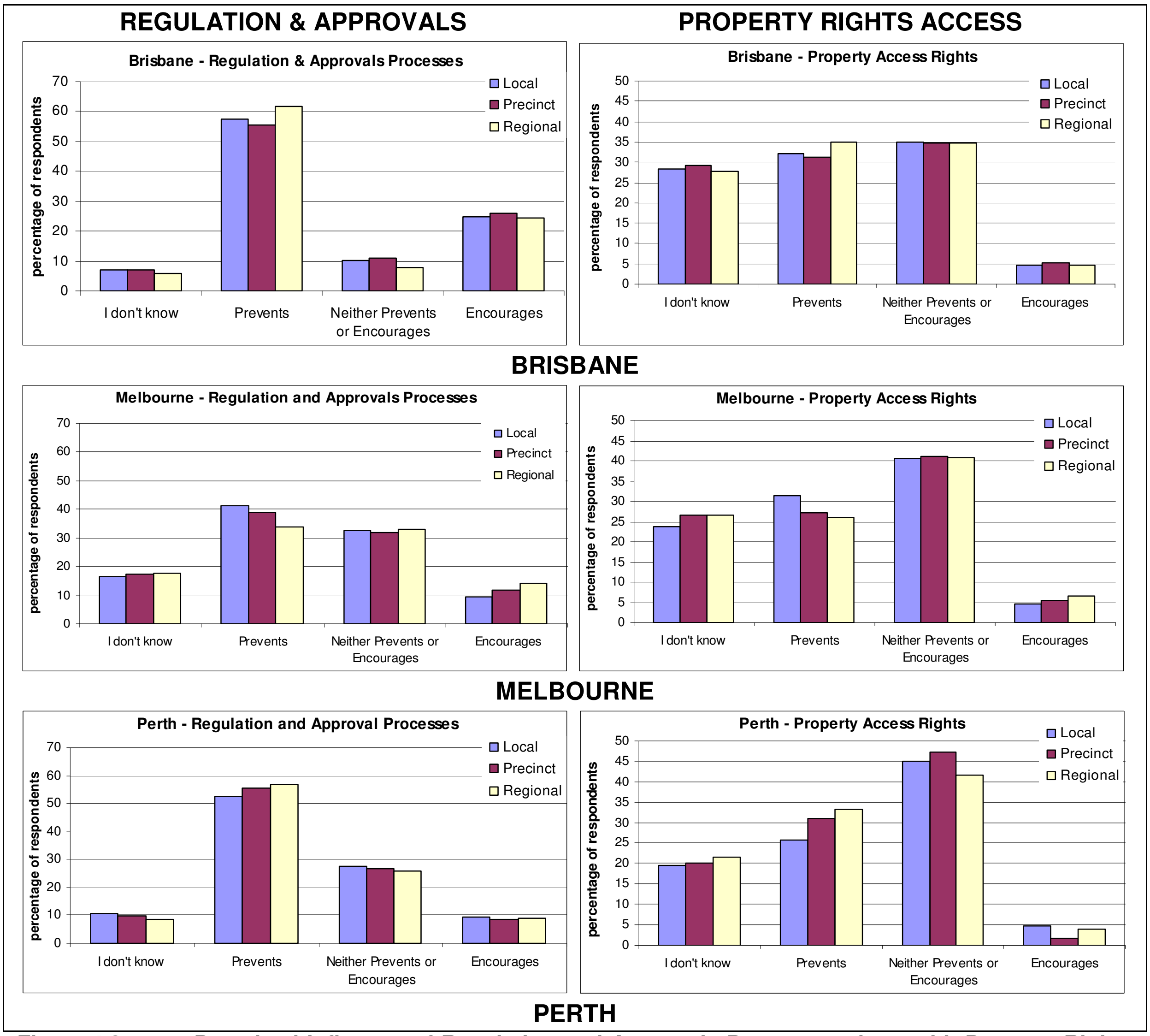


Figure 4.3: **Perceived Influence of Regulation and Approvals Processes along with Property Rights Access to the Adoption of Stormwater Quality Treatment Technologies.**

Property rights, on the other hand, are a more complex and possible unknown issue based on the results depicted in Figure 4.3. Between 20 to 25 per cent of respondents in each city simply ‘did not know’ how ‘property access rights’ may influence implementation rates. Overall, respondents in Brisbane, Melbourne and Perth consider ‘property access rights’ impacts negatively on implementation. In Brisbane, respondents were almost equal across the ‘I don’t know’, ‘prevents’ and ‘neither prevents nor encourages’ categories (Figure 4.3).

4.4 Management Arrangements and Government Policy

Over 35 per cent of Brisbane respondents suggested ‘management arrangements and responsibilities’ prevents the uptake of stormwater treatment technologies at local, precinct and regional scales. Similar results were identified in Melbourne and even more so in Perth, where over 60 per cent of respondents agreed that ‘management arrangements and responsibilities’ were limiting factors to implementation at all three scales (Figure 4.4). There were, however, a substantial proportion of respondents in each State, which suggested ‘management arrangements and responsibilities’ ‘neither prevents nor encourages’ the implementation of technologies.

Further analysis identified that there were key differences amongst the ‘field of work’ category at the local and precinct scales for Perth and Melbourne. For example, respondents working in the sewerage treatment area did not consider management arrangements were a limiting factor at either local or precinct scales, whereas individuals working in total water cycle management were more inclined to suggest management arrangements were indeed a barrier to implementation at both scales. Furthermore, at the precinct scale in Melbourne, respondents working in Water Supply indicated that management arrangements were an encouraging factor while respondents working in stormwater were more likely to consider this a negative factor.

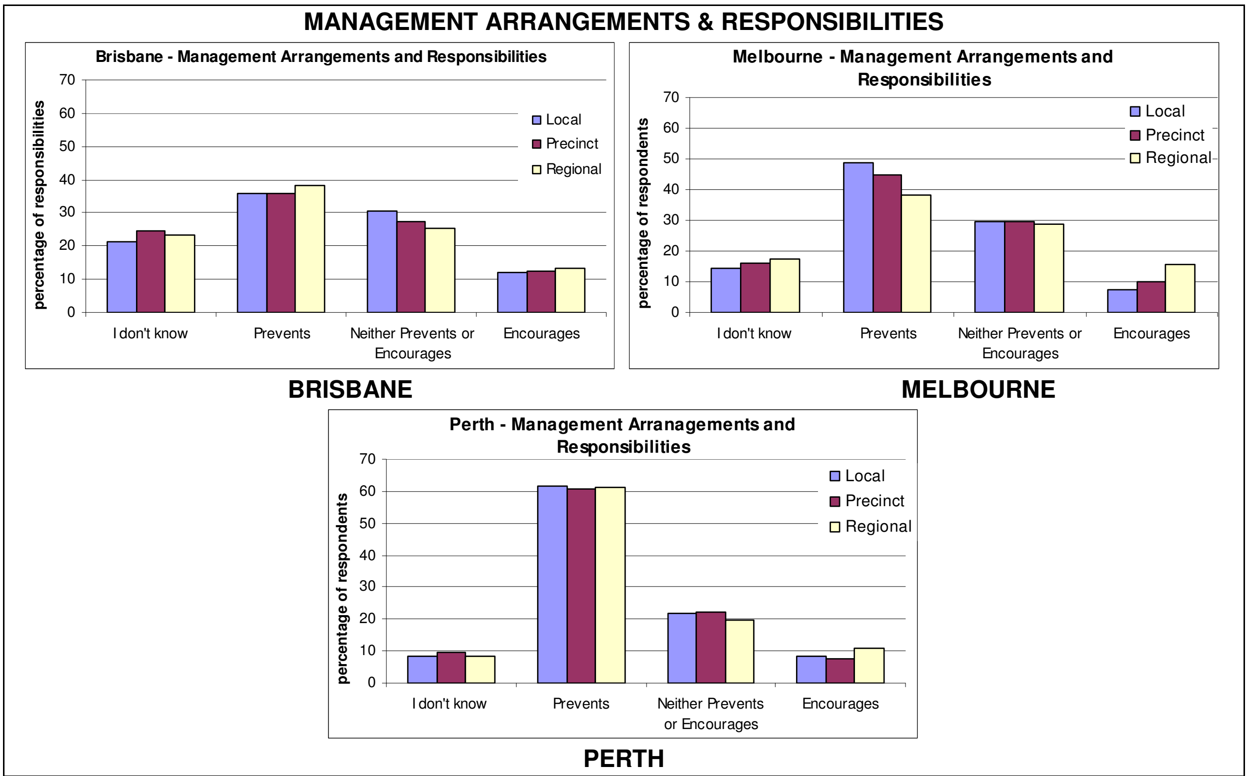
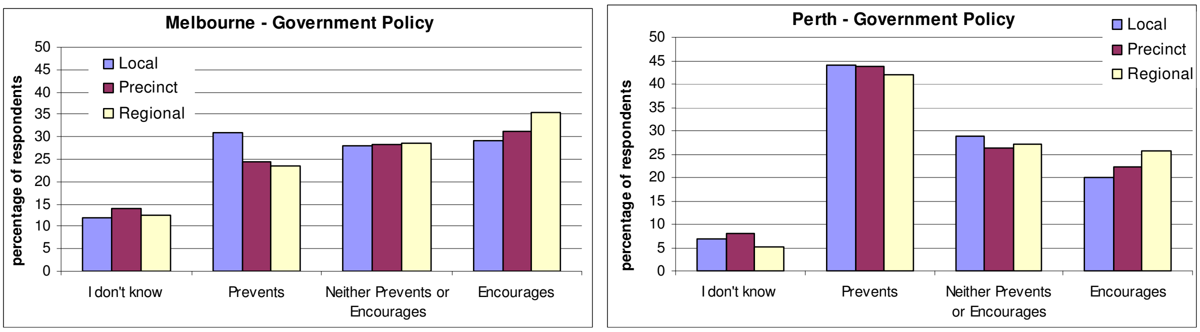


Figure 4.4: Perceived Influence Management Arrangements and Responsibilities have on the Adoption of Stormwater Quality Treatment Technologies.

Local government respondents in Perth and Melbourne considered management arrangements were not a limitation to implementation. Conversely, non-government respondents strongly suggested ‘management arrangements and responsibilities’ were a barrier at precinct and regional scales. Local scale data exhibited a similar trend with local government respondents being positive and non-government respondents negative; this was statistically significant in Brisbane and Melbourne. Respondents with little experience in the industry (0-1 years) tended to be more positive regarding management arrangements and responsibilities than respondents with 11 to 15 years experience who were more negative. Similarly, junior and middle level positions were more likely to be positive regarding management arrangements than senior or executive level respondents were. This trend was established across Brisbane, Melbourne and Perth.

Response to the influence ‘government policy’ has on the implementation of stormwater technologies was reasonably equally distributed in Melbourne (Figure 4.5), but overall, policy was considered to be slightly more positive than negative. In Perth, respondents clearly identified ‘government policy’ was a negative influence on implementation of technologies across all three scales (Figure 4.5).



MELBOURNE **PERTH**

Figure 4.5: Perceived Level of Influence Government Policy has on Stormwater Quality Treatment Technology Implementation in Melbourne and Perth.

Data were analysed for differences in responses according to respondents’ experience in urban water management, their field of work and government status for both Perth and Melbourne. The only significant difference identified was in Melbourne. There, at the local scale, respondents who have been in the urban water sector for 0-1 years were slightly more negative regarding policy influence, but they also expressed a large number of ‘I don’t know’ responses. Further, individuals who have 20 plus years experience were negative about the influence of policy. Melbourne respondents with 0-5 years experience accounted for 40 per cent of the ‘I don’t know’ responses at the local scale. While not significant, Perth exhibited a similar trend, where individuals with industry experience of between 0 to 5 years accounted for 53 per cent of the ‘I don’t know’ category. Similar figures were also experienced for precinct and regional scales. There were no key differences among respondents according to their field of work or government status. However, interestingly, Melbourne respondents who work with stormwater were generally more positive regarding the influence of policy than other ‘fields of work’ and in Perth, land developers were the most positive regarding policy influence at each scale.

Brisbane respondents were asked a slightly different question for ‘government policy’. The question was broken into three categories, Federal, State and Local (Brisbane City Council) policy. Figure 4.6

highlights that Brisbane respondents were not clear about the influence Federal policy has on the uptake in stormwater quality treatment practices. State policy received similar results, but respondents were more evenly distributed among the categories. Local policy, however, resonated with over 40 per cent of Brisbane respondents who considered Brisbane City Council's policy an encouraging factor in the adoption of stormwater quality treatment technologies. Proportional to the other State's responses, many Brisbane respondents indicated higher levels of 'I don't know' and 'neutral' across all three scales.

There were no significant differences at the local, state and regional scales based on the level of experience urban water management professionals and their 'field of work' for State and Federal policy questions. However, the majority of 'I don't know' responses were from those with up to ten years experience in the industry. Key differences were noted at the local scale in reference to Brisbane City Council's (local government) policy. Here respondents who nominated they work in water supply had very high 'I don't know' responses while people operating in total water cycle management were generally more positive than other 'fields of work'. While not significant, those working in water supply, sewage and stormwater all responded with high levels of 'I don't know' in relation to the impact of Brisbane City Council's policy at the regional scale.

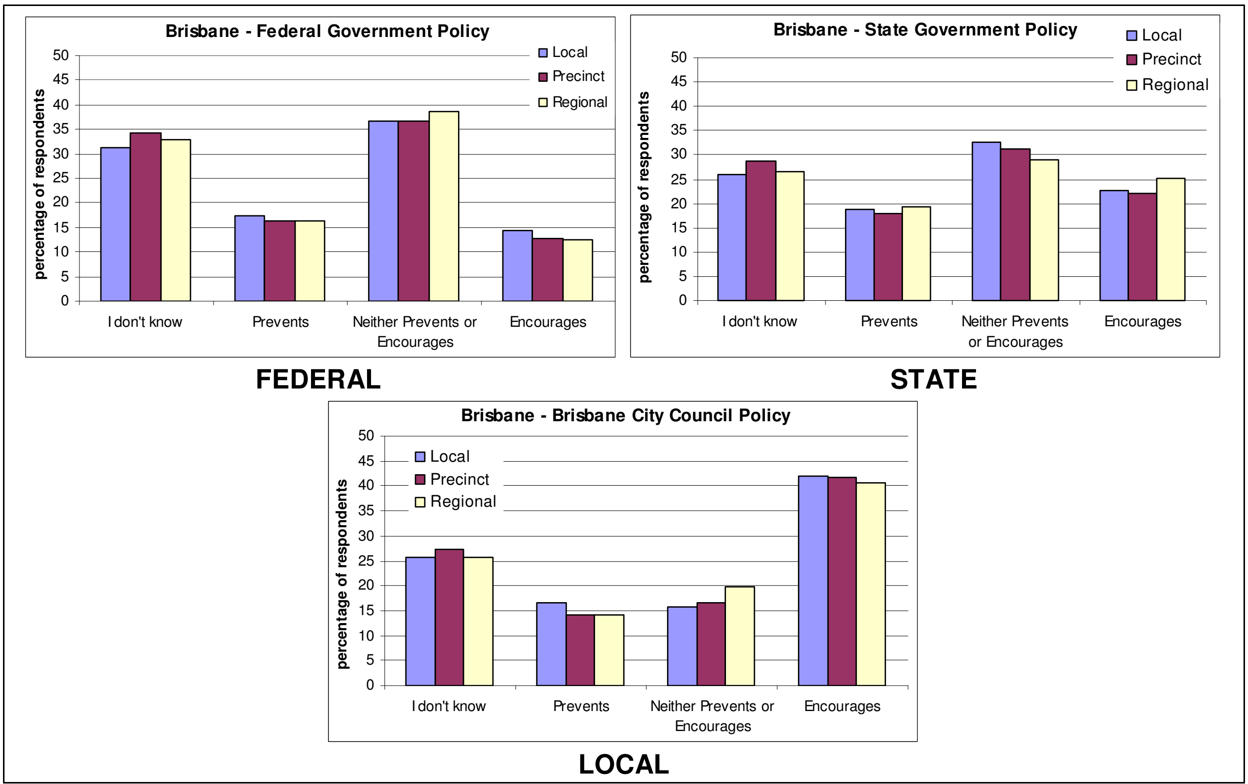


Figure 4.6: Perceived Influence of Federal, State and Local Government Policy on the Adoption of Stormwater Quality Treatment Technologies in Brisbane.

4.5 Capital and Maintenance Costs

In all three cities, across the local, precinct and regional scales, capital and maintenance costs appear to impede implementation of stormwater quality treatment practices (Figure 4.1). A cross-comparison reveals that capital and maintenance costs appear to have an equally negative influence on implementation, according to 70 per cent of respondents in each city.

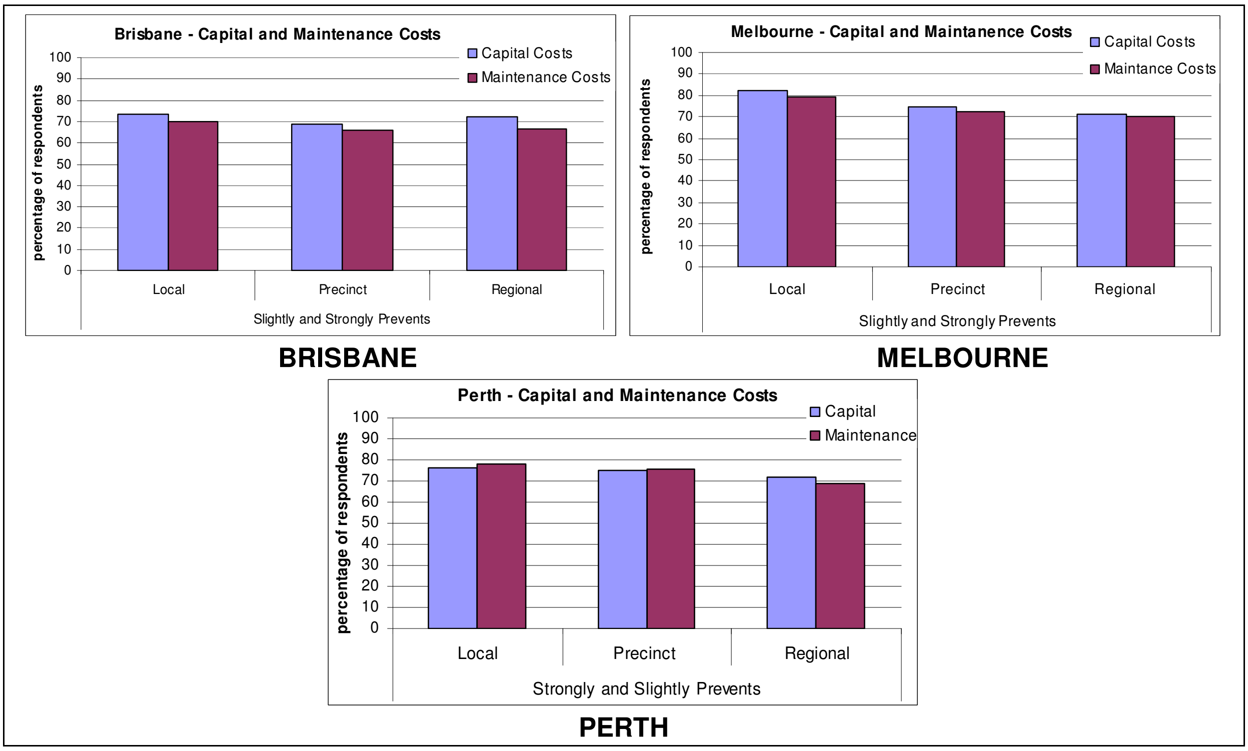


Figure 4.1: Perceived Influence of Capital and Maintenance Costs on the Adoption of Stormwater Quality Treatment Technologies in Brisbane, Melbourne and Perth.

5. Perceptions of Institutional Arrangements and Stakeholder Commitment to Water Sensitive Urban Design

There are a range of institutional barriers that have been identified in the literature which can impede the implementation of SUWM practices (see Section 1.1). Therefore, to continue to assess the level of receptivity of urban water professionals to advancing stormwater quality management practices, this Chapter addresses the influence of current institutional arrangements and examines the level of commitment of a range of organisations in promoting water sensitive urban design (WSUD) principles, as perceived by urban water professionals. These attributes are important in helping to understand the level of receptivity, and indicate the level to which urban water professionals feel supported. WSUD was described for respondents as follows:

> *water sensitive urban design has evolved from its early association with stormwater management and aims to ensure that water is given due prominence within urban design processes. This is through the integration of total urban water cycle thinking in the detailed planning and design of the built form. In particular, WSUD reintroduces the aesthetic and intrinsic values of waterways back into the urban landscape.*

Respondents were asked to rate the level of effectiveness of their current (time of survey) institutional arrangements according to the scale: I don't know, very poor, poor, neutral, good and very good. The results are presented in Figure 5.1. To determine the perceived level of commitment from a range of organisations to advancing WSUD, respondents were asked to rate organisations based on the scale: I don't know, no commitment, some individuals committed, increasing organisational/sector awareness, major organisational departments and internal champions committed, organisation/sector fully committed and, not applicable.

5.1 Effectiveness of Institutional Arrangements

Despite the large percentage of respondents across the three cities who remained neutral regarding the effectiveness of their city's institutional arrangements, a substantial proportion of respondents do consider their institutional arrangements to be poor (Figure 5.1). Indeed, almost 50 per cent of Perth's respondents considered their institutional arrangements to be barrier, while in Melbourne and Brisbane, their institutional arrangements were more a 'slight barrier' (32 per cent in Melbourne and 38 per cent in Brisbane).

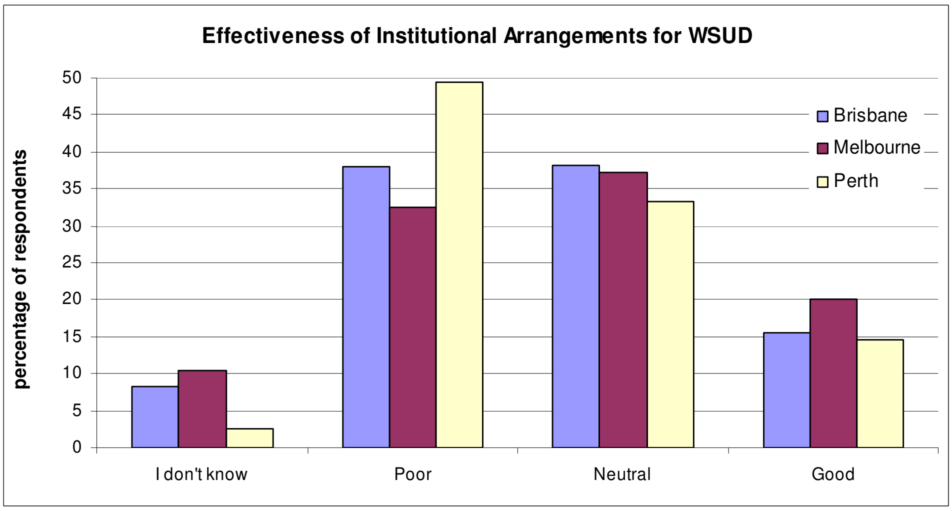


Figure 5.1: **The Effectiveness of Institutional Arrangements for Supporting Water Sensitive Urban Design in Melbourne, Brisbane and Perth.**

5.2 Stakeholder Commitment

Organisations with a major responsibility for urban water management received the highest commitment rating. For example, the water utilities in Melbourne (Figure 5.3) and Perth (Figure 5.4) were perceived as the most 'fully committed' to advancing WSUD, while in Brisbane, the Moreton Bay Watershed and Catchments Partnership was rated the highest (Figure 5.2). However, not many organisations received an outright 'fully committed' response. Therefore, by combining 'fully committed' with the next category of commitment, 'organisation/sector and internal champions committed', a clearer picture emerged. In Brisbane, the Brisbane City Council becomes the lead agency along with the other water utilities in Perth and water businesses in Melbourne. In each city, these organisations were closely followed by the state government departments responsible for urban water management in some capacity. These departments included the Department of Water (WA), the Environmental Protection Authority (Qld) and the Department of Sustainability and Environment (Vic). At the other end of the spectrum, organisations without a core day-to-day role in urban water management received very high 'I don't know' responses. Indeed, these organisations such as the economic regulators, health regulators and land developers in each city were perceived to have the largest 'no commitment' responses. In Brisbane, this response also extended to the Department of Main Roads.

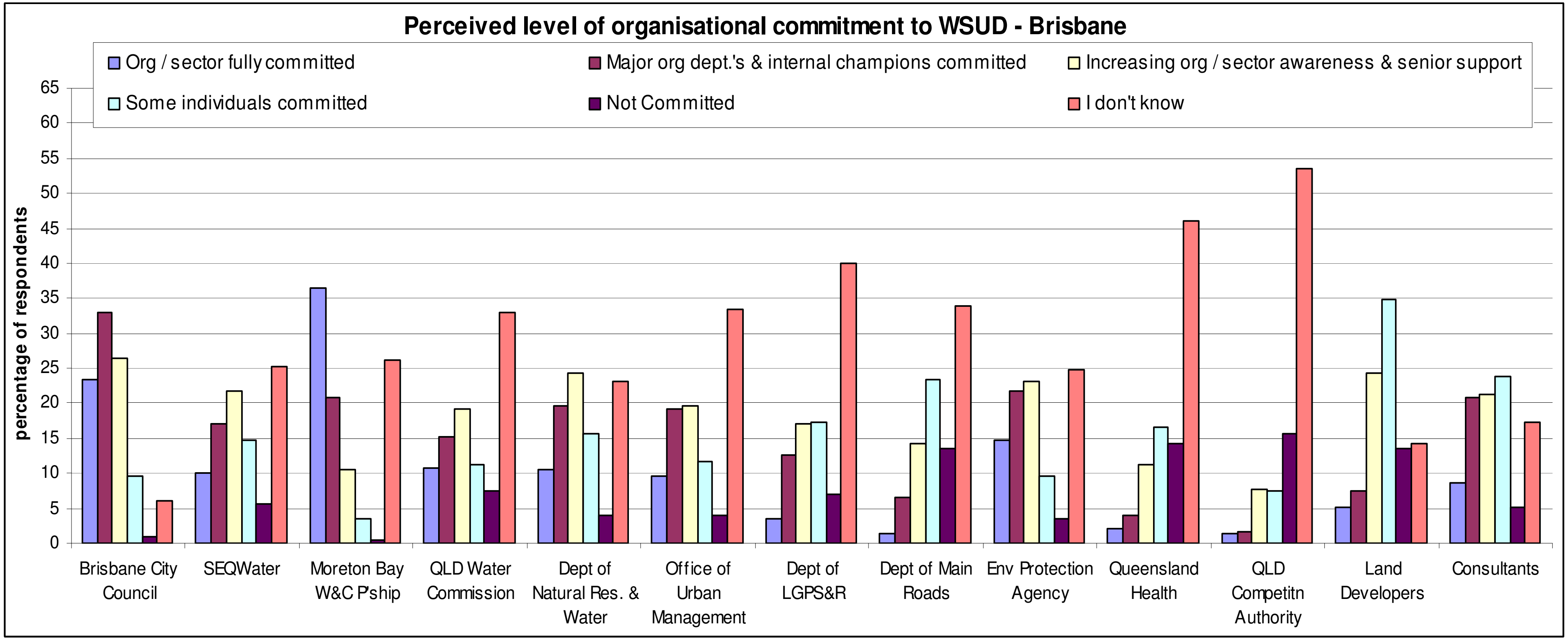


Figure 5.2: Perceived Level of Organisational Commitment to Advancing Water Sensitive Urban Design in Brisbane

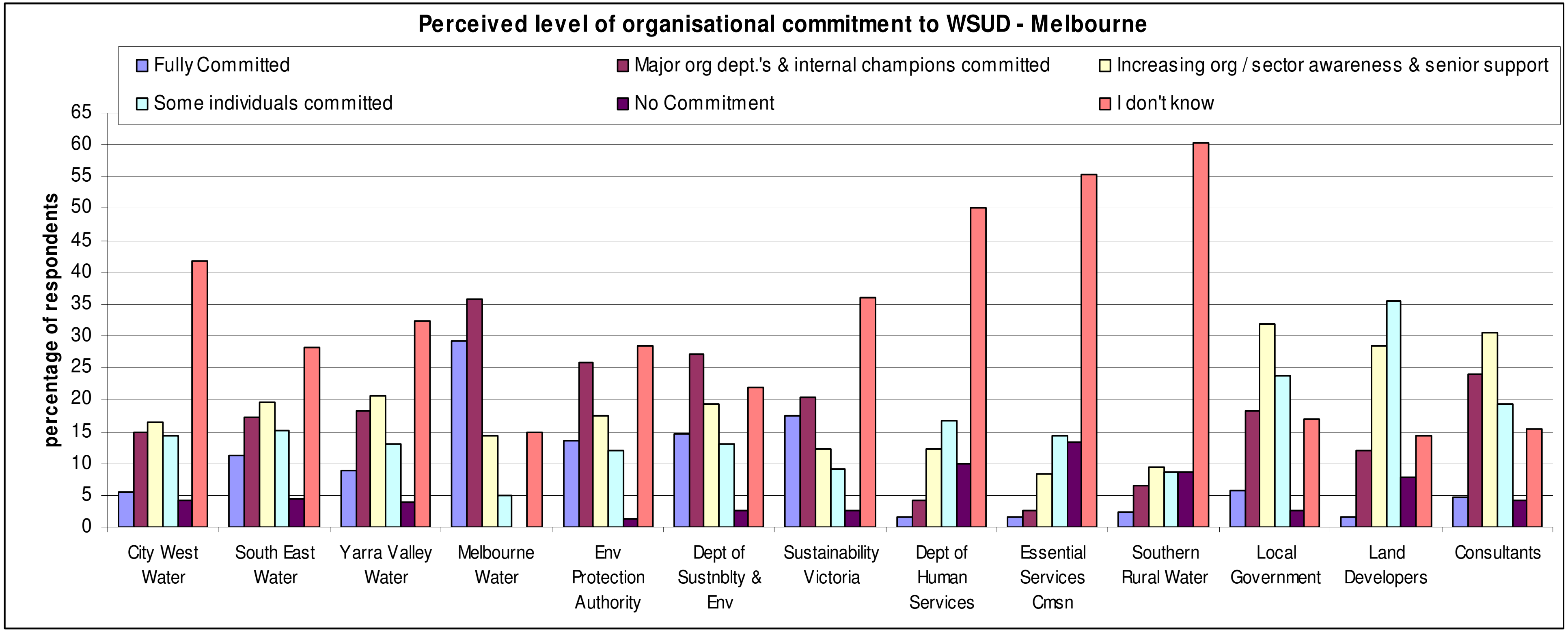


Figure 5.3: **Perceived Level of Organisational Commitment to Advancing Water Sensitive Urban Design in Melbourne.**

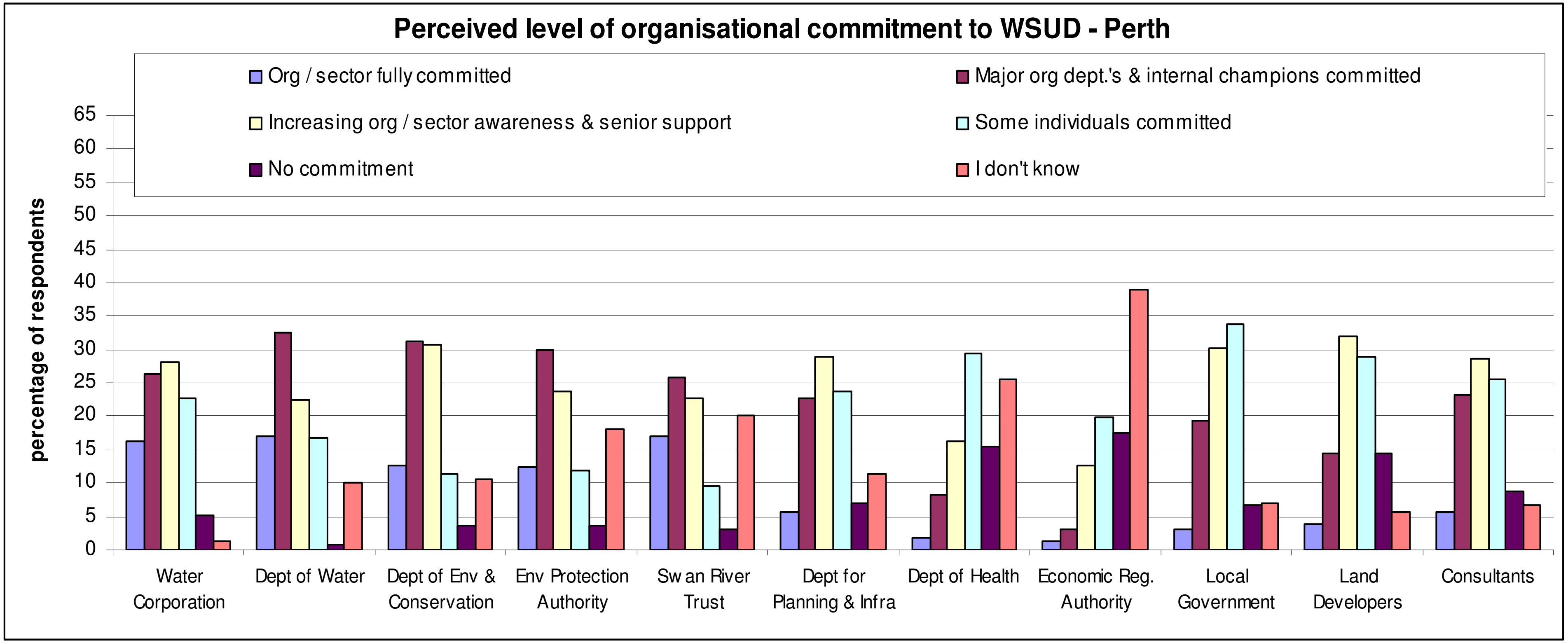


Figure 5.4: Perceived Level of Organisational Commitment to Advancing Water Sensitive Urban Design in Perth.

5.3 Contrasting Local Government with the Private Sector

Local governments, consultants and developers are all instrumental in ensuring that WSUD principles can be approved and put into practice, yet their perceived commitment to advancing WSUD remains low in each of the three cities (Figures 5.2, 5.3, 5.4). In each of the three cities, these organisations/sectors were perceived to only have ‘some individuals committed’ and a ‘growing awareness’. Further analysis was undertaken to determine whether there were any differences between respondents from local government and developers/consultant when rating local government commitment (Table 5.1). The only significant difference was in Brisbane, where developers/consultants were more negative about local government commitment; the majority of respondents (44 per cent) rated them as a sector with increasing awareness, whereas the majority of local government respondents identified their sector as ‘fully committed’ (39 per cent). Melbourne local government respondents identified their sector as having increasing organisational awareness (46 per cent) whereas developers/consultants equally considered local governments to have some individuals committed, a growing awareness and ‘I don’t know’ (Table 5.1). In Perth, there were similar perceptions among local government and developers/consultants about the level of commitment from local governments to advancing WSUD (Table 5.1).

Table 5.1: Comparing the Differences of Perceived Levels of Commitment from Local Government to WSUD by Land Developers/Consultants and Local Government Respondents in Brisbane, Melbourne and Perth.

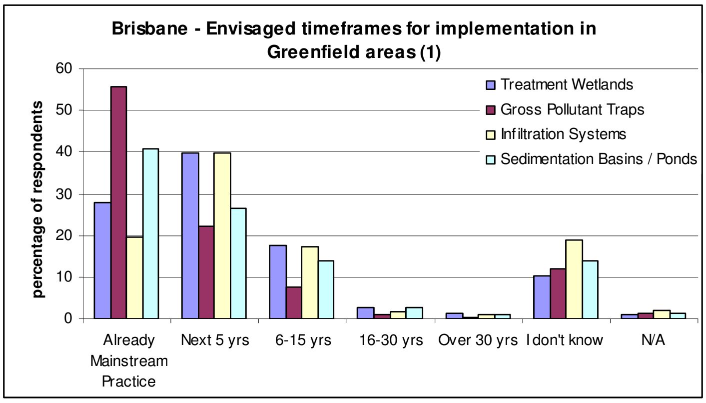
Perceived Level of Commitment	BRISBANE		MELBOURNE		PERTH	
	Land Developers & Consultants %	Local Govt %	Land Developers & Consultants %	Local Govt %	Land Developers & Consultants %	Local Govt %
No commitment	0	1.1	8.7	0	0	0
Some individuals committed	11.8	10.0	23.9	25.9	21.8	31.3
Increasing organisational / sector awareness	44.1	16.7	23.9	46.3	32.7	28.1
Major organisational departments and internal	32.4	30.0	10.9	18.5	34.5	34.4
Organisation / sector fully committed	5.9	38.9	8.7	9.3	10.9	3.1
"Don't know"	2.9	3.3	23.9	0.0	0.0	3.1
Not Applicable	2.9	0	0.0	0.0	0.0	0.0

Source (Survey Raw Data, Appendix B).

6. Projected Implementation Timeframes

Stormwater quality management practices are often defined by their scale of application and are typically introduced in 'newer' greenfield developments. Treatment technologies for stormwater quality management include treatment wetlands, gross pollutant traps, infiltration systems, sedimentation basins/ponds, porous pavements, raingardens/bioretention systems, street tree bioretention systems and swales. Respondents were asked to identify how long before they considered these treatment technologies would become everyday practice in greenfield developments and existing areas. To ensure consistency across the cities, definitions for greenfield and existing areas were provided (see Glossary). We made an assumption in the survey that respondents would know and/or understand what the different technology types involved.

Overall, in greenfield and existing sites, Brisbane respondents considered gross pollutant traps, sedimentation basins/ponds and swales as mainstream practice compared to other stormwater quality treatment technologies (Figures 6.1 and 6.2). However, the data demonstrates that the majority of these stormwater quality treatment technologies should become mainstreamed in greenfield areas over the next five years (Figure 6.1), while it could take up to 15 years (and possibly longer) in existing sites. Indeed, many respondents were not sure (I don't know) how long it would take to implement these technologies in existing areas (Figure 6.2).



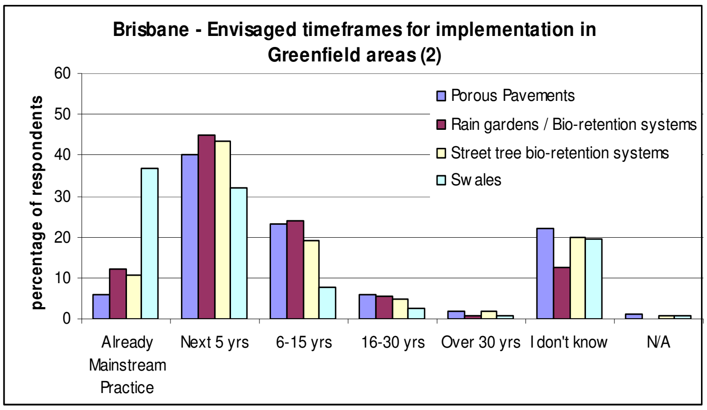
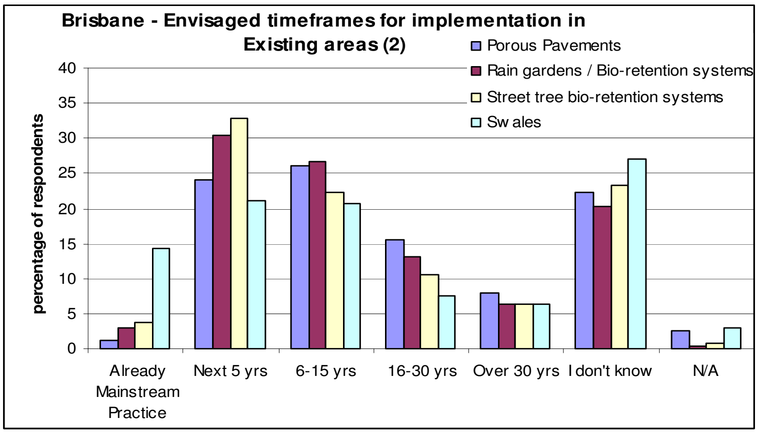


Figure 6.1: Envisaged Timeframes for the Implementation of Stormwater Quality Treatment Technologies in Greenfield Areas of Brisbane.



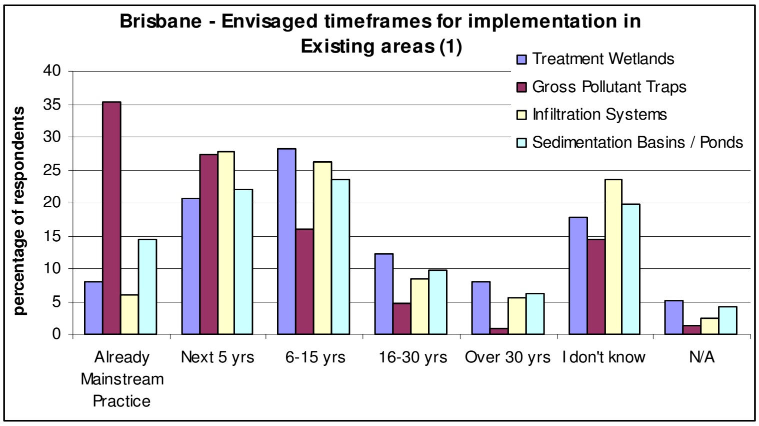
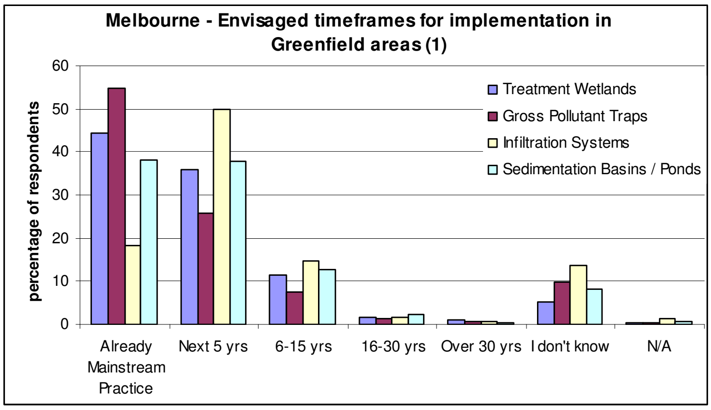


Figure 6.2: Envisaged Timeframes for the Implementation of Stormwater Quality Treatment Technologies in Existing Areas of Brisbane.

Over half of all Melbourne respondents indicated gross pollutant traps were already mainstreamed in greenfield areas and also, to a lesser extent, treatment wetlands and sedimentation basins (Figure 6.3). Respondents expect to see many of these technologies mainstreamed in greenfield sites in the near future (next five years). In contrast, the application of technologies in existing areas of Melbourne may take anywhere from 5 to 30 years (Figure 6.4). In existing areas, almost 40 percent of Melbourne respondents considered gross pollutant traps to be standard practice, but very few other technologies rated over ten per cent, with the exception of swales and treatment wetlands.



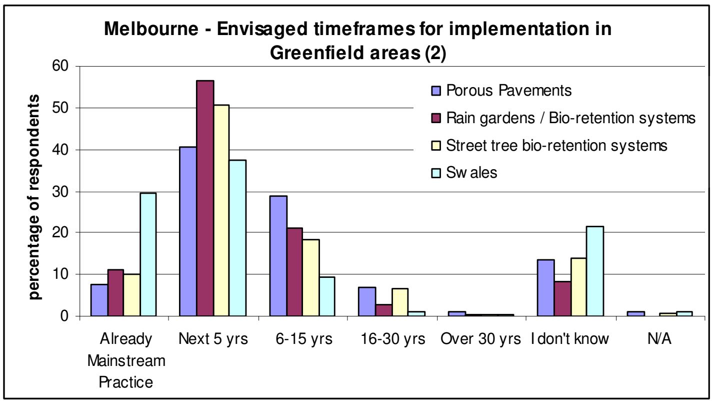
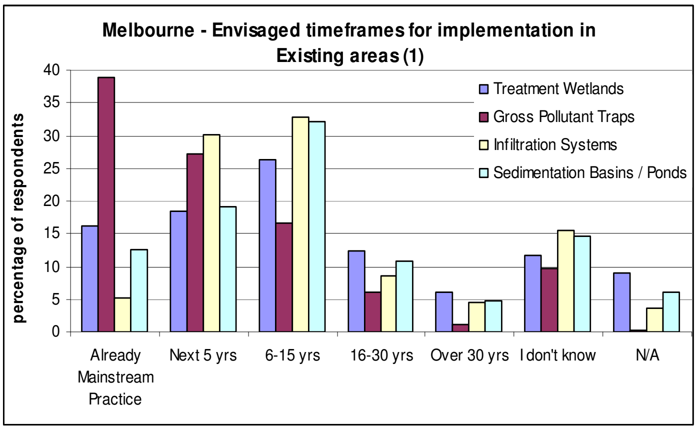


Figure 6.3a: Envisaged Timeframes for the Implementation of Stormwater Quality Treatment Technologies in Greenfield Areas of Melbourne.



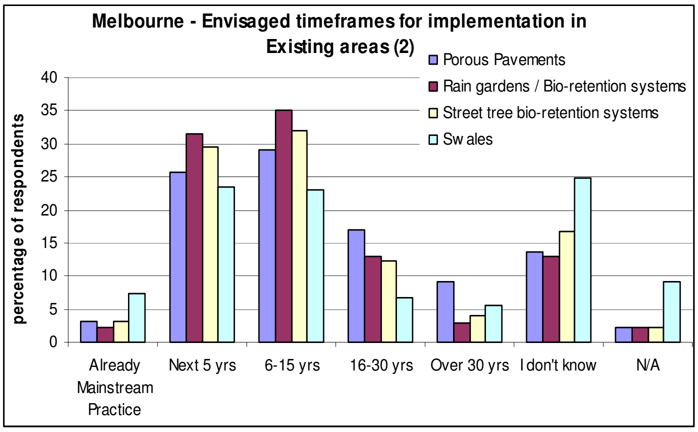


Figure 6.4: Envisaged Timeframes for the Implementation of Stormwater Quality Treatment Technologies in Existing Areas of Melbourne.

As found in the other two cities, the majority of Perth respondents considered gross pollutant traps to be mainstream practice in greenfield and in existing sites. Very few technologies were rated as not applicable in existing sites and even less so for greenfield sites. Envisaged timeframes for technology application in Perth greenfield areas was predominantly over the next five years (Figure 6.5), whereas in existing sites this may extend upwards of 15 years (Figure 6.6).

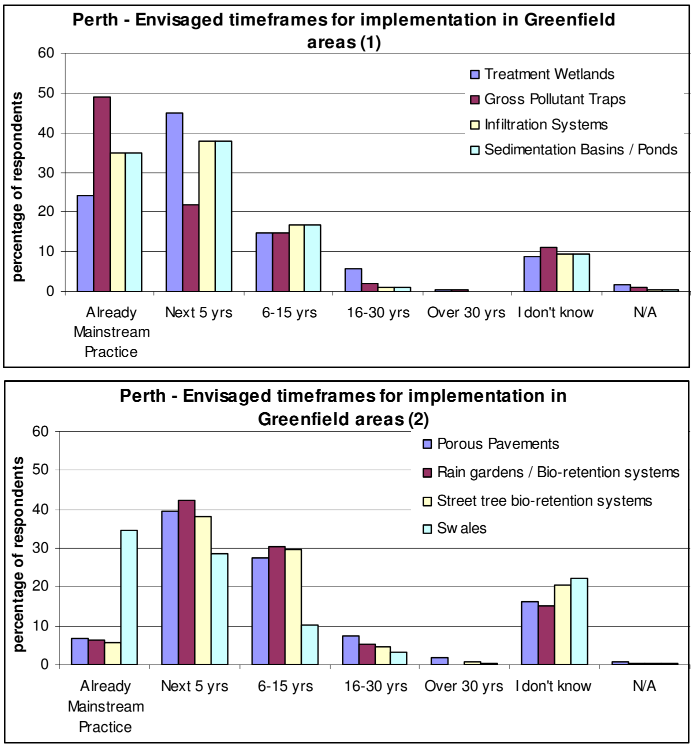


Figure 6.5: Envisaged Timeframes for the Implementation of Stormwater Quality Treatment Technologies in Greenfield Areas of Perth.

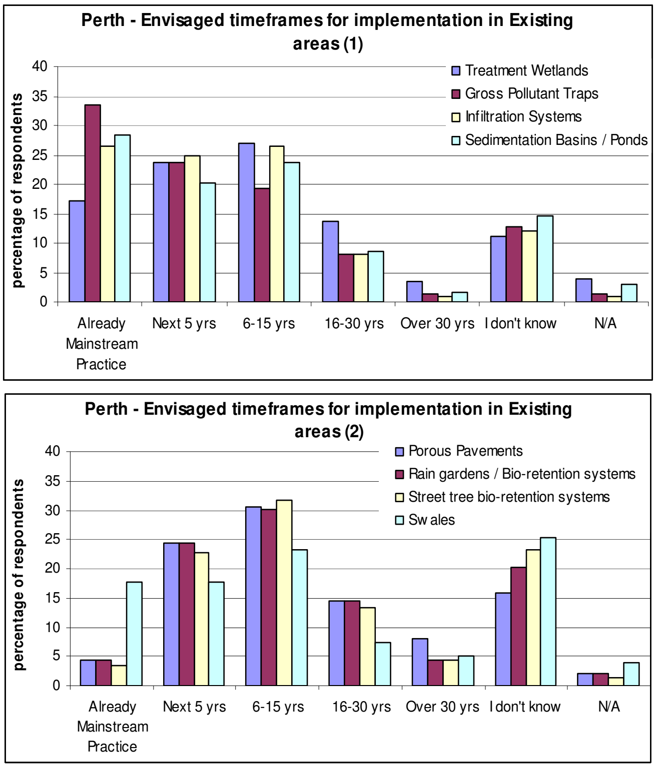


Figure 6.6: Envisaged Timeframes for the Implementation of Stormwater Quality Treatment Technologies in Existing Areas of Perth.

Across Brisbane, Melbourne and Perth, respondents considered stormwater quality treatment technologies could become mainstreamed over the next five years in greenfield sites; whereas in existing areas, technologies may be mainstreamed over the next 15, possibly 30 years. In greenfield and existing sites across the three cities, two key stormwater quality treatment technologies were repeatedly identified as already being everyday practice: gross pollutant traps (GPTs) and sedimentation basins/ponds. Others included swales in Brisbane, treatment wetlands in Melbourne and infiltration systems and swales in Perth (see Appendix B). Furthermore, across each city and in both greenfield and existing sites, three technologies were identified as potentially taking longer to implement than other technologies, these were porous pavements, raingardens/bio-retention systems and street tree bio-retention systems.

It is important to note the proportion of respondents (approximately 10 to 25 per cent) across each city who ‘did not know’ how long it would take to implement treatment technologies. Further analysis revealed the majority of respondents who ‘did not know’ had only 0-1 years experience in urban water management. Weak, but significant, negative correlations exist between the respondent’s level in the organisation and the responses to certain technologies. This suggests the more experienced executives perceived shorter timeframes for mainstream technology adoption than their more junior colleagues.

Data analysis was also undertaken to identify differences between stakeholder groups, specifically water utilities and local and state government respondents. Responses were fairly consistent within each city for treatment wetlands, porous pavements and bioretention systems. However, there were differences in opinion on envisaged timeframes for swales and gross pollutant trap technologies in greenfield and existing sites. For example, in regard to GPTs, there were statistical differences in Perth and Melbourne where, in Perth, local government respondents perceived GPTs were already mainstreamed, while Water Corporation and state government respondents indicated this technology would require ongoing development over the next five to 15 years. In Melbourne, the water businesses were collectively less certain regarding GPTs application as mainstreamed (high ‘I don’t know’), in comparison to local and state government respondents.

Swale technologies also recorded differences in each State for greenfield and existing areas. Brisbane City Council respondents clearly identified swales would be mainstreamed in existing areas in the near future (next five years), whereas other local government and state government respondents suggested this could take longer, possibly up to 30 years. Similarly, Melbourne water retailers/utilities were again less likely to consider swales as a mainstream technology in five years as opposed to the State and local government respondents. Greenfield sites, however, elicited different responses. Brisbane State government respondents were less likely to consider swales as mainstreamed, compared to Brisbane City Council and other local government respondents. Melbourne and Perth water utility respondents were also less likely to consider this mainstream practice in greenfield sites. Indeed, Water Corporation (WA) respondents suggested they were unsure (over 40 per cent indicating ‘I don’t know’). Within each case study, the large ‘I Don’t Know’ responses were largely from respondents from a major water utility/retailer.

7. Concluding Remarks

This data report has provided a statistical snapshot of the perceived social and institutional drivers and barriers to implementing sustainable urban water management in Australian cities. This is the first stage in a broader program of research aimed at investigating and identifying the institutional factors most important for enabling a Water Sensitive City. While the analysis in this report is mostly descriptive, future reports will provide analysis that is more detailed. Professionals operating in the urban water sector were targeted to provide empirical evidence regarding the drivers and barriers that encourage or impede the development and implementation of stormwater quality treatment technologies. Framed using the concept of receptivity, this report documents how urban water professionals are aware of, and associate with the need to implement stormwater treatment technologies to protect waterway health.

Improving the quality of stormwater not only benefits the receiving waterways, but helps provide an alternative water source option for supplementing conventional potable supplies. As demonstrated in this data report, urban water professionals valued the importance of high quality stormwater and identified a range of social and institutional drivers to help further the application of various treatment technologies, including environmental outcomes, public health outcomes, social amenity and community perceptions. However, there remain a number of serious institutional limitations which constrain the adoption of specific technologies; these include management arrangements and responsibilities, regulations and approvals processes and government policy.

The urban water sector needs to focus on building the levels of acquisition amongst urban water professionals.

7.1 Where next for the National Urban Water Governance Program?

Throughout 2006 and 2007, various types of data were collected and systematically analysed within and across case study cities. Data sources included online questionnaire survey data (as reported here), oral histories of the sector, interviews and focus groups with contemporary urban water professionals and associated stakeholders, industry, and scientific literature reviews. During 2008, further data will be collected on the potential of demonstration projects to encourage institutional learning in each of the three case study cities.

In late 2008, the final comparative report of the institutional analysis across the three case study cities (Brisbane, Melbourne and Perth) will be made available. However, the Program will also produce a series of interim reports, the first of which includes the survey data reports, along with the context reports.

It is important to note that all products produced by the National Urban Water Governance Program are freely available on the program’s website (www.urbanwatergovernance.com).

Finally, it is hoped that this research program will help guide future sectoral reform and help promote strategically targeted institutional capacity building interventions to help transition towards a Water Sensitive City by incorporating sustainable urban water management principles and practices. Now is the right time to begin the dialogue around what our future Water Sensitive Cities may look like around the country, not only aesthetically, but also, institutionally.

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