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Water Sensitive Cities

# Becoming a Water Sensitive City: A Comparative Review of Regulation in Australia

Tara McCallum and Emille Boulot



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## **Becoming a Water Sensitive City: A Comparative Review of Regulation in Australia Milestone Report**

*Better Regulatory Frameworks for Water Sensitive Cities (Project A3.2)*

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# Executive Summary

## About the report

Existing urban water management practices have been generally successful in delivering services to Australian communities. However, pressures arising from climate change, urban population growth and increasing urban densification are driving calls to reform the urban water sector to help make our cities more sustainable, resilient, productive and liveable. Such reform would require adopting innovative technology and new management practices. Yet, current regulatory frameworks have been identified as key impediments to making these changes.

Our earlier work involved conducting stocktakes of the existing primary legislation related to urban water across three Australian jurisdictions. We also employed the technique of regulatory space mapping to better conceptualise and understand urban water regulation in Melbourne, Victoria. Building on this previous work, the report is a comparative review of the urban water regulatory space in the three Australian metropolitan areas of Melbourne, Perth and Brisbane. The appendices to the report contain the detail of this mapping exercise. The report focuses on the uptake of innovative service delivery options, which we term 'water sensitive service delivery'. These options are likely to involve the exploitation of new water sources and promise to provide multi-functional benefits. The report has dual aims. Firstly, to identify the extent to which regulation in Australia may be acting as an enabler to these options, so that this role may be more widely encouraged and adopted. Secondly, to identify where regulation may be acting as an impediment to innovation, to enable innovation to flourish through the removal of such impediments.

In Sections 1 – 7 we investigate how the regulatory space in the three cities impacts on innovation. This space is complex and consists of many webs of regulatory controls seeking to meet multiple, and potentially competing, policy objectives in areas as diverse as public health, environmental protection, water security, urban amenity and consumer protection. Section 8 synthesises our key observations about how the regulatory frameworks in the three cities enable, or impede, water sensitive service delivery into a series of conclusions. Our conclusions attempt to move beyond acknowledging the complexity of the urban water regulatory space towards an understanding of the opportunities presented within this complexity to promote and encourage water sensitive service delivery.

Drawing on these conclusions, Section 9 recommends how the regulatory frameworks across the three cities may be better configured to enable water sensitive cities to develop. Section 9 also identifies questions that would benefit from further research. Many of our recommendations will be ones other cities, both within and outside of Australia, could also usefully pursue. However, the report does not seek to identify one specific regulatory regime for implementation. Urban water problems and solutions are location-specific and each city also has its own unique regulatory and institutional environment. Implementation must take place within the unique legislative and institutional context of each city. Moreover, water services are ones in which the Australian public places much trust. Existing institutional models and regulatory frameworks have played a vital role in securing this trust and these models and frameworks should be reconfigured only with great care so that this trust is maintained.

## Key observations and recommendations

### Reconfigure those parts of our regulatory frameworks impeding the emergence of water sensitive service delivery

In all three cities the current regulatory frameworks, supply options and institutional arrangements have been shaped in response to a conventional model of urban water management and service delivery. Yet these very frameworks and institutional arrangements may now be impeding innovation. For example, our institutional arrangements are not integrated across the water cycle. Nor do our legal definitions of water and the mechanisms we employ to allocate and protect water resources fully capture the variety of potential water sources available for exploitation. Also, our current frameworks may impede, and certainly do not encourage, greater diversity in water service providers. As problematic as restrictive regulation are those gaps within existing regulatory frameworks which make

discerning the allocation of legal risk under the background law extremely costly and time consuming. Enabling regulation can provide certainty and lower transaction costs. Enabling regulation may also allow the risks of the new practice to be specifically allocated, and potentially shared, in more desirable ways. *We recommend the development of statutory definitions and allocation mechanisms for all sources of water, clear and consistent regulatory requirements and approvals processes for alternative water source projects, statutory licensing for service providers and third party access regimes.*

### **Strengthen the enabling environment for innovation by providing economic incentives in the regulatory space**

In markets, price is the driver of much innovation. Yet, across the three cities, pricing does not reflect the true cost of water. It follows logically that the continued under-pricing of water provides only weak incentives for innovation in the urban water sector. In contrast, the provision of direct grant funding by governments has been shown to be a powerful regulatory incentive to innovate. We have also observed that regulatory tools targeted at the built environment that put a price on the externalities of urban development, such as Clause 56.7 of the Victorian Planning Provisions, have had demonstrable success in encouraging innovation in water sensitive service delivery. These tools provide a strong economic incentive to innovate and may encourage new markets to develop, for example in recycled water and in water efficient products. *As the economic incentive to innovate in urban water service provision is currently very weak we recommend governments continue to provide explicit grants to encourage innovation. We also recommend that governments explore the economics of the enabling environment for innovation.*

### **Better understand the role of our water institutions in innovation**

We observed that institutional arrangements are important for innovation and that there is high public, and regulatory, trust in drinking water service provision by the existing public water corporations. Further, while the institutional arrangements for urban water management, planning and service delivery differ across the three cities in all cases the governance arrangements are extremely complex. This complexity is likely to pose co-ordination challenges to achieving more integrated and adaptable solutions. Yet, much is still to be learnt about whether any particular arrangement is preferable for service delivery innovation. However, we have observed that the effectiveness, or otherwise, of the institutional arrangements for stormwater management in a city impacts on the uptake of water sensitive service delivery projects. *We recommend increasing our understanding of the role played by our water institutions in innovation. As a first step, we recommend Brisbane and Perth clarify the institutional responsibility for waterways health and stormwater management.*

### **Develop better models for combining political and professional decision making in urban water**

Across all three cities decisions about investment in water infrastructure, consumer pricing and which resources are suitable for exploitation are subject to significant political control. We also observed that the potential to use alternative sources in potable supplies was often impeded by unclear statutory definitions around water sources and State Government policies on acceptable sources of drinking water. *We recommend better combining political and technical/professional decision making. We also recommend clarifying, and potentially changing, State Government policies on acceptable sources of drinking water.*

## Table of Contents

Executive Summary	3
Table of Contents	5
Tables of Boxes, Diagrams and Tables	6
Abbreviations	7
Section 1 - Introduction	11
Section 2 - The Australian Model of Urban Water	18
Section 3 - A Comparative Review of Water Resource Regulation	27
Section 4 - A Comparative Review of Service Delivery and Price Regulation	33
Section 5 - A Comparative Review of Built Environment Regulation	41
Section 6 - A Comparative Review of Environmental Regulation	50
Section 7 - A Comparative Review of Public Health Regulation	58
Section 8 - Conclusions	65
Section 9 - Recommendations	73
Appendix A - National and International Urban Water Regulatory Frameworks	76
Appendix B - Brisbane's Urban Water Regulatory Frameworks	81
Appendix C - Perth's Urban Water Regulatory Frameworks	99
Appendix D - Melbourne's Urban Water Regulatory Frameworks	115
References	131

## Table of Boxes

Box 1.1	Research findings on regulatory impediments to urban water innovation	13
Box 1.2	Regulation as an enabler of innovation	14
Box 1.3	Mapping Melbourne's urban water regulatory space	15
Box 2.1	Consequences of the economic conception of water	19
Box 3.1	Stormwater and the urban water catchment in South Australia	29
Box 3.2	A novel property right for MAR?	30
Box 4.1	WICA and the development of a private water industry in New South Wales	35
Box 5.1	Fitzgibbon Chase and building level regulatory requirements as a facilitator of innovation	48
Box 5.2	BASIX and water use efficiency	49
Box 6.1	Regulatory gaps regarding stormwater reuse and the Kalkallo Project	54
Box 6.2	Fitzgibbon Chase and difficulties with Queensland's regulation of stormwater and rainwater	55

## Table of Figures

Figure 4.1	Entities responsible for water infrastructure investment decisions in each city	37
Figure 4.2	Models of price regulation across the three cities	38

## Table of Tables

Table 2.1	Significant features and challenges affecting urban water across the three cities	20
Table 2.2	Institutions responsible for urban water service delivery across the three cities	22
Table 2.3	Annual stormwater run-off falling on the three cities	25
Table 3.1	Entities responsible for urban water management across the three cities	28
Table 5.1	Entities responsible for each of the elements of built environment regulation in each city	44
Table 5.2	Entities responsible for providing water service infrastructure in greenfield areas	47
Table 7.1	Comparison of drinking water suppliers and regulators across the three cities	60
Table 7.2	Comparison of drinking water regulation across the three cities	61

## Abbreviations

Abbreviation	Full reference
ADWG	Australian Drinking Water Guidelines
AGWR	Australian Guidelines for Water Recycling
BCA	Building Code of Australia
BPEM Guidelines	Best Practice Environmental Management Guidelines
<i>Building Act</i>	<i>Building Act 1993 (Vic); Building Act 2011 (WA)</i>
Building Regs	Building Regulations 2006 (Vic)
CCA	<i>Competition and Consumer Act 2010 (Cth)</i>
CLPA	<i>Catchment and Land Protection Act 1994 (Vic)</i>
CoAG	Council of Australian Governments
CRCWSC	Cooperative Research Centre for Water Sensitive Cities
CSIRO	Commonwealth Scientific and Industrial Research Organisation
CWW	City West Water
DEHP	Department of Environment and Heritage Protection (QLD)
DELWP	Department of Environment, Land, Water and Planning (VIC)
DER	Department of Environmental Regulation (WA)
DEWS	Department of Energy and Water Supply (QLD)
DHHS	Department of Health and Human Services (VIC)
DHPW	Department of Housing and Public Works (QLD)
DoH	Department of Health (WA)
DoW	Department of Water (WA)
DNRM	Department of Natural Resources and Mines (QLD)
DSDIP	Department of State Development, Infrastructure and Planning (QLD)
DWQMP	Drinking water quality management plan
EDQ	Economic Development Queensland

EPA	Environment Protection Authority (VIC) Environmental Protection Authority (WA)
<i>Environment Protection Act</i>	<i>Environment Protection Act 1970 (Vic)</i>
<i>EP Act</i>	<i>Environmental Protection Act 1986 (WA)</i> <i>Environmental Protection Act 1994 (Qld)</i>
<i>EPBC Act</i>	<i>Environment Protection and Biodiversity Conservation Act 1999 (Cth)</i>
EPP	Environmental Protection Policy (WA)
EPP (Water)	Environmental Protection (Water) Policy 2009
ESC	Essential Services Commission (VIC)
<i>ESC Act</i>	<i>Essential Services Commission Act 2001 (Vic)</i>
ERA	Economic Regulation Authority (WA)
EV	Environmental Value
EWOQ	Energy and Water Ombudsman (QLD)
EWOV	Energy and Water Ombudsman Victoria
EWR	Environmental Water Reserve (Vic)
HEMP	Health and Environment Management Plan
IPART	Independent Pricing and Regulatory Tribunal
IWCM	Integrated Water Cycle Management
IWSS	Integrated Water Supply Scheme
Kalkallo Project	Kalkallo stormwater harvesting and reuse project
MAR	Managed Aquifer Recharge
Monitoring Guidelines	Australian Guidelines on Water Quality Monitoring and Reporting
MOU	Memorandum of Understanding
NCC	National Construction Code
NRM	Natural resource management
NRMG	Natural resource management group
NWI	National Water Initiative
NWQMS	National Water Quality Management Strategy



OEPA	Office of the Environmental Protection Authority (WA)
OLV	Office of Living Victoria (Vic)
<i>P&amp;E Act</i>	<i>Planning And Environment Act 1987</i> (Vic)
<i>PHA</i>	<i>Public Health Act 2005</i> (Qld)
Plumbing Regs	Plumbing Regulations 2005 (Vic)
PPWCMA	Port Phillip and Westernport Catchment Management Authority
QCA	Queensland Competition Authority
QH	Queensland Health
QUU	Queensland Urban Utilities
QWQG	Queensland Water Quality Guidelines
<i>RiWI Act</i>	<i>Rights in Water and Irrigation Act 1914</i> (WA)
ROP	Resource Operation Plan (QLD)
RWQMP	Recycled Water Quality Management Plan
<i>SDWA</i>	<i>Safe Drinking Water Act 2003</i> (Vic)
SEP	State Environmental Policy (WA)
SEPPs	State Environment Protection Policies
SEPP (GoV)	State Environment Protection Policy (Groundwaters of Victoria)
SEPP (Wov)	State Environment Protection Policy (Waters of Victoria)
SEQ	South East Queensland
SEQ Code	South East Queensland Water Supply and Sewerage Design and Construction Code
SEQ NRM Plan	South East Queensland Natural Resource Management Plan 2009-2031
SEQ Regional Plan	South East Queensland Regional Plan 2009-2031
SEW	South East Water
SoO	Statement of Obligations (VIC)
<i>SPA</i>	<i>Sustainable Planning Act 2009</i> (Qld)
SPP	State Planning Policy (WA & QLD)

SPRP	State Planning Regulatory Provision (QLD)
VPPs	Victorian Planning Provisions (VIC)
WAPC	Western Australian Planning Commission (WA)
<i>Water Act</i>	<i>Water Act 1989</i> (Vic) <i>Water Act 2000</i> (Qld)
Water Bill	The Water Bill Exposure Draft released by the Victorian Government in December 2013.
Water Quality Guidelines	Guidelines for Fresh and Marine Water Quality
<i>Water Restructuring Act 2007</i>	<i>South East Queensland Water (Restructuring) Act 2007</i> (Qld)
<i>Water Restructuring Act 2009</i>	<i>South East Queensland Water (Distribution and Retail Restructuring) Act 2009</i> (Qld)
<i>Water Supply Act</i>	<i>Water Supply (Safety and Reliability) Act 2008</i> (Qld)
WELS	Water Efficiency Labelling Scheme
WHO	World Health Organisation
WI Act	<i>Water Industry Act 1994</i> (Vic)
WICA	<i>Water Industry Competition Act 2006</i> (NSW)
WIRO	Water Industry Regulatory Order 2012
WMP	Waste Management Plan
WQG	Water quality guideline
WQO	Water quality objective
WRP	Water Resource Plan (QLD)
WSA	<i>Water Services Act 2012</i> (WA)
WSC	Water Sensitive City
WSUD	Water Sensitive Urban Design
YVW	Yarra Valley Water

# Section 1 - Introduction

## 1.1. The importance of urban water innovation

Existing urban water management practices have been successful in delivering the water, sewerage and drainage services that Australian urban communities have demanded. However, the combined impacts of climate change, urban population growth and increasing urban densification are placing significant pressures on Australian hydrological systems and water service delivery mechanisms. These pressures are driving calls to reform the urban water sector and encourage a more ecologically sustainable approach which will ensure the long-term reliability of water supplies (Sharma, Cook et al. 2012). As a result, there is a growing realisation that existing practices may need to change, and become more sustainable, if Australian cities are to continue to benefit from high quality urban water management (Newman 2001, Brown and Keath 2008).

Indeed, this is not just an Australian problem. Countries across the developed world face similar challenges in maintaining their current, reliable water supplies (OECD 2015a).

Such reform would see our cities become more water sensitive urban environments (Morison and Brown 2011). The term water sensitive city (WSC) is used to describe a future urban area which would be able to confront the complex, and multi-faceted, challenges of growing societal expectations and natural resource limitations (Brown, Keath et al. 2009). A WSC would be a liveable, resilient, sustainable and productive place.

Yet, for Australian cities to become WSCs significant changes would be required to current practices. These changes will require adopting innovative technology. However, as importantly, these changes will require the adoption of new urban water management practices and governance arrangements (OECD 2015). The Cooperative Research Centre for Water Sensitive Cities (CRCWSC) is a major collaborative research initiative aimed at revolutionising water management within Australia and overseas. The CRCWSC is focused on producing collaborative, multi-disciplinary research which will be of assistance to its stakeholder partners in industry and government in shifting our cities towards more integrated and sustainable urban water management.

Water sensitive innovation covers a broad range of technologies and approaches. These include Water Sensitive Urban Design (WSUD) approaches, which are focused primarily on the built environment, integrated water cycle management (IWCM) and the use of water from non-traditional, or alternative, sources. Non-technical innovations, such as new approaches to planning, are as important technological innovations, such as membrane technologies and smart meters (OECD 2015). Indeed, the two are often combined.

We consider that a WSC would address three functional problems that are not adequately dealt with by current urban water management practices and regulatory responses. Firstly, a WSC will ensure that water is used in efficient and multi-functional ways. An example of such multi-functionality would be passive stormwater capture technologies which simultaneously provide drainage, public amenity and environmental benefits. The amenity and environmental benefits include preventing the degradation of urban waterways, from pollution and excess water flows. The amenity and environmental benefits also include the provision of water to irrigate street trees which in turn lowers city temperatures and to increases air quality. Secondly, a WSC would exploit new, alternative sources of water, for example, by using water recycled from sewage. Thirdly, a WSC would ensure that waterways and wetlands are healthy, for example, by protecting the quality and quantity of water in urban waterways.

The report looks at enablers and impediments to the uptake of innovative water service delivery options. We have termed this water sensitive service delivery. Water sensitive service delivery tends to be aimed at solving the first two functional problems by using alternative water sources, such as stormwater and recycled wastewater, to offer multi-functional benefits, such as water provision and environmental protection. While the report does address, in a subsidiary fashion, the protection of wetlands and waterways a detailed examination of these extensive issues is outside of the scope of the report.

## **1.2 The role of regulation in water sensitive service delivery**

It has been argued that current institutional, political and legislative frameworks support conventional models of water service provision (Sharma, Cook et al. 2012), it has also been argued that further research is required to develop adequate governance, and better models, for the increased uptake, operation and integration of sustainable water practices (Sharma, Cook et al. 2012). Furthermore, extensive consultation with CRCWSC participants and stakeholders identified a number of key challenges to the necessary urban water reforms required to transform Australian cities into WSCs. These challenges included current regulatory and risk allocation frameworks (Brown, Farrelly et al. 2009, Brown, Keath et al. 2009, Farrelly and Brown 2011).

The Better Regulatory Frameworks for Water Sensitive Cities (Project A3.2) was created to respond to these research needs. The project aims to help create an enabling environment for water sensitive service delivery innovations, by identifying those elements in regulatory frameworks which may support and enable such innovation, and those which may hinder and impede innovation.

Regulation can be conceived of in contrasting ways (Harlow and Rawlings 2009). One perspective considers regulation as a red light and as a blocker to acting in more innovative ways. There is an extensive international literature on the potential regulatory impediments to water sensitive innovation, see Box 1.1. The contrasting perspective considers the ways in which regulation can act as a green light and facilitate innovation. This role, however, is less well appreciated (see Box 1.2). Our previous research has shown that regulation may act variously both as an enabler and as an impediment to innovation in the Australian urban water sector (McCallum 2015).

This report has dual aims. Firstly, to identify the extent to which regulation in Australia may be acting as an enabler to water sensitive service delivery innovation, so that this role may be more widely encouraged and adopted. Secondly, this report also importantly identifies where regulation may be acting as an impediment to innovation, to enable innovation to flourish through the removal of such impediments.

**Box 1.1 Research findings on regulatory impediments to urban water innovation**

Regulation has often been identified as an impediment to the uptake of innovative practices in urban water. For example, the OECD (2015) observes that while innovative urban water technologies are readily available, there are barriers to their diffusion across member countries involving regulation. Mukheirbir, Howe et al. (2014) identified regulation as an institutional challenge to the uptake of innovative, and sustainable, urban water management. Mukheirbir, Kuruppu et al. (2013) observed challenges at the local government level resulting from legal fragmentation and a complex regulatory environment. Watson (2011) found that the complexity of regulation made investment in distributed recycled systems expensive, uncertain, prolonged and difficult to pursue. In particular, there is a significant literature that considers regulation to be a crucial challenge to the adoption of WSUD (Lloyd 2001, Brown and Farrelly 2007).

Complex and uncertain regulatory environments were also a key theme in the literature review of Brown and Farrelly (2007) on barriers to sustainable urban water management. In particular, these presented as inconsistent regulatory approvals processes, conflicting formal mandates amongst organisations, unclear property rights and operational organisations lacking authority or power.

However, regulation affects different water projects in different ways. Brown and Farrelly (2007) found that water practitioners in Western Australia, Victorian and Queensland perceived the adoption of rainwater tanks as only slightly impeded by the regulation and approvals processes while these factors were identified as outright barriers to the implementation of on-site greywater systems. In contrast, the implementation of third-pipe systems in greenfield development areas was perceived to be neither encouraged nor prevented by regulations.

It has been suggested that the lack of a legislative mandate is an impediment to the uptake of sustainable water management and WSUD (Roy, Wenger et al. 2008). However, Morison and Brown (2011) caution that an enabling policy or regulatory framework does not necessarily, by itself, guarantee the uptake of WSUD principles.

In conclusion, the literature supports the general assertion that there are perceived regulatory barriers to water sensitive innovation. These barriers appear to be largely due to overlapping responsibilities and unclear regulations which in turn create a complex and uncertain regulatory environment. It has been suggested that this uncertainty has created a climate of risk aversion (Tjandraatmadja, Cook et al. 2008) which results in a reluctance to invest in innovative water solutions.

**Box 1.2 Regulation as an enabler of innovation**

Regulation can play an important role in enabling innovation and the adoption of new technologies and solutions for urban sustainability and resilience (Van der Heijden 2014). Indeed, as we observed in earlier case study work (McCallum 2015), regulation can act in two quite distinct ways as a facilitator of innovation.

Regulation may act indirectly by providing a broad, supportive environment within which experimentation can be undertaken. For example, a regulatory regime aimed at securing water quality that does not prohibit the use of alternative sources may allow experimentation with such new sources to occur even if these are not specifically encouraged.

However, perhaps more significantly, regulation may also act more directly by providing a specific prompt to explore an innovative solution. For example, building regulations might require homeowners to implement water conservation measures when building a new property, a government rebate scheme may encourage the adoption of new technologies by businesses or a statutory approvals regime may signal the social acceptability of the *approved* new technology.

Directly enabling regulation plays an important role in providing certainty and lowering the transaction costs of undertaking the innovative action. This type of regulation also enables the risks of the new practice to be specifically allocated, and potentially shared, in ways that are acceptable to those pursuing the innovation. In the absence of such regulation, discerning the allocation of legal risks under the background law may be extremely costly and time consuming and this uncertainty is likely to operate as a significant disincentive to innovate. Future research of this project will be looking at legal risk allocation in innovative urban water practices and how such risks may be better re-allocated.

**1.3 A broad framing of urban water regulation**

This report adopts a broad conception of regulation as ‘an intentional measure or intervention that seeks to change the behaviour of individuals or groups’ (Freiberg 2010, p.4). This conception itself builds upon the earlier work of Black (2002) and Selznick (1985). Regulation as a practice focused on behaviour change encompasses both activities undertaken by governments and those undertaken by a wide array of non-governmental actors. It includes interventions by way of formal legal rules but it is wide enough to include interventions by a host of other mechanisms such as codes, guidelines, economic incentives and structural architecture (Freiberg 2010)<sup>1</sup>. Using this lens, what becomes important is not the legal form of the action but its influence on behaviour. We apply such a broad conception of regulation because it is important to understand the full range of potential regulatory enablers, or impediments, to WSCs.

In our previous work (McCallum 2014), we employed the technique of regulatory space mapping (see Box 1.3) to better conceptualise and understand urban water regulation in Melbourne, Victoria. Building on this earlier analysis, this report also conceives of the Australian urban water regulatory space as being made up of five key regulation systems.

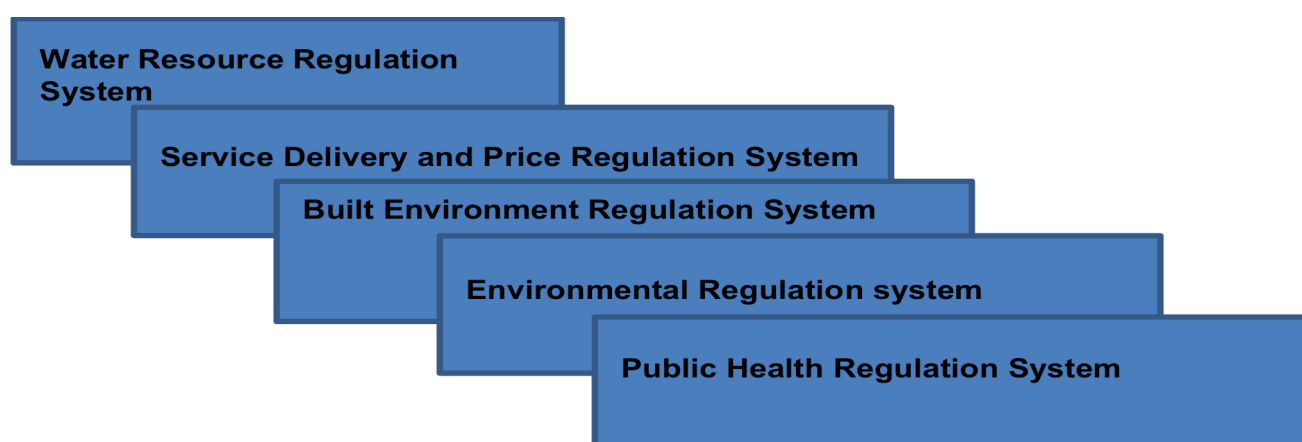
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<sup>1</sup> Freiberg (2010) uses the terms regulatory tools or regulatory methods to describe the various means by which regulatory outcomes can be produced through the exercise of government power and proposes a taxonomy of these tools to help discussions on government regulation. These modes of regulating include economic tools, transactional regulation, authorisation as regulation, structural regulation, informational regulation and legal regulation. Each category of regulatory tool involves the application of power that is focused on behaviour change yet each does this in a different way. Legal regulation is only one of these six modes although many of the other tools derive their status and powers of enforceability through legal mechanisms. With the exception of legal regulation each of these tools may also be used for regulatory effect by civil society or by business. Several of these regulatory tools involve the use of rules, whether binding legal rules or other standards, procedures and expectations. These rules can serve an important function in society by providing stability and predictability.

### **Box 1.3 Mapping Melbourne's urban water regulatory space**

By adopting a broad conceptualisation of regulation it becomes hard to visualise the regulatory framework surrounding urban water management in a simple linear fashion, as a set of cause and effect relationships solely focused on the actions of government. Rather the regulatory framework is seen to include a web of regulatory tools which originate from a variety of sources, and influence the behaviour of a variety of actors in different ways. Indeed, an issue as complex as urban water management will be impacted upon by a multitude of webs layered over each other in ways that can be mapped in a graphic representation. Regulatory scholars term this concept the *regulatory space* (Hancher and Moran 1989).

Our earlier analysis discerned five key related, but discrete, systems of regulation, or webs, that most significantly impacted on urban water management in Australian cities (McCallum 2014). Each of these systems is aimed at the achievement of a different set of regulatory objectives. These systems can be called:



The five key *regulation systems* were mapped, at a high level of generality, for the city of Melbourne, Victoria. This mapping exercise focused on identifying the underlying philosophy, or logic, of each the system, the prominent actors within the system and the most significant regulatory tools used. The five key regulation systems provided a conceptual framing which allowed us to grasp the complexity of the urban water regulatory space, identify key linkages and distinguish the types of incentives operating on various actors.

Our mapping of the Melbourne regulatory space indicated that urban water regulatory regimes are premised upon assumptions about how water is to be used in society, and by whom. These assumptions may not always be explicit. Moreover, these assumptions may not best suit attainment of a WSC. The mapping exercise also identified that Melbourne's current frameworks for service standard and price setting do not contain mechanisms that would enable a wider range of actors to participate in urban water supply.

## **1.4 A comparative understanding of urban water regulation**

Our earlier work also involved conducting stock-takes of the existing primary legislation related to urban water across three Australian jurisdictions (De Sousa 2013a, De Sousa 2014a, De Sousa 2014b). Primary legislation enables us to identify the way in which the urban water regulatory space in each jurisdiction is organised into different institutional sectors of government such as public health, planning, water resources. For each sector, primary legislation establishes the key regulatory bodies and outlines the objects, powers, duties, roles and responsibilities of these regulatory bodies and operating water institutions. Primary legislation also establishes co-ordination mechanisms and

provides for which types of subordinate laws, or secondary legislation, can be made. These stock-takes enabled us to identify where particular elements within existing legislation may potentially enable, or hinder, the adoption of water sensitive innovation across Victoria, Queensland and Western Australia.

However, the regulatory space is much broader than just primary legislation. This led us to map out the urban water regulatory space in Melbourne which enabled us to identify where this broader regulatory space was enabling, or hindering, the adoption of innovative practices in Melbourne.

An even richer understanding of how the institutions, frameworks, strategies and regulatory tools that make up the regulatory space impact on innovation is likely to arise if these elements can be compared across a number of cities. The value of such a comparison is also likely to be greater if these cities represent different models of a city, with contrasting challenges, and opportunities, for water sensitive service delivery innovation and differing regulatory responses in relation to these challenges and opportunities. Accordingly, we undertook a comparative review of the urban water regulatory space in the three Australian metropolitan areas of Melbourne, Perth and Brisbane. Each city represents a different legal jurisdiction. In addition, each city has its own unique history, hydrology and climate and these are reflected in the differing institutional arrangements in place in each city and each city's own unique water management concerns. The appendices to this report contain the detail of this mapping exercise across the cities.

While this report is primarily focused on Melbourne, Brisbane and Perth, it is acknowledged that important innovations are also occurring elsewhere in Australia. In particular, there have been significant advances made in New South Wales in relation to the regulation of the private provision of water services, the securing of third party access to water infrastructure and building level sustainability requirements. South Australia has been at the forefront of large scale stormwater capture. Accordingly, this report also considers, where appropriate, comparison with the regulatory frameworks in New South Wales and South Australia.

## 1.5. About this report

The report is a comparative review of the institutional arrangements, the broader regulatory frameworks and strategies, and the specific regulatory tools that comprise the urban water regulatory space across Brisbane, Melbourne and Perth. The aim of the report is to identify the extent to which these elements may be enabling, or hindering, the uptake of water sensitive innovation in these cities. By comparing these elements across the three cities we are also able to make broader observations about how the existing regulatory space may present constraints, challenges or opportunities for those seeking to promote water sensitive innovation in Australia.<sup>2</sup>

While seeking to cover a wide breadth of regulatory tools and strategies this report is not intended to be a forensic legal examination of each individual element of the urban water regulatory space across each city. Furthermore, the urban water regulatory space is a dynamic one, and at any time it is likely that particular elements of this will be undergoing a certain level of reconfiguration, or reform.

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<sup>2</sup> The report was prepared following the detailed regulatory mapping of the institutions, legislative and regulatory provisions, policy and other regulatory tools across each of the five key regulatory systems in the three cities. These were assessed to determine instances where regulation has resulted in, or has the potential to result in, successful water sensitive service delivery innovation. The report also undertakes a comparative evaluation of the broader regulatory and governance mechanisms in each city, to determine impediments and enablers to water sensitive service delivery innovation. This report builds on our earlier work and also draws on government inquiries and academic literature, both on regulatory scholarship and urban water management.



Section 2 of the report provides some general background about the conventional model of urban water in Australia, the challenges this model faces and potential new models. Section 2 also provides specific information about how water service delivery is currently undertaken in each of the three cities and the nature of the different particular challenges faced by each city. Sections 3 to 7 then consider, and compare, the regulatory frameworks in the three cities, across the five regulatory systems. Each section finishes with some key observations about how these enable or impede water sensitive service delivery. Section 8 synthesises these key observations and draws some conclusions about how our regulatory frameworks enable or impede water sensitive service delivery. Section 9 makes recommendations, based upon these conclusions, about how our regulatory frameworks may be better configured to enable the development of WSCs.

## Section 2 – The Australian Model of Urban Water

### 2.1 The conventional model of Australian urban water

Urban water services traditionally encompass three bundles of related services (Productivity Commission 2011a); water services;<sup>3</sup> sewerage services;<sup>4</sup> and drainage services.<sup>5</sup> In developed nations, the conventional model for urban water service provision involves water being collected, distributed and treated in large infrastructures which are centrally organised at the city level (OECD 2015a). In this model there is a heavy reliance on technology to augment supply and policy is primarily focused on maintaining water quality and supply (OECD 2015a). In this model, urban water services are delivered by corporatised utilities focused on achieving economic efficiency in service delivery.

This model is typical in Australian cities and this approach to urban water management is colloquially known as one of ‘big pipes in, big pipes out’ (Brown and Keath 2008). The conventional model exploits sources of either surface water or groundwater from relatively controlled catchments. This water is then treated to a standard suitable for potable use and this one class of water is supplied, through a reticulated system, to individual users for all their water uses. Once used, it is collected in a sewerage network, treated and discharged as wastewater into a distant environment (Troy 1996). With an increase in demand, this model responds by extracting more from existing sources or harnessing new surface or groundwater sources (Syme 2008). This linear system is undertaken within a framework of expansion and efficiency (Brown and Keath 2008). In this model, providing reliable water supply and sewerage services for the urban environment is considered to be primarily an engineering challenge, which is met by technical experts building large dams, pipelines and treatment plants (Brown, Keath et al. 2009).

Alongside this conventional water supply model sat a complimentary model of urban drainage service provision that was primarily focused on ensuring that unwanted stormwater was removed from the urban environment. Traditionally, delivery of these services required both high-level land management, to control the use that flood prone land was put to, and the provision of specific drainage infrastructure at a more localised scale.<sup>6</sup> As stormwater was historically viewed as a nuisance, liable to cause flooding that could damage property and harm people, the traditional objectives of urban drainage service provision were nuisance control, asset protection and harm prevention. This was usually achieved through engineering solutions that would quickly convey the water away to rivers and oceans. Overland flow management was not considered in great detail and flow mitigation was rarely addressed.

Primary concerns of this dominant paradigm have long been water quality and public health, reliability of supply, sanitation through wastewater disposal and flood mitigation for flood risk through a ‘dams and pipes’ approach (Head 2014). Current regulation and policy in the Australian urban water space often represents this dominant engineering approach (Head 2014).

Water also has some distinctive economic features, see Box 2.1. These features have influenced the pricing of water and the property rights regimes that have developed for water. These features also influence the service delivery models that have developed for the urban water sector and the type of investments that are typically made by the sector.

<sup>3</sup> These encompass the bulk harvesting, manufacture, storage, treatment, transmission, distribution and retail of water. Historically, in Australia water services involved just potable water. However, in recent times some water service providers have begun to provide certain customers with two classes of water; potable water for drinking and non-potable water for other uses.

<sup>4</sup> These encompass the transmission, distribution, treatment, recycling and disposal of sewage and trade waste.

<sup>5</sup> These encompass the transmission, distribution, treatment, recycling and disposal of stormwater.

<sup>6</sup> Such as channels, drains and pipes.

**Box 2.1 Consequences of the economic conception of water**

Water has certain distinctive economic features which make it different from other commodities. These features have influenced the types of property rights regimes that have emerged for water and often make water governance arrangements challenging.

**Water is both a public and a private good** – water has aspects of a private good. These aspects enable it to be enjoyed by an individual, for example when drunk. Yet, when left in situ in the environment, water also has aspects of a public good. These aspects mean that it can be enjoyed simultaneously by many people, for example, a great number of people may enjoy recreational activities on a lake. This makes water hard to value because a public good is valued in different ways to a private good. Accordingly, valuations of water must incorporate the value placed on water left in the environment by many people.

**Water is mobile** - water flows and can be reused. These mobile qualities make it hard to enforce property rights on return flows and have led to the development of 'collective rights' in water.

**Water is bulky and expensive to transport** - to deal with shortages there must either be rationing or stockpiling of the resource, for example in a dam.

**Water infrastructure is long lived, capital intensive and benefits from considerable economies of scale** - this is particularly the case in relation to potable water. These qualities mean that the water industry is heavily influenced by fixed costs, has short run marginal costs, is well suited to being a natural monopoly and is also well suited to collective action and public provision. A consequence of water provision being best suited to collective action is that it is also subject to the problems that all attempts at collective action are subject to such as free riding (where those who benefit do not pay) and rent seeking (where an attempt is made to grab a bigger share of existing wealth without creating new wealth). In addition, these qualities mean that the water industry is subject to lumpiness in investment, which favours occasional large-scale supply augmentations.

**Price of water** - water prices tend to reflect the physical cost of supply, not the scarcity of the resource. As a consequence, water users tend to pay for the costs of the infrastructure not the costs of the resource itself. Water, typically being a government owned resource, is given away for free or nearly for free.

**Essentialness of water** - up to a certain low threshold water is essential for life. However, this quality says little about the value of water above this threshold.

Source: Hanemann (2005).

The conventional model has generally served cities extremely well (OECD 2015a). However, the conventional engineering approach has been heavily criticised for its limitations, which are particularly apparent in times of drought, and for its ineffectiveness in addressing increasingly complex water problems (Blomquist, Heikkila et al. 2004, Lach, Rayner et al. 2005, Weber and Khademian 2008, Head 2014).

**Table 2.1. Significant features and challenges affecting urban water across the three cities**

	<b>Exposure to water risks</b>	<b>Urban features</b>	<b>Institutional architecture</b>
<b>Melbourne</b>	<p><b>Prevailing water resource</b> – natural surface water.</p> <p><b>Location of resource</b> - water is stored in a series of reservoirs located within and outside the Greater Melbourne area. The largest dam is the Thomson River Dam. Smaller dams, such as the Upper Yarra Dam and the Cardinia Reservoir, carry secondary supplies.</p> <p><b>Reliability of resource</b> – reliable except in periods of drought. Investment has been made in desalinated water to augment water supply in periods of low supply.</p> <p><b>Geographical features</b> - Melbourne covers an area of approximately 8,694 km<sup>2</sup>. The city itself stands in a region of alpine forests with the city spanning along the lower stretches of the Yarra River.</p>	<p><b>Population</b> – 3.8 million.</p> <p><b>Urban characteristics</b> – affluent, sprawling and growing.</p> <p><b>Urban surroundings</b> – Melbourne is located at the top of Port Phillip Bay. Melbourne is surrounded by agricultural land, industrial land, metropolitan areas, state parks and protected areas.</p>	<p>The Victorian Government is responsible for water planning and management with the support of various departments.</p> <p>Three water service retailers provide water and sewerage services.</p> <p>One bulk water authority provides bulk water, storage, treatment, catchment management, waterway health and drainage services.</p> <p>31 local councils provide drainage services across the city.</p>
<b>Brisbane</b>	<p><b>Prevailing water resource</b> – natural surface water.</p> <p><b>Location of resource</b> – water for Brisbane is stored the Wivenhoe, Somerset and North Pine dams.</p> <p><b>Reliability of resource</b> – relatively reliable except in periods of drought or flood. Significant investment has been made in desalinated and recycled water to augment water supply in periods of low supply.</p> <p><b>Geographical features</b> - The city lies along the</p>	<p><b>Population</b> – 1.5 million.</p> <p><b>Urban characteristics</b> – affluent, sprawling and growing.</p> <p><b>Urban surroundings</b> – Brisbane is located on the coast in the most populated region of Queensland. Brisbane’s surroundings include industrial land use, agricultural land use, smaller cities, state parks and</p>	<p>The Queensland Government is responsible for water planning and management with the support of various departments.</p> <p>One water service retailer-distributor provides water supply and sewerage services.</p> <p>One bulk water service provider stores, treats and delivers water to the retail-</p>

	<p>Brisbane River on a low-lying flood-plain. Its eastern suburbs line the shores of Moreton Bay. The greater Brisbane region is on the coastal plain east of the Great Dividing Range.</p>	<p>protected areas.</p>	<p>distributor.</p> <p>Brisbane City Council provides drainage services across the city.</p>
<p><b>Perth</b></p>	<p><b>Prevailing water resource</b> – groundwater and desalinated water with some use of natural surface water.</p> <p><b>Location of resource</b> – two desalination plants are located on the Western Australian coastline with groundwater largely sourced from the Gnangara and Jandakot mounds.</p> <p><b>Reliability of resource</b> – desalinated water is very reliable. Most deep groundwater aquifers are reliable however many are over-extracted.</p> <p><b>Geographical features</b> - The central business district of Perth is bounded by the Swan River to the south and east. The city is mostly located on the sandy and relatively flat Swan Coastal Plain, between the Darling Scarp and the Indian Ocean. The metropolitan area covers 6,417.9 km.</p>	<p><b>Population</b> – 1.9 million.</p> <p><b>Urban characteristics</b> – affluent, sprawling and growing.</p> <p><b>Urban surroundings</b> – Perth is located on the coast in south west Western Australia, the most populated area of the state. Surrounding environment has agricultural land use, industrial land use, tourism and other smaller cities.</p>	<p>The Western Australian Government is responsible for water planning and management with the support of various departments.</p> <p>One vertically integrated water service provider provides water, sewerage and drainage services.</p> <p>30 local councils provide drainage services across the city.</p>

(Adapted from the typology developed for the OECD (2015a) using data from Dobbie, et al. (2014)).

## 2.2. Understanding urban water management across the three cities

The OECD (2015a) has developed a typology through which to understand the particular water challenges faced by particular cities and the capacity of individual cities to respond to these challenges. This typology considers three dimensions; exposure to water risks,<sup>7</sup> distinctive urban features and institutional architecture. Table 2.1 on the previous pages applies a simplified version of this typology to the three cities considered in this report.

Brisbane, Melbourne and Perth are all affluent and geographically sprawling cities currently undergoing significant population growth.<sup>8</sup> Such population growth places stress on existing urban water supply systems. It also places existing urban water regulatory frameworks under pressure.

In addition, Australia is the driest inhabited continent and has a highly variable pattern of rainfall. Such scarcity and variability inevitably means that security of water supply is a continuing concern. Australian communities became more aware of the finite nature of their water resources during the Millennium drought which affected the eastern seaboard states between 1997 and 2009. The Millennium drought highlighted the finite nature of water resources and broader issues of climate change and sustainability and resulted in significant public concern about water security (Ferguson, Brown et al. 2013).

Rainfall patterns differ across the three cities with Brisbane experiencing the highest levels of precipitation (Dobbie, Brookes et al. 2014). As a consequence, flooding is a particular concern for Brisbane.

Across all three cities there are a number of separate organisations which provide water supply, sewerage and drainage services. These urban water service delivery institutions are set out in Table 2.3 and are either local councils or publicly owned water corporations.

**Table 2.2. Institutions responsible for urban water service delivery across the three cities**

	<b>Melbourne</b>	<b>Perth</b>	<b>Brisbane</b>
<b>Water supply services</b>	Bulk water: Melbourne Water  Retail water: Yarra Valley Water (YVW), South East Water (SEW), City West Water (CWW)	The Water Corporation	Bulk water: Seqwater  Retail water: Queensland Urban Utilities (QUU)
<b>Sewerage services</b>	Bulk sewerage: Melbourne Water  Retail sewerage: YVW, SEW, CWW	The Water Corporation.	QUU
<b>Drainage services</b>	Melbourne Water and local councils	The Water Corporation and local councils	Brisbane City Council

Melbourne, with three urban water retailers and a bulk water authority, has the most water entities involved in urban water and sewerage service provision. In contrast, Brisbane has

<sup>7</sup> These water risks are defined as risks of floods, scarcity, pollution and ecosystem resilience.

<sup>8</sup> Brisbane and Perth growth rates forecast a fifty per cent increase in population by 2030 and Melbourne expects a growth rate around 30% for the same period (PriceWaterhouseCoopers 2010).

one bulk water supplier and one retailer for the whole of Brisbane and Perth has just one entity responsible for both bulk and retail supply. The water corporations in Melbourne and Perth are owned by the Victorian and Western Australian Governments respectively. In contrast, QUU in Brisbane is owned by the five local councils in whose areas it operates. Drainage and stormwater services tend to be provided by a combination of local councils and water corporations with each city having a different model.

### 2.3. Responses to urban water challenges

In all three cities the current regulatory frameworks, supply options and institutional arrangements have also been shaped in response to the historical trajectory of each city as well as recent changes in rainfall and runoff. Often these changes can be understood as crisis responses to an urgent need to close the supply and demand gap.

The Millennium drought tested the resilience of Australia's urban water systems and the Victorian and Queensland Governments reacted by making significant investments in desalination plants which offered a climate independent source of water. However, these investment decisions did not form part of a considered strategy for long term resilience. As a consequence, once the drought broke, neither of these plants has been used to any great extent.

In Melbourne, other policy responses to the Millennium drought were predominantly focused on imposing restrictions on water use, while in South East Queensland (SEQ), the Queensland Government centralised its water networks. This led to costly institutional reform and, arguably, to a loss of institutional memory and capacity. Following the drought, Brisbane was severely affected by flooding and gaps in the city's flood mitigation infrastructure were discovered.

Investments during the Millennium drought have been criticised for failing to systematically consider all options, costs and effectiveness for ensuring water security under uncertain rainfall conditions (Productivity Commission 2011a). Indeed, the investment required to build desalination plants has significantly increased water prices in both Melbourne and Brisbane. As a result, the focus of urban water management in these two locations has now turned to enhancing efficiency savings due to consumer concern over increased prices from investments and reforms made during the drought.<sup>10</sup>

While Perth was less affected by the Millennium drought, the south-west of Western Australia has been undergoing a 'long-dry' since the 1970s, partly due to anthropogenic greenhouse gas emissions. Moreover, Perth's water shortage has been compounded by a tripling of water use over the past 25 years, predominantly due to population growth (Western Australian Planning Commission 2010) and an increase in water demand (Isler, Merson et al. 2010).<sup>11</sup> This trend is set to continue with forecasting indicating that Perth will enter a water deficit by 2020 (Government of Western Australia 2007).

Whilst water supply in Perth has been provided traditionally from both surface water and groundwater sources the increasing scarcity of surface water has resulted in a greater focus on groundwater (Isler, Merson et al. 2010). Indeed, at one point groundwater provided almost three quarters of Perth's water supply (Government of Western Australia 2007). Depleting groundwater levels and the water crisis (Fane and Patterson 2009) resulted in heavy investment in two desalination plants and now these supply approximately 145 billion litres of water. This is almost half of Perth's water requirements. The continued drying of the region has the potential to be a significant limitation to the city's growth. Perth's water service institutional structures have been largely stable but the legislative system is undergoing current reform.

<sup>9</sup> This led to a formal inquiry into the flood response being conducted. See Appendix B for a discussion of the Queensland Floods Commission of Inquiry.

<sup>10</sup> An efficiency review of the water authorities was undertaken by the Office of Living Victoria in 2014 with an independent report recommending a number of efficiency savings for the water corporations in Melbourne. The Fairer Water Bills policy promised savings of \$100 per customer per year over the next four years.

<sup>11</sup> Perth has the highest per capita consumption of water in Australia.

Another urban water challenge is the management of urban stormwater. Urban stormwater run-off increases with urban densification and the extension of the urban environment into the peri-urban fringe. Moreover, in recent years it has become apparent that urban stormwater runoff is a significant environmental pollutant and a contributor to the poor water quality of waterways and bays. This is challenging the conventional model of drainage provision.

## 2.4. The emergence of new directions for urban water

Ensuring the provision of sanitation services and an adequate supply of water to urban users, at an acceptable quality and price, will continue to be the focus of urban water service provision. However, future supply options may be constrained by financial constraints, aging assets and less availability of traditional resources (OECD 2015). There is also an increasing expectation in Australia that the water industry should play an important role in water resource conservation, environmental protection and that it should make a contribution to the overall liveability of our cities (National Water Commission 2011, Johnstone, Adamowicz et al. 2012, Office of Living Victoria 2013a, Hodge, Rodrigues et al. 2015).

Recently in Australia there has been a gradual emergence of a more collaborative approach to water governance and a more integrative approach to the sustainable management of all water resources in cities (Brown, Keath et al. 2009). This focus heralds a shift beyond traditional concerns of water supply, sanitation and drainage. Sustainable urban water management envisions an increasingly integrated mix of centralised and decentralised technologies, to augment water supply with treated wastewater or stormwater, as well as a focus on waterway protection and enhanced urban amenity (Dobbie and Brown 2013). This is leading to experimentation with new ideas in service delivery. For example, the use of recycled wastewater in dual reticulation systems and the capturing and treating of stormwater as a resource to water open spaces or to replenish aquifers.

With increasing urban population and climate variability there have been calls for adaptive management and planning in the urban water sector (Tan, Bowmer et al. 2012) and solutions that are contextual and provisional (Head 2014).<sup>12</sup> A WSC requires urban water regulatory frameworks which are resilient to change, which recognise drought and flood as part of the natural hydrological cycle, and which are able to adapt to changing circumstances. Yet recent experiences indicate that water planning, management and investment in Australia is still often undertaken in the context of political impetus rather than as part of a longer term strategic rationale.

As supply concerns remain a significant issue in Western Australia, it has been suggested that Perth provides an example of a city beginning to adopt adaptive, resilient and integrated water management (Jones and Brooke 2005, Kundzewicz, Mata et al. 2008, Isler, Merson et al. 2010). Perth's adaptive responses assume that climate change will continue to see declines in rainfall in the south-west of the State, rather than reacting once these eventuate. However, to date the response to such challenges has been largely focused upon developing climate independent water supplies, such as desalination plants (Water Corporation 2009, Dhakal 2013). A far broader set of responses is likely to be required in the future.<sup>13</sup>

In addition, modern approaches to drainage service provision focus both on providing adequate drainage and on controlling for the environmental harms from urban stormwater run-off (Wong, Allen et al. 2013). Newer stormwater management practices involve capturing water closer to its source and finding uses for it that do not involve discharge to rivers and the bay. This in turn is leading to stormwater to be considered as an alternative water resource for exploitation. The amount of stormwater falling on the three cities is extensive, see Table 2.3.

<sup>12</sup> Resilience approaches do not assume that a return to a business-as-usual after a major disturbance is possible or desirable. Rather the focus of adaptive management is to respond effectively to changing conditions (Head 2014).

<sup>13</sup> Two desalination plants now provide almost half of the fresh drinking water demand in Perth each year (Dhakal 2013). However, new solutions will be required as meeting the projected water demand by 2060 would require an additional ten desalination plants. The Water Corporation has acknowledged that the desalination approach is unfeasible due to the operational costs, energy use, environmental impacts and siting issues (Water Corporation 2009, Syme and Nancarrow 2011).



**Table 2.3. Annual stormwater run-off falling on the three cities**

	<b>Melbourne</b>	<b>Perth</b>	<b>Brisbane</b>
<b>Estimated annual stormwater run-off in metropolitan area</b>	170-440 GL	120-240 GL	380 GL

Sources: Prime Minister's Science Engineering and Innovation Council (PMSEIC) (2007), GHD Pty Ltd (2008), Stormwater Victoria (2015).

To put these amounts of run-off in context, the current volume of drinking water consumed in the Melbourne metropolitan area is 374GL, less than recent estimations of stormwater run-off (Stormwater Victoria 2015). Urban stormwater runoff does therefore appear to represent a significant, and currently underutilised, water resource.

### *Key observations about the Australian urban water model*

- The conventional model for urban water service provision in Australia involves water being collected, distributed and treated in large infrastructures which are centrally organised at the city level. Water is largely supplied to one potable standard and used once. Urban drainage services and sewerage services are primarily focused on ensuring that unwanted water is removed from the urban environment. Water supply and sewerage services are delivered by publicly owned water corporations within a corporatised model focused on economic efficiency. Drainage services are also delivered by local councils.
- In all three cities the current regulatory frameworks, supply options and institutional arrangements have been shaped in response to this conventional model.
- In all three cities the current regulatory frameworks, supply options and institutional arrangements have also been shaped in response to challenges posed by water scarcity. Such responses have not always been well considered.
- Challenges arising from drought, climate change, population growth, increased urban densification and changing societal expectations continue to challenge the conventional urban water model and leading to experimentation with new ideas and new directions.

## Section 3 - A comparative review of water resource regulation

### 3.1. About Australian water resource regulation systems

Fundamentally, water resource regulation seeks to define who is entitled to use water and for what purposes (Gardner, Bartlett et al. 2009). Australian water resource regulation systems are the regulatory frameworks within which complex decisions about the management and allocation of limited water resources are made, and any entitlements to such water resources are delineated and protected.<sup>14</sup> Across Australia, this management and allocation of water resources is guided by statutory water planning systems.

In allocating water entitlements to a share in a particular water resource, legal questions as to ownership and control arise. However, water has never been a good fit for concepts of absolute ownership (Gardner, Bartlett et al. 2009) and has a distinctive legal status (OECD 2015b). The starting point for all questions concerning property rights in water in Australia is that the right to the use, flow and control of water is usually vested in the Crown, represented by the State Government.<sup>15</sup> In addition, State Governments control access to water resources and prohibit the taking of these resources without government authority.

Allocations of water do not convey possession of the water only access to take and use the water, in the form of an access right. These access rights may be a *water access entitlement*, an approval or licence to construct and operate works for the purpose of taking water or a permit or licence to use the water. Some types of statutory water access entitlements are transferable and may be traded, in a defined geographical area, under legislative provisions. However, many alternative sources of water, such as stormwater and sewage, are not encompassed by current statutory water access entitlement regimes (Frontier Economics 2008).

As earlier assumptions about the continued abundance of water resources in Australia have become increasingly unsustainable, regulatory frameworks have evolved to enable limits to be set on the consumptive use of water (Gardner, Bartlett et al. 2009). This has led to the development of new legal concepts, such as an environmentally sustainable level of consumption and the allocation of water for environmental benefits. For a further discussion of this see Section 6.6.

### 3.2. Institutional arrangements for urban water management across the three cities

Table 3.1 sets out the entity responsible for the various aspects of urban water management across the three cities. Perth has fewer different entities involved in urban water management compared to Brisbane and Melbourne. Notwithstanding this, the governance arrangements across each city are extremely complex and co-ordination across such a large number of bodies is likely to be challenging. However, limited empirical information was available on how these institutions actually co-ordinate in each city. There was also limited evidence that a lack of co-ordination is actually acting as a significant impediment to water sensitive service delivery.

<sup>14</sup> Where clear rights to a resource exist there may be economic gains available to a society from the trading of these rights in a market. Governments may also have a role to play in regulating such markets. As urban water markets are not prevalent in Australia this regulatory role is not considered in depth in this report.

<sup>15</sup> How this Crown vesting occurs differs across the various States. For example, Western Australia and Victoria only vest water in waterways, wetlands and underground water not stormwater/overland water flows in the Crown. While South Australia vests no water resource in the Crown. A good discussion of these differences in is provided in Gardner, Bartlett et al. (2009).

**Table 3.1. Entities responsible for urban water management across the three cities**

	<b>Melbourne</b>	<b>Perth</b>	<b>Brisbane</b>
<b>Water resource planning and allocations</b>	Department of Environment, Land, Water and Planning (DELWP)	The Department of Water (DoW) and Minister for Water	The Department of Natural Resources and Mines (DNRM)
<b>Catchment management</b>	Melbourne Water	Water Corporation and the non-statutory Perth Regional Natural Resource Management Group (NRMG)	DNRM, Department of Environment and Heritage Protection (DEHP), Seqwater and SEQ Catchments
<b>Waterways management</b>	Melbourne Water	Swan River Trust, Water Corporation and the Perth Regional NRMG	DNRM, Seqwater, Healthy Waterways Partnerships and Brisbane City Council
<b>Floodplain management and drainage services planning</b>	Melbourne Water and local councils	The Water Corporation and local councils	Seqwater and Brisbane City Council
<b>Water supply planning</b>	YVW, CWW, SEW, Melbourne Water and DELWP	DoW and the Water Corporation	Seqwater, QUU and Department of Energy and Water Supply (DEWS)
<b>Water and sewerage services planning</b>	YVW, CWW, SEW, Melbourne Water and DELWP	DoW and the Water Corporation	QUU and Seqwater

In each of the three cities the publicly owned water corporations that deliver services are also involved in water planning. In theory, Perth has a clearer delineation between the roles and responsibilities of the DoW and the Water Corporation than the other two cities have between their service providers and regulators. For example, in Melbourne the sector also suffers from a degree of blurring between regulatory and service delivery roles and responsibilities with Melbourne Water having responsibilities for both service delivery and resource management (McCallum 2014). However, in practice this blurring also occurs in Western Australia as the DoW has delegated a number of its water planning functions to the Water Corporation.

Urban water institutions in Brisbane, Melbourne and Perth were often observed to have overlapping responsibilities. Co-ordination across bodies with overlapping responsibilities is likely to be particularly challenging. For example, in Melbourne the Productivity Commission (2011a) has noted that there is currently a lack of clarity and overlap of responsibilities at an institutional level between Melbourne Water and the local councils in relation to drainage service provision. Similar issues arise in Perth with responsibility shared between local councils, the Department of Main Roads and the Water Corporation.

However, despite the differences across the jurisdictions, there is insufficient information to determine whether any particular institutional arrangement has resulted in better urban water management and enhanced the uptake of water sensitive service provision.

### 3.3. Rights to use alternative water resources and their allocation

Property rights in several alternative sources of water, in particular recycled wastewater and stormwater, remain undeveloped and there are recognised gaps in the definition and regulation of property rights in such sources (Frontier Economics 2008, Gardner, Bartlett et al. 2009, De Sousa 2013a, De Sousa 2014a, De Sousa 2014b). It has been suggested that this will be particularly important in times of scarcity, when there is potential for the rationing of water resources and competing rights may need to be asserted (Young 2014).

#### **Box 3.1. Stormwater and the urban water catchment in South Australia**

As the driest state in Australia, stormwater capture and re-use has become a key water security issue in South Australia. A recent plan prepared by the South Australian Government, *Water for Good*, aims to increase both wastewater recycling and stormwater capture and reuse techniques and schemes and sets targets for stormwater re-use in urban South Australia. These are supported by a *Stormwater Strategy*, developed by the Department for Water, which also supports the development of access rights to stormwater, for reuse scheme owners, to provide certainty and increase incentives for investment.

The City of Salisbury has been at the forefront of stormwater harvesting and reuse. Salisbury Water, predominantly wetland cleansed stormwater, is distributed to parks, reserves, schools, industry and some new residential properties in the local council area. The harvested stormwater is stored in aquifers.

To facilitate stormwater harvesting and reuse South Australia has begun to establish a regulatory regime for allocating and licensing the take and use of stormwater resources. A statutory regime exists to regulate the allocation of stormwater in a catchment and to licence the take and use of such resources, there is a non-statutory understanding about the volumes of stormwater that can be injected into and extracted from an aquifer and extraction requires a statutory licence (Pitman 2013).

Existing statutory water rights and allocation frameworks for surface water, such water in waterways and wetlands, do not extend to stormwater/overland flows in either Victoria or Western Australia. The Water Bill 2014 proposed a new regime for Victoria which would have clarified the property rights of local councils to stormwater in their stormwater assets and would have provided new allocation mechanisms for such stormwater. This Bill has not been passed into law and implemented and these issues currently remain unresolved in Victoria. Box 3.2 explores how these issues are being addressed in the context of stormwater capture and re-use in Western Australia.

### Box 3.2. A novel property right for MAR?

The issues of property rights in, and access to, alternative sources of water have been significant ones for Western Australia in the context of Managed Aquifer Recharge (MAR). MAR is the process of injecting or infiltrating water to supplement the natural recharge of aquifers and it is being strongly considered as a solution to the over-allocation of groundwater resources in Western Australia. MAR is being undertaken with recycled wastewater and stormwater, which has the added benefit of utilising water that may have otherwise been discharged into, and have potentially polluted, urban waterways and adjacent marine water (Davies, Ives et al. 2011).

The DoW has released an MAR policy to aid the approval of socially and environmentally acceptable MAR proposals under the *Rights in Water and Irrigation Act 1914 (WA) (RiWI Act)*. This policy outlines the licensing process for MAR schemes, the role of the DoW and refers to the *Australian Guidelines for Water Recycling: Managing Health and Environmental Risks (Phase 2) – managed aquifer recharge (July 2009)*.

MAR raises several property rights issues. For example, there is no clear Australian judicial determination about the definition, and characterisation, of rights to access groundwater and this is acting as a significant barrier to the uptake of MAR projects by private companies (Vincent and Gardner 2014). In addition, when water is recharged into aquifers for MAR, the property rights held in that water by the recharger are uncertain. Under the MAR policy, water recharged into an aquifer becomes underground water and is, therefore, vested in the Crown under the *RiWI Act*. A proponent would therefore need a licence to recover the recharged water, has little to no security over this recharged water and has limited certainty about whether such a licence would be granted, and if so, for what volume. There are also limited powers for the protection of the quality of groundwater in a MAR scheme. Accordingly, there are calls to give MAR proponents greater security over recharged water in an MAR scheme (Ward and Dillon 2012).

Vincent and Gardner (2014) have suggested some potential solutions to these dilemmas. They propose that continuing property rights should be recognised in the alternative water resources recharged into an aquifer, assuming that the water is identifiable after recharge through comprehensive hydrogeological study. They also suggest that in the absence of a specific regulatory framework for MAR, a MAR proponent may be able to argue that it is beyond the authority of the Crown to licence the take and use of recharged water, given the potential to claim such continuing property rights. Finally, they suggest that the proponent would have an action in nuisance against any party that affected the quality of the recharged water in an aquifer.

Difficulties also arise in defining and allocating property rights in groundwater. These difficulties have been identified in Western Australia in the context of MAR. Box 3.2 discusses MAR developments in Western Australia and some of the legal issues MAR is encountering. The current Western Australian regulatory system is often contradictory in relation to MAR and contains significant gaps. For example, while legislation does regulate, by licensing, the extraction of water from an aquifer it does not require a licence for the injection of water into an aquifer (Bancroft and Gardner 2015). Nor does current Western Australian legislation address the legal control of stormwater (Bancroft and Gardner 2015).

As well as securing the right to use an alternative water resource a water service provider would also need to secure access to the infrastructure, such as pipes, through which the captured water flows. In the absence of a specific statutory regimes designed to regulate such allocations, and enable access, this is largely regulated on an ad hoc basis through the negotiation of contracts between service providers and those able to provide access to the resource (Bancroft and Gardner 2015). By way of example, in Victoria the *Water Act 1989 (Vic)* identifies who has rights to the use of water in waterways. Stormwater harvesting proponents would be required to arrange access, by contract, to these waterways if they intended to harvest stormwater from them. Similarly, in Brisbane recycled wastewater is

recognised as a water resource but access to the resource is not regulated. Therefore, recycled water providers are required to contract privately to obtain this. Issues concerning access to third party infrastructure are further considered further in Part 4 of this report.

### **3.4. The city as catchment**

While urban environments have not traditionally been considered as water catchments, their large impervious surface run-off areas could facilitate the harvesting of large quantities of stormwater for urban water supply purposes. To date, stormwater has been only harvested by small scale systems, often using energy intense technology. However, research is being undertaken by the CRC to develop low-energy and low-carbon footprint technological solutions to deliver large volumes of harvested stormwater.<sup>16</sup>

One of the challenges to increasing stormwater capture and harvesting is that current urban water regulatory systems do not conceive of the urban landscape as a catchment. Existing legal frameworks and regimes for urban water management are still grounded in the conventional model. As a consequence there are limited regulatory mechanisms for the licensing of stormwater abstraction (see also Section 3.3) and for ensuring the quality control of stormwater.

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<sup>16</sup> See the CRCWSC projects: Project B1.1: Cities as Water Supply Catchments – Urban Rainfall in a Changing Climate; Project B2.1: Cities as Water Supply Catchments: Stream Ecology; Project B3.1: Cities as Water Supply Catchments – Green Cities and Microclimate; Project C1.1: Cities as Water Supply Catchments – Sustainable Technologies; Project C1.2: Cities as Water Supply Catchments – Risk and Health. Understanding Stormwater Quality Hazards; Project D1.1: Cities as Water Supply Catchments – Integration and Demonstration through Urban Design.

### *Key observations about water resource regulation*

- Institutional arrangements for urban water management, planning and service delivery differ across the three cities and in each city the governance arrangements are extremely complex. There is limited evidence that any one model acts as a significant impediment to, or enabler of, water sensitive service delivery.
- In each city there is potentially a lack of institutional co-ordination although there is limited evidence about how such lack of coordination may be acting to impede water sensitive service delivery.
- In all three cities the right to use and control certain sources of water is vested in the Crown. However, property rights regimes across all three cities do not generally recognise rights in alternative water sources, such as recycled wastewater and stormwater. This means that there are no clear statutory mechanisms for asserting such rights or for allocating these resources.
- The concept of the urban area as a water catchment remains undeveloped across all three cities. This means, for example, that allocation mechanisms for stormwater resources may not be able to adequately protect the environment from the problems which could result from over-allocation.



## Section 4 – A comparative review of service delivery and price regulation

### 4.1. About Australian service delivery and price regulatory systems

Urban water services are considered to be *essential services* whose provision to the public is a matter of utmost importance. For this reason, it is commonly accepted in Australia that governments have a role to play in controlling who may supply urban water services and the terms of this supply. This is achieved by a complex interplay of the rules. Some of these establish publicly owned water service providers. Others promote, impede and control competition in markets in water service provision. There are still more rules that regulate the quality of the service delivered to customers by both public and private water service providers.

In addition, the network elements of urban water service systems have features of a *natural monopoly*, which means that they can be provided most efficiently by one entity. Traditionally in Australia a publicly owned monopoly service provider has been given responsibility for water service provision throughout a particular geographic area. In economic theory, the absence of a competitive market provides additional justification for government regulatory intervention to mimic the consumer outcomes that a competitive market would provide.<sup>17</sup> This is achieved by controlling the price customers pay for water services. This control may be achieved by the application of political pressures, or through a system of *economic regulation*, whereby pricing oversight and control is undertaken by an independent regulator. A result of a long term trend towards commercialisation in the Australian urban water sector has been a focus upon the independent economic regulation of water for pricing and customer service standards (Langford and Piccinin 2004).

It is also common for monopoly service providers to be the owners of monopoly assets, for example, distribution and transmission pipelines. Monopoly network ownership provides a further justification for government regulatory intervention, this time to prevent the asset owner from denying access to the asset, or water resources held within it, to other potential service providers who may wish to compete to provide services. Rules enabling third parties to access such infrastructure, and the price that access must be granted at, tend to be extremely technical and are known as *third party access regulation*.

Section 4.2 examines which entities participate in urban service provision across the three cities, the barriers new market entrants may face and the ability of third party service providers to access essential network infrastructure owned by other service providers. The remainder of Section 4 considers how the quality and price of urban water services are regulated and controls which are brought to bear on investment decisions in the urban water sector and whether water sensitive service delivery could be enhanced by changing or strengthening any of these arrangements.

### 4.2. Competition in service delivery

The institutional responsibility for urban water service delivery across the three cities is shown in Table 2.2 above. While each city has a somewhat different demarcation between which entities deliver each service, a common feature is that the urban water service providers, the water corporations, are geographical monopolies which have a corporate structure but which are publically owned. Currently, there are no private water service providers operating in any of the three cities. Drainage services are most commonly provided by local councils, although in Melbourne there is also a significant role played by Melbourne Water.

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<sup>17</sup> These outcomes are affordable and universal access to acceptable levels of the service, at a price that enables the monopoly provider to recover its costs and earn a profit, but not to earn a monopoly profit.

As noted previously there is not enough empirical evidence on which to form an opinion about whether any particular institutional arrangement is better than any other in delivering water service delivery innovation. However, it is worth noting that publicly owned water service providers in both Perth and Melbourne have been responsible for the implementation of innovative water service delivery projects. For example, the Water Corporation in Perth, with the support of the DoW, has undertaken MAR trials. While in Melbourne, the water retailer, YVW, has invested in innovative stormwater technology with the Kalkallo stormwater harvesting and reuse project.<sup>18</sup> This certainly suggests that public service providers can, with the necessary resources and motivations, be innovators. This has also been observed at the international level (Lobina, Kishimoto et al. 2014).

Increased competition in the water sector has been a focus of national reform efforts since the mid-1990s.<sup>19</sup> However, so far, policy responses have largely focused on increasing the independent economic regulation of water. Despite widespread support for the proposition (Productivity Commission 2011a, Groshinski and Clark 2015) there remains significant uncertainty about how increased private sector involvement in the water industry should be managed (Watson, Mitchell et al. 2013).

Water sensitive service delivery offers the potential for service delivery solutions that are smaller and more localised than existing options. Such decentralised solutions may lend themselves to provision by new service providers. These could be public entities, such as local councils, or private entities, such as land developers or micro-utilities.<sup>20</sup> There are significant impediments in existing regulatory frameworks and institutional arrangements to achieving diversity in service provision (Groshinski and Clark 2015).

Most prominently, in Victoria, there is a direct legislative barrier in the Victorian *Constitution Act 1975* (Vic) preventing private parties from entering into the water services market.<sup>21</sup> However, since this provision was inserted in the Victorian Constitution all water services in have been supplied by public water corporations. Therefore, the precise legal nature of this regulatory barrier to privatised water service provision is untested.<sup>22</sup>

In addition, to the direct regulatory barrier there are also significant regulatory gaps in Victoria in relation to private water service provision. These gaps arises because there is no regulatory mechanism by which service providers who are not one of a limited number of listed water corporations could be regulated, for service quality or price, should they wish to supply urban water services to the public. Accordingly, to enable urban water service supply by other parties in Victoria would require reform to the regulatory framework. Further reform would also be necessary to ensure the requisite level of governance for service quality by such providers.

In contrast, neither Western Australia nor Queensland has a direct legislative barrier to market entry by new providers. Indeed, both jurisdictions operate licensing regimes for service providers which could accommodate private as well as public service providers.

New South Wales has been at the forefront of Australian jurisdictions using licensing regimes to enable and encourage private sector entry in to water services market. The *Water Industry Competition Act 2006* (NSW) (*WICA*) facilitates this private sector entry. For more information about *WICA* see Box 4.1. However, even this regime has only resulted in extremely modest

<sup>18</sup> There has also been an important role played by publicly owned development bodies in urban water service innovation in Australia. For example, VicUrban with the Aurora development in Melbourne and Economic Development Queensland (EDQ) with Fitzgibbon Chase (see Box 5.1).

<sup>19</sup> The 1994 Council of Australian Government (CoAG) strategic water reform framework incorporated the National Competition Policy agreements which had identified concerns regarding performance and efficiency in the government-owned utility industries.

<sup>20</sup> An example of a micro-utility would be the model proposed by Flow Systems, see Box 4.1 for more details.

<sup>21</sup> Section 97 of the Constitution Act 1975 (Vic) requires that where a public authority has responsibility for ensuring the delivery of a water that it, or another public authority, must continue to have that responsibility. Water services are defined as water supply, sewerage, irrigation, water collection and storage, or sewage treatment services.

<sup>22</sup> This restriction does not, for example, prevent Aquasure, a privately owned water consortium, from providing desalinated water to the Melbourne market via a public private partnership with the Victorian Government.

private sector participation in the water services sector in New South Wales (Groshinski and Clark 2015).

#### **Box 4.1. WICA and development of a private water industry in New South Wales**

In 2006, the New South Wales enacted specific legislation, *WICA*, which sought to increase private sector investment and innovation in the water sector while maintaining protections for consumers, the environment and public health. *WICA* established a licensing regime for private sector entrants to the market. Those wishing to construct, maintain or operate any water industry infrastructure are obliged to obtain a network operator's licence. Those wishing to supply water, either potable or non-potable, or to provide sewerage services by means of any water industry infrastructure, are required to obtain a retail supplier's licence. One entity can hold both types of licence. This licensing regime is overseen by the state's economic regulator, the Independent Pricing and Regulatory Tribunal (IPART).

*WICA* also established an access regime under which an applicant might seek access to existing water industry infrastructure. IPART has been established as the arbitrator of disputes over access to infrastructure services.

A review of the *WICA* licensing scheme has recently been undertaken and as a consequence of this review the *Water Industry Competition Amendment (Review) Act 2014 (NSW)* refined the licensing scheme. These refinements include removing the requirement for entities regulated by *WICA* to obtain water from sources other than from a public water utility. There are also new measures to manage the degree of competition with incumbent utilities. The review also resulted in the development of a scheme of implied contracts, on standard terms and conditions, between *WICA* regulated entities and their customers. It also provided powers to public utilities, to acquire land and infrastructure and, where necessary on the failure of a licensee, ensure continuity of essential services.

Flow Systems is an example of a water supply entity that has been licenced by IPART under *WICA*. Flow Systems aims to design, build, operate and manage a local and sustainable water services, often in conjunction with energy services, within a development community or precinct. Flow Systems intends to own the local water network infrastructure and to bundle water and energy supply options to reduce costs. More information on Flow Systems can be found at <http://flowsystems.com.au/>.

While there appears to be opportunity for third party entry into the water services market in South East Queensland there are strong institutional impediments to competition or contestability and the Queensland Competition Authority (QCA) has expressed some concern about the potential for private investors' applications to be stymied by local councils and the incumbent water retailer in the planning application stage (Queensland Competition Authority 2014a).<sup>23</sup> Similarly, in Western Australia the dominant role played by the Water Corporation in service delivery seems to have suppressed the role played by private providers in the market (Bancroft and Gardner 2015). Indeed in all three cities, there are significant institutional barriers to market entry by new providers due to the incumbent position occupied by large, publicly-owned monopoly providers in each city.

Private water service providers may also require access to the network infrastructure of the incumbent water utilities. For example, sewer mining may involve tapping into wastewater

<sup>23</sup> Local councils have powers regarding development approvals under their local planning schemes and QUU has powers regarding development approvals, as a distributor-retailer, and a concurrence agency under the Sustainable Planning Act 2009 (Qld).

flowing through the utility's sewerage pipeline while stormwater harvesting may involve accessing stormwater that is flowing through a local council drain.

As we have seen in Section 3.3, access to alternative resources may be successfully agreed between an infrastructure owner and a service provider in the absence of a specific regulatory framework. Local governments are often responsible for stormwater and drainage management across urban environments and can determine infrastructure access arrangements for innovative stormwater projects. Yet, such negotiations may be difficult for various reasons and increase transaction costs. The lack of a specific statutory access regime, or policy, which could enable a third party to apply to access infrastructure controlled by the Water Corporation, has been identified as a potential impediment to alternative water source projects in Western Australia involving wastewater (Vincent and Gardner 2014).

None of the three jurisdictions considered has a formal third party access regime developed for the water sector that would provide agreed principles for the negotiation and grant of such access.<sup>24</sup> In contrast, New South Wales has developed a specific and tailored regime, as part of the WICA. See Box 4.1 for more details.

### 4.3. Regulating to ensure service quality to consumers

All three jurisdictions examined have in place regulatory frameworks aimed at securing service quality. These tend to involve legislated minimum standards and the development of more detailed guidelines by water service providers themselves. Independent economic regulators often have a role to play in overseeing these frameworks and commonly ombudsmen resolve consumer disputes.

For example, in Victoria, the Essential Services Commission (ESC) regulates compliance by the water corporations with a statutory Customer Service Code.<sup>25</sup> This in turn is implemented by Customer Charters and Hardship Policies developed by the water corporations themselves. Further equity concerns around the affordability of urban water services are addressed through economic regulatory tools such as the application of concessions and direct government grants to disadvantaged customers. Consumer disputes can be taken to the Energy and Water Ombudsman Victoria (EWOV). Similarly, QUU prepares its own customer charter,<sup>26</sup> regulatory oversight is provided by the QCA and disputes may be resolved by the Energy and Water Ombudsman (EWOQ). While in Western Australia, customer service standards have been recently introduced by the *Water Services Act 2012* (WA) and an Energy and Water Ombudsman is now able to provide a dispute resolution service for issues between water utilities and water customers, or those affected by a water service.

However, it is contended that current regulatory arrangements are not sufficiently robust to support more extensive private sector involvement in the urban water sector (Frontier Economics 2014). A private water service provider in Queensland would be subject to the same requirements concerning service quality and pricing regulation as the current public water service providers.<sup>27</sup> However, these protections would not be available to the customers of private water providers in Victoria or Western Australia. This is a significant regulatory gap. As noted in Box 4.1, recent changes to the WICA in New South Wales have resulted in greater consumer protections being introduced, through the use of deemed contracts.<sup>28</sup> Private service providers in New South Wales are now in the same position as public utilities and subject to the same customer service requirements. This provides a possible model other jurisdictions may wish to adopt.

<sup>24</sup> Although Victoria did attempt to develop a specific regime relating to access for stormwater held in local government drains in the Water Bill 2014, this bill has not been enacted.

<sup>25</sup> Although certain recycled water contracts may be exempted from this code.

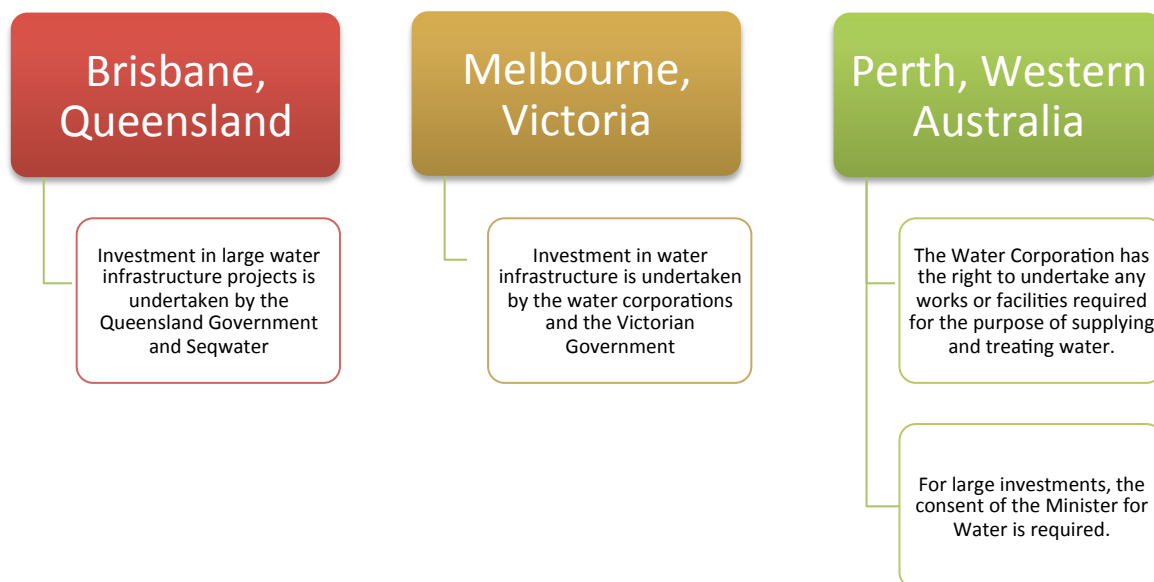
<sup>26</sup> This outlines customers' rights and responsibilities, information about the services provided, information about the utility's Hardship Policy and processes for complaints and disputes.

<sup>27</sup> *Water Supply (Safety and Reliability) Act 2008* (Qld) s 20.

<sup>28</sup> Owners of land will be deemed to have entered into contracts with licensed operators and licensed retailers to provide services to their land. Standard charges under deemed contracts will need to be published on the licensee's website.

#### 4.4. How investment in urban water is regulated

Supply management across Brisbane, Melbourne and Perth has been, and is currently, largely undertaken by investing in large infrastructure solutions, such as desalination plants. The engineering technical paradigm still pervades urban water management and it has been suggested this may be hindering the uptake of alternative options (Head 2014).



**Figure 4.1 Entities responsible for water infrastructure investment decisions in each city**

Figure 4.1 identifies which entities are responsible for making investment decisions about water infrastructure across the three cities and it can be seen that there is a significant amount of political control exerted on such investment decisions.<sup>29</sup>

Investments in water infrastructure were also significantly influenced by the availability of large federal government grants during the Millennium drought. Some of these investments were in large scale infrastructure such as desalination plants (Productivity Commission 2011a).<sup>30</sup> Others were in more water sensitive service solutions such as stormwater and rainwater recycling schemes (Productivity Commission 2011a, Economic Development Queensland 2014a, Economic Development Queensland 2014b, McCallum 2015).<sup>31</sup>

#### 4.5. Models of price regulation across the three cities

As Figure 4.2 on the next page illustrates, the institutional responsibility for pricing urban water services differs significantly between the three cities. Brisbane has adopted a light handed regulatory response with water service prices set by the water corporations themselves with price monitoring undertaken by the QCA. In contrast, Melbourne has a model whereby an independent economic regulator, the ESC, must approve the prices set by the water corporations.<sup>32</sup> Perth is different again and the Water Corporation's prices are set by

<sup>29</sup> CRCWSC Project A3.1: Better governance for complex decision making, is conducting research into what guides investment decision making in water utilities in Australia.

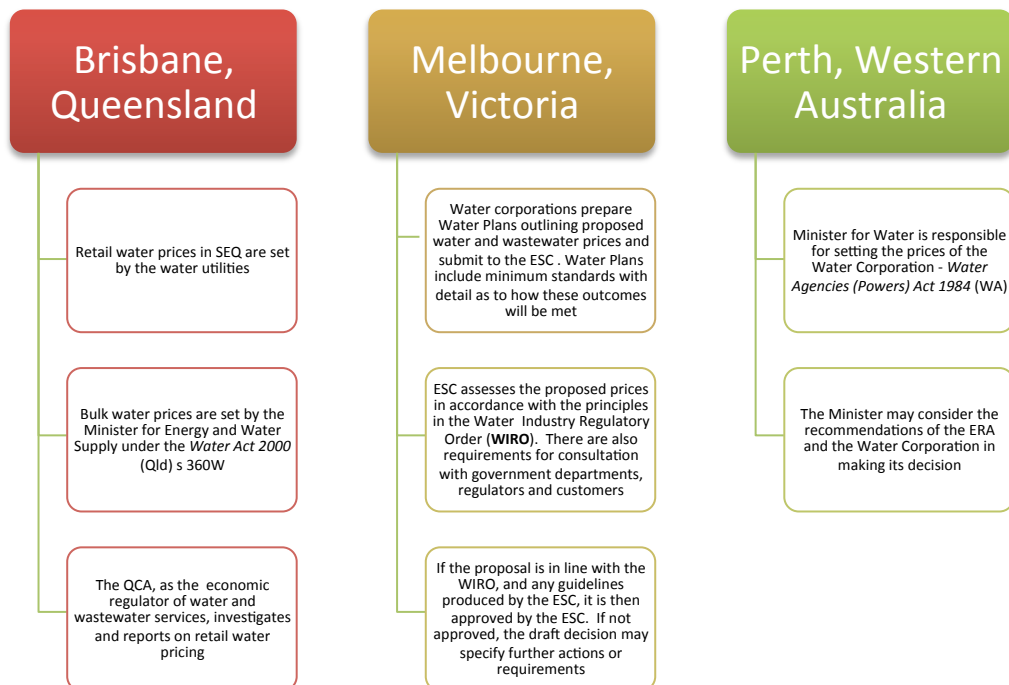
<sup>30</sup> For example, the southern seawater desalination plant in Western Australia received \$18 million from the Australian Government from the National Urban Water and Desalination Plan.

<sup>31</sup> For example, the Fitzgibbon Chase development received over \$7 million from the Australian Government's National Urban Water and Desalination Plan, Stormwater Harvesting and Reuse Projects. This was supplemented by additional grant funding from the Japanese Government. The Kalkallo Project received approximately 50 per cent of its funding from federal grants under this scheme.

<sup>32</sup> The ESC is currently looking at how changes could be made to the model of economic regulation used in Victoria, see Essential Services Commission (2015).

the Minister for Water, acting with recommendations from the Economic Regulation Authority (ERA) and the Water Corporation. Therefore, three contrasting models for the formal control of water pricing exist across the three cities; an independent expert model in Victoria, a ministerial control model in Western Australia and a water utility model in Queensland.

In addition to these formal economic regulatory mechanisms the water corporations in both Brisbane and Melbourne have also been subject to extensive parallel political interventions, from the Queensland and Victorian Governments, aimed at securing price savings and instigating pricing reform. These interventions used a variety of regulatory tools to apply pressure on the water corporations to change their retail prices. In Melbourne, the Victorian Government used its powers as shareholder of the water corporations to introduce consumer price savings under the *Fairer Water Bills Initiative*. While in Brisbane, the Queensland Government introduced legislation which capped water prices and required local councils to develop price mitigation plans.<sup>33</sup> As Groshinski and Clark (2015) observe while each State has an independent economic regulator, they may not in reality have truly independent economic regulation.



**Figure 4.2. Models of price regulation across the three cities**

It has been observed that independent economic regulation of the urban water in Australia is complex and that regulators are often given unclear, or conflicting, remits and asked secure pricing that achieves conflicting objectives (Frontier Economics 2014). As a consequence some suggest that the regulatory objectives for the economic regulation of water be clarified, with greater guidance provided to regulators on trade-offs (Frontier Economics 2014).

A further problem with independent economic regulation is that it can be extremely costly to administer and its benefits may not be great enough to justify these costs (Productivity Commission 2011a). Although the cost effectiveness of the model regulation does not seem to correlate closely with the level of independence of the model as the ESC in Victoria has been determined to be much less resource intensive than its lighter touch counterparts in Western Australia and Queensland (Deloitte 2014a).

<sup>33</sup> *Fairer Water Prices for SEQ Amendment Act 2011 (Qld)*.

Finally, it has been suggested that independent price setting may reduce the flexibility of water corporations to respond to the wishes of the consumers, or to take a *real options* approach to supply augmentation problems (Productivity Commission 2011a).

#### 4.5. Tariff structures as an enabler of water sensitive service delivery

Water has been historically under-priced in all Australian jurisdictions (Cullen 2004). However, significant reform has taken place over the past twenty years. Early reforms involved the introduction of consumption-based pricing by way of a two-part tariff composed of an access and a usage component (Council of Australian Governments 1994). More recent reforms, following the 2004 the Intergovernmental Agreement on a National Water Initiative (NWI), introduced *upper bound pricing*.<sup>34</sup> Following these changes water pricing now seeks to recover the full range of costs, including social and environmental externalities, incurred in providing urban water services (Department of the Environment 2010). Yet, the recent Harper Review of Competition Policy (Harper, Anderson et al. 2015) found that urban water pricing still fails to reflect its cost of provision and suggested this was discouraging private sector involvement in urban water. Indeed, distinctive features of water as a resource mean that under-pricing is common in most countries, as water is priced on a historic cost of supply not a future cost of replacement (Hanemann 2005, OECD 2015b).

Currently only Victoria prices water to include externalities (Langford and Piccinin 2004, PriceWaterhouseCoopers 2010) and there remain significant difficulties in deriving a price for such externalities (Frontier Economics 2011a).<sup>35</sup> Moreover, due to recent investments in supply augmentation during the Millennium drought, price paths do not yet fully reflect cost recovery (PriceWaterhouseCoopers 2010). Therefore, water is still under-priced across Australia. Various reasons have been given for this state of affairs including historical precedent, institutional inertia, lack of political will and a lack of public understanding about the need for better water pricing (PriceWaterhouseCoopers 2010).<sup>36</sup>

The relatively low cost of current potable water has significant implications for the adoption of alternative water sources, particularly those which may only be suitable for non-potable purposes.<sup>37</sup> For example, Dimitriadis (2005) notes that some water recycling schemes have failed because they do not seem economically viable in comparison to traditional drinking water supply sources.

Current pricing practices for urban water services are considered adequate when there are limited supply concerns. However, during the Millennium drought, existing mechanisms did not allow for prices to readily respond to fluctuations in available supply. This would have enabled prices to have reflected the true value of water in times of scarcity and to signal efficient water use. Accordingly, it has been suggested that *scarcity pricing* could be a useful regulatory tool for ensuring a sustainable supply and demand balance in urban water frameworks (Frontier Economics 2011b). This has been endorsed by Western Australia's economic regulator in relation to recycled water (Economic Regulation Authority 2009) and the Productivity Commission (2008). Scarcity pricing, where there is a variable price for water reflecting differences in seasonal and spatial supply and demand, could also help mitigate the environmental externalities of inefficient water practices (Gardner, MacDonald et al. 2006). None of the cities considered currently adopt scarcity pricing.<sup>38</sup>

<sup>34</sup> Upper bound pricing includes pricing for operational, maintenance and administrative costs, externalities, taxes or tax equivalent regimes, provision for the cost of asset consumption and cost of capital. This is in contrast with lower bound pricing which is the minimum necessary for a business to recover its costs and be viable.

<sup>35</sup> CRCWSc researchers are addressing some of these knowledge gaps. In particular by developing a monetary evaluation of the benefits stormwater management in urban areas, see CRCWSC Project A1.1: Cities as Water Supply Catchments – An economic evaluation, and by producing guidelines for the economic evaluation of water sensitive infrastructure, see CRCWSC Project A1.2 – Valuation of economic, social and ecological costs and benefits of strategies and systems for water sensitive cities.

<sup>36</sup> Recent trends in Melbourne, with the Fairer Water Bills initiative, and in Brisbane, with water retailer price caps and price mitigation plans, indicate that political institutions are unlikely to address this in any meaningful way in the current climate.

<sup>37</sup> Although recycled water is also often artificially priced below potable water to encourage uptake.

<sup>38</sup> CRCWSC Project A1.3: Economic incentives and instruments, looks at whether scarcity pricing would be able to reduce water use during droughts.

### *Key observations about service delivery and price regulation*

- Water services across all three cities are almost exclusively provided by public water corporations. These public institutions can be innovators.
- All three cities have significant institutional barriers to new water service providers entering the urban water sector resulting from the current provision of water services by publicly owned, centralised monopolies.
- Victoria also has legislative barriers to new water service providers entering the urban water sector.
- Even where the regulatory frameworks in Western Australia and Queensland allow for private service providers, they do not encourage or support this.
- There are also gaps in the regulatory frameworks in Victoria and Western Australia that would make it difficult to regulate the service quality of such providers.
- The WICA provides one example of a licensing regime to encourage and support private service provision which contains significant consumer protections.
- None of the cities considered have a dedicated statutory regime which service provider could utilise to secure access to water resources flowing through the infrastructure of an existing network asset owner. The WICA provides an example of a tailored regime.
- Currently water infrastructure investment decisions are subject to a high degree of political control across each of the three cities.
- Direct government grant funding has been observed to be a powerful regulatory incentive.
- All cities have differing models for price setting.
- Even if price setting is ostensibly outside of ministerial control there are many political levers that can, and often are, applied to control water prices.
- There is little evidence that wider uptake of the independent price regulation model would assist in greater innovation in urban water service delivery.
- Pricing does not reflect the true cost of water across the three states and none of the cities considered adopts scarcity pricing.



## Section 5 – A comparative review of built environment regulation

### 5.1. About Australian built environment regulation systems

The built environment encompasses all the man-made parts to our environment, such as buildings, roads and other structures. The built environment regulation system comprises several inter-related sub-systems which are concerned with controlling and influencing three types of issues. The issues are:

1. The uses that the urban environment, both its built and natural elements, can be put to.
2. The kind of infrastructure that can be developed in the urban area.
3. How such infrastructure should be designed and built.

In Australia, the uses that the urban environment can be put to are controlled by formal statutory planning regulatory systems. The objectives of such statutory planning systems are to balance the competing societal uses for the urban environment.<sup>39</sup> In addition, there are a number of other planning and management systems, such those relating to catchments, floodplains and waterways, which impose other controls on the use of land and waterways in the wider urban area.

These statutory planning regulatory systems may also influence the type of infrastructure that can be developed. However, this issue is also subject to extensive control from many other regulatory sources, such as those involving public procurement rules,<sup>40</sup> and through industry specific regulation. Water industry infrastructure regulation involves establishing which bodies have responsibility for providing the necessary infrastructure to deliver urban water services and setting some parameters around the planning for such infrastructure, to promote wider social objectives.

In contrast, how built infrastructure is designed and constructed, and the standards to which building and plumbing work is done, tend to be controlled by separate, formal systems of building and plumbing regulation. The objectives of such building and plumbing regulation systems include ensuring public health and safety, protecting consumers from poor quality work and promoting other desirable social objectives, such as sustainability.

Therefore, Australian built environment regulatory systems cover a number of discrete but overlapping systems of control aimed at ensuring our cities are productive, pleasant and safe while ensuring that competing uses of our cities are balanced. Moreover, each system has its own preferred regulatory institutions, tools and approaches. In this report we are only concerned with these systems so far as they concern water in the urban area.

One way these systems interact with water is by controlling the location and type of infrastructure that is used to supply water, sewerage and drainage services in the urban area. Section 5.3 considers, in general, how current land use planning systems interact with regulation related to the planning of water services. Section 5.4 considers the specific case of the interaction of land use planning and drainage service provision.

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<sup>39</sup> Statutory Planning for Water Sensitive Urbanism (CRCWSC Project B5.1) is looking in more detail at how Australian statutory planning processes may be used to implement WSUD.

<sup>40</sup> Public bodies can exert significant influence on decisions about all types of infrastructure through the use of their powers to procure works and services. Public procurement rules and practices have as their objective the control of such powers. A detailed examination of these rules is outside of the scope of this report.

Another way these systems impact on water service provision is in the use of tools in the land use planning systems to fund new water service infrastructure. Section 5.5 considers how such tools may enable or impede innovation in the provision of infrastructure for water sensitive service delivery.

Yet another way these systems interact with water is by controlling how individual buildings in the urban environment use water and get rid of used water. Section 5.6 considers how current regulatory systems, across the three cities, enable or impede, demand at the building level for innovation in water sensitive service delivery.

## **5.2. Institutional arrangements for built environment regulation across the three cities**

In each jurisdiction, there are several parallel systems in place which control the uses to which urban land and waterways may be put. There are also additional systems in place which control decisions about water service infrastructure and which control the quality of building and plumbing work. Table 5.1, on the following page, shows which entity, in each of the three cities, has responsibility for regulating each individual element of the overall built environment regulation system. In addition, each state has a number of bodies responsible for water service planning, see Table 3.1 in Section 3.2. Taken together this shows that each city has a very complex regulatory space within which a large number of entities have partial and overlapping responsibilities for influencing the built environment.

## **5.3. Co-ordination mechanisms between land use and water service provision planning**

Land use planning systems have the potential to provide benefits to those managing natural resources and to those planning future water servicing requirements. If these benefits are incorporated into water resource management and servicing plans, then present and future needs for the resource can be determined, and appropriate guidelines for future management and regulation can be made (Gardner, Bartlett et al. 2009). As a result, the importance of coordination between land use and water planning has been recognised both in Australia (Hamstead 2010, Hodge, Rodrigues et al. 2015) and internationally (Ridder, Mostert et al. 2005 ).<sup>41</sup>

The incorporation of WSC principles and water sensitive service delivery options into the built environment will require significant co-ordination between the water industry and the land use planning sector. To date there has been some effort to include IWCM into the land use planning systems across the three jurisdictions but such integration remains rather piecemeal and undeveloped. The specific interaction between land use planning and drainage service provision is considered in Section 5.4 and both Melbourne and Brisbane have various regulatory tools aimed at securing such integration.

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<sup>41</sup> For example, the European Framework Directive advocates for better land and water coordination.

**Table 5.1. Entities responsible for each of the elements of built environment regulation in each city**

	<b>Melbourne</b>	<b>Perth</b>	<b>Brisbane</b>
<b>Land use in catchments</b>	Melbourne Water; Port Phillip and Westernport Catchment Management Authority and DELWP	DoW	Brisbane City Council and Seqwater
<b>Land use on floodplains</b>	DELWP and local councils	Department of Planning; DoW and local councils	Brisbane City Council
<b>Use of waterways</b>	Melbourne Water	DoW and the Swan River Trust <sup>42</sup>	Brisbane City Council
<b>Statutory planning</b>	Local councils and the DELWP	Local councils, the Western Australian Planning Commission and the Department of Planning	Brisbane City Council; Department of State Development, Infrastructure and Planning (DSDIP)
<b>Water infrastructure requirements/funding</b>	Melbourne Water, YVW, SEW, CWW and DELWP	Water Corporation and the DoW	QUU <sup>43</sup>
<b>Building quality</b>	Victorian Building Authority	Department of Planning, local councils and Building Commission	Department of Housing and Public Works (DHPW) and Brisbane City Council
<b>Plumbing quality</b>	Victorian Building Authority	The Building Commission, DP, Department of Commerce and Plumbers Licensing Board	DSDIP and DHPW

<sup>42</sup> In relation to the Swan-Canning river system and riverpark.

<sup>43</sup> Infrastructure design and construction is regulated by the South East Queensland Water Supply and Sewerage Design and Construction Code, which was developed by the five South East Queensland water service providers.

In Perth these mechanisms primarily focus on the protection of the quality of water resources rather than on water service delivery. For example, in Western Australia, State Planning Policies (SPPs) must be considered when preparing, or amending, local planning schemes and when making decisions on planning matters. A number of these SPPs contain provisions relevant to water. These provisions are largely designed to protect groundwater and drinking water sources and to ensure protection for the Swan and Canning river catchment area.<sup>1</sup> In addition, the DoW has also prepared a non-mandatory *Water and Land Use Coordination Program*, which aims to coordinate the consideration and implementation of water resource management requirements with other land use planning requirements.<sup>2</sup>

In contrast Victoria has taken a different approach which is more directly targeted at alternative water service provision and is focused on new developments. Victoria has partially integrated urban water issues into the Victorian planning framework, through the Victorian Planning Provisions (VPPs), which form the basis of all local planning schemes. Clause 56.07 of the VPPs sets out various integrated water management requirements that a developer must fulfil in relation to a residential subdivision. These are triggered when a planning permit to subdivide is sought. Clause 56.07-2 imposes obligations on a developer to substitute drinking water for reused or recycled water for non-potable uses.

## 5.4. Coordination of land use planning and drainage service provision

The built environment regulatory systems also have a role to play in controlling for the adverse effects development in the urban environment may have on the natural environment. The way these issues arise is complex and crosses over with the regulatory systems that protect the natural environment, considered in Section 6.

In all three jurisdictions these adverse effects are managed by using the statutory planning, and wider land use planning, systems to influence the type of drainage services that are provided, so as to mitigate the adverse impacts of urbanisation on stormwater quality and flow. However, they approach this in significantly different ways.

Regulation in Brisbane uses a number of guidelines and policies which are given legal effect through the development approvals process. For example, guidelines are available which are intended to influence how new developments manage stormwater run-off.<sup>3</sup> New developments are also required to comply with the requirements of Brisbane City Plan 2014 and must implement WSUD.<sup>4</sup> Development proposals may also need to submit a stormwater quality management report as part of their development applications. Previously, mandatory provisions requiring IWCM plans for local councils of a certain size had been required by the Queensland planning system. The revocation of these provisions has potentially left the planning system lacking suitable enforcement mechanisms.<sup>5</sup>

In Western Australia, subdivision approvals require developers to comply with local council engineering specifications. These may require best practice stormwater management practices, but do not mandate such practices. This results in developers and councils reaching negotiated solutions to appropriate standards and maintenance obligations (Bancroft and Gardner 2015).

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<sup>1</sup> For example, SPP 2.7 Public drinking water sources, SPP 2.9 Water resources and SPP 2.3 Jandakot and Swan-Canning River System.

<sup>2</sup> The DoW has also released *Towards a water sensitive city – the urban drainage initiative – Phase 2*, a policy document envisioning a water sensitive city as one which accounts for the total water cycle.

<sup>3</sup> For example, the Stormwater Management Code developed by the Brisbane City Council and the Queensland Water Quality Guidelines (QWQG) provide information on the quality of stormwater from existing urban catchments and design objectives for urban stormwater for new WSUD in urban areas. See also the *Urban Stormwater – Queensland BPQM Guidelines 2009* which contain further detail on the nominated design objectives for desired stormwater quality in new urban development such as subdivisions.

<sup>4</sup> Brisbane City Council, *Priority Infrastructure Plan, Part 4, Desired Standards*.

<sup>5</sup> The revoked provision being s.19 of the Environmental Protection (Water) Policy 2009 (Qld).

In contrast, Victoria has legislative provisions, in Clause 56.07-4 of the VPPs, which require developers to install urban stormwater management systems to reduce urban storm water run-off.<sup>49</sup> Where compliance is not possible the developer may pay an off-set amount to Melbourne Water who may construct suitable assets elsewhere. Clause 56.07-4 is considered to have been an effective regulatory tool for the integration of water sensitive practices into urban land planning system (Potter and RossRakesh 2007). However, it is fairly limited in scope, only applying to residential subdivisions of more than two properties (Kay and Hussey 2013). Yet Clause 56.07-4 has had an effect even where the statutory scheme does not apply with some Victorian local councils having taken the initiative to apply the Best Practice Environmental Management Guideline (BPEM Guideline) objectives for stormwater control by way of council policy, and encourage voluntary compliance by developers with these, in urban in-fill areas (Kay and Hussey 2013).<sup>50</sup>

Local councils can have significant influence over the uptake of WSUD practices through local planning schemes but inconsistencies in policy across local councils can be problematic. For example, a study of 38 Melbourne municipalities by Morison and Brown (2011) found that the implementation of WSUD was inconsistent across the entire municipal area. A similar issue has been identified in Perth which has 30 council areas all with differing approaches to managing drainage and the implementation of WSUD. In contrast, Brisbane has only the one council for the metropolitan area and WSUD can therefore be coordinated across the entire metropolitan area.

## 5.5. Developer contributions as a tool to encourage the uptake of water sensitive service delivery

Table 5.2 on the following page identifies the entity responsible for providing water service infrastructure to green-field areas. In green-field areas such new infrastructure may include local reticulation pipes, water and sewerage treatment plants and stormwater drainage systems, whereas in infill areas upgrades to existing infrastructure may be required (Productivity Commission 2011b).

Water service providers often seek to recover the cost of providing the new water service delivery infrastructure required to service a development through the imposition of a levy on developers. These levies are termed *developer contributions* or *headworks charges*. Across all three cities there are legislative mechanisms that provide a basis for service providers to impose such a levy to recover at least some of the cost of such infrastructure from developers.<sup>51</sup>

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<sup>49</sup> These systems are required to comply with BPEM Guidelines and satisfy certain performance requirements.

<sup>50</sup> In Melbourne, four inner city councils have adopted a stormwater planning policy which applies to planning permit applications for new buildings, extensions to existing buildings which are more than 50m<sup>2</sup> in floor area and subdivisions in business zones. This policy adopts best practice performance approach in accordance with the BPEM Guidelines. Applicants are required to submit a WSUD Response with their applications detailing compliance with the best practice performance objectives and information on the location, design, construction and management of the WSUD system.

<sup>51</sup> For example in Victoria, the *Water Act 1989 (Vic)* s.259 provides Melbourne Water with powers to levy contributions based on development services schemes and the Planning and Environment Act 1987 (Vic) Part 3B provides local councils with powers to levy contributions based on development contribution plans, conditions on planning permits and voluntary agreements. While in Queensland, the Sustainable Planning Act 2009 (Qld) enables local councils to require development contributions based on Priority Infrastructure Plans, which identify infrastructure changes for certain contributions. In Western Australia, the Planning and Development Act 2005 (WA) allows for the State Government to require contributions for onsite physical infrastructure. The Water Services Act 2012 (WA) provides that proponents of water supply, sewerage or drainage projects pay an infrastructure contribution to the Water Corporation in certain circumstances.

**Table 5.2. Entities responsible for providing water service infrastructure in green-field areas**

	Melbourne	Perth	Brisbane
<b>Water headworks</b>	YVW, CWW and SEW	Water Corporation or council owned business	QUU
<b>Sewerage headworks</b>	YVW, CWW and SEW Water	Local council or developer or council owned business	Brisbane City Council or developer or QUU
<b>Stormwater works</b>	Melbourne Water or developer	Water Corporation or local council	Brisbane City Council or developer

Source: Adapted from the Productivity Commission (2011b) report.

These funds enable water corporations to upgrade existing infrastructure or install new infrastructure. Such upgrades may result in service delivery in a more water sensitive manner or in new infrastructure being created that is more localised and innovative. For example, YVW in Melbourne has developed innovative water services solutions for several green-field sites (Institute for Sustainable Futures 2013b, McCallum 2015).<sup>52</sup> The existence of headworks charges may also incentivise developers to innovate (Productivity Commission 2011a). This innovation may be in developing infrastructure solutions for the development in conjunction with water service providers. Alternatively, the developer may provide its own infrastructure solutions or may invest in on-site recycled wastewater to reduce the need for new infrastructure. Where headworks charges can be completely avoided by a developer providing alternative infrastructure this has the potential to create a market for innovative water service providers who can create efficiency savings for developers. For example in New South Wales, Flow Systems advertises up to a 50% saving to developers in sewerage and water solutions if the developers engage the micro-utility to provide innovative water solutions at their development.<sup>53</sup>

However, the Productivity Commission (2011b) found that there is limited consistency across the jurisdictions as to the type and quantum of contributions required and that the formula used to levy such charges can bias certain types of development. Moreover, headworks charges are passed on by the developers to purchasers of new properties. This tends to be unpopular with purchasers. As a result such charges may not be politically popular and this may limit their use as a regulatory tool. For example, the New South Wales Government legislated to cap or remove such charges so as to appease voters and promote affordable housing and, as a result, these charges lost their potential to influence the costs and benefits of recycled water schemes (Institute for Sustainable Futures 2013b).

<sup>52</sup> These include the Aurora scheme, which provides residential third-pipe recycled water, and the Kalkallo stormwater harvesting and reuse project intends to treat stormwater to a potable standard to supplement potable supply, see further at Box 6.1.

<sup>53</sup> See [www.flowsystems.com.au](http://www.flowsystems.com.au). Innovative water solutions provided by Flow Systems also have the added advantage of automatically meeting BASIX sustainable building requirements. It should be noted, however, that Flow System communities are generally still in development with limited ability to evaluate cost saving claims or the viability of such schemes.

## 5.6. Building level tools to encourage the uptake of water sensitive service delivery

Water sensitive service delivery may also involve a greater use of building level solutions. These may involve technologies to capture rainwater and stormwater or to recycle household greywater. These technologies may offer benefits in stormwater management and may also reduce the building's reliance on the reticulated water system, particularly for purposes such as irrigation and toilet flushing. There is evidence that mandatory water use efficiency requirements at the building scale can act as an incentive to innovate in water. See Box 5.1 which describes how such provisions in Queensland acted in this way on the Fitzgibbon Chase development.

### Box 5.1. Fitzgibbon Chase and building level regulatory requirements as a facilitator of innovation

The Fitzgibbon Chase development is new residential development in Brisbane's north owned and developed by EDQ, a government owned development body, which has an explicit focus on environmental sustainability. The development incorporates two innovative decentralised water supply solutions. One solution, FiSH, intends to use stormwater for non-potable purposes around the development. The other, PotaRoo, intends to use rainwater collected from domestic roofs to contribute to the local reticulated potable supply. Both of these have been demonstrated to be technically feasible but neither system is currently operating.

When the scheme was being developed provisions in the Queensland Development Code, QDC 4.2, required every new house in the State to have an alternative water source to offset potable demand. Typically this requirement would have been met by installing household level rainwater tanks. However, the FiSH solution was an innovative alternative way of meeting this regulatory requirement at a cost saving of \$1,350 per household. This regulatory facilitator was removed in 2013.

Source: Economic Development Queensland (2014a, 2014b).

At the national level, the water efficiency labelling scheme (WELS) requires that certain products be registered and labelled with their water efficiency, according to standards under the *Water Efficiency Labelling and Standards Act 2005* (Cth) overseen by the WELS Regulator.<sup>54</sup> There is also the Green Star voluntary building certification scheme run by the non-profit Green Building Council Australia. This scheme outlines stormwater management provisions which, if met, allow for proponents to obtain credit points for installing WSUD technology and reducing pollution from stormwater.<sup>55</sup>

However, regulation that encourages, or controls, the uptake of water sensitive service delivery at a building level across Melbourne, Brisbane and Perth is relatively ad-hoc. This generally consists of non-mandatory guidelines, the provision of information and the provision of financial incentives to householders to increase their water efficiency.<sup>56</sup> Moreover, with the passing of the Millennium drought certain water efficiency measures have actually been rolled back. For example, in Brisbane, the requirement for new buildings to have a water tank, and many rebates for water efficient products and rainwater tanks, have been removed altogether (Economic Development Queensland 2014a).

<sup>54</sup> These products include showers, tap equipment, flow controllers, toilet and urinal equipment, washing machines and dishwashers. Minimum standards for toilets and washing machines apply.

<sup>55</sup> Online resource: <<http://www.gbca.org.au/uploads/168/3496/Emi-5%20Stormwater%20Credit.pdf>> (accessed 8 June 2015).

<sup>56</sup> For example, DEWLP in Victoria operates a rebate program for householders and businesses for a variety of water efficiency products and services. Online resource: <[www.depi.vic.gov.au/water/using-water-wisely/water-rebate-program](http://www.depi.vic.gov.au/water/using-water-wisely/water-rebate-program)> (accessed 8 June 2015).

In comparison the BASIX scheme in New South Wales, which is described in Box 5.2, offers a model of a mandatory legal requirement, imposed at the building level, to achieve certain levels of water efficiency. This appears to driving water sensitive innovation in New South Wales.

**Box 5.2. BASIX and water use efficiency**

Policy around water use efficiency in New South Wales has been heavily influenced by the *State Environmental Planning Policy (Building Sustainability Index: BASIX) 2004* (NSW). BASIX is an online program for residential development that allows users to enter construction data and then receive scores against water and energy use reduction targets. BASIX has water targets ranging from 0 to 40% reduction in consumption of mains-supplied potable water, depending on location of the residential development. 90% of new homes are covered by the 40% target. Obtaining the target reduction is a mandatory requirement for new buildings and certain renovations. The BASIX program allows for developers, and those involved in residential development, to model WSUD projects such as use of rainwater tanks, stormwater tanks and greywater recycling.



### *Key observations about built environment regulation*

- The built environment regulation system is an extremely complex one within which a large number of entities have partial and overlapping influence.
- Coordinated land use and water resource and service planning is currently not being achieved in the three cities examined. These have only limited integration between the water planning and land use planning systems.
- Victoria is the only jurisdiction to use state wide planning requirements with express legal force to directly target alternative water service provision and stormwater management in the three jurisdictions examined. These appear to have been successful but for maximum impact would need greater scope and enforceability.
- Regulations that require the best practice management of stormwater can act as a powerful incentive towards the greater uptake of water sensitive service delivery.
- The power to levy developer contributions can be a useful tool to incentivise developers to provide water sensitive servicing options and may facilitate the growth of a market of new providers able to provide innovative solutions to developers. However, these are currently inconsistently applied.
- Regulation that encourages the uptake of water sensitive service delivery at a building level is relatively ad-hoc across the three cities and generally consists of non-mandatory guidelines, the provision of information and/or financial incentives to householders to increase their water efficiency. In contrast New South Wales' mandatory requirements for water efficiency have driven innovation.

## Section 6 – A comparative review of environmental regulation

### 6.1. About Australian environmental regulation

Australian environmental regulation systems controls for risks to the health of the environment. Such risks are often also risks to human health and there is a close relationship between environmental regulation and public health regulation, which is considered in Section 7.

This report is concerned with those aspects of Australian environmental regulation systems that control potential threats to the health of water dependent environments and the ecosystems they maintain.<sup>57</sup> These may arise as threats to the quality of water in such environments, or as threats to the quantity of water in such environments. The aspects of environmental regulatory systems that control water quality and quantity threats are largely located at the state level in Australia.

Across the three cities considered in this report, environmental regulation has been enacted to control the discharge of polluted waters into the environment and to control other threats to water quality.<sup>58</sup> Pollution to waterways and the broader environment can arise from point source pollution, for example, from discharges from sewage treatment plants. It can also arise from non-point source pollution, such as from contaminants collected by stormwater flows.

In relation to water quantity, threats largely arise from the over-extraction of water resources and regulation across the three cities has been developed to increase efficient and environmentally sustainable water resource allocations. However, urban water dependent environments and their ecosystems can be degraded by receiving too much water, too little water or water flows which do not match historical patterns. For example, changes to stormwater flow patterns caused by urbanisation are causing significant environmental degradation to urban waterways (Fletcher, Walsh et al. 2011). This threat is only starting to be acknowledged and controlled for.

The report is focused upon how current regulation addressed at water quality and quantity may impact on the uptake of water sensitive service delivery. Compliance with environmental rules may be perceived of as a constraint to those wanting to undertake urban water projects. However, rising to the challenge of working within such constraints can act as a catalyst for innovative practice.

Urban water management practices may also threaten the health of the environment in other ways. For example, current practices often fail to recover nutrients, such as nitrogen or phosphorous, from sewage and often produce significant amounts of climate changing gases.<sup>59</sup> Emerging water sensitive technologies, some of which are being developed by other CRC researchers, offer the potential to change practices in the water industry so that these can become more energy efficient and able to recover resources from waste.<sup>60</sup> Parts of the wider Australian regulatory environment may act as enablers or impediments to the uptake of such technologies. However, consideration of such questions is outside of the scope of this report.

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<sup>57</sup> For the purpose of this report the term water dependent environment is used in broad sense to capture all urban rivers, streams, creeks, estuaries, wetlands and bays.

<sup>58</sup> *Environmental Protection Act 1994* (Qld) and the Environmental Protection (Water) Policy 2009; *Environment Protection Act 1970* (Vic) and the State Environment Protection Policy (Waters of Victoria); *Environmental Protection Act 1986* (WA).

<sup>59</sup> Both water recycling and desalination plants require significant amounts of energy.

<sup>60</sup> For instance, CRCWSC Project C2.1 is examining resource recovery from wastewater.

## 6.2. Institutional arrangements for environmental regulation across the three cities

The institutional arrangements for the management of point source pollution are similar across the three jurisdictions, with environment protection agencies in each city generally responsible for managing a licensing system for prescribed point source pollutants.<sup>61</sup>

However, the institutional arrangements for the management of non-point source pollution, such as stormwater, are shared between environment protection agencies and those other bodies responsible for waterways protection and urban drainage (see Table 3.1 in Section 3.2). How responsibility for stormwater management and waterways health is allocated institutionally varies significantly between the three cities.

In Melbourne, a single body, Melbourne Water, has been tasked with both the management of major drainage systems and some 8,000km of waterways. Melbourne Water has played a lead role in influencing state and local government policy for water quality and this has resulted in Melbourne becoming a leader in stormwater management (Potter and RossRakesh 2007).<sup>62</sup> Melbourne Water has been vested with legislative responsibility for waterway health and this is likely to have facilitated its advocacy in water quality regulation and planning.

In comparison, while Brisbane has made significant changes since the 1990s in how it manages pollution from urban stormwater, it has arguably not made the same gains as Melbourne and still faces challenges. Waterway health responsibilities in Brisbane are currently undertaken by the Healthy Waterways Partnership and, unlike Melbourne, no one body is directly responsible for waterway health.<sup>63</sup>

In Perth, waterway health is focused largely on the protection of the Swan Canning Riverpark system by the Swan-Canning River Trust. Meanwhile, drainage management is primarily concerned with property flood protection and road safety. The Department of Main Roads, the Water Corporation and local councils are responsible for drainage services. There are no requirements placed on the quality or quantity of stormwater flowing through the drainage system and no requirements placed on any organisation to ameliorate its impact.<sup>64</sup>

## 6.3. Regulation to control point source pollution

Point source pollution has long been managed largely through licensing systems established by environmental protection legislation and administered by environmental protection agencies across the three jurisdictions.<sup>65</sup> These licensing schemes are broadly similar across the three cities. These licensing schemes require prescribed or scheduled premises,<sup>66</sup> or entities undertaking environmentally relevant activities,<sup>67</sup> to obtain a licence. The licence sets out conditions which control the operation of the premises, or the activity, to minimise the adverse effect on the environment. Conditions will generally address waste acceptance and treatment, as well as air and water discharge limits and requirements. Licence holders are generally required to pay an annual fee. There are specific penalties for a breach of licensing conditions and penalties apply to those operating a premise, or undertaking an activity,

<sup>61</sup> In Victoria the Environment Protection Authority manages the licensing system; in Queensland this is the Department of Environment and Heritage Protection; in Western Australia the Department of Environment Regulation, along with the Environmental Protection Authority and the Office of the Environmental Protection Authority oversees the licensing system for water pollution.

<sup>62</sup> With minor drainage systems remaining the responsibility of local councils, Melbourne Water has taken a strong role in coordinating with local councils in order to meet its river health obligations, particularly in urban growth areas. Melbourne Water was involved in the development of Clause 56 of the VPPs. See Section 5 for a further discussion of Clause 56 as a regulatory tool.

<sup>63</sup> This is a partnership between several Queensland Government departments and agencies, along with NRMGs and water corporations.

<sup>64</sup> See the *Metropolitan Water Authority Act 1982* (WA) and also the Department of Water, Stormwater Management Manual for Western Australia: Stormwater Management Plans (2007).

<sup>65</sup> *Environmental Protection Act 1994* (Qld); *Environment Protection Act 1970* (Vic); *Environmental Protection Act 1986* (WA).

<sup>66</sup> As in Victoria and Western Australia.

<sup>67</sup> As in Queensland.

without a licence. Australia is generally perceived to perform well in water quality management (PriceWaterhouseCoopers Australia 2011).

One of the major sources of point source pollution is sewage and in all three cities licence sewage treatment plants. All three cities impose standards on the levels of pollutants that discharged, treated wastewater may contain. The existence of regulation to control point source pollution, and place a cost on its discharge to the environment, can be a significant influence on the decisions water corporations make about what they will do with sewage. It may make options which recycle wastewater, rather than discharge this to the environment, more attractive. The Australian Water Recycling Centre of Excellence has identified, from case study research, that policies and regulatory tools for the protection of waterway health from the impacts of wastewater discharge have been significant drivers in the development, or expansion, of water recycling schemes (Institute for Sustainable Futures 2013b). Their research indicated that regulation, including licensing of wastewater discharge, influenced recycled water quality and how recycled water schemes were scaled and operated. Even where environmental protection was not the main driver for recycled water schemes it was still an important facilitator. However, the National Water Commission have cautioned that wastewater discharge standards may not necessarily be cost-effective or in line with community expectations (2011b).

There is some degree of national consistency in water quality standards due to the existence of non-mandatory national guidelines deriving from the National Water Quality Management Strategy (NWQMS).<sup>68</sup> These national guidelines have provided a framework for water quality management. However, they remain an underused tool as they are of variable quality and detail and are not always utilised at the state level (KPMG 2011).

#### 6.4. Specific regulation for alternative water source projects

The review of water quality regulation conducted for the NWC (PriceWaterhouseCoopers Australia 2011) expressed concern about the ability of Australia's water quality regulations to meet the challenges of emerging models of service delivery which are likely to use diversified and interconnected water sources and complex treatment systems. In particular, concerns were raised about emerging regulatory gaps and the complexity of approvals processes (PriceWaterhouseCoopers Australia 2011).

Box 6.1 below considers how gaps in regulation presented as a problem in the context of a stormwater reuse project in Melbourne. Box 6.2 on the following page considers how the gaps in the regulation of stormwater and rainwater in Queensland caused difficulties for the Fitzgibbon Chase development.

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<sup>68</sup> The NWQMS was established in 1992 with the purpose to improving water quality for sustainable resource use in Australia and New Zealand. The NWQMS developed the Guidelines for Fresh and Marine Water Quality, which outline water quality objectives and define indicators and trigger values to indicate when these qualities are threatened, and the Australian Guidelines on Water Quality Monitoring and Reporting, which provide a framework for monitoring fresh, marine and groundwater quality.

### **Box 6.1. Regulatory gaps regarding stormwater reuse and the Kalkallo Project**

The Kalkallo stormwater harvesting and reuse project (Kalkallo Project) is a precinct level project in Melbourne's northern growth corridor. The Kalkallo Project intends to treat stormwater to a potable standard to supplement potable supply. We examined the Kalkallo Project as a case study to identify the regulatory and risk allocation frameworks which impacted upon the attempted innovation.

Our research did not identify a direct legislative barrier that acted as a significant impediment. In contrast, where stakeholders identified regulation as an impediment it often presented as a *regulatory gap*, by which stakeholders meant there was no specific legal rule about the issue. There are in reality no unregulated spaces and where regulatory gaps exist background law applies. In other words established legal rules about contracts and liability arising out of a duty of care would still apply. However, background law can be obscure, costly to discern and unsuitable for the innovation in question.

Our case study observed that there were gaps in the regulation of stormwater reuse projects, under various regulatory instruments, and that these acted to increase uncertainty and complexity (McCallum 2015). In the absence of any specific regulatory process to follow for a stormwater scheme, the water corporation mirrored the process that would have been required if the scheme had used recycled wastewater. A key finding of the case study was that the clarification of definitions and regulatory approval processes may enable innovation by providing certainty and guiding decision making.

Across all three jurisdictions some degree of regulation has developed to manage the specific water quality issues that alternative water source projects raise. However, as identified by De Sousa (2013a, 2014a, 2014b) these are limited. The arrangements that currently apply across the three cities evolved to deal with recycled wastewater projects and typically consider water quality issues, at least to some extent, from both the environmental and public health perspectives. These regulatory frameworks are inconsistent, both between jurisdictions and between different types of project. The frameworks are also only partial in their coverage.

Complex and unclear approvals processes for recycled water projects have been shown to result in differing interpretations being taken of the requirements of the approvals processes (Institute for Sustainable Futures 2013a). It is also suggested that the complexity of such regulation has also made investments in such projects more expensive and difficult to pursue (Watson 2011). This appears to be a problem internationally as well as within Australia. The lack of specific regulatory frameworks for on-site alternative resource systems has also been identified as a barrier to the uptake of such systems in the United States (OECD 2015a).<sup>69</sup>

Specific national guidelines for recycled water have been developed. The Australian Guidelines for Water Recycling (AGWR) manage both health and environmental risks (Natural Resource Management Ministerial Council, Environment Protection and Heritage Council et al. 2006) for both potable and non-potable water supply (Natural Resource Management Ministerial Council, Environment Protection and Heritage Council et al. 2008). Risks are managed by establishing water quality objectives and permitted risk levels for each recycled water treatment system (Power 2010).

<sup>69</sup> San Francisco offers one model of how these barriers can be overcome at the city level by the creation of a permit and approval process for such schemes to address public health concerns. This has allowed micro-markets in water services at the building level to emerge.

### **Box 6.2. Fitzgibbon Chase and difficulties with Queensland's regulation of stormwater and rainwater**

While both the innovative water systems at the Fitzgibbon Chase development in Queensland (see Box 5.1) have been demonstrated to be technically feasible, neither system is currently operating due to a combination of other factors.

One factor has been gaps in the current regulatory framework in Queensland. The FiSH element of the scheme followed the AGWR guidelines on stormwater harvesting and reuse but there are no specific regulations in Queensland about stormwater. This has presented as a problem. In particular, as stormwater is not part of the definition of recycled water no clear pathway exists for the regulator to approve a drinking water quality management plan for the FiSH element of the scheme.

A further factor is the ongoing cost of compliance with public health requirements in relation to the validation and verification testing for the systems.

However, these technical regulatory issues, whilst important, are over-shadowed by broader difficulties the two schemes have faced in terms of securing a long term owner and operator and in terms of their long term financial viability.

Source : Economic Development Queensland (2014a), Economic Development Queensland (2014b).

In Western Australia, the DoH has developed *Guidelines for the Non-Potable Uses of Recycled Water in Western Australia 2011*. The guidelines accord with the AGWR framework and define recycled water as water generated from sewage, or from industry, that is treated to provide fit-for-purpose water quality for its intended beneficial use. However, the guidelines only regulate large recycled sewage and greywater schemes and do not deal with recycled water from individual household systems, multiple dwellings or commercial premises producing up to 5000L/day. These smaller schemes are dealt with under the *Code of Practice for the Reuse of Greywater in Western Australia* (Department of Health 2010). There are also acknowledged gaps in the regulation of third pipe schemes (Horn 2015).<sup>70</sup> It has been suggested that Western Australia's lack of a specific legislative regime relating to health standards and water quality for MAR projects is leading to uncertainty and complexity for developers wishing to instigate such projects (Bancroft and Gardner 2015).

In Victoria, the regulation of recycled sewage and greywater schemes, for both health and environmental purposes, falls within the scope of the *Environment Protection Act 1970* (Vic). Incidental ingestion health risks are only addressed as a subsidiary issue to environmental risks. Large scale wastewater treatment, disposal and recycling facilities that discharge to the environment require a licence to operate.<sup>71</sup> However, large schemes that do not have environmental discharge, called *closed loop* schemes, are not currently regulated for public health purposes. Small wastewater treatment, disposal and recycling facilities are considered to be septic tank systems. These require a certificate approving the system for use and a local council permit, for the installation and use of the system.

Queensland manages both drinking water and recycled wastewater standards through the *Public Health Act 2005* (Qld) which provides guidance on when recycled wastewater is fit for use.<sup>72</sup> Criminal sanctions apply for the supply of recycled wastewater that is not fit for use.<sup>73</sup>

<sup>70</sup> There are currently no reticulation or plumbing guidelines for non-potable water in Western Australia.

<sup>71</sup> These are schemes that are able to discharge more than 5,000 litres of effluent to the environment per day. Where a large scheme does not have environmental discharge it is called a closed loop scheme and is currently not regulated for public health purposes. This is a significant regulatory gap.

<sup>72</sup> When it would be not likely to cause physical harm to a person who might later be exposed to it: *Public Health Act 2005* (Qld) s 57D.

In addition, the Public Health Regulation 2005 (Qld) sets out drinking water quality standards for particular types of recycled wastewater,<sup>74</sup> requirements for water quality testing,<sup>75</sup> and for augmentation of drinking water supplies with recycled wastewater.<sup>76</sup> As De Sousa (2014a) identifies, the Plumbing Code in Queensland also contains performance requirements for non-drinking water installations.

Specific regulation for stormwater re-use is still emerging across the three cities and currently the use of stormwater is regulated in different ways in each jurisdiction. However, in all locations the general law of negligence imposes a duty of care on those operating stormwater harvesting and reuse regimes not to cause reasonably foreseeable damage other people (Department of Sustainability and Environment and Department of Health 2009).

In Victoria, the State Government recommends that the relevant guidelines in the AGWR relating to stormwater are followed in the design and management of stormwater reuse schemes. However, following this recommendation is not mandatory. Similarly, there is no prescribed regulatory framework for the capture and reuse of stormwater in Queensland. Although stormwater harvesting guidelines have been developed by the Healthy Waterways Partnership (Water by Design 2009). Western Australia has the most developed system for regulating the use of stormwater with stormwater management practices promoted in the DoW *Stormwater management manual for Western Australia (2004-2007)*. These reflect the AGWR guidance on stormwater harvesting and reuse, adapted to Western Australian standards. The Department of Health (DoH) is responsible for the regulation of alternative water sources and maintains an approval process for alternative water supply systems (Department of Health 2009) Licences are required from the ERA.

## 6.5. Regulation to control non-point source pollution

Across all three cities the regulation of non-point source pollution, such as stormwater, is less developed and coherent than the regulation of point source pollution. To date, stormwater management in Australia has been primarily concerned with flood mitigation rather than environmental health concerns (Productivity Commission 2011a). Often even where there is regulation it takes the form of non-mandatory guidelines which are not always adequately enforced (Melbourne Water and Environment Protection Authority Victoria 2009). However, as discussed in Section 5 there have been some advances made by the inclusion of mandatory stormwater control provisions in planning regimes. However, these provisions are generally limited in scope and apply only to new subdivisions and developments.

## 6.6. Regulation to control threats to water quantity

To manage the risk of having inadequate water in the environment, Australian governments have adopted the concept of an environmental water allocation in their water resource management frameworks.<sup>77</sup> However, environmental water allocation decisions are generally subject to ministerial discretion which frequently prioritises short term economic and social considerations to the cost of the environment (Bonyhady 2012). This is also common at the international level, with caps on water consumption often being overlooked in practice (OECD 2015b).

Arrangements for securing environmental water allocations are different in each city. Victoria has gone further than the two other States examined and has explicitly established the environment as a legal water user (Australian Government 2009).<sup>78</sup> In contrast, Perth

<sup>73</sup> *Public Health Act 2005* (Qld) s 57F states that a fine of 1350 penalty units or up to 2 years imprisonment may be imposed.

<sup>74</sup> *Public Health Regulation 2005* (Qld) r 18AA.

<sup>75</sup> *Public Health Regulation 2005* (Qld) r 18AC regulates the frequency of testing and the types of tests to be undertaken as well as the acceptable levels of the values obtained from testing.

<sup>76</sup> *Public Health Regulation 2005* (Qld) r 18AD.

<sup>77</sup> In some locations, this involves ensuring there is adequate water for groundwater replenishment. In other places it involves ensuring beneficial flooding or the water requirements of natural ecosystems.

<sup>78</sup> Under s 4 of the *Water Act 1989* (Vic) the Environmental Water Reserve (EWR) was established to set aside water for the environment to preserve the environmental values and health of water ecosystems. In order to ensure that environmental water allocation requirements are met, particularly in times of drought, an independent statutory authority has been established as the environmental water holder.

regulates environmental water allocations by way of State government policy,<sup>79</sup> using non-statutory water allocation plans (Department of Water 2011) and imposing licence conditions on those extracting water.<sup>80</sup> How effective these plans have been in addressing acknowledged over-allocation has been questioned (Bennett and Gardner 2014). In Queensland, there is a legal requirement to make adequate provision for environmental water and this is given effect by Water Resource Plans.<sup>81</sup>

Yet across all three cities there is no substantive duty for environmental conservation (Gardner 2006). Nor do water management frameworks identify over-allocated or overused systems and provide recovery measures (National Water Commission 2009). As a consequence the challenge of ensuring supply and demand, including for the environment, in times of increasing water scarcity, mean that current abstraction or entitlement regimes are likely to require reform (Young 2014).

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<sup>79</sup> The Statewide Policy No. 5 – Environmental water provisions policy for Western Australia, describes the principles and processes to determine how much water should be retained for the environment, or what water-level regime should be maintained when allocating and reviewing water-use rights.

<sup>80</sup> See *RiWi Act* Part III, Div 3A and ss 26GC and 26GD.

<sup>81</sup> See *Water Act 2000* (Qld) ss 38(3)-(4) and 46(4).



### *Key observations about environmental regulation*

- All three cities have similar institutional arrangements and regulatory frameworks in place to control point source pollution and these have performed well to date.
- There is clear evidence that regulation that restricts, or increases the price of, point source pollution from sewage treatment plants can have a significant impact upon the uptake of recycled wastewater schemes.
- There is some degree of national consistency in water quality standards but these are of variable quality and detail and are inconsistently utilised.
- There are some specific regulations in place to deal with both the environmental and public health aspects of alternative water source projects and a certain amount of national guidance on such schemes exists. However, these vary significantly across the cities and overall the picture is confusing and inconsistent. The regulations often vary depending on whether a scheme is large or small or on whether it does or does not discharge water to the environment. Often health concerns are addressed as a subsidiary issue within wider environmental approvals processes. The situation is even less clear for stormwater harvesting projects, particularly in Victoria and Queensland.
- Across all three cities institutional responsibility for non-point source pollution is shared between environment protection agencies and other entities. However, where clear institutional responsibility for waterways health, drainage and stormwater management is given to one entity, such as in the Melbourne model, this can result in a much more co-ordinated approach being taken to the protection of waterways.
- The allocation of water for the environment differs across all three cities with the strongest provisions arguably found in Victoria. However, political control of water allocation indicates that in times of scarcity, environmental water allocations will suffer.

## Part 7 – A comparative review of public health regulation

### 7.1. About Australian public health regulation

The provision of clean water, both for drinking and other purposes, along with the provision of sanitation, has long been a primary objective for urban water management. Indeed, the protection of public health is essential to a successful urban water sector. This has generally been something that large Australian cities have done well (Dale, Kirk et al. 2010, Department of Health and Human Services 2015).<sup>82</sup>

State Governments across Australia have long been involved in developing regulation to protect the public from threats to health. Most obviously, these threats arise from the contamination of water that is intended for human consumption and from inadequately disposed of sewage. However, even water that is not supplied for direct human consumption may, if ingested, impact on human health (Department of Sustainability and Environment and Department of Health 2009).<sup>83</sup> Public health regulation for urban water is largely concerned with reducing water quality risks to human health in the supply of urban drinking water and this is the primary focus of the report.<sup>84</sup> This Part 7 examines the impact that such regulations have by way of enabling or impeding the uptake of water sensitive service delivery. However, some States have developed specific regulations aimed at managing both the environmental and health implications of recycled water schemes, even if not intended for potable use, these are considered in Part 6.4.

Current public health regulations have developed to reflect the conventional model (Brown, Keith et al. 2009, Head 2014). However, water sensitive service delivery offers the potential to make use of new water sources in urban water supply and may also involve the provision of water of differing classes for differing uses.<sup>85</sup> Furthermore, water sensitive services may not be delivered by the current publicly owned water corporations but may be delivered by new providers. If water sensitive service delivery is to be successful it will be essential that good public health outcomes are maintained. Yet regulation should remain proportional to the actual risks to health from new technologies and approaches and not be unnecessarily impeded by public health regulation (National Water Commission 2011b).

### 7.2. Institutional arrangements for drinking water delivery and regulation across the three cities

In each city, drinking water service delivery has been long provided by publicly owned water corporations. In all three jurisdictions, the regulation of public health is overseen by the State

<sup>82</sup> Indeed all across Australia there have been few waterborne disease outbreaks detected and most of those reported (78%) have been associated with recreational exposure rather than drinking water (Dale, Kirk et al. 2010). In a study examining gastroenteritis outbreaks from 2000-2007 drinking water was the suspected source for only 10 out of 54 of the Australian outbreaks. The water sources in these 10 cases were tank or bore water sources, not reticulated urban supply.

In Victoria the two most recent known waterborne disease outbreaks occurred prior to the current regulatory framework with an outbreak in Sunbury in 1987 and in Kyabram in 1997. Incidents are rare and well controlled which is not always the case in other developed nations (Department of Health and Human Services 2015).

<sup>83</sup> Ingestion of water may happen if it used for irrigating food crops that are sold raw, if it is used to flush toilets and droplets of the flush water become airborne or if it is used to irrigate outside areas using a spray mechanism. Many of these uses are unlikely to pose a significant risk to public health, as the chance of ingestion is low, but some may and the risks are greatest if water is sourced from a more contaminated supply.

<sup>84</sup> Public health risks may also arise from the inadequate removal and treatment of wastewater or where poor-quality plumbing work results in cross connections between potable, non-potable and sewerage systems. Public health risks may also arise from contaminated water in the environment and there are significant points of overlap between the public health regulation system and the systems of environmental regulation that were considered in Part 6.

<sup>85</sup> For example recycled water from third/purple pipes or grey water recycling plants. This water is often reserved for gardening, toilet flushing and other low risk activities.

Government health department. However, on occasion, this role is shared with local councils, environmental regulators, catchment managers and water departments.<sup>86</sup> Table 7.1 shows which organisations supply drinking water in the three cities and which institutions are responsible for regulating drinking water supply for public health purposes.

**Table 7.1. Comparison of drinking water suppliers and regulators across the three cities**

	Melbourne	Perth	Brisbane
<b>Drinking water suppliers</b>	Melbourne Water, CWW, SEW, YVW	The Water Corporation	QUU and Seqwater
<b>Drinking water regulator (public health)</b>	Department of Health and Human Services (DHHS)	DoH	DEWS

Public health in the supply of drinking water has generally been well managed in Australia and our research indicates that, at least in Victoria, there is a great deal of trust in the current regulatory arrangements (McCallum 2015). Our research also indicates that alternative water service provision may be supported by health regulators when undertaken by trusted water service providers with a history of successful drinking water quality management (McCallum 2015). The Kalkallo Project, see Box 6.1, involved a public water corporation undertaking a proof of concept potable stormwater re-use project. We identified important trust relationships between the regulators and the water service provider that enabled the project to progress.

In light of this, a certain level of conservatism from public health regulators about water sensitive service delivery may be expected. Also new water service providers without a record of successful risk management and without longstanding relationships with health regulators are likely to find it harder to satisfy these regulators that the public health risks of innovative projects will be well managed.

<sup>86</sup> This tends to be in relation to the public health aspects of water quality protection in catchments, sewerage provision or in the regulation of recycled wastewater for non-potable purposes.

**Table 7.2. Comparison of drinking water regulation across the three cities**

	<b>Controls over entity able to supply drinking water</b>	<b>Regulator set/endorsed drinking water quality standards</b>	<b>Audit/oversight mechanisms for standards compliance</b>	<b>Consequences of failure to comply with standards</b>	<b>Regulation defining acceptable sources of drinking water</b>	<b>Regulation to protect water catchments</b>
<b>Victoria</b>	Under the <i>Safe Drinking Water Act 2003</i> (Vic) ( <i>SDA</i> ) water suppliers may supply drinking water services to the public. Water suppliers are defined authorities within the meaning of the <i>Water Act 1989</i> (Vic).	The <i>SDA</i> and the <i>Safe Drinking Water Regulations 2005</i> (Vic) provide the statutory framework for the regulation of drinking water quality in Victoria and include elements of prescriptive, process and of performance regulation. They rely on the public disclosure of information.	The DHHS is the public health regulator for drinking water quality in Victoria. The <i>SDA</i> requires water suppliers to prepare risk management plans and arrange for independent audits of these plans and report to the DHHS. The DHHS may undertake audits of drinking water suppliers.	Failure to comply with drinking water standards results in monetary penalties under the <i>Safe Drinking Water Regulations 2005</i> and under the <i>Food Act 1984</i> (Vic).	The <i>SDA</i> and the <i>Safe Drinking Water Regulations 2005</i> (Vic) do not define acceptable sources of drinking water. However, the EPA and the DHHS recommend against using rainwater, stormwater and recycled water for potable purposes.	Melbourne Water manages most of Melbourne's water catchments. The water catchment protection regime is set out under the <i>Catchment and Land Protection Act 1994</i> (Vic).
<b>Western Australia</b>	The <i>Water Services Licensing Act 2005</i> and the <i>Water Services Act 2012</i> (WA) set out the requirements for the licensing of	The DoH is the regulator for drinking water quality in Perth. The DoH enters into a Memorandum of	The DoH requires scheme providers to monitor drinking water quality and report to the DoH. The DoH oversees the monitoring of	Failure to comply with the MoU may result in revocation of the licence.	Public drinking water sources are proclaimed in the DoW's water quality protection note no. 75: <i>Proclaimed public drinking water source areas</i> which	Protection of groundwater systems and surface water systems is outlined in the <i>Metropolitan Water Supply, Sewerage and Drainage Act 1909</i>

	<p>water service providers. The ERA issues the licenses to applicants if the ERA is satisfied that they have the financial and technical ability to provide the drinking water service in the operating area and it would not be contrary to the public interest to do so.</p>	<p>Understanding (MoU) with water service providers specifying the drinking water quality standards. In general it is a condition of water service providers' licenses to enter into an MoU. These standards adopt the Australian Drinking Water Guidelines (ADWG).</p>	<p>water quality and audits water quality data and reporting systems of water suppliers.</p>		<p>predominantly cover surface and underground water systems. Drinking water sources are however not defined. The DoH recommends against the use of urban rainwater and recycled water as potable water.</p>	<p>(WA) which designates water source areas as Water Reserves, Catchment Areas or an Underground Water Pollution Control Area. Drinking water source protection plans are then developed.</p>
<p><b>Queensland</b></p>	<p>The <i>Water Supply (Safety and Reliability) Act 2008</i> (Qld) states that only a drinking water service provider can supply drinking water.</p>	<p>The Public Health Regulations 2005 (Qld) set out the standards for drinking water quality and particular types of recycled water.</p>	<p>Each drinking water provider is required to have a drinking water quality management plan in place, and comply with the details of the plan. The DEWS as the regulator, requires independent audits of the management plans and may undertake spot audits.</p>	<p>If a water service provider fails to comply with a provision of the <i>Public Health Act 2005</i> (Qld) (<i>PHA</i>), the water service provider may be liable to a penalty under the <i>Water Supply Act</i>.</p> <p>For example the supply of unsafe drinking water is an offence and may carry 3000 penalty units or up to 2 years imprisonment.</p>	<p>The <i>Water Supply Act</i> defines drinking water as water for human consumption, intended primarily as water for drinking, whether or not the water is used for other purposes. Recycled water for water supply augmentation is recognised as a water source however regulation does not specifically identify water sources suitable for drinking.</p>	<p>The <i>Water Act 2000</i> (Qld) (Chapter 2 and 3) sets out water source protection requirements for surface and groundwater as does the Environmental Protection (Water) Policy 2009 (Qld).</p>

### 7.3. Regulation of drinking water service delivery across the three cities

Table 7.2 on the previous pages provides a comparison of the regulatory systems in place to ensure the quality of drinking water across the three cities. These systems share many common objectives but differ somewhat in how they achieve these objectives.

All jurisdictions control which entities can supply drinking water and, historically, public ownership of these institutions would largely have been assumed. In Queensland and Western Australia this is now controlled through a licensing system. While in Victoria, the controls arise from the structure of the wider Victorian urban water management regulatory space. This only conceives of public water supply by those limited number of specified drinking water suppliers that operate the current reticulated system.<sup>6</sup> Innovation in the industry may see private providers wishing to provide drinking water. The regulatory systems in Western Australia and Queensland specifically allow for this to occur and for private providers to be regulated under existing public health regimes. In contrast, if an entity other than a current water corporation wished to provide drinking water in Victoria it would need to be regulated as a food supplier under the *Food Act 1984* (Vic).

There is a potential tension between existing risk based regulatory models for water quality regulation, which require significant institutional resources, and innovative technologies. These technologies may lead to more decentralised supply solutions and supply by smaller providers without such institutional resources. Smaller suppliers tend to find the complexity and costs of compliance with health regulations prohibitive (Economic Regulation Authority 2009, Economic Development Queensland 2014b). Indeed, the balancing of public health standards with cost has been identified as significant regulatory challenge (National Water Commission 2011b). New models for regulatory control which are simpler, cheaper and potentially more prescriptive may suit such providers.

In each jurisdiction there are drinking water quality standards that need to be achieved and the regulatory system provides mechanisms to ensure these standards are monitored and complied with. How this is done varies. For example, in Victoria, regulatory measures are focused on the actions of a limited number of entities and the statutory regulatory framework requires these bodies to produce and operate detailed risk management plans to control water quality risks.<sup>7</sup> The regulator oversees production of, and compliance with, these plans but does not approve them. Ultimately, non-compliance would expose the water service provider to civil and criminal sanctions for endangering public health. If non-compliance resulted in harm to those drinking the water a damages claim in negligence could be sustained. In contrast, in Western Australia, all water service providers are required to be licensed by the ERA. The licence terms and conditions specify the drinking water quality standards that a licensee must maintain and failure to comply with these standards may result in a fine or in revocation of the licence.<sup>8</sup>

Certain States also control what sources of water can be used for drinking water purposes. A restriction on water source need not be expressed in legislation. Unwritten government policy can still be a powerful tool to control what sources of water are exploited or not. For example, the Kalkallo case study identified that current unclear and unwritten Victorian policy still operated to discourage the exploitation of recycled stormwater for potable purposes (McCallum 2015).

Nor need a restriction be intentional to be powerful. For example, in Western Australia, there is regulatory confusion as to whether recycled water can be potable water which has come

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<sup>6</sup> As set out in the *Water Act 1989* (Vic) Part 6.

<sup>7</sup> *Safe Drinking Water Act 2003* (Vic) and the *Safe Drinking Water Regulations 2005* (Vic)

<sup>8</sup> *Water Services Act 2012* (WA) s 31.

to light in MAR trials (Bennett, Gardner et al. 2014).<sup>90</sup> In contrast, legislation in Queensland expressly recognises that recycled wastewater can be a potential source of potable supply, thus removing any doubt about this issue.<sup>91</sup>

Reflecting the conventional model of sourcing drinking water from dams or groundwater sources external to the urban area, all three cities have regulation in place to protect the quality of these sources.<sup>92</sup> These controls and restrictions form an important step in drinking water quality controls. As noted elsewhere in this report, current regulatory systems do not conceive of the urban area as a catchment. This is particularly significant for stormwater reuse projects as mechanisms to manage the quality of water within the urban catchment remain undeveloped.

#### 7.4. National consistency in drinking water regulation

The ADWG were developed to provide best practice national guidance on drinking water quality. All three cities have adopted the ADWG standards which have resulted in a degree of regulatory consistency.<sup>93</sup> However, without careful incorporation into legislation, to ensure the relevant statutory definitions accommodate these guidelines, national guidelines may have little impact (Bennett, Gardner et al. 2014).<sup>94</sup>

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<sup>90</sup> The *Health Act 1911* (WA) s 3 defines sewage as any kind of sewage, nightsoil, faecal matter or urine and any waste composed wholly or in part of liquid' which could therefore include recycled water. In response to the Water Corporation's MAR project, the DoH determined that recycled water is sewage up until the point of recharge.

<sup>91</sup> The definition of drinking water in Schedule 3 of the *Water Supply (Safety and Reliability) Act 2008* (Qld) includes recycled water used to augment drinking water supply.

<sup>92</sup> In Melbourne, water catchments are protected under the *Catchment and Land Protection Act 1994* (Vic); In Western Australia protection of groundwater systems and surface water systems is outlined in the *Metropolitan Water Supply, Sewerage and Drainage Act 1909* (WA) which designates water source areas as Water Reserves, Catchment Areas or an Underground Water Pollution Control Area; In Queensland the *Water Act 2000* (Qld) (Chapter 2 and 3) sets out water source protection requirements for surface and groundwater as does the Environmental Protection (Water) Policy 2009 (Qld).

<sup>93</sup> The DoH in Western Australia and Queensland Health (QH) have both adopted the ADWG as their drinking water quality standards and in Victoria, the *Safe Drinking Water Act 2003* (Vic) standards are consistent with the ADWG.

<sup>94</sup> For example, the s.3 of the *Health Act 1911* (WA) defines sewage as 'any kind of sewage, nightsoil, faecal matter or urine and any waste composed wholly or in part of liquid'. This definition could include recycled water. When considering the Water Corporation's MAR project, the DoH resolved this potential conflict in this instance by determining that recycled water is sewage up until the point of recharge. This regulatory uncertainty in Victoria has been addressed with 'sewage' meaning any human excreta or domestic waterborne waste, whether untreated or partially treated and 'recycled water' meaning water derived from sewage or trade waste that has been treated for the purposes of re-use: *Water Act 1989* (Vic) s 3.

### *Key observations about public health regulation*

- Large Australian cities have and continue to enjoy a high quality of drinking water.
- Across all three cities, there is clear institutional responsibility for the regulation of public health, particularly in relation to drinking water, and drinking water is provided by large, centralised, publicly owned water service providers. There seems to be a significant degree of public and regulator trust in these which institutions.
- Across all three cities, there are strong regulatory systems in place to ensure the quality of drinking water and there are clear, risk based management processes for drinking water regulation.
- Existing risk based regulatory models may be less suitable for smaller providers who may lack the institutional resources necessary to comply with these.
- The regulation of drinking water quality in Victoria is heavily intertwined with the conventional model of public supply of drinking water and would not be adaptable, or fit for purpose, for regulating private service providers. The licensing frameworks in Queensland and Western Australia are flexible enough to allow for this.
- Definitions of drinking water often reflect the conventional model of urban water. This can result in confusion about what sources are suitable for drinking.
- Government policy often does not support, and may even discourage or prohibit, using certain sources for drinking water purposes.
- Mechanisms to control the quality of urban water catchments are currently limited.
- National guidelines, such as the ADWG, can play an important role in promoting consistency but their benefit will be diminished if there is inconsistent State legislation.



## Section 8 – Conclusions

This report has made a number of comparative observations about the urban water management regulatory space across three very different Australia cities: Melbourne, Perth and Brisbane. In each city the space is complex, consisting of many webs of regulatory controls seeking to meet multiple, and potentially competing, policy objectives in areas as diverse as public health, environmental protection, water security, urban amenity and consumer protection. As a result, regulation aimed at urban water management can occasionally be contradictory in terms of desired outcomes, and this results in a significant amount of complexity in the urban water industry (Young 2004). To an extent, such complexity is inevitable.

Yet, it is important to move beyond acknowledging that such complexity exists, towards an understanding of the opportunities presented within this complexity to promote and encourage water sensitive service delivery. This section brings together the key observations we have made about the various components of the urban water regulatory space, across the three cities. We explore some of general themes about how the existing regulatory spaces may be acting as an enabler or an impediment to innovation in water service delivery.

### 8.1. Regulatory frameworks reflect the conventional urban water model and may be impeding innovation

#### A. Current regulation still largely reflects the conventional model

The conventional model for urban water service provision in Australia is in evidence in each of the three cities. The model is heavily influenced by engineering as a discipline, and generally involves a linear system of water being collected, distributed and treated in large infrastructures which are centrally organised at the city level. Urban drainage and sewerage services are primarily focused on ensuring that unwanted water is removed from the urban environment. In terms of supply this model tends to exploit water from traditional surface or groundwater supplies, and provides consumers with water of a single, potable standard. Pursuant to this model, water supply and sewerage services are delivered by publicly owned water corporations, and drainage services tend to be provided by local councils. Significantly, this model places both water quality and economic efficiency considerations at the centre of service delivery.

The current regulatory frameworks, supply options and institutional arrangements in all three cities have been shaped in the context of this model. However, in all three cities, changes have been made over the past decade to regulatory frameworks, supply options and institutional arrangements, often in response to the challenges posed by water scarcity. Such responses were not always well considered and, in Melbourne and Brisbane, have resulted in significant investments being made in desalination infrastructure that may prove to be sub-optimal. Recent changes to the legislative frameworks, particularly in Queensland and Western Australia, mean that some of the legislative and regulatory barriers to water sensitive service delivery that were identified in earlier literature have now been removed. However, parts of the legislative and regulatory regimes in Queensland and Western Australia remain relatively new and untested.

#### B. The conventional model and existing regulatory frameworks have been successful

The conventional model has been very successful in providing Australians' with high quality and affordable water services. In particular, Perth, Brisbane and Melbourne all have good quality drinking water provided by large, centralised, publicly owned water service providers backed up by strong regulatory systems which apply a risk-based management approach to ensuring drinking water quality. Given the success of current arrangements, it might be expected that policy makers, water professionals and regulators would be conservative about deviating from the conventional model. If water sensitive service delivery is to be successful, it will be essential that good

public health outcomes are maintained. Public support and acceptance of such projects will require stringent public health regulation to ensure ongoing consumer trust and political support.

### **C. Experimentation has occurred within current frameworks but these may still be impeding innovation**

Drought, climate change, population growth, increased urban densification and changing societal expectations will continue to challenge the ability of the conventional model to keep delivering the water services Australians expect. There is some visible experimentation occurring with new approaches to urban water service provision. There is also a modest level of innovation currently occurring within the confines of existing regulatory frameworks with respect to stormwater capture and reuse schemes, MAR and recycled wastewater projects. It is contended that common barriers to the uptake of disruptive urban water technologies are regulatory frameworks that are better aligned with incumbent technologies (OECD 2015a). This contention accords with our observation that often, when existing regulatory frameworks are impeding innovation in water sensitive service delivery, it is because they reflect a current model of water supply, use and service delivery that may not be ideal for the future. In other words, regulation may have been developed to achieve traditionally legitimate regulatory objectives and may have been successful in achieving these, but we are now seeking even better performance across broader goals.

### **D. Property rights and allocation regimes have not kept pace with new water sources**

Across all three cities, the management and allocation of water resources are guided by statutory water planning systems, and the right to use and control water is vested in the Crown. However, the statutory allocation mechanisms do not always recognise rights in alternative water sources, such as stormwater. This means that there are no clear mechanisms for asserting rights to such resources or for allocating these resources. Certain and secure rights to take and use water are required by those instigating new investments in water sensitive service delivery. The lack of clearly defined rights and a fit for purpose allocation regime, increase transaction costs and are regulatory impediments to the exploitation of alternative water sources.

Nevertheless, the clarification of these ownership rights is likely to remain a modest regulatory enabler at best, given the low price of water historically. However, understanding ownership in water resources will also be important to understanding which entity will be liable if there are problems with the exploitation of the resource. Our future work will explore questions of ownership and liability.

In addition, the lack of clear allocation mechanisms for stormwater resources may mean that cities will be unable adequately to protect the environment from the problems which could result from the over-allocation of stormwater to consumptive purposes.

### **E. Current regulations for alternative water source projects are inconsistent and partial**

There are some specific regulations in place, in each city, to deal with both the environmental and public health aspects of alternative water source projects. A certain amount of national guidance on such schemes also exists. However, the arrangements vary significantly across the cities. Overall, the picture is confusing and inconsistent, particularly in relation to stormwater reuse projects.

We have found there to be a lack of standard terminology for defining alternative water sources. As our case study research observed (McCallum 2015) this may result in organisations developing their own working definitions, based on their own practical requirements. These definitions may have implications that are not yet understood within the broader regulatory environment.

The regulations and approvals processes often vary depending on whether a scheme is large or small and depending on whether it discharges water to the environment. Moreover, health concerns are often only

addressed as a subsidiary issue in environmental approvals processes. Approval processes for alternative water sources can be protracted and difficult to navigate.

Regulatory complexity and lack of consistency have been identified in the literature as significant barriers to the uptake of alternative water sensitive delivery. The current regulation of alternative water source projects results is complex and where gaps in regulatory frameworks exist the background law that applies may be unclear. This complexity and uncertainty increases transaction costs. While regulatory gaps are not necessarily fatal to projects proceeding, the clarification of definitions and regulatory approvals processes for such schemes, particularly those involving stormwater reuse, would provide certainty and guide decision making (Economic Development Queensland 2014a, Economic Development Queensland 2014b, McCallum 2015). The AGWR have the potential to provide guidance in cases where state level regulatory environments may be undeveloped, or where there are significant gaps in relation to new and emerging technologies.

#### **F. Current drinking water regulation models may not be suitable for all providers of water sensitive services**

The regulation of drinking water quality in Victoria is, for example, heavily intertwined with the conventional model of public supply of drinking water and is not able to regulate private service providers. In contrast, the licensing frameworks in Queensland and Western Australia are flexible enough to allow for this. However, in all cases current, risk-based regulatory models will be less suited to regulating smaller providers who may lack the institutional resources necessary to comply with the risk-based regimes. Furthermore, definitions of drinking water often reflect the conventional model of water management. This can result in confusion about what sources are suitable for drinking. Finally, national guidelines, such as the ADWG, can play an important role in promoting regulatory consistency. The adoption of standards in national guidelines may enhance certainty for innovators and investors when rolling out of projects and technology across multiple jurisdictions. However, the benefit of such guidelines is diminished if State legislation is inconsistent with the guidelines.

#### **G. Current frameworks may impede and do not encourage greater diversity in water service providers**

The conventional model sees private entities operating as sub-contractors, or technology providers, to public utilities, not as water service providers in their own right. Increasing diversity in the water sector could potentially allow for greater innovation in service delivery (Groshinski and Clark 2015) and more sustainable water service options to be developed. On this basis, encouraging new entrants into service delivery markets may be an important facilitator of innovation. However, there are significant impediments in existing regulatory frameworks and institutional arrangements to achieving diversity in service provision. In particular, Melbourne has legislative barriers which may prevent new water service providers entering the urban water sector. Even in Brisbane and Perth, where private provision of water supply is possible, this diversification has not yet occurred because of the control of the established public service providers over the essential infrastructure.

#### **H. Current frameworks are not adequate to regulate private water service providers**

Strong and clear consumer protection mechanisms are essential for the protection of consumer rights, and can also provide certainty to investors as to the level of service required. Yet it is contended that current regulatory arrangements are not sufficiently robust to support more extensive private sector involvement in the sector (Frontier Economics 2014). Victoria has gaps in its regulatory framework that would make it extremely difficult to regulate the service quality of private water service providers, for example. Likewise, a private water service provider in Western Australia would not be subject to the same requirements, concerning service quality and pricing, that apply to the Water Corporation. These are significant regulatory gaps. The *WICA* provides an example of a licensing regime that encourages and supports new market entrants while maintaining significant consumer protection provisions. None of the cities considered has a dedicated statutory regime that a private service provider could use to secure access to water that flows through the infrastructure of an existing network asset owner. This may make it difficult for new providers to access water in such assets.

### **I. There are gaps in current regulatory frameworks around the urban catchment**

One particularly significant point of dissonance between existing regulatory frameworks and emerging directions for urban water is the failure of current frameworks, across all three cities, to conceive of the urban area as a water catchment. Therefore, allocation mechanisms for stormwater resources may not be able to adequately protect the environment from the problems which could result from over-allocation. Nor may environmental protection frameworks adequately protect the water quality of stormwater which is currently regulated in a piecemeal fashion.

## **8.2 Economic incentives to innovate in current regulatory frameworks are weak**

### **A. Water is under-priced**

Pricing, across the three cities, does not reflect the true cost of water. In markets, price is the driver of much innovation. It follows logically that the continued under-pricing of water provides only weak incentives for innovation in the urban water sector. It has been contended that water pricing is the fundamental barrier to the development of private sector investment in the water and wastewater sector (NERA Economic Consulting and Gilbert + Tobin Lawyers 2006). It is also argued that pricing for the true cost of water would allow for an equitable evaluation of decentralised options (Holt 2006 as cited in Sharma, Cook et al. 2012).

### **B. There is limited evidence that independent price regulation encourages water sensitive innovation**

Each city has a different model of price regulation. It has been argued that difficulties with current regulatory frameworks for water pricing have potentially undermined the certainty needed for long-term planning in the water sector (Frontier Economics 2014). Despite this there is little evidence that wider uptake of the independent price regulation model would promote greater innovation in urban water service delivery. Economic regulation adopts a lens of economic efficiency while emerging policies to promote sustainability adopt a quite different lens (Liggins 2010). Achieving the vision of a WSC will involve examining the significant, and unresolved, issue of the crossover between these two lenses. It is likely to be asking too much of independent economic regulation frameworks to expect them to take on this policy leap and resolve these significant difficulties.

### **C. Direct grant funding has been a powerful regulatory incentive**

The provision of direct grant funding by governments has been shown to be a powerful regulatory incentive to innovate. The clear example has been the availability of federal funds to invest in the innovation required for stormwater reuse to a standard suitable for potable use in the Kalkallo Project.

### **D. Regulations that require the best practice management of stormwater can incentivise water sensitive service delivery**

Regulatory interventions that encourage the best practice management of stormwater, involving the collection of urban stormwater, are used in all three cities. These interventions can be a significant regulatory incentive to the promotion of stormwater as a resource. Clause 56.7 of the VPPs in Melbourne has been particularly successful and is the only intervention involving mandatory legislation. Encouragements in Brisbane and Perth have been by way of non-mandatory guidance and appear to have been less effective.

### **E. Developer contributions can be a useful tool in encouraging water sensitive service delivery**

The power to levy developer contributions can be a useful tool to incentivise developers to provide water sensitive servicing options, and may facilitate the growth of a market of new providers able to provide innovative solutions to developers. All three cities use such levies but these are currently inconsistently applied.

#### **F. Regulation to encourage the uptake of water sensitive service delivery at a building level is undeveloped**

Across all three cities, regulation that encourages the uptake of water sensitive service delivery at a building level is undeveloped and relatively ad-hoc. The regulation generally consists of non-mandatory guidelines, the provision of information or the giving of financial incentives to householders to increase their water efficiency. This contrasts with the position in New South Wales where BASIX, with its mandatory requirements for water efficiency, has driven innovation.

#### **G. Regulating point source pollution from sewage encourages the uptake of recycled wastewater projects**

All three cities have similar institutional arrangements and licensing-based regulatory frameworks in place to control point source pollution. These have performed well to date. There is also some degree of national consistency in water quality standards, although these are not consistently adopted and used. There is clear evidence that regulation that restricts, or increases, the price of point source pollution from sewage treatment plants can have a significant impact upon the uptake of recycled wastewater schemes (Institute for Sustainable Futures 2013b). Evidence that this regulation is cost-effective is less clear (National Water Commission 2011b).

### **8.3 Institutional arrangements are important for innovation**

#### **A. Water governance arrangements are complex**

Institutional arrangements for urban water management, planning and service delivery differ across the three cities and in all three cities the governance arrangements are extremely complex. However, with the exception of waterways management (see Section 8.3.D below), there is limited evidence that any one institutional model acts as a significant impediment to, or enabler of, water sensitive service delivery.

#### **B. A lack of coordination across institutions may be leading to lost opportunities**

In each city there is potentially a lack of institutional co-ordination between the various bodies with planning and management functions as a result of the inherent complexity of arrangements. This may be resulting in the loss of opportunities for the consideration of more water sensitive service delivery options. The OECD (2015a) contends that a common barrier to the uptake of disruptive urban water technologies involves fragmented institutions with limited incentives to innovate. In addition, the NWC (2011b) has suggested that increased institutional coordination in the urban water sector has the potential to result in increased efficiency, adaptability and the adoption of more water sensitive integrated water management options. It would be expected that clear institutional responsibility for IWCM would enable a more efficient and integrated use and management of water resources. However, there is limited evidence about the extent to which such potential inefficiencies exist, or the degree to which any lack of coordination is actually acting as an impediment to water sensitive service delivery and, if so, how this is occurring.

#### **C. Current institutional arrangements impede diversity in water service providers**

Existing institutional arrangements are a significant impediment to achieving diversity in water service provision as all three cities have significant institutional barriers to new water service providers. These result from the current provision of water services by publicly owned, centralised monopolies.

#### **D. Clear institutional responsibility for waterways health may result in stronger controls for non-point source pollution by stormwater**

Across all three cities, institutional responsibility for non-point source pollution from stormwater is shared between the environment protection agency and a number of other entities. However, where clear institutional responsibility for waterways health, drainage and stormwater management is given to just one entity, the Melbourne model, this has been seen to result in a much more co-ordinated approach being taken to the protection of waterways. This approach has resulted in Melbourne becoming a leader in stormwater management. Stronger and better enforced regulatory regimes to control stormwater pollution provide environmental benefits. In addition, the requirements that current Victorian planning regime places on developers to control stormwater releases from new developments were shown to be a regulatory facilitator in the Kalkallo Project (McCallum 2015). It may be expected that stronger non-point source pollution controls could encourage the greater uptake of stormwater capture and reuse schemes as alternative uses need to be found for stormwater that would previously have been released to the environment.

#### **E. There is an opportunity to improve coordination between land use and service planning**

Across all three cities, regulatory frameworks for the built environment are extremely complicated and there are a large number of entities with partial and overlapping influence on the built environment. Co-ordinated urban land and water use is central to the WSC vision. However, despite significant efforts aimed at co-ordination it is not currently being particularly well achieved in Brisbane, Melbourne or Perth. Moreover, our research (McCallum 2015) has indicated that the most effective use of stormwater resources requires consideration at a regional level of planning.

Victoria is the only jurisdiction to use state wide planning requirements, with express legal force, to directly target alternative water service provision and stormwater management. The requirements in Clause 57.04 of the VPPs appear to have been successful, but for maximum impact would need greater scope and enforceability. Otherwise, regulation for co-ordinated urban land and water planning across the three cities predominantly takes the form of guidance material lacking express legal compliance mechanisms.

#### **F. Publicly-owned water corporations can deliver innovation**

In each city, urban water services are currently provided by geographical monopolies which have a corporate structure, but which are in public ownership. There are no private water service providers operating in Perth, Brisbane or Melbourne. The publicly owned water service providers have been responsible for the implementation of innovative water service delivery projects, such as the MAR schemes in Western Australia and the Kalkallo stormwater harvesting scheme in Victoria. Institutions matter in innovation, and these public institutions have an important role to play.

#### **G. Current water service providers may be trusted to innovate in drinking water service provision**

We have seen that alternative water service provision may be supported by health regulators when such projects are undertaken by established, and trusted, water service providers with a history of successful drinking water quality management (McCallum 2015). There seems to be a significant degree of public, and regulator, trust in these public institutions. This suggests they may have a social and regulatory *licence to innovate* in drinking water service delivery. An implication of this is that new, privately owned water service providers that do not have a record of successful risk management, and longstanding relationships with health regulators, may find it harder to satisfy these regulators that public health risks of innovative projects will be well managed.

## 8.4 Political participation in water remains high

### A. Investments in water infrastructure are subject to political control

Investment decisions in water infrastructure are subject to significant political control across all three cities. The Productivity Commission (2011a) has noted that significant costs can be associated with poor supply augmentation decisions taken when short-term political pressures influence long-term supply decisions. Adaptive water management is required to ensure resilience in the urban water sector. Allowing water corporations to undertake investment in water infrastructure may result in the decreased politicisation of supply augmentation decisions and to potentially more timely investments being made in smaller, more sustainable water supply solutions. The Productivity Commission (2011a) supports water corporations being responsible for supply augmentation decisions while Bancroft and Gardner (2015) support the introduction of an independent procurement authority for Western Australia.

### B. The pricing of water is subject to political control

Each city has a different model for price setting with different levels of formal political control over pricing. These are very complex. However, even in cities with ostensibly independent pricing regulation, the reality is that significant political levers may still be applied to pricing decisions made by service providers. This accords with observations of the OECD that in many countries the 'political sensitivity of water pricing, leave the sector vulnerable to ad hoc politics (unwillingness to charge)' (2015a, p. 63). Such political dominance has the potential to impact upon the uptake of water sensitive service delivery by preventing increases in water prices that reflect the true cost of water. As a result, an effective cost barrier is imposed on new, alternative service delivery options.

### C. Government policies on suitable drinking water sources impede innovation

Government policies about suitable drinking water sources may act as a significant regulatory impediment to water sensitive service provision by discouraging innovation in potable supply. Even where a public health regime is neutral about the source of drinking water, the lack of express support for drinking stormwater or recycled wastewater can act as a powerful disincentive to innovation in service delivery.

### D. Environmental water allocations are currently unclear and politically controlled

The allocation of water for the environment differs across all three states, with the strongest provisions arguably found in Victoria. However, political control of water allocation indicates that, in times of scarcity, environmental water allocations will suffer. A lack of clarity about water allocations does not provide an enabling environment for water sensitive service delivery.

## Section 9 – Recommendations

Section 9 builds on our conclusions about the urban water regulatory space, across each of the three cities, and makes some recommendations about how existing regulatory settings and levers may be changed to encourage innovation in water sensitive service delivery. We have recommended the removal of specific, identified impediments to water sensitive service delivery. We have also made broader recommendations aimed at strengthening the enabling environment for water sensitive service provision. Our recommendations also identify research gaps. Within each high level recommendation the sub-recommendations have been placed in order of importance from a policy perspective. However, an approach combining various recommendations is likely to be most successful (OECDa 2015) as urban sustainability and resilience is best promoted by using multiple regulatory tools in a mutually reinforcing way (Van der Heijden 2014).

This report is not seeking to identify any one specific regulatory regime for implementation. Urban water problems and solutions are location-specific and each city has its own unique regulatory and institutional environment. As a consequence, duplication of the enabling features of a regulatory regime from one city to another would be inappropriate and in any case would be unlikely to result in the same outcomes being achieved. Each jurisdiction must implement these recommendations within its own institutional and legislative context.

Water is an important public good, and water supply and sewage removal are services in which the Australian public places much trust. Indeed, the promotion and maintenance of trust and confidence in water as an essential public service is the fundamental purpose of regulation of the water sector (Ross 2015). Existing institutional models for water service provision and regulatory frameworks currently secure such trust. Any changes to these must be able to retain a similarly high level of trust into the future.

We have also observed that some recent investment decisions and institutional changes, particularly those in Victorian and Queensland in response to the Millennium drought, have been criticised for producing less than optimal decisions (Productivity Commission 2011a). Accordingly, any reconfiguration of our models for urban water regulation should be done in a careful, incremental, systematic and considered way, not in response to short term political whims.

It will also be important to retain the significant strengths of current regulatory and institutional arrangements, which have delivered Australia with a very high quality of drinking water. For all the rhetoric, we should be cautious about moving to new models for water service delivery, particularly those involving service provision by new entities. Our future work will look at how risks that are currently allocated by existing regulatory frameworks would be allocated should new entities become involved in service provision.

### **Recommendation A – Reconfigure those parts of our regulatory frameworks impeding the emergence of water sensitive service delivery**

We have observed that often when regulatory frameworks are impeding innovation it is because they reflect a model of water supply, use and service delivery that may not be ideal for the future. This suggests that some reconfiguration of our regulatory frameworks may be necessary to allow new models of service delivery to emerge.



We specifically recommend that:

### **A.1. Clear and consistent regulatory requirements and approvals processes for alternative water source projects should be developed**

Developing clear and consistent definitions, regulatory arrangements and approvals processes for alternative water projects, involving both wastewater and stormwater and for potable and non-potable purposes, would significantly strengthen the enabling environment for water sensitive service delivery. For maximum impact, the adoption of national guidelines should be considered and inconsistencies with these in State laws resolved.

### **A.2. Property rights and allocation mechanisms for alternative water sources should be clarified**

There is significant authority supporting a clear legal status for all types of water, including alternative sources (Bancroft and Gardner 2015, OECD 2015b). Yet, in all three cities, the rights for service providers to use and exploit wastewater and stormwater resources are not well defined, and there are acknowledged gaps in water allocation frameworks around these resources. A lack of clear allocation mechanisms for stormwater resources also places environmental allocations of stormwater at risk. To promote greater innovation in the use of these resources, in a considered manner, we recommend that each jurisdiction clarifies statutory definitions of alternative water resources and allocation mechanisms for these resources.

### **A.3. Drinking water regulatory regimes should be reconfigured to ensure these are suitable for water sensitive service delivery**

Emerging water sensitive service delivery practices may challenge existing public health regulatory regimes that reflect the conventional model for urban water. In particular, a re-evaluation of existing drinking water regulatory frameworks may be required to ensure that current levels of protection to human health are maintained. Prescriptive regulation, which may be less flexible but could be more certain and cheaper to comply with, may suit smaller water service providers better.

### **A.4. Regulatory arrangements for private sector providers and develop third party access arrangements should be clarified and developed**

It is often suggested that increased diversity in the water service supply sector will promote innovation (National Water Commission 2011b, Groshinski and Clark 2015). However, the involvement of new providers in urban water services is extremely modest across the whole of Australia and virtually non-existent in the three cities considered for this report. If Australian governments wish to encourage greater diversity in service provision then:

1. The direct legislative barriers in Victoria would need to be removed and a new regulatory regime introduced to enable such private providers to be adequately regulated for service quality, and potentially for price. Western Australia would also need to ensure that customers of private water providers are provided adequate consumer protections. The *WICA* provides a model of a water service provider licensing scheme that addresses quality and consumer protection issues that other jurisdictions may wish to consider.
2. Current approaches to public health regulation in relation to drinking water, particularly in Victoria, may not be well suited to new, smaller providers and would need review. The *WICA* provides a model of a water service provider licensing scheme that addresses public health issues that other jurisdictions may wish to consider adopting. See also Recommendation A.3.
3. The difficulties that new water service providers might face in accessing water resources that flow through infrastructure, for example stormwater or sewerage pipes, owned by existing providers, need to

be addressed. The WICA provides an example of a tailored third party access regime other jurisdictions may wish to consider adopting.

In addition, the role being played by institutional barriers to entry into the service delivery market in all three cities is likely to be significant. This is not currently well understood and merits further research. There are also gaps in our knowledge about how smaller service providers might co-ordinate with the wider, centralised water grid in each city, and what rules may be suitable to govern this interaction. This would also benefit from further research.

### **A.5. The NWQMS should be reviewed and updated**

Fragmented and inconsistent regulation across jurisdictions has been identified as a significant barrier to the uptake of water sensitive innovation (Brown, Farrelly et al. 2009, Sharma, Cook et al. 2012) and national water quality standards could assist here. The NWQMS should be subject to regular review and updating to ensure they are fulfilling their potential as a regulatory tool. States should also give consideration to giving these standards statutory backing.

### **A.6. Regulatory mechanisms that recognise the urban catchment should be developed**

Across all three cities, the concept of the urban area as a water catchment is undeveloped. This deficiency has the potential to negatively impact stormwater service delivery projects in several ways. For example, stormwater resources may not be able to be adequately allocated to those seeking to exploit the resource, or the resource may be over-allocated, which may cause problems for the environment. Also the lack of strong mechanisms to control non-point source pollution may diminish its value as a resource. Further work is required to establish suitable regulatory models that could reflect the urban catchment in allocation and environmental protection frameworks.

## **Recommendation B – Strengthen the enabling environment for innovation by providing economic incentives in the regulatory space**

Traditionally water infrastructure has been financed by a combination of water tariffs and government grants, yet Australia, in common with other developed nations, faces significant challenges in financing upgrades and renewals of water infrastructure (OECD 2015a). While innovative tariff structures and government grants may be part of the solution, it is contended that additional sources of finance such as fiscal instruments targeting specific externalities around land development and stormwater management will also play a role (OECD 2015a). However, our current knowledge about the economics of the enabling environment for innovation is limited.

We specifically recommend that:

### **B.1. Governments continue to provide explicit grants to encourage innovation**

The continued provision of direct grant funding by governments is a clear way to address the otherwise weak price incentive to innovate in water sensitive service delivery.

### **B.2. Governments should consider regulatory tools that target the built environment**

Certain regulatory tools that have been targeted at the built environment, such as Clause 56.7 of the VPPs and BASIX, have had demonstrable success in encouraging innovation in water sensitive service delivery. These have tended to impose prescriptive requirements on those developing land in the urban area, or building new urban buildings, to meet particular environmental sustainability standards, or to keep the effects of development environmentally neutral. By doing this, they put a price on the externalities of urban development and transfer the costs of compliance to developers, builders and ultimately purchasers. This sets a strong economic incentive. It may also encourage new markets to develop, for example in recycled water and in water efficient products. It can provide a strong incentive to innovate to reduce the development's use of potable water and impact on the

centralised supply system. Greater consideration could be given to the wider adoption of such mechanisms, particularly those that also target existing building stock, although these type of regulations tend to be politically unpopular (Van der Heijden 2014). These regulatory tools also raise equity concerns as they transfer responsibility for wider amenity benefits from the general taxation base to particular homeowners, such as purchasers of new homes in the urban fringe (National Water Commission 2011a). For this reason they may again not be politically attractive.

### **B.3. Water pricing reform to encourage more water sensitive innovation should be considered**

The full pricing of all externalities and the use of scarcity pricing mechanisms may enable water sensitive service delivery options to be more price-competitive with conventional options. However, it is likely to be challenging to capture the positive externalities of many water sensitive service delivery options, in terms of broader urban amenity and liveability benefits, and scarcity pricing is currently untested. Moreover, whilst changes to the regulated tariffs that water users pay to water service providers may act as a regulatory incentive to encourage innovation in service delivery, these are likely to play only a limited role, as urban water demand is relatively inelastic to demand (OECD 2015a).

### **B.4. Governments should consider strengthening the enabling environment for wastewater recycling schemes through point source pollution regulation**

It is important to continue ensuring that point source pollution regulation restricts, or places an appropriate price on, sewage discharges to the environment. Within appropriate cost benefit constraints, all three cities should continue to pursue improvements in environmental discharge standards, as these can be a powerful incentive for the greater uptake of recycled water schemes.

## **Recommendation C – Better understand the role of our water institutions in innovation**

In each city, there are a number of institutions involved in water governance, and this is likely to pose coordination challenges to achieving more adaptable and integrated servicing solutions. However, further research would be required to demonstrate whether this institutional complexity is a significant impediment to the greater uptake of water sensitive service delivery, and if so, how this is occurring. We have also observed that each city's institutional arrangements are different and that there are significant benefits in having a dedicated waterways manager. However, much is still to be learnt about whether any particular arrangement is preferable for service delivery innovation. Furthermore, our research has also identified public and regulatory trust in drinking water service provision by the existing public water corporations. This may imply that these bodies have a greater social *licence to innovate* than new providers would have but, again, there is much to be learnt about the precise role public institutions play in water sensitive innovation.

In addition, we specifically recommend that:

### **C.1. Institutional responsibility for waterways health and stormwater management should be clarified**

The effectiveness, or otherwise, of stormwater management in a city may impact on the uptake of water sensitive service delivery projects. As a consequence, Brisbane and Perth should clarify the institutional responsibilities for waterways health and stormwater management in their urban areas and ensure that co-ordination mechanisms between bodies, if these responsibilities reside in multiple institutions, are strong.

## **C.2. Co-ordination between IWCM and land use planning should be strengthened**

Land use planning regimes and water planning regimes are not particularly well aligned in any of the cities considered, and even where they are aligned this is usually through soft law rather than mandatory legislative requirements. This represents a missed opportunity to facilitate water sensitive service innovation as it has been widely observed that incorporating water management into spatial planning and development offers a way to encourage innovative water management (OECD 2015a). Strengthening consideration of IWCM and planning into land use planning requirements, at a State level, should continue to be pursued.

## **C.3 Further research into the role of internal regulatory tools and professional practices should be conducted**

This report focused heavily on regulation produced by governments. However, it is contended that regulation generated internally within Australian businesses imposes far more costs than government generated regulation (Deloitte 2014b). The internal rules of water corporations are likely to be significant regulatory influences on behaviour in the sector, as are the professional practices of water industry practitioners. These may influence how regulation produced by governments is applied in practice. There was not sufficient publicly available data for us to consider these internal regulatory influences in any detail in this report. However, examining these regulatory tools would close an important research gap and should be a focus for future research.

## **Recommendation D – Develop better models for combining political and professional decision making in urban water**

In all three jurisdictions, the State Government is involved to some degree in investment decisions about water supply infrastructure. In recent times, these decisions have favoured large scale, centralised projects, rather than more localised, sustainable and adaptable solutions. These decisions have not always been transparent. It has been suggested that the de-politicisation of such decisions, and decisions about the retail pricing of water, may enable service delivery options to be considered on their merits (National Water Commission 2011b). However, the OECD (2015a) have identified four potentially conflicting objectives for water; economic efficiency, environmental sustainability, social equity and financial sustainability. In light of this, all pricing decisions involving water are likely to involve complex trade-offs and continued political participation in water seems likely. Nonetheless, it may be that better models are required whereby such decisions are shared between politicians and those with technical, professional knowledge and this issue would benefit from further research.

In addition, we specifically recommend that:

### **D.1. Environmental water entitlements should be clarified**

Investors in the water industry are likely to require greater certainty about how limitations on abstraction may occur and what mechanisms will apply. Each of the cities needs to clarify what water allocations will be made to the environment in the longer term and what legal security they will have.

### **D.2. Australian Governments should clearly signal their policies around the potable use of recycled water**

The future use of alternative sources in potable supplies would be significantly enabled by the clarification of statutory definitions and the clarification of, and possible change to, State Government policies on acceptable sources of drinking water.

# Appendix A: National and International Urban Water Regulatory Frameworks

## A. Water Resource Regulation

### International

#### The human right to water

In July 2010 the United Nations General Assembly made a non-binding resolution declaring that access to clean water and adequate sanitation was a human right.<sup>95</sup> This right has not been formally protected in Australia law and there are no current proposals to change this (Good 2011).

### National

#### NWI

For constitutional reasons water policy, planning and regulation have historically been State responsibilities in Australia.<sup>96</sup> However, in 1994 a national approach to water reform was agreed to by the Council of Australian Governments (CoAG). Ten years later, the NWI set out an agreed national approach to best practice water management which was overseen by the National Water Commission.<sup>97</sup> The NWI predominantly focused on rural water management and, in particular, on the management of the Murray Darling Basin. However, aspects of the NWI were focused on urban water and the intention was for the National Water Commission to focus on urban water reform at a later date (National Water Commission 2011b). The National Water Commission was abolished in mid-2015, although some functions have been transferred to other federal agencies.<sup>98</sup>

#### Supply/demand regulation

The Commonwealth Government has been actively involved in the regulation of water supply/demand. On the supply side it has made direct investments in water projects aimed at encouraging alternative water source use in the urban water sector.<sup>99</sup> On the demand side resource use efficiency has been promoted through the WELS. This is a national, compulsory labeling and registration scheme for certain water saving/using products. The WELS regime works by providing customers with information aimed at influencing their purchasing decisions and by prohibiting the sale of certain non-certified/approved products.

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<sup>95</sup> United Nations General Assembly (2010) Resolution 64/292: The human right to water and sanitation (Resolution adopted by the General Assembly on 28 July 2010).

<sup>96</sup> Indeed, s.100 of the *Commonwealth of Australia Constitution Act 1900* (Cth) specifically prohibits the Commonwealth from abridging, by law or regulation of trade or commerce, 'the right of a State...to the reasonable use of the waters of rivers for conservation or irrigation.' However, the referral of State powers to the Commonwealth in respect of the management of the Murray Darling Basin, and the enactment of the *Water Act 2007* (Cth), has seen the Commonwealth enter the water policy space in a significant way.

<sup>97</sup> The NWI is not itself legally enforceable but relies on implementation by the States.

<sup>98</sup> The Abolition Bill transferred two statutory functions to the Productivity Commission: assessments of progress in the implementation of the NWI, and inquiry into the effectiveness of the implementation of the Murray–Darling Basin Plan and associated Basin State water resource plans and the commission will produce a biennial National Water Planning Report Card. The Australian Bureau of Agricultural and Resource Economics and Sciences will monitor and report on water markets and the Department of the Environment will take on the assessment roles in relation to the National Partnership Agreement on Implementing Water Reform in the Murray–Darling Basin and the Carbon Credits (Carbon Farming Initiative) Regulations 2011. National performance reporting for urban water utilities in 2014–15 will be undertaken by the Bureau of Meteorology. Online resource: <<http://www.nwc.gov.au/organisation/closure-in-2014>> (accessed 3 June 2015) .

<sup>99</sup> Such as the *Water for the Future initiative* and the *National Urban Water and Desalination Plan*.

## B. Service Delivery and Price Regulation

### National

#### NWI pricing principles

Broadly speaking service delivery and price regulation of water utilities remains a State responsibility in Australia. However, best practice pricing and institutional arrangements are one objective of the NWI. Four sets of national metropolitan pricing principles have been developed which are intended to inform State pricing policies.<sup>100</sup>

#### Competition and Consumer Act

The framework for the regulation of markets, through the mechanism of competition law, and the protection of consumers, through consumer policy, are set out at a national level in the *Competition and Consumer Act 2010* (Cth) (CCA). The CCA is enacted in individual jurisdictions through State legislation.

Part IIIA of the CCA contains a third party access regime for infrastructure of national importance. Water infrastructure has not been considered infrastructure of national importance and therefore the CCA has had limited impact upon third party access to urban water infrastructure across the Australian states.

## C. Built Environment Regulation

### National

#### Infrastructure planning

As part of the NWI, non-mandatory national guidelines have been developed on WSUD option evaluation (BMT WBM Pty Ltd 2009). There is also a certain amount of non-mandatory national advice, of a technical and scientific nature, on WSUD and stormwater harvesting. This advice is primarily directed towards the health and environmental risks of stormwater rather than the risks related to flooding and is discussed further in Sections D and E of this Appendix A.

#### Design and construction

The National Construction Code (NCC) is a single national standard for all building and plumbing work in Australia. The NCC is updated annually and is given effect by State legislation. The NCC reflects a performance based approach to regulation and contains performance standards. These standards can be satisfied either by compliance with *deemed to satisfy provisions* or by providing an *alternative solution* which requires specific approval. The NCC cross references several hundred technical standards. Volumes 1 and 2 of the NCC contain the Building Code of Australia and Volume 3 of the NCC contains the Plumbing Code of Australia.

The Green Building Council of Australia operates an optional quality mark/certification scheme for the design, construction and fit out of sustainable buildings across Australia.<sup>101</sup> This enables innovative designs to be championed and water is one of several factors assessed as part of the certification process.

The Watermark Certification Scheme is a compulsory national certification scheme for certain plumbing products.

In addition, various industry specific technical infrastructure guidelines also apply across Australia.

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<sup>100</sup> National Water Initiative Pricing Principles.

<sup>101</sup> Both small and large scale.

## D. Environmental Regulation

### International

Australia is a signatory to several international legal and policy instruments aimed at the protection of freshwater resources and ecosystems (Stoeckel, Webb et al. 2012).<sup>102</sup> In addition, the *Berlin Rules on Water Resources*, while falling short of establishing binding legal rules, have a strong influence upon domestic law in this area (Stoeckel, Webb et al. 2012).<sup>103</sup> The *Berlin Rules on Water Resources* require the sustainable use of water resources and the protection of waters from environmental damage and pollution.<sup>104</sup>

### National

#### Environment Protection and Biodiversity Conservation Act

The *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (*EPBC Act*) incorporates into Australian law certain international environmental commitments. The *EPBC Act* also prohibits certain actions that may have a significant impact on matters of national environmental significance.<sup>105</sup> The *EPBC Act* contains a procedure to approve, subject to conditions, otherwise prohibited actions.

#### National Water Quality Management Strategy

The NWQMS represents a national approach to improving water quality in Australia and New Zealand. The NWQMS was established by Commonwealth and State governments in 1992, with the objective of sustainable resource use through the protection and enhancement of water quality.

The NWQMS requires the preparation of management plans for individual water catchments, aquifers, estuaries and coast waters.

The NWQMS has also given rise to a large number of non-mandatory guidelines which are all based on a preventative risk management framework. These guidelines are designed to influence State approaches to regulation and include:

- The Guidelines for Fresh and Marine Water Quality (Water Quality Guidelines). The Water Quality Guidelines outline water quality objectives and define indicators and trigger values to indicate when these qualities are threatened. These are currently being updated and revised.
- The Australian Guidelines on Water Quality Monitoring and Reporting (Monitoring Guidelines). The Monitoring Guidelines provide a framework for monitoring fresh, marine and groundwater quality.
- The Guidelines for Groundwater Protection in Australia.
- The Guidelines for Urban Stormwater Management.
- The Guidelines for Sewerage Systems.<sup>106</sup>
- The AGWR.<sup>107</sup> The NWC promotes State based regulatory approaches based on the AGWR. These are discussed in Section E .

The uptake of these guidelines varies across Australian jurisdictions and many are not currently up to date. An independent evaluation of the NWQMS (KPMG 2011) recommended greater clarity about the purpose of the

<sup>102</sup> The most significant being the *Intergovernmental Agreement on the Environment*, the *Ramsar Convention on Wetlands of International Importance*, the *Convention on Biological Diversity*, the *World Charter for Nature* and *Agenda 21*.

<sup>103</sup> Customary norms of international law relating to the regulation of freshwater resources produced by the International Law Association.

<sup>104</sup> Berlin Rules on Water Resources, Articles 7 and 8.

<sup>105</sup> These include Ramsar listed wetlands, migratory species and nationally threatened species.

<sup>106</sup> These include guidelines on effluent management, acceptance of trade waste, biosolids management, reclaimed water use and sewerage system overflows.

<sup>107</sup> These include guidelines for general management of health and environmental risks, augmentation of drinking water supplies, stormwater harvesting and reuse and managed aquifer recharge.

NWQMS, closer links to other water reform agendas, clearer roles and responsibilities and a series of rolling reviews of the guidelines.

### ANZECC Guidelines

The ANZECC Guidelines were prepared as part of the NWQMS and include environmental values relating to aquatic ecosystems, primary industries, recreational use, drinking water supply, industrial water and cultural and spiritual values.

These guidelines generally apply uniformly across Australia and rely on physico-chemical indicators. As water quality guidelines for aquatic ecosystem protection are considerably more complex, and can be region and water type specific, the ANZECC Guidelines have specified three different levels of aquatic ecosystem protection (high ecological value, slightly to moderately disturbed, highly disturbed), for which different guideline values may need to be derived. ANZECC water quality guidelines are therefore technical numerical concentration limits or a descriptive *statement recommended for the support and maintenance of a designated environmental value*. Water quality objectives take social and economic factors into account and are agreed to by all stakeholders.<sup>108</sup>

## E. Public Health Regulation

### International

The World Health Organisation (WHO) has produced guidance on how to set up a regulatory framework for the safe use of recycled water. The AGWR are based upon this guidance.

### National

#### The Australian Drinking Water Guidelines

The ADWG were developed to provide best practice guidance on the public health issue of drinking water quality. The ADWG were developed by the National Health and Medical Research Council in collaboration with the Natural Resource Management Ministerial Council.<sup>109</sup> The ADWG were designed to provide an authoritative reference to the Australian community, and the water supply industry, on what defines safe, good quality water, how it can be achieved and how it can be assured.<sup>110</sup> The ADWG applies an end point control approach to water quality management and contains standards relating to the safety and aesthetic quality of water. The ADWG acknowledges that the greatest risks to human health come from pathogenic microorganisms. There are further national standards in relation to the quality of bottled water.

#### Alternative water source guidelines

The AGWR (see also Section D) provide best practice advice on both the health and environmental aspects of water recycling by establishing water quality objectives and the permitted risk levels for each recycled water treatment system (Power 2010). The guidelines cover managing health and environmental risks for non-potable and potable water supply (Natural Resource Management Ministerial Council, Environment Protection and Heritage Council et al. 2008). This is a significant change from the *end-point control* approach used in the ADWG and in previous guidance on recycled water. This approach requires a regulatory emphasis on system validation. The NWC promoted State based regulatory approaches based on the AGWR.

National guidelines also exist for the human health management of water bodies such as rivers, lakes and bays which are used for recreational water based activities (National Health and Medical Research Council 2008). These are not binding.

<sup>108</sup> Australian and New Zealand Guidelines for Fresh and Marine Water Quality (Australian and New Zealand Environment and Conservation Council – ANZECC, 2000).

<sup>109</sup> Now abolished.

<sup>110</sup> Online resource: <<https://www.nhmrc.gov.au/guidelines/publications/eh52>> (accessed 3 June 2015).



# Appendix B: Brisbane's Urban Water Regulatory Frameworks

## A. Urban water management in Brisbane

### Brisbane's water challenges

Brisbane is the third largest city in Australia and is the capital, and the most populous city, of Queensland. Brisbane is situated in the SEQ region. The entire metropolitan area is managed, at a local government level, by the Brisbane City Council.

### Water supply challenges

Historically, and through to present day, Brisbane's water was largely supplied by rainfall captured and stored in dams. Groundwater is not a significant source of water in the region and is not used for reticulated supply.

In addition to traditional sources of water, the Queensland Government also invested in a number of large scale alternative water source projects. However, these are not currently contributing to water supply. The Gold Coast Desalination Plant was built, in response to the Millennium Drought, at Tugun on the Gold Coast and commenced operation in early 2009. However, the Gold Coast Desalination Plant was closed by 2011 due to an increase in annual rainfall. The Western Corridor Recycled Water Facility was also built in response to the Millennium Drought. However, after the return of rainfall it was announced that potable recycled water would only be considered to augment supply if reservoir levels fall below 40 per cent (Spearritt and Head 2010).

Climate change modelling for Australia indicates that the city of Brisbane will experience an increase in the number of dry days, but it is also likely that rainfall will be heavier during wet periods (CSIRO and Bureau of Meteorology 2012). Temperatures are expected to continue rising (CSIRO and Bureau of Meteorology 2012). Concerns over the prospect of irregular rainfall, due to climate variability and long term climate change, along with population growth and increased demand for potable water have influenced recent and ongoing reform in the urban water sector (Harman and Wallington 2010).

### Other responses to the Millennium Drought

The Millennium Drought also triggered significant policy and institutional changes in the water sector across the SEQ region in addition to investment in alternative water supply projects. These changes resulted in the centralisation of water supply bodies and the adoption of demand-management measures. Water sector reform commenced in 2007 and reduced the number of organisations managing and distributing water supply in the SEQ region from 21 to 6. An engineering and technical approach was taken to water planning during the drought (Head 2014) with centralist reform undertaken in response to the concern that localised water utilities were not equipped to deal with the drought, and that water was unable to be transported from areas of high supply to areas of high demand. The institutional and regulatory reform in Queensland was costly. For example, the transitional and establishment costs for Brisbane's new water service provider were \$39.1m, as of June 2010 (Brisbane City Council 2011).

Modest rainfall returned in 2009, and at this point water restrictions were lifted. In the wake of a state election, the focus also moved from alternative water projects to job creation, investment and efficiency in the provision of water services (Head 2014). The incoming Newman Government sought to combat increases to bulk water costs that had resulted from costly infrastructure investment in desalination and recycled water. Desalination and

wastewater operations were ceased and the Queensland Water Commission, established during the Millennium Drought, had its functions transferred to the bulk water supplier.

### Flooding challenges

The SEQ region is geographically situated in a sub-tropical zone, which fluctuates between temperate weather patterns and more extreme weather. Floods are one of the most prominent and destructive natural hazards facing Queensland, and particularly Brisbane, which is built on a flood plain (Brisbane City Council 2013). Accordingly, flood management is essential in the urban built environment and, historically, reservoirs and dams constructed in river valleys by state and local government authorities, served as the primary flood-mitigation facilities.<sup>111</sup>

In 2010 and early 2011 unusual weather conditions resulted in major flooding, particularly in the Brisbane catchment. As a result of the floods the policy focus returned to water issues. Public sector spending on flood recovery was an estimated \$5 billion (National Climate Change Adaptation Research Facility 2013) and in 2011 a Commission of Inquiry was established to investigate flood mitigation failure (Queensland Floods Commission of Inquiry 2012).

With increasing temperatures and water vapour from climate change, Brisbane is likely to experience an increase in heavy rainfall events and subsequent flooding (Allen and Ingram 2002). The Queensland Government Preliminary undertook an examination of the risks of future flooding under climate change. The subsequent Inland Flood Study report, published in 2010, made recommendations to improve flood resilience in the region, specifically a uniform approach to flood management and a number of specific measures aimed at improving flood resilience (Department of Environment and Resource Management, Department of Infrastructure and Planning et al. 2010 ). To date, the approach outlined by this report has not been formally adopted.

### Institutional arrangements

Water supply, stormwater and sewerage services in SEQ have traditionally been a local government service. However, recent restructuring has resulted in increased control and involvement by the Queensland Government. Currently in Brisbane there is vertical separation between bulk supply-transmission and retail-distribution. Seqwater is the monopoly supplier of bulk potable water, and bulk sewerage services, in the SEQ region. A publicly owned water statutory body, QUU, supplies retail potable water and retail sewerage services, on a monopoly basis, to domestic and business customers in the Brisbane area. Stormwater services are provided by Brisbane City Council.

## B. Brisbane's Water Resource Regulation

### Institutional framework

#### Urban water planning

Numerous Queensland institutions have urban water planning functions and responsibilities. For example:

- The Minister for Natural Resources and Mines is responsible for ensuring various Water Resource Plans (WRPs) are undertaken, and for water allocations under these WRPs.
- The DEWS provides policy development, legislative reform, planning and regulation services for the Queensland water sector.

<sup>111</sup> For example, the Wivenhoe dam was completed in 1984 on the upper Brisbane River in response to a major flooding event in 1974. The 1974 flood resulted in government policy focused upon flood mitigation engineering and the construction of the Wivenhoe dam was to 'flood proof' the city (Head 2014).

- Seqwater, as the bulk water supplier, has specific waterways management, drainage and flood management functions and specific obligations to plan for water supply. Seqwater is also responsible for the long term planning of the region's future water needs, a function that was formerly undertaken by the Queensland Water Commission.
- QUU, as a water service provider, has specific obligations to plan for water and sewerage services in its geographic area.<sup>112</sup>
- Brisbane City Council has water planning functions in relation to flood-management and undertakes integrated total water cycle management planning.<sup>113</sup>

The urban water planning system is complex and the overlapping responsibilities of the various institutions are not always clear.

### Catchment and waterways management

Catchment and waterways management in the Brisbane area is undertaken by the Healthy Waterways Partnership, SEQ Catchments Limited and Seqwater. The Healthy Waterways Partnership is a not-for-profit, non-government organisation which has the aim of protecting and improving waterways health through monitoring, planning and implementing waterways health actions via regional collaboration.<sup>114</sup> SEQ Catchments Limited is a community-based, not-for-profit business that works to protect and restore the SEQ region's natural assets and biodiversity (SEQ Catchments 2013) and is a natural resource management organisation funded by a number of government and non-government organisations.<sup>115</sup> SeqWater undertakes strategic catchment planning to minimise and manage the risks to drinking water catchments and develops Natural Asset Management Plans.

### Legislative framework

The *Water Act 2000* (Qld) (*Water Act*) is the overarching legislative framework for water resource regulation in Queensland. The *Water Act* provides the framework for water planning, water allocation and for the provision of water and sewerage services.

Under the *Water Act* catchment-based WRPs and resource operation plans (ROPs) are to developed for the allocation and sustainable management of water resources to meet future requirements, including the protection of natural ecosystems and security of supply to water users.

The *Water Act* draws on aspects of IWCM and acknowledges alternative water sources. For example, it recognises stormwater as part of the water framework,<sup>116</sup> and acknowledges alternative water sources, such as desalination and recycled water, in certain circumstances.<sup>117</sup> However it cannot be considered a water cycle Act.

### Water allocation

The *Water Act* sets out the water entitlements framework for Queensland.<sup>118</sup> The State is responsible for granting statutory authorisations to take and use water under the WRPs. Certain residual statutory rights to take and use

<sup>112</sup> Water Netserv Plans under *South East Queensland Water (Distribution and Retail Restructuring) Act 2009* (Qld) s 99BJ.

<sup>113</sup> Brisbane City Council has prepared the Water Smart Strategy.

<sup>114</sup> Healthy Waterways' partners include members from government, industry and the community including Brisbane City Council, the Department of Environment and Heritage Protection as well as the water utilities for the Brisbane area. More information on the Healthy Waterways Partnership can be found on the organisation's website: <<http://www.healthywaterways.org/Home.aspx>> (accessed 3 June 2015).

<sup>115</sup> Funding is provided by the federal departments of the Department of Agriculture and the Department of the Environment and the Queensland departments of Department of Natural Resources and Mines and the Department of Environment and Heritage Protection. Financial support is also provided by local councils in the SEQ region, Council of Mayors, QUU, Energex, Powerlink and Stockland.

<sup>116</sup> The *Water Act 2000* (Qld) provides a statutory definition for surface water which is not in a waterway (i.e. stormwater).

<sup>117</sup> *Water Act 2000* (Qld) Schedule 4.

<sup>118</sup> *Water Act 2000* (Qld) s 19.

water are also granted directly by the *Water Act* to adjacent landholders<sup>119</sup> and to persons accessing public land for certain purposes.<sup>120</sup>

A water allocation is an authority to take water, and an entitlement to a share of the available water resource in a surface water catchment. The allocation may be traded in accordance with trading rules under ROPs.<sup>121</sup> The water allocation has title separate to land title.

In metropolitan Brisbane the most important water entitlements are bulk water supply entitlements and water licences. In relation to bulk water supply entitlements, the *Water Act* sets out the process for bulk water supply agreements for the supply of bulk services between an SEQ bulk supplier and a bulk water customer.<sup>122</sup> The *Water Act* allows for the Minister to decide the cost, or price, of bulk water for a particular period.<sup>123</sup>

The water entitlements framework embodies a somewhat historical view of Queensland's water sources as only surface water allocations can be traded. The framework does not consider the right to use and trade in alternative water sources, such as stormwater and recycled wastewater.

### Supply/demand regulation

To meet supply obligations, QUU, Seqwater and the DEWS must balance supply and demand. The *Water Act* sets out service objectives for water security in the SEQ region, and requires the bulk water authority and water service providers to have water security programs to meet service objectives.<sup>124</sup>

During the Millennium Drought, supply management largely took the form of significant direct investment in rainfall-independent sources. Demand management measures were more disparate and included water restrictions on the consumption of potable water,<sup>125</sup> education campaigns, mandatory rain tank installations for new properties, rebates for water efficient products and restrictions on the sale of non-WELS products. The former Queensland Water Commission also undertook a marketing campaign to encourage water conservation across indoor and outdoor use and to reduce per capita consumption below 140 litres. The marketing campaign was successful and price increases provided an incentive for restraint. Behaviour changes continued after the end of the drought and this program of water conservation and efficacy is considered an enduring success.

### Regulatory reform initiatives

The DNRM undertook a review of the *Water Act*. The aim of the review was to achieve consistency with NWI commitments around the purpose of the *Water Act*, to reduce 'red-tape', to streamline regulations, to accelerate the release of unallocated water reserves and to simplify requirements for water entities and trusts. The *Water Reform and Other Legislation Amendment Act 2014* (Qld) was passed in late 2014.<sup>126</sup>

## C. Brisbane's Service Delivery and Price Regulation

### Institutional framework

On 1 July 2010, QUU was established as both:

<sup>119</sup> *Water Act 2000* (Qld) s 20A. These rights are limited to domestic and stock watering uses.

<sup>120</sup> *Water Act 2000* (Qld) s 20. This is limited to firefighting, camping and watering travelling stock purposes.

<sup>121</sup> The rules also seek to ensure that overall planning objectives are met: *Water Act 2000* (Qld) Chapter 2, part 4, s 122.

<sup>122</sup> *Water Act 2000* (Qld) ss 260G, 360V.

<sup>123</sup> *Water Act 2000* (Qld) s 360W.

<sup>124</sup> *Water Act 2000* (Qld) Chapter 2A, s 340.

<sup>125</sup> Water restrictions, despite being considered politically unpopular, were an important demand measure and allowed for the deferral of new supply-side infrastructure, such as additional desalination plants, which would have been costly (Head 2014).

<sup>126</sup> Online resource: <<http://www.dnrm.qld.gov.au/our-department/policies-initiatives/water-management-initiatives/water-reform>> (accessed 18 May 2015).

- a distributor retailer for Brisbane and surrounds under the provision of the *South East Queensland Water (Distribution and Retail Restructuring) Act 2009* (Qld) (*Water Restructuring Act 2009*).
- and as a service provider under the *Water Supply (Safety and Reliability) Act 2008* (Qld) (*Water Supply Act*).

QUU is responsible for the delivery of water and wastewater services across five local council areas, including the Brisbane metropolitan area, and was formed by the merging of water assets from these five local councils.<sup>127</sup>

The bulk water provider, Seqwater, was established under the *South East Queensland Water (Restructuring) Act 2007*<sup>128</sup> (*Water Restructuring Act 2007*). Seqwater came into being on 1 January 2013 through a merger of three state-owned water businesses.<sup>129</sup> Seqwater is the monopoly supplier of bulk potable water and water treatment for the larger SEQ region.<sup>130</sup>

## Service delivery regulation

### Water service providers

All water service delivery providers must be established as a water service provider under the *Water Supply Act*. Water service providers must ensure that all premises in the service area are able to be connected directly and separately to the service provider's water supply and sewerage infrastructure for the area.<sup>131</sup> Water service providers therefore have a statutory obligation to provide water services.

### Consumer protection

There are a number of statutory customer protection provisions. The *Water Supply Act* requires all service providers to prepare and publically publish customer service standards for the supply of the registered service.<sup>132</sup> The *Water Restructuring Act 2009* also provides a number of customer protection responsibilities in relation to complaint handling procedures, information within water bills, meter reading and testing, use of security deposits and publishing of customer service charters. Residential customers in the SEQ region are also protected by the *Water and Sewerage Services Code for Small Customers in South East Queensland*.<sup>133</sup> This code outlines customer service standards and responsibilities applying to distributor-retailers and small customers in the SEQ region.

The EWOQ was established under the *Energy and Water Ombudsman Act 2006* (Qld).<sup>134</sup> EWOQ has the purpose of giving small water customers a timely, effective, independent and just way of referring disputes about particular matters involving water entities and having the disputes investigated and resolved.<sup>135</sup> EWOQ however cannot accept a referral about, or investigate the fixing of charges for wastewater or water services, or

<sup>127</sup> The local councils were Brisbane, Ipswich, Scenic Rim, Lockyer Valley and Somerset and QUU is jointly owned by these five councils. This A\$4.3bn merger was the largest ever water transaction and second largest ever infrastructure transaction in Australian history.

<sup>128</sup> *South East Queensland Water (Restructuring) Act 2007* (Qld) s 6.

<sup>129</sup> SEQ Water Grid Manager, LinkWater and the former Seqwater.

<sup>130</sup> The SEQ region as defined in the *Water Act 2000* (Qld) s 341.

<sup>131</sup> *Water Supply (Safety and Reliability) Act 2008* (Qld) s 164. See also *Water and Sewerage Services Code for Small Customers in South East Queensland* which states that where a small customer requests a connection to an available service, pays the relevant connection fees and connection is technically feasible, the water retailer must connect or agree to connect within 20 business days after the request.

<sup>132</sup> *Water Supply (Safety and Reliability) Act 2008* (Qld) ss 115-117. QUU has prepared a customer charter outlining customers' rights and responsibilities, information about the relevant services that QUU provides, information about the Hardship Policy that QUU operates and processes for complaints and disputes.

<sup>133</sup> Enacted under the *South East Queensland Water (Distribution and Retail Restructuring) Act 2009* (Qld) s 93.

<sup>134</sup> *Energy and Water Ombudsman Act 2006* (Qld) s 10.

<sup>135</sup> *Energy and Water Ombudsman Act 2006* (Qld) s 3. The functions of the ombudsman are listed under *Energy and Water Ombudsman Act 2006* (Qld) s 11(1)(a)-(e): to receive and investigate, and facilitate the resolution of, disputes referred to it; to resolve the disputes if they cannot be resolved by agreement, negotiation or mediation; to promote the operation of this Act to eligible customers and relevant occupiers of land; to identify systemic issues arising out of complaints anyone makes to the it; and other functions conferred on it under any other Act.

methodologies for fixing the charges.<sup>136</sup> EWOQ is also prohibited from accepting a referral about, or investigating, the content of government policies or the customer water and wastewater code.<sup>137</sup>

### Industry oversight

Oversight of the performance of the water corporations in delivering their service supply and other obligations under the *Water Act*, the *Water Restructuring Act 2007* and the *Water Restructuring Act 2009* is conducted by the Minister for Energy and Water Supply.

### Competition barriers

The QCA has undertaken a review of the water sector and has determined that, while there appears to be opportunity for competition in service provision, in that there are no explicit legal barriers to entry into the market, there are strong institutional impediments to competition or contestability (Queensland Competition Authority 2014a).<sup>138</sup> The QCA have also noted that there is some potential for competition between water supply and sewerage services, particularly where recycled wastewater can replace potable water supply including through dual-reticulation systems (Queensland Competition Authority 2014a).

However, there is a possibility that privatised entities may potentially be able to become owners of distributor-retailers in the future (Baumfield 2012).<sup>139</sup> In the event that an independent water service provider is registered as a service provider in Queensland,<sup>140</sup> it would be subject to the same requirements as the current water service providers concerning service quality and pricing regulation.

## Price Regulation

### Price setting

Bulk water prices for Seqwater are set by the Queensland Government.<sup>141</sup> There is no independent price setting in Queensland, for either bulk water or retail water.

Pricing of the retail water and wastewater services provided by QUU is undertaken by the utility itself in accordance to a price mitigation strategy (Queensland Competition Authority 2014b). Retail prices typically include a sewerage access charge, a water access charge and bulk water and retail distribution water prices paid per litre of water used.<sup>142</sup>

The large scale supply augmentation investment in the SEQ region during the Millennium Drought resulted in significantly increased consumer prices. Seqwater, in particular, has sought to recover the costs of these investments. Increased costs has focused public attention on the price regulation framework and consumer perceptions of whether they are being fairly charged for the value of the services they receive (Baumfield 2012). In response to the public outcry concerning increases in water prices in May 2011 the Minister for Energy and

<sup>136</sup> *Energy and Water Ombudsman Act 2006* (Qld) s 12A.

<sup>137</sup> *Energy and Water Ombudsman Act 2006* (Qld) s 12B.

<sup>138</sup> The Queensland Competition Authority (2014a) did raise concern as to the approval powers that local governments have as assessment managers under the *Sustainable Planning Act 2009* in relation to urban development (which includes water infrastructure). The QCA noted that local governments could potentially stymie potential private investors from installing water infrastructure.

<sup>139</sup> *South-East Queensland Water (Distribution and Retail Restructuring) Act 2009* (Qld) s 22 which states that a distributor retailer's participation agreement may provide for such matters as the reissuing, registration, transfer of participation rights (subject to Ministerial approval) and the creation of different classes of participants.

<sup>140</sup> *Water Supply (Safety and Reliability) Act 2008* (Qld) s 20.

<sup>141</sup> The Minister for Energy and Water Supply has the power to set bulk water prices under the *Water Act 2000* (Qld) s 360W.

<sup>142</sup> Online resource: <<http://www.qca.org.au/Water/Urban-retail-water/Retail>> (accessed 18 May 2015).

Water Utilities introduced the *Fairer Water Prices for SEQ Amendment Bill Act*. This Act amended the *Water Restructuring Act 2009* and introduced price caps for the 2011/12 and 2012/13 financial years.<sup>143</sup>

The amendments also required Brisbane City Council to prepare and adopt a written Price Mitigation Plan outlining how it would mitigate the impact of water and wastewater charges on customers for the period from June 2013 to June 2019. The resulting joint Price Mitigation plan, prepared by the Brisbane Council and other local councils, noted that bulk water price increases set by the Queensland Government were above CPI and were not subject to the price capping rules. The plan's first strategy was for the participating councils to continue to lobby the Queensland Government for a reduction, or a cap, on bulk water prices. The QCA has recommended that prices continue to be monitored against CPI-X (Queensland Competition Authority 2014a, Queensland Competition Authority 2014b).

### Price oversight

The QCA is Queensland's independent economic regulator of water and wastewater services. QCA was established under the *Queensland Competition Authority Act 1997* and has the power to investigate and report on the pricing practices of certain declared monopoly, or near monopoly, business activities of State and local governments.<sup>144</sup> The QCA also has powers to declare a government business activity, or a non-government business activity, to be a monopoly business activity,<sup>145</sup> or a water supply activity to be a monopoly water supply activity.<sup>146</sup> QCA may investigate the pricing practices of such monopolies or simply monitor their pricing practices upon a referral from the Minister responsible.<sup>147</sup>

### Regulatory reform proposals

QCA was directed to investigate and report on a long-term regulatory framework for the monopoly retail water and sewerage activities of the five SEQ region distributor-retailers. QCA was tasked to facilitate the transition to more light-handed pricing oversight over time to minimise the administrative burden on the entities (Queensland Competition Authority 2014a).<sup>148</sup> The resulting Water Supply Services Legislation Amendment Bill 2014 proposes to remove the delegation of QUUs powers to its participating local governments and establish a 'utility model'. The QCA has also recommended that as part of a light handed regulatory approach SEQ water service providers develop best practice customer engagement strategies and report annually to the QCA on their strategies in order to complement the oversight of prices (Queensland Competition Authority 2014a).<sup>149</sup>

<sup>143</sup> The price cap for the 2011/12 financial year was 3.6% and for the 2012/13 financial year, the price cap was not more than the percentage represented by the CPI<sup>2</sup> above the base charge for 2011-12. QCA has found consistently that there has been compliance with the CPI cap instituted for the 2011-2013 period (Queensland Competition Authority 2014a).

<sup>144</sup> *Queensland Competition Authority Act 1997* s 10 (e).

<sup>145</sup> *Queensland Competition Authority Act 1997* s10(a) (i).

<sup>146</sup> *Queensland Competition Authority Act 1997* s10(a) (ii).

<sup>147</sup> As at July 2014, the Treasurer, Minister for Trade, Minister for Justice and Attorney General.

<sup>148</sup> The QCA considers it unnecessary for prices to be determined by the Ministers or the QCA as previous price monitoring reviews of QUU and Unitywater have found no evidence of an exercise of market power.

<sup>149</sup> Queensland Competition Authority (2014a) states that approach is light handed in comparison to the previous price monitoring framework as it does not include annual complex and costly prudency and efficiency reviews of capital or operating expenditure.

## D. Brisbane's Built Environment Regulation

### Land and waterways use

#### Catchment management

Where development is proposed in a water catchment area, it is a requirement under the SPP 2014 that local planning schemes ensure that the development is to be undertaken in a manner which contributes to the maintenance and enhancement, where possible, of water quality. Planning schemes are also required to ensure that development in a water supply buffer area complies with the specific outcomes and measures contained in the Seqwater Development Guidelines.<sup>150</sup>

#### Stormwater management

The SPP requires local planning schemes to implement provisions that require development proposals for an urban purpose be located, designed, constructed and/ or managed to avoid, or minimise, impacts arising from altered stormwater quality, or flow. Proposals must also avoid the release and mobilisation of nutrients to avoid the increased risk of algal blooms.

#### Waterways/floodplain management

Development in the Brisbane flood plain area is regulated by Brisbane City Council's planning provisions. In response to the findings of the Queensland Floods Commission of Inquiry, State departments, agencies and local governments have commenced a technical study of the Brisbane River Catchment and are in the process of preparing a Floodplain Management Study and Plan to identify floodplain risks and assess various management options to increase the community's resilience to floods in the Brisbane River catchment

The study will guide the Queensland Government and local councils in the catchment area in prioritising a range of infrastructure projects and ensuring better land use planning to manage residual flood risks. The resulting plan will inform the local planning schemes.

#### Flood management

The *Draft State Planning Policy Guideline - Guidance on flood, bushfire and landslide hazards* released in December 2013 states that a local government planning scheme should take an evidence-based risk management approach to avoid or mitigate the risks associated with natural hazards (Department of State Development Infrastructure and Planning 2013b). This is reiterated in the SPP which requires the Brisbane City Council to identify in its planning schemes all natural hazard areas for flood based on a fit for purpose natural hazard study, and include provisions that seek to achieve an acceptable or tolerable level of risk.<sup>151</sup> Planning schemes should also include provisions that require development to avoid flood-prone areas, or mitigate the risks of flooding to an acceptable or tolerable level, as well as ensure that an increase in the severity of flooding is avoided. Brisbane City Council has incorporated all of these requirements into their planning scheme.

Development in flood prone areas is also regulated by the recently developed Queensland Development Code *Mandatory Part 3.5 - Construction of buildings in flood hazard areas*. This code sets out requirements for certain building work where the work is carried out in a designated flood hazard area. The Building Regulation 2006 (Qld) has also been amended to align with the new SPP and to refine the operation of Queensland Development Code Mandatory Part 3.5. As the local government body, the Brisbane City Council may designate and declare a flood hazard area and define a flood level in the Brisbane area.<sup>152</sup>

<sup>150</sup> Development Guidelines for Water Quality Management in Drinking Water Catchments 2012 in the SEQ region.

<sup>151</sup> Based on a fit for purpose risk assessment consistent with AS/NZS ISO 31000: 2009 Risk Management.

<sup>152</sup> This could be by a temporary local planning instrument or a resolution such as Building Regulation 2006 (Qld) r 13.



## Infrastructure planning

Infrastructure planning is regulated by specific rules relating to water industry infrastructure, which are contained in primary and delegated legislation, and through the statutory planning regime.

### Statutory planning

The Department of State Development, Infrastructure and Planning is the department largely responsible for planning in Queensland and its work is governed by the *State Development and Public Works Organisation Act 1971* (Qld),<sup>153</sup> the *Sustainable Planning Act 2009* (Qld) (*SPA*),<sup>154</sup> and the *Economic Development Act 2012* (Qld) (Department of State Development Infrastructure and Planning 2013a).<sup>155</sup> The *SPA* is the pre-eminent planning act in Queensland and provides the overarching framework for Queensland's planning and development system. The *SPA* is supported by the Sustainable Planning Regulation 2009. The purpose of the *SPA* is to seek to achieve ecological sustainability, by managing the process by which development takes place, managing the effects of development on the environment, and continuing the coordination and integration of planning at the local, regional and State levels.<sup>156</sup> The *SPA* includes information regarding the preparation of a council's planning scheme, the meaning of development and when council approval is required.

Planning and development is also informed by the SPP which is a single, whole-of-government statutory instrument that defines the Queensland Government's policies about matters of state interest in land use planning and development.<sup>157</sup> If there is an inconsistency between a SPP and a regional plan or local planning instrument, the SPP prevails to the extent of the inconsistency.<sup>158</sup>

The SPP is supported by State Planning Regulatory Provisions (SPRPs),<sup>159</sup> statutory instruments that regulate development.<sup>160</sup> SPRPs provide for a charge for the supply of infrastructure and protect planning scheme areas from adverse impacts.<sup>161</sup> If there is an inconsistency with any other planning document under an Act, the SPRP prevails.<sup>162</sup>

Growth management and development in the SEQ region is regulated by the SEQ Regional Plan 2009-2031 (SEQ Regional Plan), which is a statutory instrument that provides an integrated planning policy for the SEQ region.<sup>163</sup> The SEQ Regional Plan aligns structure plans, planning schemes and state agencies' plans with matters of state interest in land use planning and development. Local planning schemes must be amended to reflect regional plans.<sup>164</sup>

The SEQ Regional Plan is supported by the South East Queensland Natural Resource Management Plan 2009–2031 (SEQ NRM Plan). The SEQ NRM Plan is a non-statutory environment and natural resource management plan that articulates measurable targets for the condition, and extent, of the environment and natural resources

<sup>153</sup> Which provides for state planning and development through a coordinated system of public works organisation, environmental coordination and related purposes.

<sup>154</sup> Which manages the development process to achieve ecological sustainability.

<sup>155</sup> Which concerns economic development and development for community purposes.

<sup>156</sup> *Sustainable Planning Act 2009* (Qld) s 3.

<sup>157</sup> *Sustainable Planning Act 2009* (Qld) chapter 2, part 3: A state interest is defined as an interest that the Minister considers affects an economic or environmental interest of the state or a part of the state, including sustainable development, or an interest that the Minister considers affects the interest of ensuring there is an efficient, effective and accountable planning and development assessment system.

<sup>158</sup> *Sustainable Planning Act 2009* (Qld) s 25.

<sup>159</sup> Developed under the repealed *Integrated Planning Act 1997* (Qld) SPRPs remain current under the *Sustainable Planning Act 2009* (Qld).

<sup>160</sup> *Sustainable Planning Act 2009* (Qld) Chapter 2 Part 2.

<sup>161</sup> *Sustainable Planning Act 2009* (Qld) s 16(1).

<sup>162</sup> *Sustainable Planning Act 2009* (Qld) s 19.

<sup>163</sup> The plan is currently undergoing review to have an increased focus on economic development; Online resource: <http://www.dsdip.qld.gov.au/regional-planning/seq-regional-plan.html> (accessed 18 May 2015).

<sup>164</sup> *Sustainable Planning Act 2009* (Qld) s 39. If there is an inconsistency between a regional plan and a local planning instrument, the regional plan prevails to the extent of the inconsistency.

and which is aligned to desired regional outcomes and policies in the SEQ Regional Plan.<sup>165</sup> The administration of the SEQ NRM Plan is undertaken by SEQ Catchments, which is committed to delivering the long term targets detailed in the plan.<sup>166</sup>

Local planning schemes must also be aligned with standard planning scheme provisions in Queensland.<sup>167</sup> These standard provisions provide for a consistent structure for planning schemes and for implementing integrated planning at the local level across the state.<sup>168</sup> They are statutory instruments.<sup>169</sup> Standard provisions prevail over local planning instruments to the extent of the inconsistency and have effect in place of the local planning instrument to the extent of the inconsistency.<sup>170</sup>

## Infrastructure planning

### Drainage infrastructure

Brisbane City Council has the responsibility for providing stormwater drainage services to metropolitan Brisbane. Non-binding guidelines, such as the Queensland Urban Drainage Manual, influence the type of drainage infrastructure provided.

The first edition of the Queensland Urban Drainage Manual, released in 1992, established principles of minor and major flow management and had a focus on mitigating increasing flows from urbanisation. The second edition, released in 2007, updated this to include significant guidelines on the management of stormwater for improved environmental outcomes.

WSUD has also become widely accepted in Queensland, and there is a strong focus on stormwater quality and quantity. The Queensland Government's Department of Infrastructure and Planning released the *Implementation Guideline No. 7 – Water Sensitive Urban Design Objectives for Urban Stormwater Management* (Department of Infrastructure and Planning and Healthy Waterways Partnership 2009) as part of the South East Queensland Regional Plan.<sup>171</sup> This included design objectives for the management of stormwater quality, the improvement of waterway stability and the management of the frequency of flows.

### Water Industry infrastructure

Planning for water industry infrastructure is undertaken by a number of State departments, Seqwater and the distributor-retailers.<sup>172</sup>

Under the SPP, the Brisbane City Council must amend its planning scheme to consider the location of bulk water supply infrastructure and protect bulk water supply infrastructure locations and corridors from development that would compromise the corridor integrity, and the efficient delivery and functioning of the identified infrastructure (Department of State Development 2014).

QUU's Netserv plan provides an overview of QUU's water and sewerage infrastructure planning and development for next 20 years. Under the *Water Restructuring Act 2009* distributor-retailers were required to have a Water

<sup>165</sup> Targets are currently undergoing review.

<sup>166</sup> Online resource: <http://www.seqcatchments.com.au/what-we-do.html> (accessed 18 May 2015).

<sup>167</sup> *Sustainable Planning Act 2009* (Qld) s 55.

<sup>168</sup> *Sustainable Planning Act 2009* (Qld) s 50.

<sup>169</sup> *Sustainable Planning Act 2009* (Qld) s 51.

<sup>170</sup> *Sustainable Planning Act 2009* (Qld) s 53.

<sup>171</sup> New generation regional plans are intended to have an increased focus on economic development, and will be shaped by the government's policy and planning reform agenda. This means there is now a need to review the regional plan for the SEQ region.

<sup>172</sup> Section 9(1) (g) of the *South East Queensland Water (Restructuring) Act 2007* provides that Seqwater along with the State has the function of undertaking collaborative planning activities in order to: support cost-effective operations; promote the efficient use of and investment in water infrastructure and other ancillary infrastructure; ensure the safe, secure and reliable supply of water.

Netserv Plan<sup>173</sup> in place by 1 March 2014<sup>174</sup> with review every 5 years.<sup>175</sup> Netserv Plans must also be consistent with the SEQ Regional Plan and planning assumption.<sup>176</sup>

## Infrastructure design and construction

Building and plumbing regulation in Queensland includes primary legislation, which allocates responsibilities to different entities and establishes the overall regulatory framework, and delegated and quasi-legislation, which contains the detailed standards and rules. Regulatory tools also include licensing/registration schemes for professionals working in the industry and accreditation schemes for certain approved products/techniques. There is also some use of voluntary certification schemes to promote specific desired social objectives, specifically sustainability and water efficiency.

### Water industry infrastructure

Infrastructure design and construction is regulated by the South East Queensland Water Supply and Sewerage Design and Construction Code (SEQ Code), which has consolidated design and construction standards for water supply and sewerage infrastructure in the SEQ region. The SEQ Code is based on the National Codes that have been developed by the Water Services Association of Australia and is compliant with the *Water Restructuring Act 2009*.<sup>177</sup> Where there is an inconsistency, the SEQ Code prevails over any provisions within a local council's planning scheme that currently specify water services infrastructure outcomes.<sup>178</sup> The SEQ Code is applicable to all planning, designing and/or constructing of water supply and sewerage infrastructure that will be owned by one of the SEQ region water service providers.

### Rainwater tanks

Water tanks in Brisbane must comply with the requirements in the QDC.

### Large recycled sewage/greywater schemes

Large recycled sewage/greywater schemes are regulated under the SEQ Code.

### Small recycled sewage/greywater schemes

Small recycled sewage and greywater schemes are regulated under the *Plumbing and Drainage Act 2002*. On-site sewage treatment facilities, including a septic system or an on-site sewage treatment plant, must obtain local council approval at the chief executive level.<sup>179</sup> Where a household re-uses and generates more than three kilolitres per day of greywater, they must install a greywater treatment system with approval from the Chief Executive of the Department of State Development, Infrastructure and Planning and meet the performance criteria in the Queensland Plumbing and Wastewater Code. On site wastewater systems are also covered by the national Plumbing Code of Australia.

### Other infrastructure

The *Building Act 1975* (Qld) establishes the framework for Queensland's building regulation system and regulates building development approvals, building work, building classification, building certifiers and provides for particular matters about sustainable buildings in Queensland. The *Building Act 1975* (Qld) is supported by the *Building Regulation 2006*.

<sup>173</sup> The purpose of Netserv Plans are to provide for strategic planning for the operation of the service provider's business; to provide planning for the delivery of infrastructure for supplying the service provider's water services and wastewater services for at least 20 years; to ensure the provision of safe, reliable and secure water services and wastewater services by service providers; to integrate land use planning and planning for infrastructure for the service provider's water services and wastewater services; to provide for the management of the service provider's water services and wastewater services in a way that seeks to achieve ecological sustainability.

<sup>174</sup> *South East Queensland Water (Distribution and Retail Restructuring) Act 2009* (Qld) s 99BJ.

<sup>175</sup> *South East Queensland Water (Distribution and Retail Restructuring) Act 2009* (Qld) s 99BL(3).

<sup>176</sup> *South East Queensland Water (Distribution and Retail Restructuring) Act 2009* (Qld) s 99BK.

<sup>177</sup> *SEQ Water (Distribution and Retail Restructuring) Act 2009* (Qld) Chapter 4A.

<sup>178</sup> *Sustainable Planning Act 2009* (Qld) s 755D.

<sup>179</sup> *Plumbing and Drainage Act 2002* (Qld) Part 5.

The *Plumbing and Drainage Act 2002* governs plumbing and drainage, the licensing of plumbers and drainers and, on-site sewerage facilities in Queensland. The Queensland Plumbing and Wastewater Code provides performance solutions to meet the statutory requirements under the *Plumbing and Drainage Act 2002*. The Plumbing and Drainage Regulation 2003 details the types of plumbing and drainage licences and the type of work a licensed person can do. Standard Plumbing and Drainage Regulation 2003 details specific laws to ensure plumbing and drainage work is compliant with the regulation.

## E. Brisbane's Environmental Regulation

### Institutional framework

Queensland's environmental protection regulator is the DEHP.

### Brisbane's environmental concerns

Chemical pollution and nutrient loads in urban rivers, bays and estuaries became a matter of public concern in Queensland in the late 1990s and led to a broad coalition of environmental groups focusing upon water quality to support 'healthy waterways' (Head 2014). This concern was incorporated into the SEQ regional planning framework initiated in the mid-1990s. This led to an alliance of local councils, state agencies, environment groups and scientists, now known as the Healthy Waterways Partnership (Healthy Waterways Partnership 2007). The Healthy Waterways Partnership developed an annual audit of water quality in SEQ region rivers and in 2000 the *Water Act* was introduced requiring all catchments, or river basins, to prepare a water resources plan, to determine water quantity and the allocation of water.

A particular environmental concern for Queensland involves the management of urban stormwater. Significant changes have been made since the 1990s to the management of non-point source pollution from urban stormwater. However, stormwater remains a significant concern in the management of waterway health. Furthermore, despite a strong focus on total water cycle management in urban environments, current regulatory frameworks in Brisbane do not recognise the urban environment as a water catchment in and of itself and stormwater is not considered a water resource. Sustainable water management projects, such as WSUD projects, have also been challenged by a lack of public awareness and acceptance of WSUD as a tool for achieving sustainable development in the SEQ region (Young 2004).<sup>180</sup>

### Water quality regulation

#### Legislative framework

DEHP is responsible for the administration of the following Acts and regulation in relation to the management and regulation of water supply:

- The *Environmental Protection Act 1994* (Qld) (*EP Act*) and the Environmental Protection (Water) Policy 2009 (EPP (Water));
- The *Water Act* - (Chapter 3) and Water Regulation 2002;
- *Nature Conservation Act 1992* (Qld);
- Water Supply (Safety and Reliability) Regulation 2011 (Qld).

<sup>180</sup> Young (2004) felt that the biggest challenge to the uptake of WSUD was community perceptions and understanding, with health and safety being a priority for most people.

Subordinate legislation and statutory policies, enacted under the *EP Act*, set out the specific standards required for the protection of particular parts of the environment. The EPP (Water) is made under Chapter 2 of the *EP Act* and aims to achieve the object of the *EP Act* in relation to Queensland waters.<sup>181</sup>

The policy objectives are achieved through a framework that first includes identifying environmental values (EVs) for aquatic ecosystems and for human uses.<sup>182</sup> Following this, water quality guidelines (WQGs) and water quality objectives (WQOs) are determined to enhance or protect the environmental values. The policy also provides an objective basis for sound statutory decision making under the *EP Act*. In addition, the policy provides information for land use planning and development under the *SPA*, water resource planning under the *Water Act* and promotes community involvement, consultation and community awareness. The processes to identify EVs and to determine WQGs and WQOs are based on NWQMS Implementation Guidelines (1998) and the Water Quality Guidelines.

### Statutory planning

The SPP requires planning schemes to facilitate the achievement of water quality objectives. Local councils are to identify land for urban purposes in areas which avoid, or minimise, the disturbance to natural drainage, erosion risk and impact on groundwater. Local planning schemes must also include requirements for development to ensure it is located, designed, constructed and/or managed to avoid, or minimise, impacts arising from altered stormwater quality or flow, wastewater and the release and mobilisation of nutrients. Local planning schemes should also adopt stormwater management design objectives relevant to the climatic region and facilitate innovative, and locally appropriate, solutions for urban stormwater management. Where development in water catchments is undertaken it should contribute to the maintenance, and enhancement, of water quality to protect both the drinking water and aquatic ecosystem. Finally, where there is development in a water supply buffer area requirements in the planning scheme should state that development must comply with Seqwater's Development Guidelines for Water Quality Management in Drinking Water Catchments (Seqwater 2012).

### Point source pollution

Pollution sources for nutrients are primarily sewage treatment plants and most of these are located on the SEQ region coast. Chemical or heavy industries typically produce small amounts of nutrients but higher amounts of other pollutants, such as metals, pesticides, acids/bases or organic matter. The main mechanism used by DEHP to protect the environment from point source pollution is the licence/works approval system. Under this system an occupier of premises likely to be undertaking polluting activities is required to obtain an environmental authority from DEHP. Standard operating conditions apply where the application is deemed to be a standard application.

Water quality guidelines have also been developed to protect water bodies from point source pollution. The Queensland Water Quality Guidelines 2009 (QWQG), developed by DEHP, reflect the ANZECC 2000 Guidelines and provides guideline values that are tailored to Queensland regions and water types<sup>183</sup>. QWQG provides a process and framework for deriving, and applying, more locally specific guidelines. WQOs and EVs are listed in the EPP (Water) for Queensland waters.<sup>184</sup>

Sewerage system discharges from an environmentally relevant activity must be licensed under the *EP Act*. Environmental authority holders are required to monitor and report contaminant levels to the Water Tracking and Electronic Reporting System, which has been developed to improve the tracking of regulated activities in Queensland involving water discharges.

<sup>181</sup> The object of the EPA is to protect Queensland's environment while allowing for development that improves the total quality of life, in a way that maintains the ecological processes on which life depends.

<sup>182</sup> For example water for drinking, farm supply, agriculture, industry and recreational use.

<sup>183</sup> Water quality guidelines are technically-derived numerical measures (e.g. concentrations) or descriptive statements to protect aquatic ecosystems and human water uses and values (e.g. irrigation, stock watering, recreation). They can be derived for a range of physico-chemical, biological and habitat indicators based on best-available science. The ANZECC 2000 Guidelines provide in relation to aquatic ecosystems that there is a need to develop more locally relevant guidelines.

<sup>184</sup> Environmental Protection (Water) Policy 2009 (Qld) Schedule 1.

Industrial waste pollution is regulated under the environmentally relevant activity scheme under the EPA. Regulated activities must obtain a licence/authority to operate and discharge industrial waste pollutants into the environment. If the activity does not fall into an environmentally relevant activity, an authority is not required.

### Non-point source pollution

'Diffuse' or 'non-point source' water pollution is that which does not enter a waterway from one identifiable location. While diffuse sources are generally the major contributor of suspended sediment loads to coastal waters they are not an environmentally relevant activity and are therefore not licensed.<sup>185</sup>

Currently the QWQG provides non-mandatory guidelines on the quality of stormwater from existing urban catchments and design objectives for urban stormwater for new urban areas. New urban developments that incorporate WSUD are expected to achieve much higher stormwater quality entering waterways than those development areas that are not water sensitive. DEHP has also developed summary non-mandatory guidelines that reflect best practice environmental management for water quality and flow management. The Urban Stormwater – Queensland BPEM Guidelines 2009 contain further detail on the nominated design objectives for desired stormwater quality in new urban developments.

Further it is an offence to release stormwater run-off into waters, a roadside gutter or a stormwater drain if this results in a build-up of earth in the waters, roadside gutter or stormwater drain.<sup>186</sup>

Water use plans are also relevant to the management of diffuse pollution. Water use plans may be developed under the *Water Act* where there is a need to manage a risk of land or water degradation.<sup>187</sup> This includes a risk of deteriorating water quality.<sup>188</sup>

### Water quantity regulation

Allocation and sustainable management of water is primarily advanced under the *Water Act*. The *Water Act* sets out the water allocation system and seeks to ensure sustainable and efficient use of water planning and to maintain consumptive use that can be continued indefinitely at a level which protects biological diversity and natural ecosystem health.<sup>189</sup> In achieving this purpose, the *Water Act* recognises principles of ecologically sustainable development, including the precautionary principle and the principle of intergenerational equity.<sup>190</sup>

WRPs, published as subordinate legislation to the *Water Act*, establish a system for water allocations which must include environmental flow objectives and performance indicators.<sup>191</sup> WRPs aim to establish a framework for water use and allocation between consumptive and environmental requirements and may also address environmental degradation and establish water allocations for this purpose.<sup>192</sup> Where there is a risk that the extraction of overland flow, i.e. stormwater, will significantly impact upon beneficial flooding, or the water requirements of natural ecosystems, WRPs must regulate the taking of overland flow.<sup>193</sup>

ROPs may be made to implement WRPs.<sup>194</sup> ROPs provide technical detail as to how water resources will be managed to meet the specific environmental and consumptive objectives of the WRPs.<sup>195</sup> ROPs may include

<sup>185</sup> Online resource: <[https://www.ehp.qld.gov.au/water/monitoring/reporting\\_of\\_licensed\\_discharges\\_to\\_waterways.html](https://www.ehp.qld.gov.au/water/monitoring/reporting_of_licensed_discharges_to_waterways.html)> (accessed 18 May 2015).

<sup>186</sup> *Environmental Protection Act 1994* (Qld) s 440ZG(1)(b).

<sup>187</sup> *Water Act 2000* (Qld) s 59.

<sup>188</sup> *Water Act 2000* (Qld) s 60.

<sup>189</sup> *Water Act 2000* (Qld) s 10.

<sup>190</sup> *Water Act 2000* (Qld) s 11.

<sup>191</sup> *Water Act 2000* (Qld) s 46(4).

<sup>192</sup> *Water Act 2000* (Qld) s 38(3).

<sup>193</sup> *Water Act 2000* (Qld) s 38(4).

<sup>194</sup> *Water Act 2000* (Qld) s 94.

<sup>195</sup> Online resource: <[http://www.water.gov.au/RiverandWetLandHealth/Environmentalwaterprovisions/Queensland/index.aspx?Menu=Level1\\_5\\_6\\_3](http://www.water.gov.au/RiverandWetLandHealth/Environmentalwaterprovisions/Queensland/index.aspx?Menu=Level1_5_6_3)> (accessed 18 May 2015).

environmental management rules.<sup>196</sup> If the WRP regulates the taking of stormwater and other overland flows, the ROP must set out the minimum share of overland flow water that each water user may take. It is however, not an offence to interfere with overland flow water.<sup>197</sup>

## F. Brisbane's Public Health Regulation

### Institutional framework

Queensland's public health regulatory system draws a basic distinction between drinking water and other, non-potable, water. DEWS is the regulator of drinking water under the *Water Supply Act* and is responsible for ensuring that water service providers are licensed and have the requisite management plans and strategies in place. Queensland Health (QH) is responsible more broadly for public health in Queensland. QH administers the *Public Health Act 2005* (Qld) (*PHA*) and the *Water Fluoridation Act 2008* (Qld).

### Drinking water regulation

Queensland was one of the last Australian jurisdictions to regulate the quality and standard of drinking water (Stoeckel, Webb et al. 2012). The quality of drinking water is regulated by a specific legislative regime, the *Water Supply Act*, and is informed by non-binding national guidelines.

Drinking water in Queensland is defined under the *Water Supply Act* as water, for human consumption, intended primarily as water for drinking, whether or not the water is used for other purposes.<sup>198</sup> Drinking water is to be supplied by a drinking water service provider that provides a drinking water service.<sup>199</sup> Drinking water includes recycled water, provided that it is being used to augment drinking water supply.

Each drinking water service provider is required to have a drinking water quality management plan (DWQMP) in place, and to comply with the details of the plan to protect public health.<sup>200</sup> Guidelines have been developed to guide the creation of DWQMP and utilise the language of the ADWG. These guidelines include a requirement for the incorporation of risk identification and management into the DWQMP, which must identify risks posed by hazards and hazardous events and demonstrate how the drinking water service provider intends to manage these risks.<sup>201</sup>

The *PHA* aims to protect and promote the health of the Queensland public. Drinking water, and recycled water under a recycled water scheme, are considered public health risks under the *PHA*.<sup>202</sup> As a result water supply is a managed health risk. The *PHA* defines unsafe drinking water as water that is likely to cause physical harm to a person who may consume it.<sup>203</sup> The *PHA* also provides guidance on when recycled water is fit for use, specifically when it would be not likely to cause physical harm to a person who might later be exposed to it.<sup>204</sup> The provisions

<sup>196</sup> *Water Act 2000* (Qld) s 98 (2).

<sup>197</sup> *Water Act 2000* (Qld) s 808.

<sup>198</sup> *Water Supply (Safety and Reliability) Act 2008* (Qld) schedule 3.

<sup>199</sup> *Water Supply (Safety and Reliability) Act 2008* (Qld) schedule 3. A drinking water service is (a) the treatment, transmission or reticulation of water for supply as drinking water; or (b) water collection in a water storage, if the water in the storage

(i) includes recycled water, other than coal seam gas water; and (ii) is used to augment a drinking water supply.

<sup>200</sup> *Water Supply (Safety and Reliability) Act 2008* (Qld) s 94. Failure to comply with a DWQMP is an offence under *Water Supply (Safety and Reliability) Act 2008* (Qld) s 92.

<sup>201</sup> *Water Supply (Safety and Reliability) Act 2008* (Qld) s 95(3).

<sup>202</sup> As they are or likely to be hazardous to human health, or contribute to, or be likely to contribute to, disease in humans or the transmission of an infectious condition to humans; *Public Health Act 2005* (Qld) s11(b).

<sup>203</sup> *Public Health Act 2005* (Qld) s 57C.

<sup>204</sup> *Public Health Act 2005* (Qld) s 57D.

complement the *Water Supply Act*. If a water service provider fails to comply with a provision of the *PHA* the water service provider may be liable to a penalty under the *Water Supply Act*.

The Public Health Regulations 2005 set out the standards for drinking water quality and particular types of recycled water.<sup>205</sup> Drinking water standards include regulation on the frequency of testing, and the types of tests to be undertaken, as well as stating the acceptable levels of the values obtained from testing.<sup>206</sup> The regulations also provide standards for recycled water supply for augmentation of drinking water supply.<sup>207</sup>

The supply of unsafe drinking water is an offence.<sup>208</sup> If the Chief Executive of the Health Department believes that a water service provider is providing unsafe drinking water the Chief Executive may issue an improvement notice.<sup>209</sup>

The supply of drinking water by persons other than water corporations, such as bottled water sales by shops and restaurants, is regulated under the *Food Act 2006 (Qld)*.<sup>210</sup> Further regulation is provided by the Australia New Zealand Food Standards Code.

## Non-potable water regulation

### Rainwater

QH recommends that residents in reticulated areas should use reticulated water for drinking, personal hygiene and food preparation and roof-harvested rainwater be used without further treatment for flushing toilets, the cold water laundry tap and for watering gardens and lawns.<sup>211</sup> This has not been mandated by legislation and the choice is left up to the consumer.

In relation to the construction and maintenance of rainwater tanks, local governments are responsible for the administration and enforcement of Part 1A, Division 2 of the Public Health Regulation 2005. This provision details the construction, installation and maintenance requirements of water tanks to ensure that water tanks do not become breeding grounds for mosquitos. Mosquito proof screens are required and it is an offence not to have or maintain them.<sup>212</sup>

### Greywater

Treated and untreated greywater re-use is allowed in both sewerred and unsewerred areas. The *Queensland Plumbing and Wastewater Code* sets water quality requirements depending on the intended end use of the water. The level of treatment will determine whether the water can be reused for internal uses, such as toilet flushing, or only for garden irrigation.

### Large recycled sewage and greywater schemes

The *Water Supply Act* defines and sets out provisions relating to recycled water.<sup>213</sup> These provisions include the development and approval of a recycled water management plan and it is an offence to supply recycled water without such a plan.<sup>214</sup> The *Water Supply Act* also provides validation program requirements. A validation

<sup>205</sup> Public Health Regulations 2005 r 18AA.

<sup>206</sup> Public Health Regulations 2005 r 18AC.

<sup>207</sup> Public Health Regulations 2005 r 18AD.

<sup>208</sup> This may carry 3000 penalty units or up to 2 years imprisonment; *Public Health Act 2005 (Qld)* ss 57E, 57F.

<sup>209</sup> *Public Health Act 2005 (Qld)* s 57.

<sup>210</sup> *Food Act 2006 (Qld)* s 12(e).

<sup>211</sup> Online resource: <<http://www.health.qld.gov.au/ph/documents/ehu/factsheet-rainwater.pdf>> (accessed online 18 May 2015).

<sup>212</sup> Public Health Regulation 2005 (Qld) rr 2N-Q.

<sup>213</sup> Recycled water covers sewage or effluent sourced from a service provider's infrastructure, greywater from a large greywater treatment plant (greater than 50 kilolitres per day) and process water which is intended for reuse.

<sup>214</sup> *Water Supply (Safety and Reliability) Act 2008 (Qld)* s 196. It is also an offence to supply recycled water that is not fit for use.



program must be prepared in accordance with the Recycled Water Management and Validation Guidelines, which are based on the AGWR.<sup>215</sup>

Under the Public Health Regulation 2005 Part 6A, QH can set standards for recycled water. Standards have been set for recycled water used in dual reticulation schemes that used for irrigation of minimally processed food crops. The Public Health Regulation 2005 Part 6A details QH's powers to ensure public health risks are minimised with water re-use schemes. QH's powers are however limited to those entities that are covered by the *Water Supply Act*. Entities and persons that produce or use recycled water that fall outside the scope of that Act are regulated by local government.

QH has powers to respond to public health incidents under the *PHA* and can prosecute a recycled water supplier that has provided recycled water not fit for use.<sup>216</sup> Should there be a public health issue with recycled water augmenting a drinking water supply QH would be responsible for providing advice to DEWS with respect to any public health risks. QH would also be responsible for assessing the corrective actions of the recycled water provider.

The *Water Supply Act* regulates large recycled sewage and greywater schemes, including sewer mining. Audits and reviews of recycled water management plans are required and providers must be aware of how the end user(s) of their scheme are using and managing the recycled water. If the end user(s) is improperly using the recycled water and the provider is aware of this, they must cease supply immediately to that end user(s). Controls put in place by the end user must be included in the recycled water provider's recycled water management plan or an exemption should be sought. Proponents are expected to have user agreements in place to ensure the safe use of the recycled water.

### Small recycled sewage and greywater schemes

Small recycled sewage and greywater schemes are regulated under the *Plumbing and Drainage Act 2002* (Qld). On-site sewage treatment facilities, including a septic system or an on-site sewage treatment plant, must obtain local council approval.<sup>217</sup> If recycled water is to be supplied to a consumer, any single greywater treatment system with a capacity of greater than 50 kilolitres per day must obtain approval from DEWS.

In a sewerage area, blackwater must be discharged into sewerage infrastructure and failure to do so is an offence.<sup>218</sup> However, blackwater reuse trials are taking place in high-rise apartments, multi-unit developments, shopping centres and tertiary educational institutions, with the treated water being used for toilet flushing and outdoor open-space irrigation (Department of Infrastructure and Planning 2009).

There are offences and fines under the *Plumbing and Drainage Act 2002* (Qld) relating to the installation of a greywater diversion device, or treatment plant, without prior council approval, without a current plumbers and drainers licence or for non-approved greywater systems. Owners of the premises must ensure that where non-kitchen greywater is discharged into a greywater treatment plant installed on the premises, that it is treated to the standard stated in the Queensland Plumbing and Wastewater Code. Such treated water may only be used, on the premises, for specified uses.<sup>219</sup> Penalties apply for non-compliance.

<sup>215</sup> *Water Supply (Safety and Reliability) Act 2008* (Qld) s 236.

<sup>216</sup> Fit for use recycled water is defined as recycled water that would not be likely to cause physical harm to a person who might later be exposed to it, assuming nothing happened to it after that particular time and before the person was exposed to it that would prevent its being used for its intended use and it was used according to its intended use: *Public Health Act 2005* s 57D.

<sup>217</sup> *Plumbing and Drainage Act 2002* (Qld) Part 5.

<sup>218</sup> *Plumbing and Drainage Act 2002* (Qld) s 128K. Blackwater is defined as waste discharged from a human body into a toilet and water used for the discharge.

<sup>219</sup> These are irrigation, washing vehicles, paths or exterior walls, toilet discharge and cold water supply to a washing machine /closed loop laundry system.

Home owners must also ensure that greywater does not cause an odour that unreasonably interferes with the use, or enjoyment, of any other premises and that any ponding, or run-off, of the greywater does not cause a danger or health risk to anyone.<sup>220</sup>

### **Stormwater capture and reuse schemes**

Stormwater harvesting guidelines developed by the Healthy Waterways Partnership Water by Design program, provide a guideline as to the implementation of stormwater harvesting (Water by Design 2009). There is no particular regulatory framework for the capture and reuse of stormwater in Queensland. However, the end use must meet the requirements for either potable re-use or non-potable purposes.

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<sup>220</sup> *Plumbing and Drainage Act 2002* (Qld) s 128PA (3).

# Appendix C: Perth's Urban Water Regulatory Frameworks

## A. Urban water management in Perth

### Perth's water challenges

Historically, Perth's water has been supplied from storage reservoirs on rivers in the Darling Range and from groundwater. Yet Western Australia has had a long history of water scarcity and drought with early accounts of life in the Swan River Colony in the 1830s lamenting the lack of water (Morgan 2011, Morgan 2015). Since the mid-1970s Perth has experienced a significant reduction in rainfall reduction which has resulted in a substantial decline in stream flow into city dams (Silberstein, Aryal et al. 2012).<sup>221</sup>

With the increasing scarcity of surface water Perth's focus moved to groundwater (Chong and White 2007, Isler, Merson et al. 2010) and by 2007 groundwater accounted for almost three quarters of water used in Perth (Government of Western Australia 2007). Yet depleting groundwater levels, due to a decrease in rainfall and a drying climate, (Power, Sadler et al. 2005, Water Corporation 2009), has resulted in south-west Western Australia facing a significant water shortage.<sup>222</sup> This water crisis is expected to continue (Fane and Patterson 2009).<sup>223</sup>

Meanwhile, both water use and the population size have increased considerably over the past few decades.<sup>224</sup> Indeed, despite the severe drying of the south west of Western Australia there remains in place a culture of significant water consumption in Perth with high value placed on large suburban blocks with water intensive gardens (Morgan 2015). As a consequence, Perth has been described as Australia's thirstiest city and has the highest domestic water use per capita (Isler, Merson et al. 2010). Moreover, Western Australia continues to have the fastest growing population rate of any Australian state.<sup>225</sup> As a result, demand for potable water in Perth is increasing at a rate of 3.87 per cent per annum (Department of Water 2010, Bancroft and Gardner 2015).

The Water Corporation, a government owned, vertically integrated water business, supplies water to most of Western Australia through the Integrated Water Supply Scheme (IWSS). The Water Corporation is the only supplier of reticulated water in the Perth metropolitan area, where the majority of Western Australians live.

### Responses to the water security crises

In response to the water security crisis, the Water Corporation has outlined a 50 year plan for the supply of water (Water Corporation 2009). It has invested in alternative resource projects and is trialling MAR to increase groundwater levels.

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<sup>221</sup> Rainfall has declined by 16% and flows to dams by 50% over this period.

<sup>222</sup> It has been suggested that anthropogenic forcing contributes to about 50% of the observed rainfall decline (Cai and Cowan 2006; McFarlane et al. 2012) with other possible causes including land cover change (Pitman, et al. 2004) and multi-decadal variations making up the difference (Cai et al. 2005).

<sup>223</sup> Reports undertaken for the Department of Water indicate that under low, medium and high growth scenarios, the Perth metropolitan region will enter into an absolute water deficit by 2020 (Thomas 2008).

<sup>224</sup> Water use has tripled in 25 years. This is largely due to a doubling of the population of Western Australia over the past 30 years (Western Australian Planning Commission 2010) and subsequent increase in water demand.

<sup>225</sup> Western Australia's population is expected to further double by 2030 (Western Australian Planning Commission 2010).

### Desalination

With groundwater no longer a fall-back option, due to its overexploitation in the Perth region, and in light of the need to decrease groundwater allocations in certain areas (Thomas 2008, Gardner, Bartlett et al. 2009), Perth's attention has shifted to desalination as a source of rainfall independent water supply. Currently, two desalination plants provide almost half of the fresh drinking water demand in Western Australia each year (Water Corporation).<sup>226</sup> However, to meet projected water demand by 2060, an additional ten desalination plants would be required. Due to operational costs, energy use, environmental impacts and siting issues with desalination plants the Water Corporation has acknowledged that it is unfeasible to rely upon desalination to meet the gap between future availability and demand (Water Corporation 2009, Syme and Nancarrow 2011).

### Recycled water

The Western Australian Government has recognised recycled water as an important option to meet the needs of the growing population and continued economic development. In 2008, the Western Australian Government, in partnership with stakeholders, developed the *State Water Recycling Strategy* to explore and determine how recycled water can be safely incorporated across the range of water use sectors (Department of Water and Department of the Premier and Cabinet 2008). The strategy highlights the potential for recycling to provide fit for purpose water for irrigated horticulture, green space irrigation, industry and MAR.

The Water Corporation has outlined a 50 year plan for the supply of water which includes a recycling target of up to 60% in the Perth-Mandurah area (Water Corporation 2009). The Water Corporation has stated that it will provide free treated wastewater for community benefit at the wastewater treatment plant boundary. However, the ERA has reported that this is not always readily available (Economic Regulation Authority 2009).

In addition, despite the recent focus on wastewater and recycled water, there remain regulatory challenges with its use, see Section B of this Appendix C.

### Domestic garden bores

Domestic garden bores are a common use of shallow aquifer groundwater in the Perth region and are used for the irrigation of lawns and gardens. In 2009, there were an estimated 176,000 homes with domestic garden bores in the Perth-Peel region (CSIRO 2009). A large number of these private bores were built in response to water use restrictions that were imposed in the late 1970s (Bennett and Gardner 2014) and now these bores pose a threat to the integrity of the shallow aquifers. Existing bores are generally unlicensed.<sup>227</sup> Water efficiency legislation was passed in 2010 which provided for the implementation of domestic garden bore restrictions to ease pressure on groundwater resources in the Perth region.<sup>228</sup> For a further discussion of these provisions see Section B of this Appendix C.

### MAR

MAR is the process of injecting or infiltrating water into aquifers to supplement the natural recharge of those aquifers (Vincent and Gardner 2014). In Western Australia this process is undertaken with recycled wastewater and with stormwater to address over-allocated groundwater resources, in order to prevent the over-allocation and degradation of the aquifers. MAR uses water that may have otherwise been discharged into, and potentially polluted, urban waterways and adjacent marine water.<sup>229</sup> A MAR trial by the Water Corporation was completed in December 2012.

To assist in the approval of socially and environmentally acceptable MAR proposals, a MAR policy was developed in line with the NWI. The policy describes the water quantity and water quality issues relevant to MAR, and how the process will be managed by the DoW. The policy also details the process for licensing MAR

<sup>226</sup> Together these desalination plants produce 145 billion litres of water per year.

<sup>227</sup> Domestic bores have been exempted from the requirement to have a licence through an *Exemption Order* under the *Rights in Water and Irrigation Act 1914* (WA) ss 5C, 25A.

<sup>228</sup> *Water Agencies (Water Use) By-laws 2010* (WA) under the enabling provision of *Rights in Water and Irrigation Act 1914* (WA) s 26.

<sup>229</sup> The discharge of wastewater and stormwater can have adverse environmental effects upon the waterway and marine environment (Davies et al. 2011).

schemes. The guidelines assist in managing any associated health and environmental risks and where stormwater or treated wastewater is the source water the managed aquifer recharge policy refers to the AGWR.<sup>230</sup>

## B. Perth's Water Resource Regulation

### Institutional framework

#### Urban water planning

The Water Resources portfolio was created in 2005, due largely to recognition of the strategic importance of water to Western Australia and the need to provide direction across a wide range of water matters (Government of Western Australia 2007). The DoW is the lead agency for both urban and rural water resources in Western Australia and is responsible for policy, planning and management of the water sector and for managing water resources as defined by the *RiWI Act*.<sup>231</sup> The DoW administers water entitlements and water rights in Western Australia, produces water resource policy and undertakes investigations, management, conservation and restoration of Western Australia's water resources in accordance with the *Water Resources Legislation Amendment Act 2007* (WA).<sup>232</sup>

The Western Australian Planning Commission (WAPC) and the Water Corporation also undertake certain planning functions. The WAPC is primarily concerned with urban development and the Water Corporation is primarily concerned with water services and delivery.

The *Water Corporations Act 1995* (WA) established the water corporations in Western Australia, including the Water Corporation.<sup>233</sup> This Act sets out the nature of the water corporations and their status, as independent business enterprises, independent from the crown.<sup>234</sup>

#### Catchment and waterways management

Catchment and waterways management is predominantly the responsibility of the DoW and NRMGs. The Water Corporation undertakes catchment management activities under delegation from the DoW, according to an operational agreement for catchment management between the two organisations. Catchment management in drinking water source catchments is largely tied to ensuring adequate potable water quality, for example, by preparing drinking water source protection plans to protect water catchments and groundwater aquifers to minimise the risk of contamination.

For further discussion on the protection and management of waterways and catchments see Section E of this Appendix C.

### Legislative framework

Urban water management in Western Australia is regulated under a number of different pieces of legislation. The Western Australian water legislation largely predates current interest in IWCM and alternative water sources. These Acts cannot be considered water cycle Acts due to significant gaps in relation to alternative water sources (Frontier Economics 2008, Gardner, Bartlett et al. 2009).

<sup>230</sup> *Australian Guidelines for Water Recycling: Managing Health and Environmental Risks (Phase 2) – managed aquifer recharge (July 2009)*.

<sup>231</sup> This includes groundwater and surface water, but not recycled water or surplus stormwater.

<sup>232</sup> The DoW's functions include water resource data gathering and database management, water allocation, protection of public water supply sources, salinity control, protection of waterway and groundwater values, and ensuring water use efficiency.

<sup>233</sup> *Water Corporations Act 1995* (WA) s 4.

<sup>234</sup> *Water Corporations Act 1995* (WA) ss 5-6.

The legislative framework does regulate groundwater and surface water in waterways.<sup>235</sup> However, it does not provide a statutory definition for surface water which is not in a waterway, i.e. stormwater. Accordingly, stormwater is largely left outside the scope of the legislative framework. Further, licencing systems have yet to be developed for alternative water sources, such as stormwater, and trading in such sources is not possible under the current legislation.

Similarly, recycled water does not fall within the definition of a water resource vested in the State and is therefore not regulated by legislation. The determination of proprietary rights in wastewater is considered a barrier in the uptake of recycled water projects such as MAR (Vincent and Gardner 2014). Once wastewater is eliminated from a customer's premises and enters into the Water Corporation's wastewater infrastructure, all proprietary rights in the water are likely terminated (Gray and Gardner 2008, Vincent and Gardner 2014). In the Perth region, the Water Corporation can then exercise control over the wastewater and has the power to exclude others from the resource.

## Water allocation

### Rights to use and control water

The current framework for the allocation and licencing of water access is set out in the *RiWI Act*. The right to the use, flow and control of water is vested in the Crown.<sup>236</sup> The Minister for Water is then responsible for granting statutory authorisations to take and use water. Without such a right, or licence, taking water is an offence.<sup>237</sup> Water rights include take and use rights for domestic and stock watering granted to riparian land owners<sup>238</sup> and where there is public access to the water source.<sup>239</sup>

Under the *RiWI Act*, groundwater and surface water areas can be proclaimed as management areas.<sup>240</sup> In a management area the DoW sets allocation limits by preparing allocation plans for water resources. One plan may cover a number of management areas. These plans guide licencing decisions by setting out how much water can be abstracted from a resource and how that abstraction will be managed. Allocation plans are generally developed for resources where 30 per cent or more of the allocation limit is already committed. Standard allocation plans are developed where abstraction is between 30 and 70 per cent and intensive allocation plans are developed where abstraction is more than 70 per cent (Department of Water 2011 ).

In a management area the DoW issues water licences under the *RiWI Act* and the *Water Services Act 2012 (WA)* (*WSA*) in accordance with allocation plans to take either groundwater or surface water. These licences, and their water allocations, can be traded, either permanently or temporarily. A licence may be granted for an indefinite term or a fixed term and there is a presumption of renewal for fixed terms.

Outside of management areas, the rights to take and use water from a watercourse are effectively a statutory codification of common law rights to water.<sup>241</sup> Therefore, water may be extracted from watercourses in these areas without a licence so long as the flow is not *sensibly* diminished, affecting the rights of downstream users. An exception is the unclear right to take non-artesian groundwater outside of a management area (Vincent and Gardner 2014).<sup>242</sup>

<sup>235</sup> *Rights in Water and Irrigation Act 1914 (WA)* s 2 defines water resources as watercourses and wetlands together with their beds and banks; other surface waters; and aquifers and underground water.

<sup>236</sup> *Rights in Water and Irrigation Act 1914 (WA)* s 5A.

<sup>237</sup> *Rights in Water and Irrigation Act 1914 (WA)* s 5C.

<sup>238</sup> *Rights in Water and Irrigation Act 1914 (WA)* s 9.

<sup>239</sup> *Rights in Water and Irrigation Act 1914 (WA)* s 10.

<sup>240</sup> 45 groundwater and 22 surface water management areas have been proclaimed. Online resource: <<http://www.water.wa.gov.au/Business+with+water/Water+licencing/Proclaimed+areas/default.aspx>> (accessed 15 May 2015).

<sup>241</sup> *Rights in Water and Irrigation Act 1914 (WA)* ss 20, 21.

<sup>242</sup> It may reside in the remnant common law or may only be conferred under another written law.

## Stormwater

Access to stormwater and drainage infrastructure is not regulated in Western Australia and stormwater is not regulated under the *RiWI Act* (Vincent and Gardner 2014).

## Groundwater management

Groundwater is managed under the *RiWI Act* as a water resource and is a significant source of water supply for the Perth region.

Drinking water from groundwater sources are proclaimed/gazetted as either a water reserve, catchment area, or underground water pollution control area, under the *Metropolitan Water Supply, Sewerage and Drainage Act 1909 (WA)* and the DoW allocates groundwater. If the groundwater is to be allocated for potable purposes, the DoW must prepare a drinking water source protection plan in order to minimise the risk of contamination of the aquifer. See Section F of this Appendix C for further discussion on drinking water protection.

In the Perth region, the Gnangara groundwater areas allocation plan covers the groundwater resources of the Yanchep, Gnangara, Wanneroo, Swan, Mirrabooka, Gwelup and Perth groundwater areas. The Gnangara groundwater system is Perth's largest source of groundwater and has been heavily extracted to meet water shortages (Dhakal 2013). To construct a bore or well to extract groundwater in a groundwater management area, the proponent must obtain a licence from the DoW.<sup>243</sup>

Domestic garden bores were previously exempted from the licensing requirement in the *RiWI Act*.<sup>244</sup> However, licences are now required for the construction of a new domestic garden bores.<sup>245</sup> A map has also been developed of the Perth/Mandurah region to show areas that are suitable or unsuitable for garden bores and the DoW has also developed the *Operational Policy 5.17: Metropolitan domestic garden bores to guide the implementation of domestic bores*. There are, however, no specific regulatory instruments which prevent the construction or use of garden bores in areas that have been identified as unsuitable (Bennett and Gardner 2014). Bennett and Gardner (2014) have suggested that both new, and existing, domestic garden bores be licensed in specified areas or the construction of new domestic garden bores be prohibited in specified areas

## Supply/demand regulation

Perth's sprawling suburbs, with a focus on detached housing, combined with a Mediterranean climate has placed a significant amount of value upon outdoor living and a green domestic garden environment (Syme, Shao et al. 2004, Morgan 2015). This has resulted in high outdoor water consumption and a strong focus upon access to open space and water bodies (Syme, Fenton et al. 2001). Supply management has largely taken the form of significant direct investment in rainfall-independent sources, such as desalination plants, and a focus upon water recycling.

Demand management measures have been instituted, aimed at both household and business consumers. The measures seek to encourage behavior change by reducing the consumption of potable water through pricing, through express legislative prohibitions on use,<sup>246</sup> and through education. The Minister for Water has the power to impose water use restrictions, under the Water Services Regulations 2013, to restrict the use of restricted IWSS scheme water and a person's use of scheme water if used in contravention to water use restrictions.<sup>247</sup> Other demand measures include increasing potable water use efficiency by consumers through information

<sup>243</sup> *Rights in Water and Irrigation Act 1914 (WA)* ss 26B and 26D require a licence to construct or alter a well in a proclaimed groundwater management area. Exemptions apply for wells used only for domestic and stock watering purposes.

<sup>244</sup> Domestic garden bores are exempt from acquiring a licence: *Rights in Water and Irrigation Act 1914 (WA)* s 25A.

<sup>245</sup> *Rights in Water and Irrigation Act 1914 (WA)* s 26D.

<sup>246</sup> For example, mandatory water restrictions for garden bores.

<sup>247</sup> Water Services Regulations 2013 (WA) rr 77 and 78.

dissemination,<sup>248</sup> rebates for water efficient products, legal tools,<sup>249</sup> and encouraging the use of alternative water sources to replace potable water for some uses.

### Regulatory reform initiatives

Urban water reform has been ongoing in Western Australia since the early 2000s. The *RiWI Act* was substantially amended in 2001 in order to implement the NWI. Current reform is focused upon compliance with the NWI and on providing a more flexible and adaptive water management system. Reform is in progress to consolidate eleven existing Acts into two: the *WSA*, which addresses the supply and provision of water services and the *Water Resources Management Bill* that will address water resources management.

The *Water Resources Management Bill* when passed will significantly reform water resource management in Western Australia. It has been indicated that the obstacles to establishing statutory allocation plans will be removed (Bennett and Gardner 2014) with a transition to statutory allocation plans under certain circumstances including where water resources are approaching or have approached full allocation.

Ongoing reform initiatives include licences to take water and to inject water into aquifers to provide regulatory support, rather than the current administrative support, to MAR and geothermal activities. These licences will be able to be traded under certain conditions.

## C. Perth's Service Delivery and Price Regulation

### Institutional framework

Perth's water supply is provided by the publically owned Water Corporation which operates as monopoly service provider and asset owner. The Perth urban water service sector is characterised by a very low level of consumer choice, with alternative water supply being limited to installing rain-water tanks, residential wastewater treatment systems and domestic bores.

The ERA is an independent regulatory body established under the *Economic Regulation Authority Act 2003 (WA)*. Western Australia's economic regulation regime was set up to regulate third party access to electricity, gas and rail infrastructure and to administer licences for electricity, gas and water service providers. The ERA is involved in the oversight of urban water pricing and service delivery in Perth.

### Service delivery regulation

#### Water service providers

Service delivery is regulated largely by the *WSA*. The *WSA* was introduced to reform the service provision of water in Western Australia by providing for an independent economic regulator, the ERA, and customer service standards.

The *WSA* provides that land owners have a statutory entitlement to the provision of water services where statutory water service charges apply.<sup>250</sup>

The ERA sets service standards independently through operating licences under the *Water Services Licensing Act 1995 (WA)* consistent with government policy.

<sup>248</sup> For example, the WELS regime, discussed in Appendix A, and a number of education campaigns aimed at encouraging behaviour change both in individuals and organisations.

<sup>249</sup> For example, the WELS regime prohibiting the sale of certain non-registered products. Western Australian legislation implements the WELS regime at the State level.

<sup>250</sup> *Water Services Act 2012 (WA)* s 73.



The *Water Corporation Act 1995 (WA)* established the Water Corporation as the water service provider for the Perth region.<sup>251</sup> The functions of the Water Corporation include the acquisition, treatment, distribution and supply of water and the collection, storage, treatment and disposal of wastewater and surplus water.<sup>252</sup> The Water Corporation is obliged to act in accordance with prudent commercial principles, to endeavour to make a profit and to act consistently with maximizing its long term value.<sup>253</sup>

### Consumer protection

Customer service standards were introduced in 2013 by the *WSA*. The Water Services Code of Conduct (Customer Service Standards) 2013 ensures that water providers meet minimum service standards in relation to billing, payment, complaints and provision of services.

The Energy and Water Ombudsman was established, in January 2014, under reform introduced by the *WSA* and its powers include the investigation of water matters including the provision or supply of water, billing, debts and disconnections and restrictions of supply.

### Industry oversight

Oversight of the performance of the Water Corporation, in delivering its service supply and other obligations, is conducted by the Minister for Water. Financial oversight of the Water Corporation is undertaken by ERA and annual reporting of financial information is required.

### Competition barriers

There is no retail competition currently for urban water services in Perth. However, a licensing mechanism now exists to enable service delivery by new providers to occur.

## Price regulation

### Price setting

The Government of Western Australia has retained the price-setting function for the Water Corporation with the Minister for Water setting water charges through a by-law process under the *Water Agencies (Powers) Act 1984 (WA)*.<sup>254</sup> When setting these water charges, the Minister considers the recommendations made by the ERA for guidance.

### Price oversight

The ERA assists in setting prices by undertaking inquiries into urban and country water, wastewater prices and bulk water supply options and has an ongoing reference to provide an annual review of Water Corporation tariff levels.

### Third party access

The ERA regulates third party access to essential infrastructure, such as water storage and distribution systems. Western Australia does not have a third party access regime for access to wastewater infrastructure.

## Regulatory reform proposals

Significant reform around service delivery has recently occurred in Western Australia. In accordance with the recommendations of the Productivity Commission (2011a), the *WSA* has implemented third party service provider

<sup>251</sup> *Water Corporation Act 1995 (WA)* s 4.

<sup>252</sup> *Water Corporation Act 1995 (WA)* s 27.

<sup>253</sup> *Water Corporation Act 1995 (WA)* s 30.

<sup>254</sup> The charges of other public water service providers in Western Australia (i.e. Aqwest and Busselton Water) are set by their respective boards and approved by the Minister.

licencing provisions. However, the WSA did not capture all the service delivery and price regulation reforms suggested by the Productivity Commission. Significantly, the reform did not address the recommendation that States transfer pricing of water to water authorities, with price monitoring oversight by State economic regulators.

## D. Perth's Built Environment Regulation

### Land and waterways use

#### *Catchment management*

Western Australia has developed catchment management planning policies, to inform the built environment, through the statutory planning framework. In the region of Perth, groundwater protection for the Gnangara groundwater system is outlined in the *State Planning Policy 2.2 Gnangara Groundwater Protection*. This policy aims to prevent, control or manage development, and land use changes, which would be likely to cause detrimental effects to the groundwater resource. The policy informs local government planning schemes and land development proponents, for example, by providing guidance on planning requirements that need to be considered before rezoning, development, or subdivision can proceed. The policy also provides guidance on the compatibility of land uses in source protection areas and in underground water pollution control areas. The objectives of the policy are predominantly concerned with the protection of the drinking water sources.

#### *Floodplain management*

The Swan River runs through the centre of Perth and the population of the city is intensely focused around the river.<sup>255</sup> Flooding is a rare occurrence in the Perth region. However, modelling indicates that sea level rise from climate change will increase the likelihood of coastal flooding in the Swan River (Climate Commission 2011).<sup>256</sup>

Currently the DoW provides advice and recommendations for development on floodplains with the aim of minimising flood risk and damage. The DoW undertakes floodplain mapping and strategies. The DoW also advises the Department of Planning on land use planning and advises local government on development controls. The Department of Planning and the WAPC have incorporated flood risk management and planning into the State Planning Policies (SPPs) through SPP 3.4: *Natural Hazards and disasters* and SPP 2: *Coastal Planning*. Floodplain management strategies are also incorporated into Regional Planning Schemes and local government planning documents (Rodgers 2013). At the time of writing, the DoW was also preparing the draft Western Australia floodplain management strategy for flood affected regions in Western Australia.

#### *Stormwater management*

The *Stormwater Management Manual for Western Australia* aims to build on the traditional objective of local flood protection by having multiple outcomes, including improved water quality management, protected ecosystems, and liveable and attractive communities (Department of Water 2004).

#### *Waterways management*

The DoW is the lead agency for waterways management in Western Australia. The DoW prepares Waterway Management Plans to identify the condition and threats to waterways and develops strategies to protect, restore and manage waterways.

In the Perth region the *Swan and Canning Rivers Management Act 2006 (WA)* was enacted for the protection of the Swan and Canning rivers, and associated land, to ensure maintenance of ecological and community benefits

<sup>255</sup> In 2010, the centre of population for Perth was located on the Swan River between the Perth CBD and South Perth (Australian Bureau of Statistics 2011).

<sup>256</sup> Sea levels along the WA coast rose between 7.1 and 7.4mm per year since the early 1990s, almost double the global average.

and amenity. This Act provides for the development of targets for river use and environmental health,<sup>257</sup> improved coordinated management of activities that may affect the rivers, a more streamlined and flexible assessment of planning approvals,<sup>258</sup> and the introduction of the option to use River Protection Notices to manage activities that affect the rivers.<sup>259</sup>

The Swan River Trust has also been established under the *Swan River Trust Act 1988* (WA) and is responsible to the Minister for Environment. The Swan River Trust manages and protects the Swan Canning river system, works with government and other bodies to provide facilities around the rivers and advises the Minister for the Environment on development proposals. The Swan River Trust also ensures the rivers remain clear of rubbish, advises on and controls erosion of riverbanks in the river system, provides advice to local councils and the WAPC on statutory planning issues and promotes community awareness of issues affecting river health.<sup>260</sup>

Community based regional NRMGs also undertake waterway and catchment management functions. For example the Perth Region NRM coordinates community participation in regional planning and priority setting, and supports implementation of state and national NRM programs.<sup>261</sup>

In Perth the waterways management issue is predominantly one of foreshore protection, rather than stormwater capture and management for waterways health and DoW has released the *Operational policy: Identifying and establishing waterways foreshore areas* to identify and protect foreshore areas. This policy is part of SPP 2.9: *Water Resources* and a guidance note has been released as part of the *Better urban water management partnership on waterway foreshores* (Department of Water 2013a). Foreshore areas are considered at all stages of land use planning and information as to foreshore areas is contained in relevant water management reports and is reflected in the relevant land planning tool.

## Infrastructure planning

### Statutory planning

Land use and development decisions in Western Australia are made in the context of the state planning framework, which unites existing state and regional policies, strategies and guidelines within a central framework. It informs the WAPC, local government and others involved in the planning process on those aspects of planning policy which are to be taken into account, in order to ensure integrated decision-making across all spheres of planning.

SPPs are prepared by WAPC and established under the *Planning and Development Act 2005* (WA). The WAPC and local government authorities must have due regard for the provisions of SPPs when preparing, or amending, local planning schemes and when making decisions on planning matters. A number of SPPs are relevant to water, in particular SPP 2.7 *Public drinking water sources*, SPP 2.9 *Water resources* and SPP 2.3 *Jandakot and Swan-Canning River System*. The DoW's *Water and Land Use Coordination Program* focuses on integrating land and water planning.

<sup>257</sup> *Swan and Canning Rivers Management Act 2006* (WA) part 4.

<sup>258</sup> *Swan and Canning Rivers Management Act 2006* (WA) part 5.

<sup>259</sup> *Swan and Canning Rivers Management Act 2006* (WA) ss 90-103, part 6.

<sup>260</sup> *Swan and Canning Rivers Management Act 2006* (WA) s 23.

<sup>261</sup> NRM bodies are funded federally through the Caring for Country program and, at a state level, to deliver on agreed NRM targets such as improving water quality. The Perth Region NRM undertakes the implementation of the Swan Canning Water Quality Improvement Plan in the catchment of Bayswater Brook, as well as undertaking Swan Canning Tributaries Restoration which contributes to the implementation of the Swan Canning Water Improvement Plan and local Water Quality Improvement Plans. It also undertakes the Canning River Restoration Project which contributes to the implementation of the Swan Canning Improvement Plan and local Water Quality Improvement Plans. Online resource: <<http://www.perthregionnrm.com>> (accessed 18 May 2015).

The Environmental Protection Authority (EPA) has also released guidance statements regarding specific environmental factors including guidance statements for the assessment of planning,<sup>262</sup> and draft guidance on Groundwater Environmental Management Areas.<sup>263</sup>

A partnership between the DoW, the Water Corporation, WAPC, Western Australian local councils and the federal government produced the *Better urban water management* (2008) which provides guidance on the implementation of SPP 2.9 *Water Resources* for developers. The document identifies a framework for the implementation of integrated land and water planning which adopts the staged hierarchy of the state's strategic and statutory land-use planning decision-making processes. It describes how water resources should be considered at each land use planning stage and identifies actions, investigations and agencies responsible for the provision of particular water resource information. Water resource information derived at each planning stage is used to inform the subsequent planning stage. In this way, an appropriate level of consideration is given to the total water cycle at each stage of the planning process from the strategic level down to the lot level. However, the document does not establish compliance targets or provide prescriptive measures (Bancroft and Gardner 2015). The *Decision Process for Stormwater Management in WA* provides a decision framework for the planning and design of stormwater management systems.

## Infrastructure planning

### *Drainage infrastructure*

Responsibility for providing drainage services to metropolitan Perth is undertaken by local councils and the Water Corporation. Local councils are generally responsible for planning for the drainage system within a catchment with the DoW responsible for the arterial drainage planning.<sup>264</sup> The Water Corporation is then responsible for operating the majority of the arterial drainage systems. The Department of Main Roads is responsible for stormwater management and drainage on freeways and State roads.

The primary purpose of drainage system management in Western Australia is property flood protection and road safety. The Department of Main Roads and the Water Corporation have no responsibility as to the quality or quantity of stormwater flowing through the drainage system.<sup>265</sup>

### *Water industry infrastructure*

Planning for water industry infrastructure is primarily undertaken by the Water Corporation and the DoW. The Water Corporation has the right to undertake maintain and operate any works, system, facilities, apparatus or equipment required for the purpose of supplying and treating water.<sup>266</sup> For large investments, the consent of the Minister for Water is required.<sup>267</sup> Local government may undertake works in relation to sewage management subject to certain conditions.<sup>268</sup>

## Infrastructure design and construction

Building and plumbing regulation in Western Australia consists of primary legislation, which allocates responsibilities to different entities and which establishes the overall regulatory framework, and delegated and quasi-legislation, which contains detailed standards and rules, licensing/registration schemes for professionals working in the industry and accreditation schemes for certain approved products/techniques. Some use is also made of voluntary certification schemes to promote specific desired social objectives, such as sustainability concerns.

<sup>262</sup> Environmental Protection Authority, Draft EPA Guidance 33: Policies, Guidelines and Criteria for Assessing Planning.

<sup>263</sup> Environmental Protection Authority, Draft EPA Guidance 48: Groundwater Environmental Management Areas.

<sup>264</sup> *Metropolitan Water Authority Act 1982* (WA).

<sup>265</sup> *Metropolitan Water Authority Act 1982* (WA); see also Department of Water (2007).

<sup>266</sup> *Water Corporations Act 1995* (WA) s 27.

<sup>267</sup> *Water Corporations Act 1995* (WA) s 32.

<sup>268</sup> *Health Act 1911* (WA) s 95.

The *Building Act 2011 (WA)* (Building Act) is the primary source of legislation that governs building works in Western Australia. The Building Regulations 2012 have been enacted under the Building Act and incorporate the Building Code of Australia. The Building Commission, an independent statutory body established by the *Building Services (Registration) Act 2011 (WA)*, and a division of the Department of Commerce, is the regulator under the Building Act. The Building Commission will research and prepare building codes and standards, including input to the Building Code of Australia, Plumbing Code of Australia and Australian Standards.

In Western Australia, the Plumbing Code of Australia has not yet been incorporated into the legislative regime but a decision to do so has been made. The Plumbing Code is performance-based and there is some flexibility regarding the way in which it can be applied. The Plumbing Code contains a number of sections, particularly in relation to non-drinking water services,<sup>269</sup> stormwater drainage systems,<sup>270</sup> surface and subsurface drainage systems,<sup>271</sup> and on site wastewater systems.<sup>272</sup>

The WSA specifies requirements relating to approved fittings, fixtures and pipes.<sup>273</sup> The WSA also requires an owner or occupier of land to manage risks and maintain fittings, fixtures and pipes to ensure that there is no waste of water, nuisance or a health hazard occurring.<sup>274</sup>

## E. Perth's Environmental Regulation

### Institutional Framework

The Department of Environmental Regulation (DER) has broad responsibility for environmental regulation in Western Australia under Part V of the *Environmental Protection Act 1986 (WA)* (*EP Act*).

The EPA, established under the *EP Act*,<sup>275</sup> is an independent statutory authority with the broad objective of protecting Western Australia's environment. The EPA provides environmental advice to the Minister, prepares statutory Environmental Protection Policies (EPPs) and non-statutory State Environmental Policies (SEPs) that relate to water resources,<sup>276</sup> and provides public statements about matters of environmental importance.

The Office of the Environmental Protection Authority (OEPA) was established in 2009 to support the EPA in conducting environmental impact assessments and developing policies to protect the environment. The OEPA also monitors compliance with Ministerial conditions related to approvals and is accountable to the Minister for Environment and the EPA.

### Western Australia's environmental concerns

Non- point source pollution, such as urban stormwater runoff, has been recognised as a significant environmental pollutant and contributor to algal blooms and fish kills in Western Australia's waterways and bays.

Climate change has seen a significant decrease in rainfall since the 1970s in south-west Western Australia. Reports prepared for the DoW indicate that the Perth metropolitan region will enter into an absolute water deficit by 2020 (Thomas 2008). This will have a significant impact upon the quantity of water available for the environment.

<sup>269</sup> Plumbing Code of Australia, B03.

<sup>270</sup> Plumbing Code of Australia, section D.

<sup>271</sup> Plumbing Code of Australia, section D, part D2.

<sup>272</sup> Plumbing Code of Australia, section F.

<sup>273</sup> *Water Services Act 2012 (WA)* s 90.

<sup>274</sup> *Water Services Act 2012 (WA)* s 92.

<sup>275</sup> The functions of the EPA are outlined in the Environmental Protection Act 1986 (WA) s 16.

<sup>276</sup> Online resource: <[http://www.epa.wa.gov.au/Policies\\_guidelines/Pages/Policies.aspx?cat=Policies&url=Policies\\_guidelines](http://www.epa.wa.gov.au/Policies_guidelines/Pages/Policies.aspx?cat=Policies&url=Policies_guidelines)> (accessed 18 May 2015).

Another significant environmental issue for Western Australia is the over-extraction of groundwater systems with the protection of underground drinking water sources becoming a significant water quality and quantity problem (Thomas 2008, Department of Water 2009, Gardner, Bartlett et al. 2009). Protection plans have been prepared for many large aquifers in the Perth region and replenishing MAR trials have been undertaken by the Water Corporation.

## Legislative Framework

The *RiWI Act* provides the legislative basis for the planning, regulation, management, protection and allocation of water resources in Western Australia. The objectives of the *RiWI Act* includes providing for the management, sustainable use and development of water resources to meet the needs of current and future users, and for the protection of their ecosystems and the environment in which water resources are situated.<sup>277</sup>

The *EP Act* sets out the legislative framework for the protection of the environment, providing for the prevention, control and abatement of pollution and environmental harm, for the conservation, preservation, protection, enhancement and management of the environment.<sup>278</sup> The *EP Act* details a number of offences relating to water and pollution,<sup>279</sup> as well as environmental harm.<sup>280</sup> Pollution to water sources is largely controlled by works approval and licensing provisions, which regulate the construction and ongoing operation of listed *prescribed premises*.<sup>281</sup> The *EP Act* also provides for environmental protection notices designed to stop emissions and pollution.<sup>282</sup>

EPPs provide for the protection of specific areas, particular environments or particular components of the environment. The EPA releases guidance statements regarding specific environmental factors, for example, the draft EPA Guidance 48 on Groundwater Environmental Management Areas.

## Water quality regulation

### Point source pollution

The regulatory regime controlling point source pollution in Western Australia is largely found in the *EP Act*. Occupiers of prescribed premises must hold a licence to perform any activity that may lead to the discharge of waste into the environment.<sup>283</sup> The Environmental Protection Regulations 1987 (WA) define prescribed premises. If the occupiers of prescribed premises perform works on those premises resulting in an alteration or volume of waste emitted from the premises, they must have a works approval.<sup>284</sup>

The *EP Act* also has a number of offences relating to pollution and the DER can issue an environmental protection notice where there is a presence, or likelihood, of pollution. Further, anyone who discharges or abandons liquid waste is also liable under the *EP Act* and there is no requirement for waste discharge offences that there be a detrimental impact on the environment.<sup>285</sup>

The following EPPs are relevant to water management in the Perth region:

- The Swan Coastal Plain Lakes policy, which seeks to protect the environmental values of lakes on the Swan Coastal Plain.

<sup>277</sup> *Rights in Water and Irrigation Act 1914* (WA) s 4.

<sup>278</sup> *Environmental Protection Act 1986* (WA) s 4A.

<sup>279</sup> *Environmental Protection Act 1986* (WA) ss 49,49A,50.

<sup>280</sup> *Environmental Protection Act 1986* (WA) ss 50A, 50B.

<sup>281</sup> *Environmental Protection Act 1986* (WA) s 56.

<sup>282</sup> *Environmental Protection Act 1986* (WA) s 65.

<sup>283</sup> *Environmental Protection Act 1986* (WA) s 53.

<sup>284</sup> *Environmental Protection Act 1986* (WA) s 53. See Part V, Div 3 of the EPA for the governance of works approvals and licences grants for works on scheduled premises.

<sup>285</sup> *Environmental Protection Act 1986* (WA) s 49A.

- The Gnangara Mound Crown Land policy, which aims to protect the quality of groundwater, vegetation and wetlands in the Gnangara mound area.
- The Peel Inlet—Harvey Estuary policy which seeks to identify a range of environmental quality objectives to rehabilitate the Peel Inlet-Harvey Estuary.
- The Swan and Canning rivers policy.

The *EP Act* also includes a number of other environmental protection provisions that could apply to water pollution as well as four primary offences relating to environmental pollution.<sup>286</sup>

Control of sewage pollution is primarily done under the licence/works approval system.<sup>287</sup> Sewage pumping stations where sewage is pumped, other than to or from septic tanks, and where a discharge of waste from the station may enter the Swan River or the Canning River, are also regulated.

Industrial waste is largely controlled by the licence/works approval system. In addition, industrial effluent pollution is managed by the terms of individual trade waste agreements between industrial effluent producers and the Water Corporation. These allow agreed amounts of waste to be discharged into the sewerage system, subject to certain conditions, for a charge.<sup>288</sup> The *WSA* includes a statutory offence of discharging designated trade waste to a sewer without or contrary to the licensee's approval.<sup>289</sup>

### Non-point source pollution regulation

The *Stormwater Management Manual for Western Australia* (Department of Water 2004) includes stand-alone chapters on stormwater management and aligns with national guidelines.

Stormwater management plans may also be prepared for an area by a local council, catchment groups, regional NRMGs/councils or by a multiple partner group (Department of Water 2004). A stormwater management plan may address urban stormwater management to protect ecological, social/cultural and economic values and may be used to aid with decision making to ensure that decisions in relation to new development are made with the implications for stormwater impacts taken into account.

### Water quantity regulation

Water quantity is managed under the water resource system and until the Water Resources Management Bill is passed, the *RiWI Act* provides the legislative basis for water resources in Western Australia.

The *RiWI Act* provides for the establishment of statutory water management plans to provide for the protection of water-dependant ecosystems at the regional, subregional and local scales. Yet no statutory water allocation plans have been developed (Bennett and Gardner, 2014). Instead, DoW has developed non-statutory water allocation plans which have similar functions to the statutory plans contemplated by the *RiWI Act*. The DoW generally develops such plans in cases where 30 per cent of the allocation limit for a particular resource has been committed (Department of Water 2011).

In administering the *RiWI Act* and allocating water, the Minister for Water must consider whether the proposed extraction and use of water would be ecologically sustainable and environmentally acceptable.<sup>290</sup> This is supported by the No5 - *Environmental Water Provisions Policy for Western Australia* which provides broad objectives and principles for the development of environmental water requirements and environmental water

<sup>286</sup> *Environmental Protection Act 1986* (WA) ss 49, 50, 50A, 50B.

<sup>287</sup> Sewage facilities where sewage is treated, excluding septic tanks, or from which treated sewage is discharged onto land or into waters and it is more than 20 m<sup>3</sup> are prescribed premises. See the Environmental Protection Regulation 1987 (WA) Schedule 1.

<sup>288</sup> Online resource: <<https://www.watercorporation.com.au/home/business/trade-waste>> (accessed 18 April 2015).

<sup>289</sup> *Water Services Act 2012* (WA) s 102.

<sup>290</sup> *Rights in Water and Irrigation Act 1914* (WA), Sch 1, cl 7(2).

provisions. The Minister may impose licence conditions that regulate the use management, protection, enhancement and monitoring of freshwater ecosystems and riverine environments.<sup>291</sup> These licences can be amended, as required, to protect the freshwater environment from unacceptable damage.<sup>292</sup> The Minister also has broad powers to direct that restrictions, or prohibitions, be imposed on water extraction where the Minister has found that the quantity of water in the water body is unlikely or insufficient to meet environmental needs.<sup>293</sup>

However, the current legislative framework does not include a substantive duty for environmental conservation (Gardner 2006, National Water Commission 2009) and current water management frameworks do not identify over-allocated or overused systems and do not provide recovery measures for such systems (National Water Commission 2009). Bennett and Gardner (2014) have noted that there is a significant problem with groundwater over-allocation in the south west region of the state but there is a reluctance to amend water licences to address this over-allocation.

### Regulatory reform proposals

When enacted, the Water Resources Management Bill, will significantly reform water resource management in Western Australia and will remove existing obstacles to establishing statutory allocation plans (Bennett and Gardner 2014).

## F. Perth's Public Health Regulation

### Institutional framework

The Minister for Health has overall responsibility for the provision of health services in Western Australia is supported by the DoH. The Minister may set urban water standards to protect public health and in doing this, is advised by Advisory Committee for the Purity of Water. The DoW also has health responsibilities in relation to the supply of drinking water.<sup>294</sup>

### Drinking water regulation

Perth has a specific regulatory regime which specifies the quality of drinking water and controls of the entities that are allowed to supply reticulated potable water. The *Water Services Licensing Act 2005 (WA)* requires that all water service providers be licensed by the ERA. As the licensed water service provider for the Perth region, the Water Corporation must reach the required drinking water standards. The licence terms and conditions specify drinking water quality standards which are set out in a MOU between the Water Corporation and the DoH. The MOU defines the role of the DoH as the regulator of drinking water quality and enables it to audit the Water Corporation's water quality, data and reporting systems and provides for the development of a drinking water quality framework.

Drinking water sources are proclaimed under the *Metropolitan Water Supply, Sewerage and Drainage Act 1909 (WA)* which also defines legal boundaries of surface and groundwater drinking water sources, provides for by-laws to protect the water quality of these sources and provides for the establishment for protection zones around these sources. A list of proclaimed public drinking water sources in Western Australia is provided in the DoW's *Water Quality Protection Note no. 75: Proclaimed public drinking water source areas* (Department of Water 2012 ). SPP 2.7 *Public Drinking water source* also guides state and local government land-use planning decisions in public drinking water source areas.

<sup>291</sup> *Rights in Water and Irrigation Act 1914 (WA)*, Appendix to Schedule 1.

<sup>292</sup> *Rights in Water and Irrigation Act 1914 (WA)*, Sch 1, cl 24.

<sup>293</sup> *Rights in Water and Irrigation Act 1914 (WA)* ss 26GC, 26GD.

<sup>294</sup> These responsibilities include the preparation of water service policies, the identification and protection of public drinking water source areas, the preparation of drinking water source protection assessments, drinking water source protection plans and the water services policy framework.



## Non-potable water regulation

Under the *Health Act 1911* (WA), the DoH is responsible for the regulation of alternative water sources and maintains an approval process for alternative water supply systems (Department of Health 2009). These systems must comply with a number of conditions concerning water quality before obtaining a licence from the ERA, if applicable, and obtaining approval from the DoH.

### Recycled wastewater

#### **Generally**

The DoH regulates the design, construction, connection, operation and maintenance of sewage in accordance with the *Health Act 1911* (WA). Recycled water is considered sewage under section 3 of the *Health Act 1911* (WA).

The *Guidelines for the Non-Potable Uses of Recycled Water in Western Australia 2011* were developed by the DoH and are designed to provide a planning and implementation framework for wastewater recycling schemes. The guidelines have the objective of maximising the reuse of recycled water while minimising, and managing, any risks associated with recycled water use (Department of Health 2011).<sup>295</sup> Recycled water is defined under the guidelines as water generated from sewage,<sup>296</sup> or from industry, that is treated to provide fit-for-purpose water for its intended beneficial use.<sup>297</sup> The DoH also sets conditions for the approval of recycling water schemes and for the use of recycled water (Department of Health 2011).

Previously, the approvals process for the supply of non-drinking water was considered to be a significant barrier to the uptake of water recycling in Western Australia and the DoW has developed a guideline to simplify, and streamline, the approval process for non-drinking water systems with a focus on urban development. The *Guideline for the approval of non-drinking water systems in Western Australia – urban developments* (Department of Water 2013b) provides simplified approval requirements for non-drinking water systems in urban developments and seeks to better align with the *Better Urban Water Management* framework.

#### **Large recycled sewage/greywater schemes**

The AGWR and the *Guidelines for the Non-Potable Uses of Recycled Water in Western Australia 2011* inform the regulation of large recycled sewage and greywater schemes. However, these guidelines do not deal with recycled water from individual household systems, single/multiple dwellings, or commercial premises producing up to 5000L/day.

#### **Small recycled sewage/greywater schemes**

Recycled water from individual household systems, single/multiple dwellings, or commercial premises producing up to 5000L/day, are dealt with under the *Code of Practice for the Reuse of Greywater in Western Australia* which has been endorsed under the *Health Act 1911* (WA) (Department of Health 2010).<sup>298</sup> The code establishes acceptable means for greywater reuse and is intended to guide local councils, industry and homeowners. The code sets minimum design and installation standards for greywater systems, establishes procedures for the obtaining of approvals to install greywater systems and ensures that greywater systems are designed, installed, operated and maintained to a satisfactory standard (Department of Health 2010). For single dwelling premises, the local council is responsible for the approval of the installation of greywater reuse systems. Approval from the DoH may be required for larger systems.

<sup>295</sup> The guidelines apply the '12 element' risk assessment used by the National Guidelines for Water Recycling.

<sup>296</sup> This includes grey water, yellow water and black water.

<sup>297</sup> *Health Act 1911* (WA) s 3.

<sup>298</sup> *Health Act 1911* (WA) s 344A(2).

### Rainwater

The quality and use of rainwater is not regulated by legislation in Western Australia. The DoH recommends the use of rainwater only for non-potable purposes when a safer reticulated drinking water supply is available. At common law, the law of negligence imposes a duty of care on those operating rainwater harvesting regimes not to cause reasonably foreseeable harm to other people.

### Stormwater capture and reuse schemes

The capture and harvesting of stormwater in Western Australia is guided by the stormwater management practices promoted in chapter 9 of the DoW's *Stormwater management manual for Western Australia (2004-2007)*. The DoH has also adapted the AGWR to Western Australian standards and released the *Draft Alternate Water Supply Guidelines – Stormwater and Rainwater* in 2009.<sup>299</sup> The general law of negligence also imposes a duty of care on those operating stormwater harvesting and reuse regimes not to cause reasonably foreseeable harm to other people.

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<sup>299</sup> Specifically, the *Australian Guidelines for Water Recycling: Stormwater Harvesting and Reuse (Phase 2)*.

# Appendix D: Melbourne's Urban Water Regulatory Frameworks

This Appendix D contains an updated version of the material presented in a previous project report (McCallum 2014).

## A. Urban water management in Melbourne

Historically, water in Melbourne has been supplied from rainwater captured and stored in dams. However, Melbourne's supply has recently been augmented by the Wonthaggi desalination plant which uses desalination technology to recover freshwater from sea water.<sup>300</sup> Melbourne has also seen a degree of supplementation of supply from other alternative sources. These include household scale greywater systems and larger wastewater recycling schemes which recover water from sewage (Ferguson, Brown et al. 2013). However, with the exception of desalinated seawater, these alternative sources have not been approved for use in potable supply and are currently only reserved for non-potable uses.

Current climate change modeling for southern Australia suggests that over the next few decades Melbourne will be subject to long term drying during winter and spring, more frequent droughts and periods of heavy rainfall (Productivity Commission 2011a, CSIRO and Bureau of Meteorology 2012).

Urban water services in Victoria are provided by corporatised publicly owned water corporations (Essential Services Commission 2012) and metropolitan Melbourne has four water corporations with vertical separation between bulk supply-transmission and retail-distribution. Melbourne Water is the monopoly supplier of bulk potable water and bulk sewerage services. Three metropolitan retailers, YVW, SEW and CWW, supply retail potable water and retail sewerage services on a monopoly basis to domestic and business customers in defined geographic areas. Stormwater services are provided by both Melbourne Water and the various local councils across the metropolitan area.

Recent large scale supply augmentation projects in Victoria, such as the desalination plant, have resulted in significantly increased consumer prices, as the water corporations seek to recover the costs of the investments. This has focused public attention on the price regulation framework and consumer perceptions of what constitutes fair value for water services they receive.<sup>301</sup>

Much urban drainage service provision in Victoria reflects the traditional objectives of urban drainage service provision and the goal of controlling flooding risks through a variety of physical mechanisms typically involving the provision of hard infrastructure such as pipes, channels and drains. However, over time there has been a move towards greater use of WSUD to provide benefits in addition to drainage control. This has led to a host of new regulatory tools being developed which are aimed at encouraging both the control of the physical environment and the provision of environmental benefits. These approaches often involve the provision of softer landscape infrastructure such as rain gardens, swales and wetlands.

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<sup>300</sup> The state government has yet to order any desalinated water from the plant which is currently in standby mode; Online resource: <<http://www.melbournewater.com.au/whatwedo/supply-water/Pages/Desalination.aspx>> (accessed online 15 May 2015).

<sup>301</sup> Dr Ron Ben-David has explored this issue in a series of papers and tentatively suggests what is required is a much greater level of engagement between Victorian water corporations and their customers (Ben-David 2012a, 2012b).

## B. Melbourne's Water Resource Regulation

### Institutional framework

#### Urban water planning

DELWP is the lead agency managing both urban and rural water resources in Victoria. DELWP is responsible for policy, planning and management of the Victorian water sector.

There are many Victorian institutions with a planning function and many instruments with a planning effect (Gardner, Bartlett et al. 2009). For example:

1. The Minister for Water is responsible for ensuring various water resource assessments and plans are undertaken for Victoria. These include Sustainable Water Strategies,<sup>302</sup> Long Term Water Assessments,<sup>303</sup> and Water Supply Protection Area Management Plans.<sup>304</sup> The Minister for Water is responsible for water allocations.
2. The Port Philip and Westernport Catchment Management Authority (PPWCMA) is responsible for drainage and floodplain management and has some role in implementing State water plans at a catchment level.
3. Melbourne Water has waterways management, drainage and floodplains management functions under Part 10 of the *Water Act 1989* (Vic) (*Water Act*) and also specific obligations to plan for water and sewerage needs.<sup>305</sup> The Statement of Obligations (SoO) imposes further obligations regarding waterways and drainage planning on Melbourne Water.
4. The three metropolitan retailers,<sup>306</sup> as water corporations with water district and sewerage district responsibilities under the *Water Act*, have specific obligations to plan for water and sewerage services in their districts.<sup>307</sup> Bulk entitlements also perform some planning functions.<sup>308</sup> There are also obligations contained in the SoO obliging the water retailers to plan for IWCM.

This system is extremely complex and the overlapping responsibilities of the various institutions are not particularly clear.

#### Catchment and waterways management

The *Catchment and Land Protection Act 1994* (*CLPA*) establishes catchment management authorities for different regions. The PPWCMA is the body responsible for catchment management in the area occupied by metropolitan Melbourne.

Melbourne Water and PPWCMA are given significant regulatory powers and resource management functions for waterways management under the *Water Act* and *CLPA*. This blurs the separation between service delivery institutions and policy, planning and management institutions in Victoria and is out of step with the requirements of the NWI (Gardner, Bartlett et al. 2009).

#### Groundwater

Groundwater resources in the metropolitan area are managed by DELWP and Southern Rural Water.

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<sup>302</sup> *Water Act 1989* (Vic) s 22. The strategy for the central region of Victoria includes metropolitan Melbourne and has legislative effect.

<sup>303</sup> *Water Act 1989* (Vic) Part 3 Div 1B.

<sup>304</sup> *Water Act 1989* (Vic) s 27. If the Minister for Water declares a Water Supply Protection Area.

<sup>305</sup> *Water Act 1989* (Vic) ss 171 and 184A.

<sup>306</sup> City West Water, South East Water and Yarra Valley Water.

<sup>307</sup> *Water Act 1989* (Vic) s 163.

<sup>308</sup> *Water Act 1989* (Vic) Part 4, Div 1.

## Legislative framework

The *Water Act* is designed to be the overarching legislative framework for water resource regulation in Victoria. As the *Water Act* largely predates current interest in IWCM and alternative water sources, it is not a water cycle Act, and it contains significant gaps in relation to alternative water sources (Frontier Economics 2008, Gardner, Bartlett et al. 2009). Therefore, while the legislative framework does regulate groundwater and surface water in waterways,<sup>309</sup> it does not provide a statutory definition for surface water which is not in a waterway (i.e. stormwater). Accordingly, stormwater is largely left outside the scope of this framework. Similarly, although the *Water Act* contains a limited definition of *recycled water*,<sup>310</sup> it also sits largely outside the mainstream regulatory framework of the *Water Act*.

## Water allocation

Part 2 of the *Water Act* sets out the Victorian water entitlements framework,<sup>311</sup> it also provides that the Victorian Government is vested with the right to the use, flow and control of all surface water in waterways and all groundwater in the State.<sup>312</sup> The Minister for Water is then responsible for granting statutory authorisations to take and use water. Certain residual statutory rights to take and use water are also granted directly by the *Water Act* itself to adjacent landholders and persons accessing public land.<sup>313</sup> It is prohibited to take water from a waterway or aquifer without an authorisation under the *Water Act*.<sup>314</sup>

In Metropolitan Melbourne the most important statutory water entitlements are:

1. Bulk entitlements issued under Part 4, Div 1 of the *Water Act*. A bulk entitlement holder is entitled either to a water source (i.e. groundwater or surface water) or to water held in the storage works of a water corporation. Bulk entitlements can be subject to conditions which are enforceable under provisions in the *Water Act*. Bulk entitlements can only be issued to an 'authority'.<sup>315</sup>
2. 'Take and use' licences issued under s.51 of the *Water Act*. These entitle the holder to take and use surface or ground water.<sup>316</sup> These licences can also be subject to conditions.

The water entitlements framework embodies a historical view of Victoria's water sources and contains significant gaps and uncertainties about the right to use and trade in alternative water sources such as stormwater, recycled water, wastewater and greywater. For example, recycled water cannot form part of a bulk water entitlement, and regulation of ownership of stormwater in local council drains is unclear (De Sousa 2013b).

## Supply/demand regulation

To meet their supply obligations the water corporations must balance supply and demand. In recent years the Victorian Government has become significantly involved in how this is done.<sup>317</sup> Local councils and the water corporations are also primary institutional actors in this space.

Supply management has largely taken the form of significant direct investment in rainfall-independent sources. Demand management measures have been aimed at both household and business consumers. The measures encourage behaviour change in the following ways:

<sup>309</sup> *Water Act 1989* (Vic) s 3(1) defines *groundwater* and *wastewater*.

<sup>310</sup> This includes treated sewage and trade waste but not treated stormwater.

<sup>311</sup> This statutory framework specifically abolishes and replaces pre-existing common law rights, see s 8(7) of the *Water Act 1989* (Vic).

<sup>312</sup> *Water Act 1989* (Vic) s 7(1).

<sup>313</sup> *Water Act 1989* (Vic) s 8(1). These rights are limited to domestic and stock watering uses.

<sup>314</sup> *Water Act 1989* (Vic) ss 33E and 289.

<sup>315</sup> *Water Act 1989* (Vic) s 34. Authorities are primarily the water corporations but also include other specified organisations such as electricity generators and the environmental water holder.

<sup>316</sup> Southern Rural Water has been delegated power by the Minister for Water to issue ground water licences in the metropolitan area.

<sup>317</sup> For example by prescribing in the *Water Act 1989* (Vic) and SoO in significant detail what permanent water savings plans are to be developed and the restrictions on potable water use by the public that must be applied/developed by water corporations.

1. By reducing the consumption of potable water even if other desirable consumer outcomes are sacrificed.<sup>318</sup> Measures to achieve this involve rebates, education campaigns and mandatory water restrictions on certain uses of water.<sup>319</sup>
2. By increasing potable water use efficiency by consumers whilst retaining other outcome levels. Measures to achieve this include the WELS regime and education campaigns, rebates for water efficient products and prohibitions on the sale of certain items under the WELS regime.<sup>320</sup>
3. By recycling water/using alternative water sources to replace potable water for some uses. Measures to achieve this include a combination of economic tools,<sup>321</sup> and information tools.<sup>322</sup>

## Regulatory reform

The former Victorian Government established the Office of Living Victoria (OLV) to pursue a number of policy goals in relation to urban water. This included the development of the Water Bill which would have significantly revised and updated the *Water Act*. If enacted, the proposed Water Bill 2014 would have made significant changes to the *Water Act*, for example, by defining property rights to stormwater in council drains and amending the water planning framework (Office of Living Victoria 2013b). However, these promised reforms did not go ahead.

The current Victorian Government abolished the OLV in December 2014 and all urban water functions have been integrated in the Water and Catchments Group within DELWP.

## C. Melbourne's Service Delivery and Price Regulation

### Institutional framework

Victorian urban water services are provided by corporatised publicly owned water corporations which operate as monopoly service providers within defined geographic areas.<sup>323</sup> Part 6 of the *Water Act* establishes the water corporations as statutory water corporations and details their objectives and governance arrangements.<sup>324</sup> The Minister for Water has the power to declare the boundaries of a water corporation's monopoly *water district* and *sewerage district*.<sup>325</sup> Public ownership of the water corporations is enshrined in the State constitution.<sup>326</sup>

The ESC is Victoria's independent economic regulator. The *Essential Services Commission Act 2001 (Vic) (ESC Act)* establishes the ESC and provides the economic regulatory framework for all regulated industries. The *ESC Act* sets out the powers of the ESC and its objectives. The Victorian economic regulation regime is not industry specific and was set up across all industries. The regime was deliberately framed in such a way to avoid industry capture of the regulator (Martin 2012).

Victoria has full and independent service delivery and price regulation of the urban water sector, see below. The *Water Industry Act 1994 (Vic) (WI Act)* provides that the water industry is a regulated industry for the purposes of

<sup>318</sup> For example, watering outside plants.

<sup>319</sup> E.g. mandatory water restrictions under *Water Act 1989 (Vic)* s 170F.

<sup>320</sup> E.g. WELS regime prohibiting the sale of certain non-registered products. Victorian legislation implements the WELS regime at the State level.

<sup>321</sup> E.g. direct government funding of an IWCM project.

<sup>322</sup> E.g. community engagement and education programs about alternative water sources.

<sup>323</sup> However, almost all capital works and a significant amount of maintenance work in Victoria is outsourced to the private sector (Productivity Commission 2011a). In addition, the Wonthaggi desalination plant is operated by a private company under a PPP arrangement.

<sup>324</sup> Until recently a different regime had applied to the three metropolitan retailers whereby they were established under general corporations law and licensed under the *Water Industry Act 1994 (Vic)*.

<sup>325</sup> *Water Act 1989 (Vic)* s 122GAA. The actual areas encompassed by such districts are identified by plans referenced in the *Water Act 1989 (Vic)*.

<sup>326</sup> Ss 96 and 97 of the *Constitution Act 1975 (Vic)* provide that the public water utilities in Victoria must retain ultimate responsibility for providing water services even if they contract out some elements of service provision. This *anti-privatisation* provision could potentially hinder the role for third parties in decentralised water service provision in Victoria.

the *ESC Act* and sets out specific objectives for the ESC regarding service delivery and price regulation of the water industry.

The Victorian urban water service sector is characterised by a very low level of consumer choice with Victorian water corporations the owners of natural monopoly assets. There is a significant level of governmental regulatory intervention in regard to service delivery, price and third party access.<sup>327</sup>

## Service delivery regulation

### *Water Act/SoO*

The *Water Act* sets out the statutory duty on metropolitan water corporations to provide urban water services to consumers.<sup>328</sup> The *Water Act* also provides for a statutory deemed contract (Frontier Economics 2008) between consumers and the water corporations pursuant to which a water corporation may recover its service delivery costs from a consumer.<sup>329</sup>

Although there is no retail competition in Victoria under the institutional structure established by the *Water Act* there is a degree of ‘competition through benchmarking’ (Baldwin, Cave et al. 2012) between the water corporations, whereby public comparisons can be made about relative performance. The expectation here is that such public comparison will spur performance improvements by the water corporations.

The SoO is subordinate legislation aimed at the water corporations and is the main regulatory tool used by the Victorian Government to regulate the performance of the water corporations. The SoO imposes specific, and often detailed, operating obligations on the water corporations in addition to those found in the *Water Act*.

### Consumer protection

The ESC regulates for general consumer protection by way of the Customer Service Code. This sets the minimum standards which water corporations must provide to consumers in relation to regulated services. Certain recycled water contracts may be exempted from this code. Water corporations implement the Customer Service Code by developing and complying with their own Customer Charters and Hardship Policies.

Water corporations must also make payments to individual customers if a Guaranteed Service Level set out in a Water Plan is breached.

The *Water Act* obliges water corporations to participate in an approved customer dispute resolution scheme. The scheme approved by the ESC in Victoria is that operated by EWOV. EWOV is a fully member funded body which can make binding decisions. Customer complaints under the Customer Service Code can be taken to EWOV.

Equity concerns around the affordability of urban water services are addressed through a combination of water corporation Hardship Policies, the application of concessions to certain disadvantaged customers and the payment of direct government grants to disadvantaged customers.

The ESC regulates for the consumer protection of trade waste customers by way of the Trade Waste Service Code.<sup>330</sup> Trade waste agreements are required to authorise the discharge of trade waste by a customer into the

<sup>327</sup> Should future institutional change to the urban water sector result in increased markets in urban water services there would be less justification for price regulation. However, there would remain a justification for having in place adequate competition and consumer law frameworks aimed at correcting common imperfections in markets and the protection of consumer interests.

<sup>328</sup> *Water Act 1989* (Vic) Part 8 requires the three metropolitan retailers to supply water services to the public and for Melbourne Water to supply bulk water services. Part 9 of the *Water Act 1989* (Vic) requires the three metropolitan retailers to supply sewerage services to the public and for Melbourne Water to operate and maintain bulk services for the collection, conveyance and disposal of sewage and to provide for the recycling of treated waste.

<sup>329</sup> *Water Act 1989* (Vic) Part 13.

<sup>330</sup> Businesses who dispose of waste to the sewerage system.

sewerage system.<sup>331</sup> The principles and terms for these agreements are set out in the Trade Waste Service Code. Different forms of agreement are available to reflect different customer risk profiles. Water corporations are obliged to develop Trade Waste Customer Charters to implement the Trade Waste Service Code. In addition, the *Water Act* authorises water corporations to make by-laws in respect of trade waste.<sup>332</sup>

### Industry oversight

Oversight of the performance of the water corporations, in delivering their service supply and other obligations under the *Water Act* and SoO, is conducted by the Minister for Water. An Annual Corporate Plan produced by each water corporation and approved by the Minister for Water provides for general performance monitoring (Department of Sustainability and Environment 2011).<sup>333</sup>

The *WI Act* also provides the ESC with a role in monitoring and publicly reporting on the performance of the Victorian water corporations, both to inform customers and the Victorian Government, and to encourage competition by benchmarking within the industry. The *WI Act* requires the ESC to monitor, and publicly report, on regulated water industry performance and compliance with Water Plans, codes and the SoO.

Financial regulation of the water corporations is undertaken by the Victorian Treasurer (Department of Sustainability and Environment 2011) and annual reporting of financial information is required.<sup>334</sup> There is also a requirement that a water corporation submit a business case to the Minister for Water and the Treasurer for approval for significant items of expenditure.

### Competition barriers

Currently the entire Victorian regulatory framework around price and service delivery is based on a set of assumptions about who supplies urban services which '*does not contemplate competition or the free entry of innovative supply options*' (Liggins 2010, p.4). Therefore, service supply by new providers would require significant changes to be made to current frameworks both to enable the supply and to regulate for service quality. Water sensitive service providers may also require access to water corporation assets. Existing mechanisms in the regulatory framework which could be used to grant such access have not yet been tested.

### Price regulation

The *WI Act* provides for the enactment of subordinate legislation which in turn establishes further detail of the regulatory framework.<sup>335</sup> In particular, the WIRO is the regulatory tool that specifies how the ESC is to regulate the standards and conditions of the supply of *declared services* and the price of *prescribed services*. Through the price and service standard setting process the ESC sets prices for the regulated services provided by the Victorian water corporations. The current prices that each water corporation may charge for regulated services are set out in each water corporation's tariff schedule. Other services such as plumbing which a water corporation may also provide are not regulated for price. The ESC is also provided with a dispute resolution function to resolve disputes over price and supply standards between regulated entities.

Part 2 of the SoO establishes the price and service standard setting process. Each water corporation is obliged to prepare a Water Plan which must contain the service outcomes it will meet over the regulatory period. The Water Plan must include certain minimum standards called *Guaranteed Service Levels* that it will meet. The Water Plan must also include details about how the outcomes will be delivered, revenue requirements and proposed prices. The Water Plan must accord with any guidelines produced by the ESC.<sup>336</sup> There are also requirements for

<sup>331</sup> Discharge without such an agreement is an offence under s 178 of the *Water Act 1989* (Vic).

<sup>332</sup> The content for such by-laws is set out in Part 3 of the WIRO.

<sup>333</sup> *Water Act 1989* (Vic) s 247.

<sup>334</sup> *Water Act 1989* (Vic) s 122ZJ.

<sup>335</sup> The SoO, WIRO and Customer Codes.

<sup>336</sup> Such as ESC 2013 Water Price Review Guidance on Water Plans. Specific guidance also exists for particular issues such as the calculation of suitable prices for developer contributions for new developments. See Essential Services Commission (2011).



consultation with government departments, regulators and customers. Water Plans can be viewed as self-regulatory tools produced by the water corporations.

The ESC assesses the Water Plan and makes a draft decision as to whether or not to approve the prices proposed. The proposed prices in a Water Plan must be approved by the ESC if these are in accordance with the procedural requirements specified in the SoO and certain *regulatory principles* which are listed in the Water Industry Regulatory Order. If approval is not granted the draft decision may specify what further actions or changes will be required for approval. The water corporations respond to a final decision with a revised tariff schedule.

There is currently no mechanism in Victoria by which non-water corporation service providers could be regulated for service quality or price should they supply urban water services to the public.

### Third party access

There is no third party access framework for water infrastructure in Victoria.

### Regulatory reform

The ESC are currently consulting about making potential changes to how Victorian water prices are set (Essential Services Commission 2015).

## D. Melbourne's Built Environment Regulation

### Land and waterways use

Victorian urban land and waterways use is regulated by a web of regimes relating to land and waterways management and to planning.

#### *Catchment management*

Catchment management by the PPWCMA is discussed above. The strategies the PPWCMA produces may be incorporated into Planning Schemes or State Environment Protection Policies (SEPPs.) In addition, the Secretary may, by notice, impose special legally binding land use conditions on land in a water supply catchment.

#### *Waterways/floodplain management*

Part 10 of the *Water Act* sets out the functions of Melbourne Water as waterways manager for the metropolitan area, this responsibility includes flood plain management functions. Local councils are also given powers to construct, operate and control flood plains management or waterways management schemes. Melbourne Water may require a financial contribution from a local council or other water corporation towards the costs of undertaking waterway management functions. It is a statutory offence to build on a flood plain without appropriate permission from Melbourne Water.<sup>337</sup>

#### *Other public land management*

A variety of other pieces of state legislation, both primary and delegated, control how public land is managed in Victoria.<sup>338</sup> These are not considered in this report.

<sup>337</sup> *Water Act 1989* (Vic) s 208.

<sup>338</sup> Such as the *Conservation, Forests and Lands Act 1987* (Vic), *Crown Land (Reserves Act) 1978* (Vic), *Land Act 1958* (Vic), *Parks Victoria Act 1998* (Vic) and the *Wildlife Act 1975* (Vic).

## Infrastructure planning

The current regulatory frameworks for the built environment in Victoria tend to operate at a state-wide or municipal level, rather than at the level of the actual city as a greater metropolis. In Victoria, infrastructure planning is regulated by specific rules relating to water industry infrastructure which are contained in primary and delegated legislation and through the statutory planning regime.

### Statutory planning

DELWP is responsible for planning in Victoria. The enabling framework for the Victorian planning system is the *Planning and Environment Act 1987 (Vic) (P&E Act)* which sets broad objectives, rules and principles and defines the roles of those who operate in the system. Also of relevance is the *Subdivision Act 1988 (Vic)* which sets out the procedures for the subdivision of land and the *Owners Corporation Act 2006 (Vic)* which provides the legislative framework for the management of common property.

The VPPs are quasi-legislative rules operating under the P&E Act that set out standard provisions which should guide the development of specific municipal level Planning Schemes. The VPPs become operationalised through the Planning Scheme for an individual municipal area. A Planning Scheme, which is subordinate legislation, determines the zoning of land, specifies how land in a zone may be used/developed and specifies the uses and developments for which a planning permit is required.

Unless a particular land use or development is allowed *as of right* under the relevant Planning Scheme it will require authorisation through the issue of a planning permit by the local council. The conditions which attach to such permits are a significant regulatory tool. Some of these conditions may require developers to enter into an agreement with the council.

### Drainage infrastructure

Responsibility for providing drainage services to metropolitan Melbourne is shared between local councils and Melbourne Water. Part 10 of the *Water Act* sets out the functions of Melbourne Water as waterways manager for the metropolitan area, this includes regional drainage functions. Part 6 of the SoO requires IWCM be taken into account in the planning of drainage services and Part 7 of the SoO sets out additional asset management planning requirements. The powers of local councils are set out in the *Local Government Act 1989 (Vic)*. Ownership of public sewers and drains is vested in local councils who are given powers to manage and control these. Local council funding comes both from rates charged to local property owners (both residential and commercial) and from other charges and grants.

Both Melbourne Water and local councils are obliged to install and maintain suitable drainage infrastructure to fulfil their functions. Historically, drainage infrastructure used direct physical controls such as storm drains and retarding basins to manage the flow of stormwater and direct it safely away from people and property. This was usually achieved through engineering solutions that would convey the water to rivers and the bay. However, as the science surrounding stormwater and its place in the environment has evolved there has been a gradual retreat from such approaches. Newer stormwater management practices involve capturing water closer to its source and finding uses for it that do not involve discharge to rivers and the bay. Such practices include stormwater and rainwater harvesting, road/hard area design/connection and soil moisture retention strategies such as tree planting, rain gardens and wetlands.

The BPEM Guidelines provide State level technical scientific advice on WSUD and stormwater harvesting. However, this advice is primarily directed towards health and environmental risks rather than towards flooding risks. The BPEM Guidelines are currently under review. There are a number of other regulatory tools aimed at education, capacity building and attitude change around WSUD and Melbourne Water has published maintenance guidelines about WSUD (Melbourne Water 2013).

A significant regulatory tool in the planning regime aimed at promoting both supply/demand management and WSUD is clause 56.07 of the VPPs which contains the various *integrated water management* requirements a

developer must fulfil in relation to a residential subdivision. These are triggered when a planning permit to subdivide is sought. Cl56.7 imposes obligations on a developer to ensure the supply of drinking water and sewerage services to a residential lot.<sup>339</sup> However, this is coupled with a requirement to substitute drinking water for reused/recycled water for non-potable uses.<sup>340</sup>

Cl56.07-4 has the objective of reducing urban storm water run-off for public safety, property safety and environmental protection purposes and requires urban stormwater management systems to be put in place.<sup>341</sup> These systems must comply with the BPEM Guidelines and satisfy certain performance requirements. Cl56.07-4 has an accompanying practice note. Cl56.07-4 is limited in scope as a tool as it currently only applies to residential subdivisions of more than two properties (Kay and Hussey 2013). Where compliance with cl56.07-4 is not possible the developer may pay an off-set amount to Melbourne Water to construct suitable assets elsewhere. The legality of the use of offsets by local councils is untested. Even if cl56.07-4 does not apply to a development some local councils still apply the BPEM Guidelines objectives as council policy and encourage voluntary compliance by developers (Kay and Hussey 2013).<sup>342</sup> The *Water Act* also obliges local councils to impose conditions in a planning permit if drainage in an area may be affected.

### Other water infrastructure

The power of a water corporation to levy a contribution from a developer towards the cost of urban water supply and sewerage infrastructure for the new development is a further regulatory tool. The use of this power is controlled by the ESC which has set out guidance to water corporations on appropriate pricing principles to apply in setting such levies (Essential Services Commission 2011).

## Infrastructure design and construction

Building and plumbing regulation in Victoria consists of primary legislation, which allocates responsibilities to different entities and establishing the overall regulatory framework, and delegated and quasi-legislation, which contains detailed standards and rules, licensing/registration schemes for professionals working in the industry and accreditation schemes for certain approved products/techniques. There is also some use of voluntary certification schemes to promote specific desired social objectives, such as sustainability concerns.

### Water industry infrastructure

The *Water Act* gives water corporations the right to construct water industry infrastructure and requires:

1. That a works licence be obtained from the Minister for Water for the carrying out of works on a waterway.
2. That Ministerial approval be obtained before any underground disposal is made.
3. That Ministerial approval be sought before abandoning major works.

The *Water Act* also vests the Minister for Water with wide powers to give directions regarding such works. Once water industry infrastructure is built it is given certain statutory protections in the *Water Act*. The *Water Act* also sets up a licence scheme to regulate drillers.

### Other infrastructure

The *Building Act 1993* (Vic) (*Building Act*) establishes the framework for Victoria's building and plumbing regulation system and establishes Victoria's building industry regulator and its plumbing industry regulator.<sup>343</sup>

The Building Regulations 2006 (Vic) (Building Regs) incorporate the Building Code of Australia into Victorian law by making it a requirement that the Building Code of Australia be complied with in all building works. Unless

<sup>339</sup> In VPP cl 56.07-1 and cl 56.07-3.

<sup>340</sup> VPP cl 56.07-2.

<sup>341</sup> By increasing the quality of receiving waters.

<sup>342</sup> Typically in urban infill situations.

<sup>343</sup> The Building Commission and the Plumbing Industry Commission.

exempt, all buildings must comply with the requirements in the Building Act, the Building Regs and the Building Code of Australia regarding the standard for building work. Additional regulatory tools operating under the framework of the *Building Act* include the regulation of building practitioners by a registration scheme and the accreditation of certain building products and methods. Building standards are also controlled by the mandatory requirement for building and occupancy permits to be issued by a registered building surveyor.

The *Building Act* regulates plumbing practitioners by way of a registration and licensing scheme and provides for self-certification of plumbing works. This is underpinned by a system of random audits. Plumbing work must only be carried out by a registered plumber. The Plumbing Regulations 2005 (Vic) (Plumbing Regs) incorporate the Building Code of Australia into Victorian law by making it a requirement that the Plumbing Code of Australia be complied with. In addition, the Plumbing Regs contain additional Victoria specific rules relating to the quality of stormwater plumbing work.

The Building Code of Australia includes the requirement that all new residential buildings and renovations achieve a 6 star standard for energy performance (Building Commission Victoria 2011). The *deemed to satisfy* provisions require the installation of a solar hot water system or a rainwater tank for toilet flushing in all new Class 1 buildings. Alternative solutions involving greywater recycling or purple pipe systems are possible but would require individual certification by a registered building surveyor. Alternative solutions must also comply with the Plumbing Regs.

The Building Regs set out specific requirements regarding the design and construction of stormwater drainage systems, septic tank systems and certain building works in flood prone areas. These specific requirements often require that additional approvals are obtained from the local council.

Local laws enacted by local councils may also impact on construction.

## E. Melbourne's Environmental Regulation

### Institutional framework

Victoria's environmental protection regulator is the Environment Protection Authority (EPA). The EPA is part of DELWP and is accountable to the Victorian Parliament.

### Melbourne's environmental concerns

The regulatory regime, which controls point source pollution in Victoria has been in place since the early 1970s.

However, in recent times it has become apparent that urban stormwater runoff is a significant environmental pollutant and contributor to the poor water quality of Melbourne's waterways and bays. As the non-point source pollution in stormwater originates from many sources,<sup>344</sup> its control is more complex than the control of point source pollution. Current Victorian regulatory approaches to the control of pollution from urban stormwater run-off involve a combination of two approaches:

1. Control of the activities causing the pollution. This often involves the use of primary and delegated legislation to create pollution offences and to control particular activities that may be causing the pollution.

<sup>345</sup>

<sup>344</sup> E.g. vehicle emissions, litter, roofing materials, vehicles, animal faeces, leaf matter and cross contamination with the sewerage system. Such pollution may originate upstream in a rural catchment or in the urban area itself.

<sup>345</sup> Such as littering and poor building site maintenance

2. Capture/treatment of the polluted water before it can be discharged to the environment. This commonly occurs alongside the provision of urban drainage services (Wong, Allen et al. 2013) and involves a host of new technologies involving soft landscape infrastructure. Regulation may mandate the use of these approaches,<sup>346</sup> or regulation may encourage the uptake of such technologies through grants/rebates and education/best practice guidelines.

While there are many potential regulatory tools aimed at controlling non-point source pollution from urban stormwater, there is some evidence that the existing legislative provisions are not always adequately enforced (Melbourne Water and Environment Protection Authority Victoria 2009, p.92). There are also some gaps in the tools currently available, such as the lack of regulation for environmental purposes of, for example, the discharge of stormwater from local council drains.

New approaches to waterways health are also focusing on the environmental health of upper catchments,<sup>347</sup> rather than upon remediation works to restore waterways and control pollution at the end of catchments. These are currently at an experimental stage. However, it is likely that funding best practice management actions to control the quality of stormwater run-off which are aimed at agricultural producers in rural catchments is substantially more cost effective than actions aimed at directly improving urban water quality (Melbourne Water and Environment Protection Authority Victoria 2009). To date, upper catchment interventions have tended to concentrate on public land. However, an innovative approach has been trialed in Melbourne (Fletcher, Walsh et al. 2011) which uses an auction process to encourage environmental remediation work for stormwater retention on private allotments.<sup>348</sup> This was accompanied by significant amounts of focused public education.

## Legislative framework

The key piece of primary legislation in relation to environmental protection in Victoria is the *Environment Protection Act 1970 (Vic)* (*Environment Protection Act*) which establishes the EPA and provides a risk based framework for the protection of the environment. However, there are several other pieces of primary legislation that control for particular environmental hazards in relation to water dependent environments and their ecosystems. The most important of these is the *Water Act*.

Statutory policies are pieces of delegated legislation that operate underneath the Environment Protection Act, and which set out the specific standards required for the protection of particular parts of the environment.<sup>349</sup> The SEPPs establish the environmental values which society wishes to protect, identify ways in which to measure if these are being protected and identify measures to ensure their protection or remediation. There are two SEPPs relevant to urban water management. The State Environment Protection Policy (Waters of Victoria) (SEPP (WoV)) sets out the framework and standards for the protection of Victorian waterways. The State Environment Protection Policy (Groundwaters of Victoria) (SEPP (GoV)) sets out the framework and standards for the protection of Victorian groundwater. Together these incorporate the Water Quality Guidelines into Victorian law although some of the water quality targets are aspirational at the current time.<sup>350</sup>

The EPA also issues a large amount of non-binding guidance.<sup>351</sup>

<sup>346</sup> For example, CI56.07-4 of the VPPs discussed above

<sup>347</sup> There is then some cross over with land management regimes.

<sup>348</sup> The approach was trialed in the Little Stringybark Creek catchment and was called a 'stormwater tender'. Private land owners bid for the minimum level of subsidy they would require to undertake stormwater retention works such as installing rainwater tanks, rain gardens and downpipe diversions.

<sup>349</sup> SEPPs and Waste Management Policies.

<sup>350</sup> The SEPPs also have public health objectives.

<sup>351</sup> To assist organisations in fulfilling the conditions of licences and works approvals and in complying with the legislative requirements in the *Environment Protection Act 1970 (Vic)* and the SEPPs.

## Water quality regulation

### Point source pollution

The main mechanism used by the EPA to protect the environment from point source pollution is the licence/works approval system. Under this system an occupier of premises likely to be undertaking polluting activities is required to obtain an operating licence and/or works approval from the EPA. The categories of premises that require a licence and/or works approval to operate are listed in the Environment Protection (Scheduled Premises and Exemptions) Regulations 2007 (Vic). Water quality standards are set in SEPP (WoV) and all discharge of effluent to the environment must be in accordance with these standards.<sup>352</sup> The *Environment Protection Act* and the *Water Act* also set out various pollution offences. The control of point source pollution through the mechanisms in the *Environment Protection Act* is perceived as 'robust and effective' (Melbourne Water and Environment Protection Authority Victoria 2009, p.49).

Control of sewage pollution operates at three levels:

1. By controlling what goes into the reticulated sewerage system.
2. By controlling what comes out of the reticulated sewerage system.
3. By controlling what happens to sewage treated outside of the reticulated sewerage system.

Control of what goes into the reticulated sewerage system is done by the application of several legislative tools which attempt to ensure that only sewage is allowed into the system and strongly encourage the offsite discharge of domestic sewage into this system. Therefore, under the *Water Act*, water corporations are given extensive powers to require domestic properties to connect to sewerage networks. Further, SEPP (WoV) prohibits the offsite discharge of wastewater other than to a sewer. The *Water Act* also provides that it is a statutory offence to discharge non-sewage to a sewer.<sup>353</sup>

Control of what comes out of the reticulated sewerage system is achieved by requiring sewage treatment plants discharging more than 5,000 litres of effluent to the environment per day to be licensed under the *Environment Protection Act* licensing regime. Traditionally such water treatment plants have been owned and/or managed by the water corporations. SEPP (WoV) contains further detail about what should be considered by the EPA in issuing such licences. The licensing regime for both public health and environmental health reasons is considered in detail in Section F of this Appendix D.

Control of what happens to sewage treated outside of the reticulated sewerage system is achieved by the regulation of small on-site sewage facilities under a modified *Environment Protection Act* licensing regime for both public health and environmental health purposes.<sup>354</sup> This is also considered in detail in Section F of this Appendix D.

Systems that recycle sewage in a closed loop fashion and accordingly do not discharge any effluent to the environment, as well as off-site systems that discharge less than 5,000 litres of effluent to the environment per day, are currently outside of the existing regulatory regimes.

Control of industrial effluent pollution is managed by the terms of individual trade waste agreements between industrial effluent producers and the water corporations. These allow agreed amounts of waste to be discharged into the sewerage system (Melbourne Water and Environment Protection Authority Victoria 2009) subject to certain conditions. The *Water Act* provides that it is a statutory offence to discharge designated trade waste to a

<sup>352</sup> *Environment Protection Act 1970* (Vic) s 38.

<sup>353</sup> *Water Act 1989* (Vic) s 178.

<sup>354</sup> Discharging less than 5,000 litres of effluent to the environment per day. These are termed *septic tank systems*.

sewer,<sup>355</sup> and grants water corporations extensive powers both to make by-laws for trade waste and to enforce trade waste agreements.

Industrial waste plants discharging more than 5,000 litres of effluent to the environment per day are required to be licensed under the *Environment Protection Act* licensing regime. SEPP (WoV) contains further detail about what should be considered by the EPA in issuing such licences.

### Non-point source pollution

A five year plan by Melbourne Water and the EPA sets out various targets which are consistent with the SEPPs to reduce non-point source pollution arising from urban stormwater flows in the bays and waterways. This plan also sets out a series of proposed actions to meet these targets (Melbourne Water and Environment Protection Authority Victoria 2009). Achievement of the plan's targets will involve applying a number of different regulatory tools:

1. Control of littering through littering offences contained in various pieces of primary legislation.<sup>356</sup>
2. Control of potentially polluting building site practices through the provision of guidance and local laws.<sup>357</sup>
3. Prevention of sewerage system overflows.<sup>358</sup>
4. Improving stormwater quality/treatment through WSUD such as rain gardens and swales. The BPEM Guidelines provide state level technical scientific advice on WSUD and stormwater harvesting which is primarily directed towards health and environmental risks. The BPEM Guidelines place an emphasis on water quality (nutrients and sediment) objectives and amounts of litter in receiving waters and do not consider stormwater flow issues.<sup>359</sup> There are also a number of regulatory tools aimed at education, capacity building and attitude change around WSUD and the encouragement of WSUD uptake through the use of grants and rebates.<sup>360</sup>

The discharge of urban stormwater from local council drains is exempt from EPA licensing requirements.<sup>361</sup> Therefore, a potential tool for controlling stormwater discharge quality is not currently being used.

### Water quantity regulation

The *Water Act* is the primary legislative tool which ensures that adequate water is available in all environments. The *Water Act* establishes an environmental water reserve and an environmental water holder.<sup>362</sup> Together these provide the conceptual framework to give water for environmental purposes a legal status in the water allocation and planning frameworks operating under the *Water Act*. For more detail on these planning and allocation frameworks see Section B of this Appendix D.<sup>363</sup> The tools aimed at encouraging WSUD are also used to control water quantity threats and are discussed above.

<sup>355</sup> *Water Act 1989* (Vic) s 178.

<sup>356</sup> Such as those in the *Environment Protection Act 1970* (Vic), the *Health Act 1958* (Vic), the *Litter Act 1987* (Vic) and the *Public Health and Wellbeing Act 2008* (Vic).

<sup>357</sup> Guidance would include the EPA Environmental Guidelines for Construction Sites. An example of a local law is the City of Kingston, Local Law, Section 10. Such local laws are in turn given legal effect by the operation of the *Local Government Act 1989* (Vic).

<sup>358</sup> SEPP (WoV), cl 35 requires water corporations to maintain their sewers to a standard of no leaks/spills for a 1 in 5 year rainfall event or equivalent to achieve certain water quality outcomes. Achieving these by way of sewer containment is very expensive and Melbourne Water have recently commissioned specialist research into ways that environmental benefits could be achieved by other broad interventions higher up the catchment.

<sup>359</sup> The BPEM Guidelines are given some legal effect through the planning regime (CI56.07-4 of the VPPs) and potentially through SEPP (WoV).

<sup>360</sup> For example, educational materials, the Clearwater initiative and prizes for rain gardens.

<sup>361</sup> Environment Protection (Scheduled Premises and Exemptions) Regulations 2007 (Vic).

<sup>362</sup> *Water Act 1989* (Vic) ss 4A and 4B, Part 3AA, Part 4, Div A.

<sup>363</sup> See also Gardner et al. (2009) for a discussion of these provisions which notes that in Victoria whilst this statutory framework exists there is no duty to make such an allocation.

## Regulatory reform

The Victorian Government has committed to introducing a Yarra River Protection Act to enhance the protection of the Yarra River.<sup>364</sup>

# F. Melbourne's Public Health Regulation

## Institutional framework

Victoria draws a basic distinction between drinking water and non-potable water. The DHHS is the public health regulator for drinking water quality in Victoria. Both the DHHS and the EPA have a regulatory role in respect to the quality of non-drinking water supplies and their use in Victoria.

## Drinking water regulation

The quality of drinking water is regulated by a specific legislative regime and also through government control of the entities that are allowed to supply potable water. The *Safe Drinking Water Act 2003* (Vic) and the *Safe Drinking Water Regulations 2005* (Vic) provide the statutory framework for the regulation of drinking water quality in Victoria.<sup>365</sup> This framework includes elements of prescriptive regulation, process regulation and of performance regulation and relies on the public disclosure of information.<sup>366</sup>

Drinking water is not expressly defined in Victorian legislation but may be thought of as the water which is supplied to customers, as potable water, by the Victorian water corporations. The sources which the water corporations are permitted to use for potable purposes are controlled by Victorian Government policy. All other water sources are, by default, non-potable water supplies. The current policy in Victoria is not to use recycled sewage, recycled greywater or stormwater as potable water supplies. The use of alternative sources in potable supplies would require a change in current State Government policy

Moreover, in areas such as metropolitan Melbourne, where reticulated potable water is supplied, people are not encouraged to use rainwater as a drinking water supply. Therefore, where reticulated water supplies are available, the regulatory system assumes these should be used for drinking purposes. This leads to regulatory measures focused on the actions of drinking water suppliers and water storage managers. The reservation of drinking water service provision to large, centralised government-owned entities ensures that these providers have a certain level of technical competence and a long-term ownership interest in service provision (Department of Sustainability and Environment and Department of Health 2009). Such entities are likely to have the skills and equipment required to operate to performance based standards under a process based regulatory regime.<sup>367</sup>

The supply of drinking water by persons other than water corporations, such as bottled water sales by shops and restaurants, are treated as a supply of food and are regulated under the *Food Act 1984* (Vic).

## Non-potable water regulation

Until recently the use of alternative water sources in Victoria for potentially high risk non-potable uses where incidental ingestion could occur was minimal.<sup>368</sup> Therefore, regulatory regimes aimed at ensuring the quality of such alternative water sources from a public health perspective are currently sparse. In addition, whilst higher degrees of regulation would from first principles be appropriate for more risky sources of water and for more risky uses of water, this logic is not currently reflected in Victoria's regulatory framework. Regulation in this space is

<sup>364</sup> Online resource: <<https://envirojustice.org.au/blog/why-the-yarra-needs-a-yarra-river-protection-act>> (accessed online 4 June 2015).

<sup>365</sup> The *Safe Drinking Water Regulations 2005* (Vic) are currently under review.

<sup>366</sup> Audit reports and annual performance reports.

<sup>367</sup> These are primarily the water corporations.

<sup>368</sup> Such as public open space irrigation.



currently patchy and reflects that the current regulatory regime evolved from measures aimed at securing environmental health through limiting the discharge of pollutants to the environment from large recycled water schemes. To date health concerns have been addressed as a subsidiary issue within this framework.

### Rainwater

The quality and uses of rainwater are not legally regulated in Victoria. Use of rainwater is regulated by non-binding guidelines produced by the EPA and DHHS which provide public information and advice. In addition, the general law of negligence imposes a duty of care on those operating rainwater harvesting regimes not to cause damage to other people.

### Large recycled sewage/greywater schemes

Currently both the health and environmental regulation regimes for recycled sewage/greywater Victoria derive from the *Environment Protection Act*. The starting point is that wastewater treatment, disposal and recycling facilities able to discharge more than 5,000 litres of effluent to the environment per day require an EPA licence to operate, in addition to an initial EPA works approval when constructed.

However, the Environment Protection (Scheduled Premises and Exemptions) Regulations 2007 provide an exemption to the EPA licensing requirements for individual schemes where the EPA is satisfied that the scheme meets discharge and operating specification requirements. Guidance produced by the EPA sets out when such an exemption may be granted and requires the production of a Health and Environment Management Plan (HEMP) for the scheme. These guidelines also establish 4 classes of recycled water. Each of these classes has its own water quality parameters, required treatment processes and acceptable end uses. These guidelines apply a preventative risk management approach consistent with the AGWR and are supported by an array of further technical guidance.

Schemes producing Class A recycled water (that is schemes where the permitted end uses are of highest risk) must also produce a Recycled Water Quality Management Plan (RWQMP) as part of the HEMP. The RWQMP requires endorsement by the DHHS. The EPA produces further guidance on how to seek this endorsement. In addition, the DHHS publishes guidance on how to complete a RWQMP. A crucial part of the HEMP approval process is *validation* of the particular scheme. This requires demonstrating that the system can provide water of the required microbial quality under various operating conditions and that this can be monitored in real time. There are further DHHS guidelines about how such systems can be validated.

Large schemes with no environmental discharge are called *closed loop* schemes and are currently not regulated for public health purposes. This is a significant regulatory gap.

### Small recycled sewage/greywater schemes

Wastewater treatment, disposal and recycling facilities able to discharge less than 5,000 litres of effluent to the environment per day are regulated, for both health and environmental purposes, as septic tank systems under the regime set out in the *Environment Protection Act*. The approach taken is prescriptive and based on the authorisation of a scheme by a central regulator through a two stage process of approvals:

1. EPA certificate of approval for the system.
2. Local council permit for installation and certificate to use the system at a specific site.

Onsite sewage recycling is actively discouraged in areas with reticulated sewerage services. Despite being discouraged, Power (2010) notes that such schemes are effectively *orphaned* without any regulatory agency having power to oversee them if they do occur.

### **Stormwater capture and reuse schemes**

The Victorian government recommends that the relevant guidelines in the AGWR relating to stormwater are followed in the design and management of stormwater reuse schemes. However, following this recommendation is not mandatory. The general law of negligence also imposes a duty of care on those operating stormwater harvesting and reuse regimes not to cause reasonably foreseeable damage other people (Department of Sustainability and Environment and Department of Health 2009).

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