



CRC for
Water Sensitive Cities



Annual Report 2012-2013



An Australian Government Initiative



**Sustainable,
resilient,
and
liveable
water
sensitive
cities**





CRC for
Water Sensitive Cities



A message from the Chair

The CRC for Water Sensitive Cities was established with an ambitious goal – to influence the way we build our cities, emphasising the importance of water as a resource that enables our quality of life, and as a support for the regions and ecosystems of which cities are a part.

What we envisage is a fundamental change in urban living – where our cities generate their own water supplies to cope with droughts and increasing demands on scarce resources, where the natural systems in cities provide a range of services to improve quality of life, and where all of us as citizens are engaged as water managers from the scale of households and business through to large centralised water systems.

Our CRC supports this change by delivering new knowledge and new networks; and the CRC is itself a large-scale innovation of the kind that is needed. With investment of over \$120 million over nine years and with more than 70 participating organisations, strong leadership is essential to meet all expectations.

The Board has been established and has successfully guided the CRC through its first year. A number of Board positions were filled by members with specific skills relating to the establishment phase of new organisations. We are fortunate in drawing upon the contributions of Directors Shaun Cox and Greg Davis in this way.

Other aspects of CRC governance have also been established, including Board Committees, Stakeholder Committees, and Research Committees. These are vital to the long-term success of the CRC as they allow stakeholders to make a contribution to its direction and performance. Equally encouraging has been the level of direct engagement with participants through the Industry Partners Workshops and Researchers Workshops, as well as the

many hub-based seminars and workshops, many of which I attended personally.

In early 2013 the Board and Executive settled on vision and mission statements for the CRC. “Sustainable, resilient, and liveable water sensitive cities” is a vision with global relevance, for communities in cities small and large. It speaks to tangible and intangible forces that will shape our cities, and is a clarion call for change to confront the challenges they must face.

The importance of building more water sensitive cities continues to be reflected in public policy at the local, State, and Commonwealth level across Australia. The language varies, but the hurdles to overcome are strikingly similar; and there is a very evident desire for more agile management of the urban water cycle – in ways that capture a broader range of community and environmental benefits. With its strong vision and mission, and an operating structure that supports genuine relationships with stakeholders, the CRC is delivering these benefits.



Cheryl Batagol
Chair



A message from the CEO

The CRC for Water Sensitive Cities completed its first full year of operations by exceeding expectations. The establishment of the CRC was a team effort. So too was the successful delivery of activities over the first year. I would like to acknowledge the efforts that have gone into this success, by the CRC's operational staff and its research teams, along with our industry participants who have contributed in their many ways. Over this period, the CRC needed to address three specific challenges.

The first challenge was to set up management and operational systems for such a large undertaking. The CRC involves more than 70 participating organisations, distributed across three major hubs and partnered with a number of international researchers. Drawing together staff, systems, and processes to function as one seamless enterprise has been a substantial task in itself. The CRC now has these elements in place and is able to meet the many administrative demands, including all the essential reporting and financial-management commitments. We will continue to refine our administration of the Centre.

Secondly, the CRC needed to engage and develop relationships with its 70 participating organisations. A significant endeavour. They comprise research institutions, utilities, government agencies, councils, private enterprises, and community-based organisations across Australia (and at international locations including Singapore, the UK, the Netherlands, Denmark, and Austria). The CRC will be most effective when these organisations are fully integrated for delivery of research outputs. In 2012–13 we have emphasised building relationships and facilitating networks both locally and nationally, which has already yielded an impressive and diverse list of achievements that can only be summarised in this document. This activity will expand

in 2013–14 and beyond, with further investment of resources.

The third challenge relates to demonstration of value for our participants. This is an ever-present challenge in the early years of any research program. The CRC has been fully productive from its first year as a result of links to Monash University's Cities as Water Supply Catchments research program – which contributed a wealth of outputs and knowledge concerning urban stormwater management. As our projects continue developing in 2013–14 and beyond, we will build on these early achievements with expanded and enhanced knowledge of urban water systems.

While there are a number of research programs addressing urban water management, this CRC is unique. What sets it apart is the scope of its synthesis across disciplines, contexts, and applications – promising real-world solutions for those planning, building, and operating water systems in our future cities. This will be a lasting legacy. By way of example, the Water Sensitive Cities Modelling Toolkit, which integrates knowledge from a number of research projects, is already released as a beta version. It is now being used for applied testing with our participants, enabling them to conceptualise urban planning scenarios that assess a range of benefits through better stormwater management.

The CRC for Water Sensitive Cities is now established and operating. Our four comprehensive Research Programs, with their many component projects, are in place; and 2013–14 will provide fresh opportunities for world-class research, toward an understanding of how the knowledge newly created within the CRC can be applied to the real-world challenges our end users face.



Tony Wong
CEO

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Executive summary

In this first annual report of the CRC for Water Sensitive Cities (CRCWSC), we note first that achievements in 2012–13 have been substantial, and that a solid base has been established for continued success over the lifetime of the CRCWSC to 2021.

Launch of the CRCWSC

The CRCWSC was officially launched in Melbourne on 24 September 2012 by Senator the Hon Don Farrell, then Parliamentary Secretary for Sustainability and Urban Water, in the presence of some 80 associates from partner organisations, government departments and offices, community bodies, and universities and other research organisations. The opening was followed on 25 September by a similar function in Queensland, when Brisbane City Council hosted the launch of CRCWSC's Brisbane Hub by Mr Jon Black, Director General of the Department of Energy and Water Supply (Queensland). And on 27 November, The University of Western Australia hosted the launch of the Perth Hub, by the Hon Bill Marmion, then Minister for Environment (Western Australia).

Administration and governance

A first crucial element in the year's work was inauguration of the CRCWSC's administrative and governance structures. This was achieved. There are no issues with administration or governance to report, and the way was soon clear for focus on 37 research projects, in collaboration with several research organisations. Eight are projects carried over with continuity from the Cities as Water Supply Catchments program (funded by industry partners, the National Water Commission, and the Government of Victoria, preceding the present CRCWSC), deemed therefore as commencing on 1 July 2012; 22 are new projects that commenced in 2012–13; and the remaining seven projects are due for commencement in the next two years.

Structures for effective operation and communication

The multiple internal committees and the many outward-oriented workshops and seminars are a signature of the CRCWSC's collaborative and inclusive approach. The rich connectivity of these structures enables excellent communication for all parties and stakeholders.

- We have established Stakeholder Advisory and Research Advisory Sub-Committees for each of the Research Programs. Full details of these sub-committees are contained in Appendix 1.
- Our two Industry Partners Workshops for the year (Brisbane, September 2012; and Perth, April 2013) were well-attended and successful. These ongoing workshops enable industry inputs to research, and development of multiple adoption pathways for our research outputs in turn.
- We convened two Researchers Workshops. The first, in Brisbane, was focused on developing the projects within each of our four Programs. The second, in Melbourne, brought together over 90 researchers across 20 research disciplines; it contributed to integration and interdisciplinary initiatives to assimilate research outcomes.
- We have presented 26 seminars and events around Australia – on average one every two weeks, over the year. See Appendix 2 for a detailed summary of communications activities, and Appendix 3 for a detailed summary of education and training activities.

The CRCWSC Board has met five times, and has come together with the CRCWSC

Executive on two occasions to develop the Strategic Plan. The Board has also taken the opportunity, following its meetings, to learn about current activities and any concerns that might be raised among local CRCWSC Participants in Perth, Brisbane, and Melbourne.

Continuity in research excellence

The eight Cities as Water Supply Catchments projects continued productively throughout 2012–13. The CRCWSC produced 48 formal publications and 14 publications and reports for end users. The acceptance of our publications in top international journals is testament to the quality of the research we undertake. Full details of our publications are contained in Appendix 4. We mention just two significant outputs here:

- The publication of blueprint2013: Stormwater Management in a Water Sensitive City with over 1000 registered downloads by stakeholders.
- The release of the beta version of modelling modules for simulating the effects of stormwater management on stream ecosystem health, urban micro-climate, and peak flow reduction.

Our researchers continue to be recognised for their excellence, notably Professor Ana Deletic being awarded the Victoria Prize for excellence in science and Professor Jurg Keller named the AWA Water Professional of the Year.

Expanding research initiatives

The CRCWSC took on more than just existing projects in its first year. Some 22 new research projects were commenced in 2012–13; these projects are inherently complex due to the multidisciplinary nature of the research





Incidental delays were encountered in commencing some new projects, as the CRCWSC accelerated to full speed in its first year. Viewed as inevitable in the context of an ambitious and innovative operation with multiple external links, these are progressively being overcome. We are pleased to report fully on significant advances in research and development, across the broad range of CRCWSC commitments.

2013–2014 in prospect: the outlook toward and beyond 2021

The CRCWSC is becoming closely identified on the global stage with the vision evident in its name: water sensitive cities. The CRCWSC does not claim ownership of this message; but it has a world-leading role in promoting the concept and in enabling its implementation through rigorous, sustained research – and social development initiatives with great leverage and reach. Our effort begins in Australia, but it responds to a need that is without regional boundaries. With that breadth of application in mind, the CRCWSC has planned to make full use of the opportunity given by its projected nine years of operation.

In 2013–2014, now that the first year has seen all administrative and governance structures put in place and a great deal of research continued or begun, the long-term agenda can be vigorously pursued. We report in detail on initiatives for the year ahead. Some illustrative selections from those initiatives:

- Commencement of Singapore-based projects, and establishment of the Singapore research hub.
- Enhanced participation by Research Advisory Sub-Committees, for even more effective operation of our four Programs.
- Expanded dissemination of early insights from our existing projects: stepping up the production

of published research reports, written with industry partners in mind; further enhancement of our successful Industry Partners Workshops; more grass-roots outreach, for example greater involvement of local government representatives; appointment, at a senior level, of a Stakeholder Relations Manager, and of a Communication and Adoption Officer.

- Research synthesis activities: enhancements of the six-monthly Researchers Workshops will continue, to facilitate integration and the development of a consistent base for interdisciplinary research; real-world “exemplar” projects of our participants, presented as models for synthesis of research outputs, for our industry partners.
- A focus on expanding our stakeholder sectors, particularly small-to-medium enterprises.
- New strategic partnerships with research organisations, in Australia and overseas; and high-level partnerships with peak industry bodies to facilitate a greater outreach in domains of real practice – for adoption and societal impact.
- Building the funding base for stability and continuity even beyond 2021, and growing research investment in the sector for permanent benefit and open-ended development toward water sensitive cities. The international focus is, for 2013–14 at least, on the global cities growing rapidly in Australia’s own region – particularly in South-East Asia and China.

With such an abundance of activity at an advanced stage of planning, some of which is already yielding early outcomes, there is firm evidence that the CRCWSC is positioned to meet and exceed its objectives in future years, as it has in 2012–13.



1. Overview

1.1 About the CRCWSC

The CRC for Water Sensitive Cities (CRCWSC) represents a determined endeavour, at the institutional scale, to meet the risks and challenges faced by modern cities in their interaction with the water environment: its insidious degradation, long drought and sudden floods, various shortcomings in supply. Addressing these issues is imperative for maintaining the quality of human life, and the life of countless species beyond our own. The hydrological cycle is of nature's own making: comprehensive in its relevance, and with an arc long enough to call on serious research efforts if we are to achieve understanding of its rhythms and its uncertainties. What has become abundantly clear in our century is that even cities – those most built and “unnatural” outcomes of human ambition and ingenuity – are within the embrace of that cycle as much as forests, deserts, and oceans are.

The CRCWSC is therefore committed to meeting a challenge faced by many cities. The threat is to their very viability – inseparable, in a number of distinct ways, from the thriving of the water environment.

What is a water sensitive city? It is a city that interacts with the hydrological cycle to provide the water security essential for sustained economic prosperity – by efficient and well-researched use of resources, including some that have been overlooked by earlier generations of experts. It is a city that enhances and protects the health of watercourses and wetlands. It factors into all of its planning the risk of looming drought – and equally, the risk of sudden and unforeseeable floods. Such a city creates public spaces that harvest, clean, and recycle water. Its management of water contributes to biodiversity, carbon sequestration, and reduction of urban “heat islands”. A water sensitive city is one where water's journey through the urban landscape

is managed with regard for its origins and its destinations – and where its spiritual and cultural significance is celebrated. That city meets challenges to its water environment with integrity (not evasion), breadth of vision (not the expedient perspectives of sectional interests), and evidence-based practice (not slogans from the past, nor borrowings from some imagined future).¹

The vision of the CRCWSC, presented concisely below, is a world of water sensitive cities. The mission of the CRCWSC is to work toward that vision: first through multiple lines of collaborative research; then by efforts to synthesise that research into coherent recommendations for practice and policy; and last by disseminating those results by applying influence with industry, community, and government at all levels. To implement its nine-year program in the service of that mission, the CRCWSC hosts a comprehensive range of collaborative research projects. These span many disciplines – from the fundamentals of physical-science studies, through engineering investigations, to innovative social-science research that is less commonly applied in such contexts. A large investment is made to integrate these diverse strands to provide definite practical outcomes that can bring real change, and to engage with those who ultimately manage the water cycle in our cities to realise the full value of these changes.

The CRCWSC was established in July 2012 under the Commonwealth Government Cooperative Research Centre (CRC) Program. The CRCWSC was then launched in Melbourne on 24 September 2012 by Senator the Hon Don Farrell, then Parliamentary Secretary for Sustainability and Urban Water, in the presence of some 80 associates from partner organisations, government departments and offices, community bodies, and universities and other research organisations. The opening

was followed on 25 September by a similar function in Queensland, when Brisbane City Council hosted the launch of the CRCWSC's Brisbane Hub by Mr Jon Black, Director General of the Department of Energy and Water Supply (Queensland). And on 27 November, The University of Western Australia hosted the launch of the Perth Hub, by the Hon Bill Marmion, then Minister for Environment (Western Australia). In the period to 30 June 2021 the Centre will receive a total of \$30 million in Australian Government funding through the CRC Program. Further support, amounting to more than \$89 million, is being contributed by government and non-government organisations, water utilities, research and tertiary education institutions, and the private sector.

In collaboration with over seventy partners and others in industry, all levels of government, and research, the CRCWSC is delivering the socio-technical urban water management solutions, education and training programs, and industry engagement required to help towns and cities to be water sensitive. As a nationwide initiative endeavouring to serve needs across the entire continent, we also believe that transforming the ways we manage water is a challenge without borders; the Centre therefore takes on a share of global leadership in its field.

¹ Wong, T. (2013). Towards water sensitive cities: A three-pillar approach, in *Free flow: Reaching water security through cooperation*. Ed. J. Griffiths and R. Lambert (Paris: UNESCO Publishing; and London: Tudor Rose), pp. 275–278.



1.2 Overall structure of CRCWSC research

Research is organised into four Programs, which also have many coordinated channels of communication between them for maximum integration:

Program A: Society

the social sciences and humanities as facilitators for change

Program B: Water Sensitive Urbanism

spatial planning, terrestrial and aquatic ecologies, climatology, and city planning and architecture

Program C: Future Technologies

water technologies and information systems

Program D: Adoption Pathways

education and training, demonstration projects, science and policy partnerships, and establishment and maintenance of a community of practice

1.3 Our Vision and our Mission

The CRCWSC Board and Executive have adopted a short formulation to capture its vision:

Sustainable, resilient, and liveable water sensitive cities

In pursuit of that vision, the CRCWSC articulates its mission in three simple steps:

Research

Synthesise

Influence

Research and develop world-class science, technology, innovation, and design – for social and institutional renewal in urban water management, toward sustainable and resilient cities and towns that adapt to variations in climate.

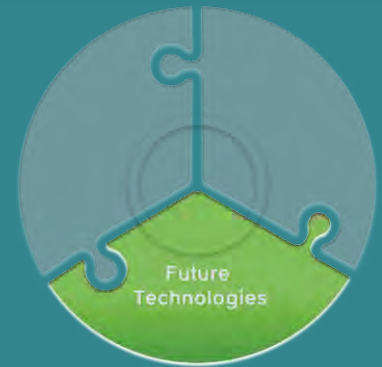
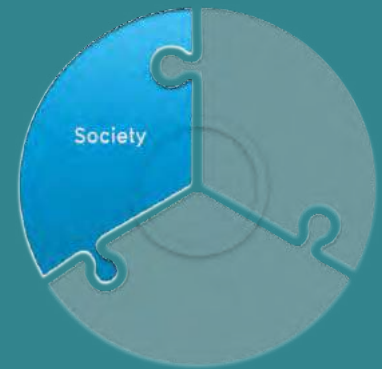
Synthesise, in collaboration with our industry partners, knowledge across disciplines – establishing truly responsive water sensitive systems.

Influence, lead, empower, and join in partnership with stakeholders across all sectors – enabling transformation toward water sensitive cities and towns.

The sections of this report present in detail the success the CRCWSC has achieved in its first year of operations, in carrying forward its mission and advancing the vision for water sensitive cities.

In the next section we report on the CRCWSC's already substantial record of achievements. These are considered under four headings: *development and networking* (communication of the message, toward adoption of water sensitive policies and practices); *progress toward research outcomes*; *education and training*; and *community and global outreach*. The strands are necessarily intertwined to allow the CRCWSC to achieve its vision.

In formulating its research and adoption activities, the CRCWSC strives to understand the context, needs, and priorities of its industry participants.



2. Key achievements

2.1 Development and networking

Overview of 2012–13 activities to encourage adoption

The CRCWSC undertook a range of networking and communications activities to support understanding and adoption of sound water policy. First among these was establishment of a governance structure, with Stakeholder and Research Advisory Sub-Committees for each Research Program. All committees were established during the CRCWSC's first year of operation.

We instituted an Adoption Pathways Program (Program D), which delivers a range of projects to support adoption by end users. A number of Program D projects were progressed during the year, including "Integration and Demonstration Through Urban Design" (Project D1.1), which yielded a new modelling toolkit to underpin decision making (now in advanced beta version). A number of on-ground projects that demonstrate the CRCWSC's research in action were also developed in Program D (for example, through the projects "Integration and Demonstration Through Urban Design" and "Urban Intensification and Green Infrastructure"). Examples include the urban development at Officer in Melbourne's eastern growth corridor, Marrickville West Eco Water Garden in Sydney, and the Footscray Primary School urban heat island project in Melbourne.

The CRCWSC undertook national activities such as Industry Partners Workshops and Researchers Workshops; and regional events including seminars, training courses, and launches of CRCWSC projects or outputs.

Participation in high-profile industry events was deemed essential to furthering the aims of the CRCWSC, which therefore maintained a presence at conferences over the course of 2012–13. These provided opportunities to

promote the CRCWSC, and to engage with a wider range of potential end users. All such activities were supplemented by, and fed into, development of a range of online and new media resources.

Some statistical points for the year, relevant to those advances, include:

- More than 1000 end users attended CRCWSC events or presentations over the year (including 902 at seminars and workshops, and 110 at training courses), with 87% of CRCWSC partner organisations registering to participate in at least one event.
- There were two Industry Partners Workshops, held in Brisbane and Perth.
- Two Researchers Workshops were conducted, in Brisbane and Melbourne.
- There were 24,000 hits on the CRCWSC website.
- The CRCWSC attracted 143 followers on Twitter.
- CEO Tony Wong recorded a successful TEDx talk, in Canberra.²
- Five CRCWSC events were streamed live to the web.
- Two newsletters, seven newsflashes, and thirty-two news items were posted to the website.
- The WSC "fly through" YouTube clip achieved 900 hits.

These and other communications activities demonstrate the CRCWSC's commitment to cooperation in research to ensure that the outputs provide maximum value for participants.

A more detailed summary of key communications activities for 2012–13 can be found in Appendix 2.

Communications and Adoption Plan

The Industry Partners Workshop in April 2013 included a workshop to identify our participants' communication needs. At this workshop, participants were asked how they wished to receive information about the CRCWSC. The responses were used in development of the Communications and Adoption Plan, and a draft strategy was distributed for feedback in June 2013. This was well received, and represents a significant step toward meeting CRCWSC goals.

2.2 Progress toward research outcomes

Over its lifetime, the CRCWSC will address the issue of ensuring that water services and planning processes in Australian cities and towns can meet the challenges of population growth, and economic and climatic uncertainties.

Facing this challenge, we recognise that an approach founded on interdisciplinary collaborative research engagement is necessary. Our progress in establishing such a research partnership is summarised as follows:

- We have commenced 22 new projects involving multiple research organisations and across 20 research disciplines. The projects complement the existing eight legacy projects of the Cities as Water Supply Catchments program that commenced on 1 July 2012 and continued as a part of the CRCWSC's research program (for a total of 30 projects).

² <http://tedxcanberra.org/2013/05/tony-wong-at-tedxcanberrasaloon-2013/>



- The CRCWSC has established four Programs, within which the 30 projects are grouped:

Program A: Society, the social sciences and humanities as facilitators for change

Program B: Water Sensitive Urbanism, spatial planning, terrestrial and aquatic ecologies, climatology, and city planning and architecture

Program C: Future Technologies, water technologies and information systems

Program D: Adoption Pathways, education and training, demonstration projects, science and policy partnerships, and establishment and maintenance of a community of practice

- These four program themes capture the key research and research adoption disciplines needed to achieve our mission. We have established a Stakeholder Advisory Sub-Committee and Research Advisory Sub-Committee for each of the research programs.

A large number of teams pursue research under these programs. Efforts are made to keep these teams well coordinated, and to ensure that the specialist work each team conducts is enriched by experience in all of the others, and feeds back to them in return. Here we report on specific developments that show the extent of progress so far.

During the year, a number of projects initiated or completed their reviews of the state of the science in their respective disciplines. These studies are important outputs for industry, and provide an overview of the current knowledge. For example, in

June 2013 Project A2.1 (Understanding the Social Processes to Achieve Water Sensitive Futures) published “Australian Domestic Water Use Cultures”, for use by industry. This project aims to understand the social and historical processes of water use in Australian cities, and the review showed that when designing processes to change water use practices it is important to take account of 1) the systems and infrastructure, 2) social and geographic capital, 3) domestic water use contexts and technologies, and 4) everyday practices and values.

Other research projects in the CRCWSC developed new knowledge from their research during the year. Through studies of urban catchments in Victoria, Queensland, and New South Wales, one research team (on Project C1.2, Cities as Water Supply Catchments – Risk and Health: Understanding Stormwater Quality Hazards) showed that urban stormwater in some catchments can have characteristics similar to secondary treated waste water, with remnants of pathogens found. This is an important finding that informs the selection of stormwater treatment technologies to produce fit-for-purpose water supplies. The team pinpointed a need for continuing research into the public health implications of a presence of pathogens, and recommended interim design and water quality guidelines affecting the use of stormwater for non-drinking purposes.

Project C1.1 (Cities as Water Supply Catchments – Sustainable Technologies) assessed biofilter design, examining the removal of microbotic and other pollutants. This work informed the development of UrbanBEATS (a software modelling tool for strategic planning of stormwater treatment technologies), which is being tested for use in industry.





A changing climate would also impact on the performance of stormwater treatment and harvesting systems. Project B1.1 (Cities as Water Supply Catchments – Urban Rainfall in a Changing Climate) has developed a comprehensive model to simulate probable rainfall in four major cities at a grid scale that would reliably support rigorous design of stormwater treatment and harvesting systems. This model combines historical radar information on local rainfall distribution with larger-scale synoptic weather information, and is integrated into a global- and regional-climate downscaling framework – the first ever model of its kind. Basic development has been completed, and the model is currently being tested for the Melbourne region, with full availability of scenarios scheduled for 2014.

In addition to stormwater as a resource benefit, we have confirmed the nexus between increasing urban heat and degrading ecological health of urban waterways and urbanisation. We have demonstrated that heat mitigation by the practice of Water Sensitive Urban Design (WSUD) and implementation of green infrastructure are critical, as cities continue to evolve. Other research provided evidence of the effects of WSUD, irrigated green infrastructure, and urban form at a range of spatial scales on urban micro-climate, with implications for human thermal comfort and health. We have demonstrated the considerable variation in micro-climate spatially, and shown that real thermal benefits can be gained from strategic use of WSUD and green infrastructure. This scientific evidence has provided the catalyst for urban planning to incorporate WSUD and green infrastructure, aimed at improved liveability through heat mitigation.

Another research team (on Project B2.1, Cities as Water Supply Catchments – Stream Ecology) has successfully framed urban stormwater runoff as a unique

environmental flow problem, in that it is a large, reliable resource for human use and for protecting the health of urban aquatic environments in reducing the impact of excessive streamflows in urban waterways. This synergy in beneficial outcomes has resulted in new initiatives and an added business case for a new approach to the management of urban stormwater.

The multiple benefits of a new approach to the management of urban stormwater that have been demonstrated by the various sub-projects have highly varied market and non-market value. The direct benefits are readily identified while the values of non-market benefits are often not included in assessing water infrastructure projects. Project A1.1 (Cities as Water Supply Catchments – Economic Valuation) made advances toward a monetary valuation of non-market benefits from water management, with emphasis on stormwater, through studies of individual willingness-to-pay for externalities associated with stormwater. Using a stated-preference approach and a conjoint choice experiment, the approach also tests multi-attribute risk aversion and calibration for hypothetical bias. It combines the traditional choice experiment with a field experiment, to investigate shifts in preferences as a result of natural variation in rainfall, temperatures, and flooding. This project aids assessment of individuals' and societies' willingness to pay for managing water in their communities, particularly when there is risk and uncertainty associated with some of the benefits of the management policy.

The new approach to stormwater management will require an accompanying new approach to urban water governance, policy mechanism, and servicing models. The development of possible models to support this is the focus of Project A4.1 (Cities as Water Supply Catchments – Society and Institutions). Factors affecting transition

to continuing application of stormwater harvesting were found to include policy discourse (from problem specification through to building shared prosperity), developing implementation coalitions (from engineering teams through to economic and planning networks), seeding bridging organisations, demonstration projects, and timed application of administrative tools. This now presents a framework for fostering new co-governance arrangements for effective stormwater management.

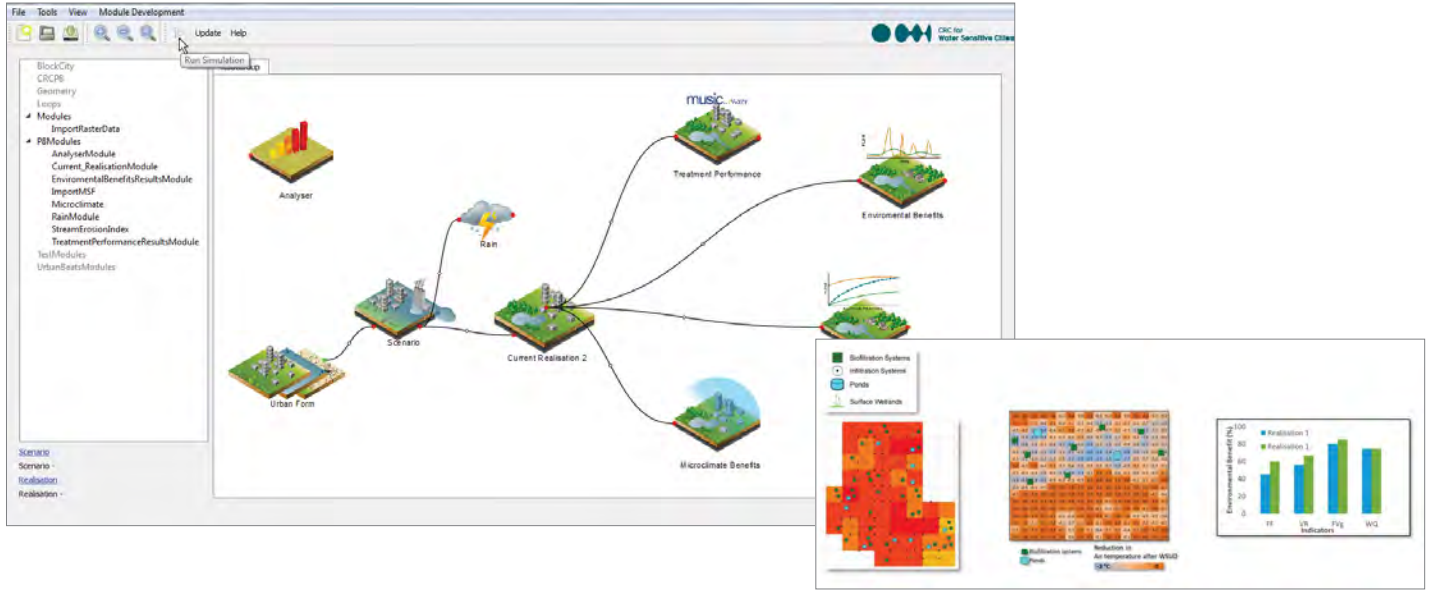
In facilitating the application of research findings in industry, Project D1.1 (Cities as Water Supply Catchments – Integration and Demonstration through Urban Design), working closely with other sub-projects, released the beta version of the Water Sensitive Cities Modelling Toolkit. The toolkit integrates new stormwater management research, and provides a platform to apply this knowledge in planning and designing more liveable and sustainable urban places. Ongoing research and development over the next 18 months will see the toolkit support operations at catchment and regional scales, with modules focused on four dimensions of the domain: stormwater management planning and conceptual design, local rainfall variability and uncertainty, health of urban streams, and urban micro-climate.

The CRCWSC produced a large number of formal publications in 2012–13 that capture these and other research outcomes. A full list is provided in Appendix 4.

Another testimony to our success is the recognition of our researchers. Among numerous awards to CRCWSC staff, Professor Ana Deletic was awarded the 2012 Victoria Prize for Science and Innovation for her research work and Professor Jurg Keller was honoured as the Australian Water Association's 2013 Water Professional of the Year.



MODELLING TOOLKIT





2.3 Education and training

This section provides a high-level summary of the CRCWSC's education and training activities in 2012–13. A more detailed summary can be found in Appendix 3.

PhD-level education: training tomorrow's research leaders

The CRCWSC had 18.1 Equivalent Full Time Student Load PhD enrolments, with five students commencing in 2012–13. These students are given a comprehensive grounding in all aspects of research directed at the goals we pursue – to achieve the depth and breadth of competence expected of tomorrow's leaders in the field of water research and development.

Other postgraduate education: training tomorrow's industry leaders

Two of the CRCWSC industry and education partners currently offer Masters level programs to showcase CRCWSC knowledge and the latest research understanding.

The International WaterCentre (IWC) commenced their Masters in Integrated Water Management (MIWM) in 2006. The aim of this innovative program is to create water leaders by drawing on international teaching and research from many fields, for a transdisciplinary, whole-of-water-cycle approach. In 2012–13, CRCWSC researchers at Monash University worked with the IWC to review and update the module Designing Urban Water Futures to integrate early CRCWSC findings. Fourteen students enrolled in the MWIM and the Designing Urban Water Futures stream of study in 2012–13.

A unique feature of the IWC MIWM is the opportunity for students during their final semester (or final two semesters for part-time students) to design and undertake self-directed project work: consolidating

and applying concepts, principles, and methodologies learned throughout the Foundation and Integration modules. The CRCWSC is helping to facilitate partnerships between the MIWM student and CRCWSC participants to identify project and research opportunities for students' final projects.

During the year, the CRCWSC also continued to develop its partnership with UNESCO-IHE (the UNESCO-funded Institute for Water Education, based in Delft, the Netherlands). UNESCO-IHE offers a wide variety of educational courses in the field of water. In addition to four MSc programs and the PhD program, the Institute offers a range of courses tailored to specific needs. UNESCO-IHE will be collaborating with the CRCWSC to incorporate new research outcomes in these graduate programs.

2.4 Community and global outreach

The CRCWSC has set out to deliver the planning, technology, and decision support tools required to improve the efficiency and effectiveness of urban water systems. Much of the fundamental material to deliver on this objective will be derived from the research activities that have now commenced. Capacity-building activities designed to help industry deliver more efficient and effective urban water management are underway, and will continue throughout the term of the CRCWSC. Our achievements in 2012–13 toward this objective are summarised as follows:

- The release of the beta version of modelling modules for simulating the effects of stormwater management on stream ecosystem health, urban micro-climate, and peak flow reduction.
- The delivery of the CRCWSC's "Urban Water Futures" Module, presented as part of the MIWM program offered by the IWC. Both the Masters program and the Urban Water Futures module have in place a governance structure for design, delivery, and quality assurance of the module, including an External Advisory Group comprising various industry and government representatives.
- The two Industry Partners Workshops conducted during the year provided a way for the CRCWSC to engage with our industry partners in achieving and disseminating research outputs, and the two Researchers Workshops provided a forum for researchers to foster integration and interdisciplinary research.
- Presentation of 26 seminars and events around Australia – this is on average one every two weeks over the year.
- The publication of blueprint2013: Stormwater Management in a Water Sensitive City with over 1000 registered downloads by stakeholders.



2.5 A case study in synthesis: the Adoption Pathways Program

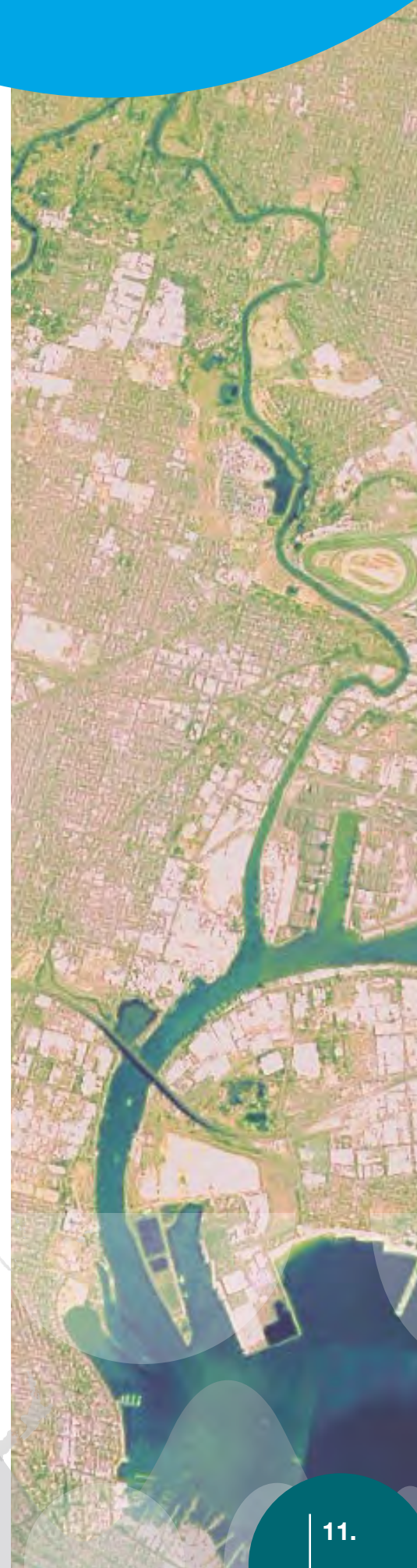
CRCWSC Project D1.1, Integration and Demonstration through Urban Design, facilitates and supports collaboration between individual researchers and research projects of the CRCWSC, and researchers and industry partners. Engagement and collaboration is central to the development of the Water Sensitive City Modelling Toolkit, and the development of demonstration projects.

The process of developing the Water Sensitive City Modelling Toolkit has involved extensive collaboration between researchers from the various projects represented in the beta version of the software, to translate the research outcomes and knowledge into a form that can be applied to solve problems in the model. This process has enabled researchers to consider how knowledge needs to be presented in order to be accessible and useful to practitioners, and to clearly define the possible applications, assumptions, and limitations of their research.

Engaging with CRCWSC partners during the development phase of the CRCWSC's Modelling Toolkit has increased collaboration between researchers and partners. This has provided useful input and feedback to the development process, as well as enabling partners to understand how the Toolkit may support the planning and design activities of their organisations. Further, activities such as the launch of the beta version (in Melbourne) have led to CRCWSC partners offering current urban water projects to be used in the testing and validation of the software, and enabled practitioners to be linked with research relevant to their current projects and priorities. This engagement and

collaboration encourages greater uptake and application of CRCWSC research and knowledge, by our partners.

The CRCWSC's ongoing involvement in the Marrickville West Eco Water Garden demonstration project (Sydney) is an example of how researchers are collaborating with practitioners to support the design and implementation of a stormwater harvesting and use project that involves co-design, health risk assessment, and green treatment technologies. Demonstration projects also provide opportunities to share knowledge with non-CRCWSC stakeholders, and through this increase the profile of the CRCWSC and its participants. For example, these case study projects have involved the Department of Health (NSW), the Department of Education and Communities (NSW), and community groups. The CRCWSC's participation in the Hanlon Park Ideas Forum (Brisbane) enabled key research knowledge from across the CRCWSC to be applied directly to a waterway rehabilitation strategy. This project will inform future precinct and open space redevelopment projects in Brisbane. The Forum brought together local government stakeholders, providing opportunities for collaboration and integration. It also connected the CRCWSC to groups within partner organisations that had not previously been exposed to the CRCWSC.



3. Governance

The CRCWSC was incorporated as an unlisted public company on 17 May 2012. Its governance structure is shown in Figure 3.1 on the right.

3.1 Board

The initial Board of five Directors, including the Chair, was established by representatives of the Essential Participants who formed the CRCWSC. Two Directors were nominated by the Research Essential Participants and two by the Non-Research Essential Participants, all for terms of one year (during the establishment phase of the CRCWSC). The Constitution allowed for the appointment of four other Directors – one Independent Director and three Directors nominated by the Other Participants. The Independent Director was appointed in November 2012, and the three remaining Directors were appointed in February 2013.

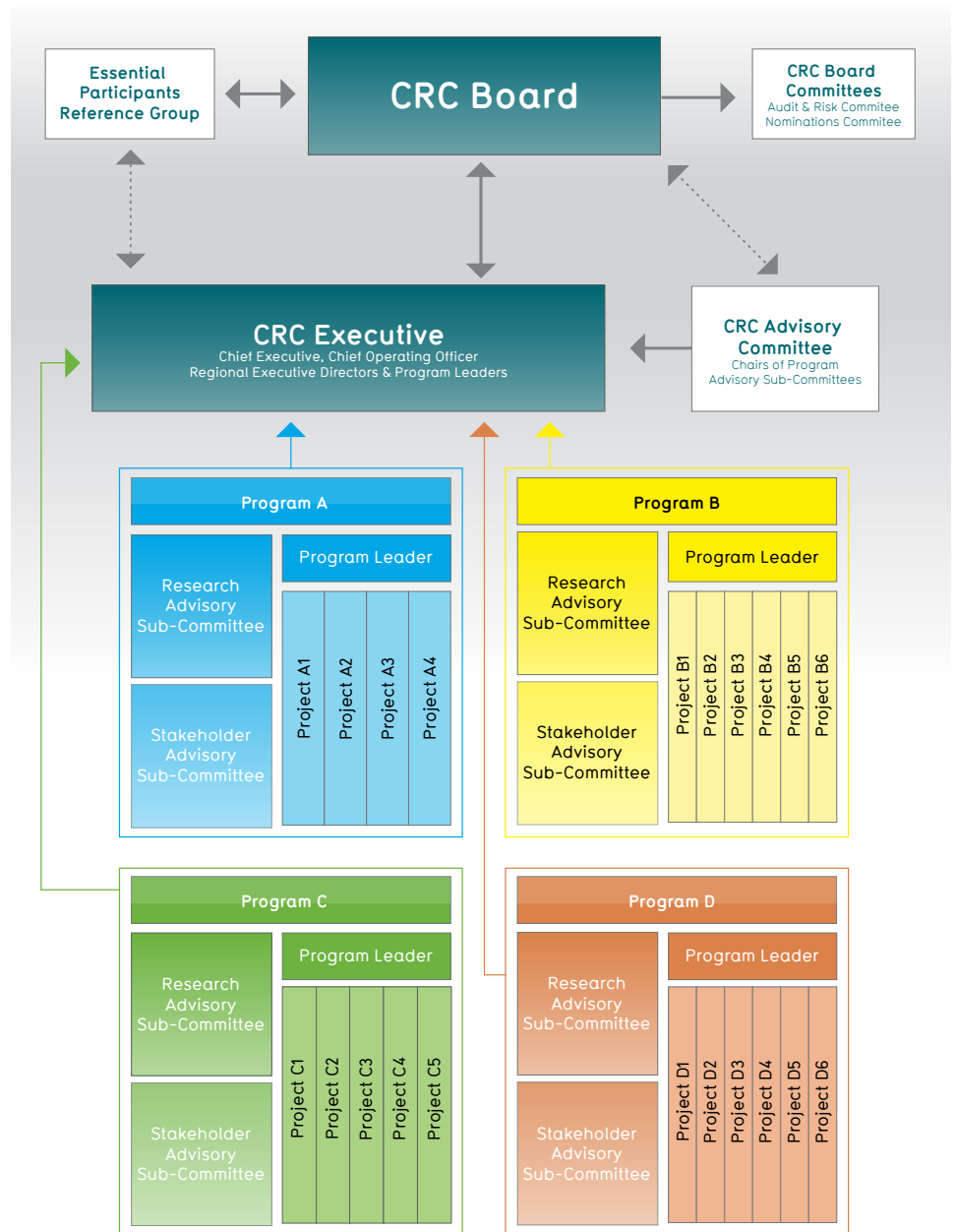


Figure 3.1 Governance structure of the CRCWSC



CRCWSC Board Members



Cheryl Batagol
Chair



Robert Skinner
Director



Barry Ball
Director



Shaun Cox
Director



Greg Davis
Director

Cheryl Batagol – Chair

Ms Cheryl Batagol is Chair of the CRCWSC Board. With more than 40 years of experience in environmental leadership, Ms Batagol brings governance skills through her numerous roles on a range of government and commercial boards including currently Chair of the Environment Protection Authority and Member of Sustainability Victoria, and formerly Chair of Melbourne Water, Deputy Chair of Sustainability Victoria, and Member of the Victorian Catchment Management Council.

Ms Batagol is a past recipient of the Centenary Medal (Australian Government), for her services to the water industry (City West Water) and sustainability (EcoRecycle Victoria), and the John Guice Award (Australian Waste Management Association) for service to the waste management industry. Her expertise was further acknowledged by her inclusion as an Australia 2020 participant. She commenced her career in waste management, but it has evolved to encompass broader environmental matters with a focus on water. Ms Batagol was appointed to the CRCWSC Board on 17 May 2012.

Robert Skinner – Director

Professor Robert Skinner is Director of Monash Water for Liveability. He is also Chair of WaterAid Australia and in 2011 was a member of the Victorian Government's Living Melbourne Ministerial Advisory Council. Professor Skinner was Managing Director of Melbourne Water from 2005 until 2011. Before joining Melbourne Water, he was CEO of the

Kingston City Council – a large municipal council in metropolitan Melbourne – during which time he also held a number of key positions in the water sector as chairman or member of boards or government advisory committees. He has been a board member of the Water Services Association of Australia, and is a Fellow of the International Water Association and a leading figure in the Association's Cities of the Future Program. While at Melbourne Water, Professor Skinner initiated a number of collaborative relationships between Melbourne Water and agencies in Singapore, UK, and Timor Leste. Professor Skinner was appointed to the CRCWSC Board on 17 May 2012.

Barry Ball – Director

Mr Barry Ball is Deputy Director of the Global Change Institute at The University of Queensland. Part of his role is to work with the International WaterCentre as Manager, Water Policy. Mr Ball has worked in both State and Local Government in his 40-year career, predominately in the water sector. He served previously as Manager, Strategic Planning and Manager, Water Resources, for Brisbane City Council. His achievements include establishment of the Moreton Bay Waterways and Catchments Partnership, as well as development and implementation of the Drought Strategy for the City of Brisbane.

Mr Ball has served on the board of Queensland Urban Utilities and is a member of the Environment Professional Advisory Board at Griffith University. He has held positions on the Urban Water Advisory Committee for the National Water Commission, and board positions on the CRC for Catchment

Hydrology and CRC for Coastal Zone, Estuary and Waterway Management. In 2010 he was awarded an Australian Public Service Medal for his achievements in water policy. Mr Ball was appointed to the CRCWSC Board on 17 May 2012.

Shaun Cox – Director

Mr Shaun Cox was appointed Managing Director of Melbourne Water in March 2011 and is currently a board member (and former Chair) of both the Smart Water Fund and the Water Services Association of Australia. Mr Cox has a strong background in large-scale water and sewage services, as well as a passion for innovation and sustainability. He holds a degree in Civil Engineering and a Masters of Engineering and Technology Management. Mr Cox is also an Adjunct Professor at the University of Queensland. Before joining Melbourne Water, Mr Cox has held positions as Managing Director of South East Water and CEO of Gold Coast Water. Mr Cox was appointed to the CRCWSC Board on 17 May 2012.

Greg Davis – Director

Mr Greg Davis has been involved in water resource management in the Western Australian public service for nearly 25 years. He has a Bachelor of Science and a Postgraduate Diploma in Environmental Impact Assessment. He has had a pivotal role in the development of many of Western Australia's most significant policy and planning initiatives in land and water management. This includes the development and implementation of planning policies to protect drinking water sources through town planning schemes, and



Kerry Stubbs
Director



Dominic Dolan
Director



Nick Apostolidis
Director



Stephen Frost
Director

the State's principal planning document that aligns land and water planning. Mr Davis was the Executive Director of Science and Planning in the Western Australian Department of Water up until December 2012. He also has worked with Western Australia's Environmental Protection Authority, managing the area that assesses environmental impacts of major land developments. Mr Davis was appointed to the Board of the CRCWSC on 17 May 2012.

Kerry Stubbs – Director

Ms Kerry Stubbs has undergraduate and postgraduate degrees in Arts (with honours) from the University of Sydney, majoring in Government and Public Administration. She worked as a researcher in the New South Wales Parliament before moving into human resources in the NSW Public Sector and as a private consultant. Ms Stubbs was appointed the first Corporate Human Resources Manager of Sydney Water in 1998, and then into General Manager roles in Australian Water Technologies. In 2001 Ms Stubbs served as General Manager, Human Resources, for St Vincent's & Mater Health Sydney, and was appointed as Executive Director of St Vincent's Hospital and Sacred Heart Hospice. In 2007 she was the NSW winner of the Community and Government Sector Telstra Businesswomen's Award. In 2008 Ms Stubbs commenced as CEO and Managing Director of Northcott Disability Services. She holds a number of board positions, including Chair of NSW Utilities and Electrotechnology ITAB, Director of The Eleanor Dark Foundation, Director of eWater, and Director and Treasurer of The Health Roundtable. She is currently Chair of the National Accreditation Authority for Translators and Interpreters, and a

Director of The Health Services Association of NSW, Cerebral Palsy Australia, Ability First Australia, and a member of the Finance and Investment Committee of the Board of Trustees, University of Western Sydney. Ms Stubbs was appointed to the CRCWSC Board on 1 November 2012.

Dominic Dolan – Director

Mr Dominic Dolan joined eWater in April 2011, and is currently Business Manager and Company Secretary. Mr Dolan has built up a uniquely broad range of experience working as a Chief Financial Officer and subsequently a Chief Operating Officer in manufacturing, information technology, computer games, and biotechnology companies in the United Kingdom, the United States, and Australia. The companies concerned were going through rapid growth in dynamic markets. Mr Dolan was closely involved with all growth and change aspects of the companies, at the strategic and operational level. He has a degree in Economics and a Masters of Business Administration from Warwick Business School (UK), and is an Associate of the Chartered Institute of Management Accountants. Mr Dolan was appointed to the CRCWSC Board on 28 February 2013.

Nick Apostolidis – Director

Mr Nick Apostolidis has over 37 years of international experience in the water industry. He has an honours degree in Civil Engineering and a Masters of Engineering Science. A keen student of global water issues and sustainable development, he has been involved in some of the most significant water management projects internationally, and has authored

more than a hundred technical publications. Before his recent retirement, he oversaw global water operations for GHD (a leading engineering, architectural, and environmental consulting firm) and was on the GHD Board from 2002, having worked with that company since graduation. Mr Apostolidis is currently Deputy Chairman of Water Australia, a not-for-profit organisation established to promote Australian products and services. He was appointed to the CRCWSC Board on 28 February 2013.

Stephen Frost – Director

Mr Stephen Frost has over 40 years of experience in the civil engineering field, working in stormwater management, floodplain risk management, urban stream restoration, and natural resource management. He was President of Stormwater NSW for five years and is immediate past President of the National Stormwater Industry Association, a position he held for a further five years. Until March 2012, Mr Frost worked at Fairfield City Council (NSW) as the Manager of Engineering Services, with an extensive portfolio: floodplain, stormwater, and natural resource management; civil, landscape, and urban design; and land survey, spatial data, graphics, and mapping. Mr Frost holds a Certificate in Engineering Surveying, an Advanced Diploma in Contract Management and Project Management, and a Graduate Diploma in Local Government Management from the University of Technology Sydney. Upon his retirement he commenced work as a sole trader, and now looks forward to extending his contributions in the broader water industry. Mr Frost was appointed to the CRCWSC Board on 28 February 2013.

3.2 Executive

Key Staff			
Name	Organisation	CRCWSC Position/Role	Time committed
Tony Wong	CRCWSC	CEO	100%
Robyn McLachlan	CRCWSC	COO and Company Secretary	100%
Rebekah Brown	Monash University	Program Leader of Program A: Society	51%
Nigel Tapper Darryl Low Choy	Monash University Griffith University	Co-Program Leaders of Program B: Water Sensitive Urbanism	60%
Zhiguo Yuan	The University of Queensland	Program Leader of Program C: Future Technologies	51%
Jamie Ewert	Melbourne Water	Co-Program Leader of Program D: Adoption Pathways	50%
Fiona Chandler	International WaterCentre	Co-Program Leader of Program D: Adoption Pathways	50%
Ana Deletic	Monash University	Regional Executive Director: Southern Region	51%
Anas Ghadouani	The University of Western Australia	Regional Executive Director: Western Region	55%
Jurg Keller	The University of Queensland	Regional Executive Director: Eastern Region	51%

3.3 Committees

Committees were established in three categories: two CRCWSC Board Committees (Audit and Risk, and Nominations); the Essential Participants Reference Group; and the CRCWSC Advisory Committee (with its Advisory Sub-Committees). Membership details for all committees are presented in Appendix 1. Here we outline their roles and reporting structures.

CRCWSC Board Committees

The CRCWSC Board has two committees – the Audit and Risk Committee, and the Nominations Committee.

Audit and Risk Committee

The Board established the Audit and Risk Committee to assist in the discharge of its responsibility to exercise due care and diligence in relation to the CRCWSC's corporate governance, financial reporting, and risk management.

Nominations Committee

The role of the Nominations Committee is to oversee the nomination and selection of acceptable candidates for Director positions and to make recommendations to the Board about its succession plans and its internal performance evaluation. The Chair of the Board also acts as Chair of the Nominations Committee, whose two remaining members are nominated by the Essential Participants.

The Nominations Committee had two meetings in 2012–13 to draft its Terms of Reference for approval by the Board, and to commence the process of election of four Directors to fill vacancies created by the initial Directors whose one-year terms were completed on 30 June 2013.



Essential Participants Reference Group

The Essential Participants Reference Group (EPRG) was set up to advise the CRCWSC Board on the needs of major end users (Non-Research Essential Participants). The EPRG is made up of one representative from each of the CRCWSC’s nine Essential Participants. The EPRG’s role is to:

- inform the Board of the priorities and research needs of Essential Participant end users;
- provide strategic advice and recommendations to the CRCWSC Board on the scope and effectiveness of existing and planned research activities, as well as utilisation of the research;
- communicate to the Board new policy directions or research priorities and objectives of Essential Participant end users; and
- communicate to the Board regarding the performance of the CRCWSC in relation to achieving its objectives and project goals.

CRCWSC Advisory Committee, and Advisory Sub-Committees

The CRCWSC Advisory Committee provides advice on:

- research proposals and project performance;
- effectiveness of program and project linkages; and
- stakeholder needs.

The Advisory Committee reports to the CRCWSC Executive and informally to the CRCWSC Board. It comprises the Chairs of Research Advisory Sub-Committees and the Chairs of Stakeholder Advisory Sub-Committees (see next paragraphs), and did

not meet in the first year of the CRCWSC as establishment of the Programs and their sub-committees was in progress.

Research Advisory Sub-Committees

For each Program there is a Research Advisory Sub-Committee to provide its Leader (and as required, the CRCWSC Advisory Committee) with:

- feedback on overall conduct and progress of the relevant Program;
- independent advice on project proposals, variations, and performance;
- advice on the effectiveness of Program and project linkages; and
- advice on appropriate linkages between research activities and stakeholder needs.

These sub-committees are a formal mechanism for independent appraisal of the research projects, and for advice on meeting participants’ expectations.

Stakeholder Advisory Sub-Committees

For each Program there is a Stakeholder Advisory Sub-Committee to facilitate liaison with all non-research participants, to provide its Leader (and as required, the CRCWSC Advisory Committee) with:

- recommendations and advice on the adoption, progress, and focus of projects within the relevant Program;
- advice on the utilisation of project outputs; and
- feedback from stakeholders about the conduct of the projects to ensure that expectations are met, to the extent that is possible.

These sub-committees are a formal mechanism for participants to influence the focus and progress of research projects.



4. Outlook for 2013–2014

Planning is well advanced for the next phase of the CRCWSC's operations, and a number of initiatives are underway in 2013–14.

4.1 Remaining projects of the first tranche

Administrative and governance structures for the CRCWSC are now in place. Out of the first tranche of projects (totalling 37), 30 are now in progress; and three will commence in 2013–14, to advance our integrated research agenda over the next three years.

We anticipate more active participation of the Research Advisory Sub-Committees for each of our four Programs, as new insights flow from the studies they conduct. Our review process will make optimal use of expertise concentrated in these Sub-Committees, as we prepare for the third-year review of the Centre in 2015. We also anticipate commencement of Singapore-based projects, and establishment of the Singapore research hub.

4.2 Toward completion of Cities as Water Supply Catchments projects

The Cities as Water Supply Catchments projects, operational since February 2010, have contributed much that is inspired by the mission of the CRCWSC, and much that works toward realising its vision. Insights from these projects so far are well captured in existing reports, and have been transferred for application in the Water Sensitive Cities Modelling Toolkit. We anticipate that 2013–14 will see testing of the Toolkit by participants, consolidating its effectiveness and reach.

Proof of concept, on many of the integrated approaches to urban stormwater management, is scheduled for timely delivery as these projects come to completion. These outcomes will form a significant foundation for water sensitive

cities in Australia.

4.3 A focus on disseminating early insights of projects

Our mission's third and last element is "influence", and we are already delivering real value for society through our impact pathways: from research to practice to outcomes. Efforts in 2013–14 will be directed with greater emphasis on disseminating the early insights of CRC projects through focused seminars and workshops, at many locations in Australia and overseas. There will be:

- An increase in published research reports, written with industry partners in mind.
- Seminars and workshops at our regional hubs, attended by key researchers and practitioners from across the programs.
- Further enhancement of the already successful six-monthly Industry Partners Workshops, as we continue to adapt to the needs of such partners.
- Ongoing funding support for local government representatives to attend appropriate workshops.

We will finalise our Communication and Adoption Plan, and invest additional resources in strengthening our capacity for research communication and adoption, through:

- Appointment at a senior level of a Stakeholder Relations Manager who will work in unison with the Regional Executive Directors and the Chief Executive in fostering proactive engagement of our participants in establishing adoption pathways for our research and innovation resulting from the synthesis of our research.

- Appointment of a Communication and Adoption Officer to support the work of the Stakeholder Relations Manager and Chief Executive in the implementation of the CRC Communication and Adoption Plan.

4.4 Commencing research synthesis activities

- As research projects progress, there will be an increasing demand for coordinating the integration and synthesis of research outputs across all disciplines, and throughout sectors represented by our industry partners. Enhancements of the six-monthly Researchers Workshops will continue, to facilitate integration and the development of a consistent base for interdisciplinary research.
- The central element of our mission is an interdisciplinary and industry-partnership approach to synthesising knowledge and technology, for integrated solutions that can realise the goal of water sensitive cities. In 2013–14 we envisage introducing a number of exemplar case studies, to help focus our varied projects and draw their outcomes into that larger synthesis. These real-world projects of our participants will serve as models for synthesis of research outputs, for our industry partners.
- Building on the Centre's inputs to Places Victoria's development at Officer, the next such integrative and synthesising case studies will be at the Tonsley Redevelopment Project by RenewalSA in Adelaide. Located on the site of an old Mitsubishi factory, the 61 ha redevelopment will mainly comprise commercial land use, combined with residential and educational applications.



Sustainability goals are already established for the site, and the CRCWSC will capitalise on these and its research projects, through a series of workshops, to help Tonsley become a water sensitive city.

4.5 Expanding our stakeholders' engagement

The CRCWSC has now established 71 partnerships across seven industry sectors: (i) Federal government; (ii) State government; (iii) local government and community groups; (iv) research, education, and training; (v) land development and housing; (vi) private sector consulting services and technology providers; and (vii) water authorities and utilities.

Our focus in 2013–14 is on expanding our stakeholder sectors, particularly in facilitating access for small-to-medium enterprises (SMEs) to our research outputs and building SMEs' capacity for water sensitive innovations. We will also continue to secure new involvements nationally, anticipating between five and ten additional participants in the year ahead.

We will commence initiatives to establish new strategic partnerships:

- with other research organisations in Australia and overseas, to strengthen our already solid research offerings, with resulting rigour and completeness in synthesis of research insights, recommendations, and water sensitive strategies for CRCWSC participants; and
- with peak industry bodies to facilitate a greater outreach to the industry in communicating our research innovations and fostering the desired adoption and societal impact.

Such partnerships will further leverage

our research expenditures, enhancing the value of our investment in research and in research communication, and therefore adoption through the efforts of our participants. They will also expand our base for research funding.

4.6 Creating a stable funding base and growing the research investment

Every sector relevant to water sensitive cities is undergoing some form of financial review of its operations, including investment in external activities and services such as research and development. It is essential that we ensure a stable funding base for our research, research synthesis, and research communication (along with adoption functions). This is needed for creating a cooperative environment to encourage innovation for societal impact.

With the administrative and governance structure for the CRC now established and research projects underway, the CRC can now devote some of its time to business development for growing the research investment. In 2013–14 these activities will initially be modest, and focused on securing research funding from overseas, particularly in South-East Asia and China. This is Australia's region, and a significant majority of developing global cities fall within it.

We will capitalise on existing research partnerships with Chinese universities, established by Monash University, the University of Queensland, and the University of Western Australia. We will also capitalise on inter-governmental relationships at State and Federal levels with the Asia-Pacific region to explore strategic institutional partnerships, as well as government-to-government partnerships.



Appendix 1

Membership of CRCWSC Committees

CRCWSC Board Committees

Audit and Risk Committee

Name	Commencement	Organisation (or independent)
Kerry Stubbs (Chair)	01/11/2012	Independent
Cheryl Batagol	17/05/2012	Environment Protection Authority (VIC)
Dominic Dolan	28/02/2013	eWater Pty Ltd

Nominations Committee

Name	Commencement	Organisation (or independent)
Cheryl Batagol (Chair)	17/05/2012	Environment Protection Authority (VIC)
John Savell	17/05/2012	Department of Housing (WA)
Simon Want	17/05/2012	Office of Living Victoria (VIC)

Essential Participants Reference Group

Essential Participants Reference Group

Name	Organisation (or independent)
Sara Harbidge (Chair)	Department of Sustainability and Environment (VIC)
Rhys Coleman	Melbourne Water (VIC)
Ian Johnson	South East Water (VIC)
Julie McLellan	Queensland Urban Utilities (QLD)
Ian Harris	The University of Queensland
Antonietta Torre	Department of Water (WA)
Bart Boelen	Department of Housing (WA)
Sarah Newton	Monash University
Alistar Robertson	University of Western Australia

Advisory Committees

CRCWSC Advisory Committee

Name	Organisation (or independent)
Chris Cocklin	James Cook University
Ian Johnson	South East Water (VIC)
Peter Newton	Swinburne University
Malcolm Robb	Department of Water (WA)
Paul Greenfield	Australian Nuclear Science and Technology Organisation, Australia
Leah Wheatley	Office of Living Victoria (VIC)



Advisory Committees (continued)

CRCWSC Advisory Committee (continued)

Name	Organisation (or independent)
Andre Taylor	Andre Taylor Consulting
Julie McLellan	Queensland Urban Utilities (QLD)
Alistar Robertson	University of Western Australia

Research Advisory Sub-Committees

Program A: Society

Research Advisory Sub-Committee

Name	Organisation (or independent)
Chris Cocklin (Chair)	James Cook University
Geoff Syme	Edith Cowan University
David Sunding	University of California, Berkeley, USA

Program B: Water Sensitive Urbanism

Research Advisory Sub-Committee

Name	Organisation (or independent)
Peter Newton (Chair)	Swinburne University
Glenn McGregor	University of Auckland, NZ
Nancy Grimm	Global Institute of Sustainability, Arizona University, USA

Program C: Future Technologies

Research Advisory Sub-Committee

Name	Organisation (or independent)
Paul Greenfield (Chair)	Australian Nuclear Science and Technology Organisation, Australia
Gustaf Olsson	Lund University, Sweden
David Sedlak	University of California, Berkeley, USA

Program D: Adoption Pathways

Research Advisory Sub-Committee

Name	Organisation (or independent)
Andre Taylor (Chair)	Andre Taylor Consulting
Kevin Collins	The Open University, UK
David Perry	Bureau of Meteorology, Australia
Carol Howe	ForEva Solutions, USA

Stakeholder Advisory Sub-Committees

Program A: Society		Stakeholder Advisory Sub-Committee
Name	Organisation (or independent)	
Ian Johnson (Chair)	South East Water (VIC)	
Peter Morison	Melbourne Water (VIC)	
David Bell	Warringah Council (NSW)	
Catrin Jones	Department of Planning and Infrastructure (NSW)	
Ed Hauck	Department of Water (WA)	
Martin Allen	Department of Environment and Natural Resources (SA)	
Emma Bishop	Office of Living Victoria (VIC)	
Mike Mouritz	City of Canning (WA)	
Pat Bourke	Brisbane City Council (QLD)	

Program B: Water Sensitive Urbanism		Stakeholder Advisory Sub-Committee
Name	Organisation (or independent)	
Malcolm Robb (Chair)	Department of Water (WA)	
Amelia Tendler	Office of Living Victoria (VIC)	
Ben Fallowfield	Warringah Council (NSW)	
Melanie Davies	City of Subiaco (WA)	
David Mitchell	Department of Planning and Infrastructure (NSW)	
Erin Sellers	Fairfield City Council (NSW)	
Graham Brook	Department of Environment, Water, and Natural Resources (SA)	
Jennifer Stritzke	Swan River Trust (WA)	
Paul McAllister	City of Gosnells (WA)	
Rhys Coleman	Melbourne Water (VIC)	





Stakeholder Advisory Sub-Committees (continued)

Program C: Future Technologies	Stakeholder Advisory Sub-Committee
Name	Organisation (or independent)
Leah Wheatley (Chair)	Office of Living Victoria (VIC)
David Hardy	Melbourne Water (VIC)
Garry Henderson	Kellogg Brown & Root Pty Ltd
Jeff Foley	GHD Pty Ltd
Krishna Seewraj	Department of Water (WA)
Olof Jay Jonasson	Ku Ring Kai Council (NSW)
Andrew Chapman	South East Water (VIC)
Peter Adkins	Swan River Trust (WA)
Peter McCafferty	ChemCentre (WA)
Yvan Poussade	Veolia Water Australia

Program D: Adoption Pathways	Stakeholder Advisory Sub-Committee
Name	Organisation (or independent)
Julie McLellan (Chair)	Queensland Urban Utilities (QLD)
Greg Ingleton	South Australian Water Corporation (SA)
Ashis Dey	eWater Pty Ltd
Tim Sparks	Department of Water (WA)
Lauretta Rogers	Brisbane City Council (QLD)
Bileen Nel	Kellogg Brown & Root Pty Ltd
Jacquie White	Melbourne Water (VIC)
Andrew Allan	Office of Living Victoria (VIC)
Natalia Payne	Blacktown City Council
Sophia Findlay	Ku-Ring-Gai Council (NSW)



Appendix 2

Summary of key communications activities of the CRCWSC in 2012–13

1 to 4 July 2012 (Singapore) – Professors Rob Skinner and Tony Wong were prominent participants at the 2012 Singapore International Water Week. Professor Wong also facilitated and accompanied Senator the Hon Don Farrell, his senior advisor Ms Helen Rodwell, and Ms Jennifer Barnes (Acting Director, Urban Water Policy Section, Department of Sustainability, Environment, Water, Population, and Communities), on a visit to a number of water sensitive projects in Singapore.

8 to 10 August 2012 (Esperance, WA) – Associate Professor Anas Ghadouani presented an overview of the activities of the CRCWSC at the Town Centre Revitalisation Conference in Esperance.

14 August 2012 (Melbourne) – Monash University hosted a CRCWSC Research Project information seminar presented by Professors Rebekah Brown, Ana Deletic, Nigel Tapper, and Tony Wong. The seminar was attended by 60 representatives from participant organisations in Victoria and South Australia.

15 and 16 August (Canberra) – Professor Tony Wong and Ms Cheryl Batagol attended the CRC Association Parliamentary Engagement Program as part of Science Week. Ms Vivienne Skinner, senior advisor to then Minister the Hon Anthony Albanese, was briefed on the CRCWSC – and it was arranged for the Minister to be briefed on water sensitive cities activities in and around Marrickville. Senator the Hon Don Farrell, his senior advisor Ms Helen Rodwell, and Ms Jennifer Barnes (Acting Director, Urban Water Policy Section, Department of Sustainability, Environment, Water, Population and Communities) were also briefed.

21 August 2012 (Adelaide) – The consortium of South Australian participants hosted a CRCWSC Research Project information

seminar presented by Professors Ana Deletic, Nigel Tapper, and Tony Wong. The seminar was attended by approximately 50 representatives from participant organisations as well as other interested parties, including the Goyder Institute and a number of local councils.

22 August 2012 (Perth) – The University of Western Australia hosted a CRCWSC Research Project information seminar presented by Associate Professor Ghadouani and Professors Peter Davies, David Pannell, and Tony Wong. The seminar was attended by over 90 representatives from participant organisations and a number of other interested parties, including officers from the Department of Premier and Cabinet.

27 to 31 August 2012 (Copenhagen) – Professor Tony Wong led a delegation of eight Monash University researchers from the Faculty of Arts and the Faculty of Engineering, including Professors Rebekah Brown and Ana Deletic, to visit the Danish Technical University (DTU) and Danish Hydraulic Institute (DHI). The delegation participated in collaborative workshops focused on CRCWSC projects involving DHI, DTU, and UNESCO-IHE, and postgraduate student exchange between DTU and the CRCWSC. The delegates also presented at a public forum in Copenhagen on 28 August 2012.

4 to 7 September 2012 (Belgrade) – Professor Tony Wong presented a keynote address at the International Conference on Urban Drainage Modelling entitled “Emerging trends in modelling integrated urban water systems”.

17 to 20 September 2012 (Busan, South Korea) – Professor Tony Wong attended the IWA World Water Congress in Busan, and presented a number of invited lectures.

24 September 2012 (Melbourne) – Monash University hosted the launch of the CRCWSC by Senator the Hon Don Farrell, then Parliamentary Secretary for Sustainability and Urban Water. The function was attended by approximately 80 representatives from participant organisations and from the Department of Industry, Innovation, Science, Research and Tertiary Education. Other invited speakers were Ms Cheryl Batagol (Chair of the CRCWSC Board), Professor David Copolov (Pro-Vice Chancellor, Vice-Chancellor’s Office, Monash University), and Mr Chris Chesterfield (former CEO, Office of Living Victoria; representing the Victorian Minister for Water).^{3,4,5}

25 September 2012 (Brisbane) – Brisbane City Council hosted the launch of the Brisbane Hub of the CRCWSC by Mr Jon Black (Director General, Department of Energy and Water Supply, QLD). Other invited speakers were Mr Barry Ball (a Director on the CRCWSC Board), Ms Louise Dudley (CEO, Queensland Urban Utilities), and Professor Alan Lawson (Deputy Vice Chancellor, Research, The University of Queensland).⁶

5 October 2012 (Melbourne) – Professor Tony Wong hosted a visit by a delegation from Council of Chilean University Rectors (CRUCH) visiting Monash University, and gave a presentation on the research program of the CRCWSC.

10 October 2012 (Darwin) – Professors Tony Wong and Rob Skinner briefed a meeting of Northern Territory government departments and the Northern Territory Power and Water Corporation.

18 October 2012 (Melbourne) – Professor Tony Wong presented a keynote address at Stormwater2012: the 2nd National Conference on Urban Water Management.

3 <http://watersensitivecities.org.au/melbourne-launch-video-crc-for-water-sensitive-cities/>

4 <http://watersensitivecities.org.au/melbourne-launch-photo-gallery/>

5 <http://watersensitivecities.org.au/senator-farrell-launches-the-crc-for-water-sensitive-cities/>

6 <http://watersensitivecities.org.au/brisbane-launch-photo-gallery/>



1 November 2012 (Canberra) – The CRCWSC hosted the delegates breakfast of the Australian Water Association's Annual Water Leadership Summit in Canberra. Approximately 80 delegates were briefed on the activities of the CRCWSC. Attendees included Senator the Hon Don Farrell, and Senator the Hon Scott Ludlam (Australian Greens, Western Australia).

8 November 2012 (Melbourne) – Professor Tony Wong, Ms Cheryl Batagol, and Professor Rob Skinner briefed the Hon Peter Walsh (Minister for Water, Victoria), and Mr Mike Waller (Acting CEO, the Office for Living Victoria).

26 November 2012 (Perth) – Ms Cheryl Batagol presented at the New Water Way Research Forum. This workshop outlined opportunities for WA participants to collaborate with the CRCWSC (principally demonstration sites and research implementation).

26 November 2012 (Perth) – The University of Western Australia hosted the launch of the CRCWSC Western Region office by the Hon Bill Marmion (Minister for Water, WA). The function was attended by approximately 100 people representing participant organisations and other stakeholders. Other invited speakers were Professors Tony Wong and Rob Skinner, along with Mr Bart Boelen (Department of Housing, WA).⁷

23 January 2013 (Singapore) – Professors Tony Wong and Rob Skinner met with the Public Utilities Board (PUB) of Singapore as part of ongoing development of research activities in the Singapore Hub. The CRCWSC then hosted a dinner with invited guests from PUB, the Centre for Liveable Cities, and the National University of Singapore, and with researchers from the CRCWSC who were in Singapore attending the Water Research Conference. Special guests were Mr Chew Men Leong (Chief Executive of

PUB), Mr Khoo Teng Chye (Chief Executive of the Centre for Liveable Cities), and Professor Wolfgang Rauch (Professor in Civil Engineering, University of Innsbruck). Members of the CRCWSC Executive in attendance were Professor Ana Deletic and Associate Professor Anas Ghadouani.

14 February 2013 (Perth) – Professor Peter Davies, Associate Professor Anas Ghadouani, and Professor Tony Wong hosted a meeting of Western Australian participants at the Australian Urban Design Research Centre in Perth. The meeting was attended by 41 people, and all Western Australian CRCWSC participants were represented. Topics included strategies to address priority gaps in science and adoption, as previously identified at a meeting with the Board in November 2012.

21 February 2013 (Sydney) – A half-day stakeholder workshop, hosted by the Eastern Region office, was led by Professor Jurg Keller (Regional Executive Director, Eastern Region) and Ms Fiona Chandler (Co-Leader, Program D: Adoption Pathways). The emphasis was on informing stakeholders how the CRCWSC can support government, industry, the water sector, and the community to create water sensitive cities.

6 to 8 March 2013 (London) – Professor Tony Wong attended the EcoBuild Conference in London as a keynote speaker, and also the launch of Greener Grangetown at Cardiff as guest speaker. This was a joint initiative by the Government of Wales, Welsh Water, and the City Council of Cardiff, directed at reducing stormwater flow into the combined sewers of Cardiff, to alleviate flooding and environmental pollution from combined sewer overflows. The initiative to retrofit the streets of Grangetown with biofiltration raingardens will establish a precinct scale demonstration of WSUD in Wales.

18 to 21 March 2013 (Viña del Mar, Chile) – Professor Tony Wong attended the Latin America Water Week conference in Viña del Mar as part of the Australian Commission delegation. The mission was to explore collaboration in water research and consulting services in Chile. Professor Wong had the opportunity to highlight in his presentation that developing countries are well-placed to leap frog directly to a water sensitive city rather than undertake the organic evolution of urban water infrastructure and institutions often seen in cities in developed countries.⁸

17 April 2013 (Canberra) – Professor Tony Wong presented at TEDxCanberra on envisioning a water sensitive future.⁹

15 May 2013 (Dubbo) – Mr Jamie Ewert (Co-Leader, Program D: Adoption Pathways) represented the CRCWSC, on the invitation of the Central West CMA (a member of the NSW Consortium participant organisation of the CRCWSC), and was keynote presenter at a meeting of the Regional Organisations of the Central West Catchment Management Authority (NSW) involving the Rural Development Australia, the Regional Organisation of Councils, the Water Utilities and Sustainability Alliances, the Central West Local Government Reference Group, the Salinity and Water Quality Alliance, and NetWaste.

⁷ <http://watersensitivecities.org.au/perth-hub-launch-photo-gallery/>

⁸ <http://watersensitivecities.org.au/leap-frogging-to-water-sensitive-cities-in-developing-nations/>

⁹ <http://www.youtube.com/watch?v=6KFqEmcLXk8>



15 to 17 May 2013 (Melbourne) – Professor Tony Wong and Ms Robyn McLachlan attended the CRC Association Conference.

23 May 2013 (Melbourne) – All Victoria-based Essential Participants and several Other Participants (making a total of 18) were represented at the CRCWSC Board meeting.

24 May 2013 (Adelaide) – Professor Ana Deletic presented on the CRCWSC and on its stormwater research at a meeting of the Local Government Association (South Australia), and took part in their roundtable on needs in stormwater research. The meeting was held at City of West Torrens Council.

27 May 2013 (Melbourne) – Professors Rebekah Brown and Ana Deletic presented at the Water Sensitive Cities Workshop, organised by Monash Council around the theme of Healthy Liveable Places for People. Around 30 people from Monash Council attended the meeting. The meeting was a follow-up from an earlier Local Government Designers Forum entitled “Healthier Cities by Design”, held at Monash Council on 19 March, where Professor Ana Deletic presented on CRCWSC work toward green infrastructure.

10 June 2013 (Eawag, Zurich, Switzerland) – Professor Ana Deletic gave a presentation at a research seminar in Eawag.

18 June 2013 (Jerusalem) – Professor Ana Deletic presented at the Jewish National Fund World Congress in Jerusalem.

17 to 21 June 2013 (Malaysia and Indonesia) – Professor Tony Wong participated in a successful trip to Malaysia and Indonesia as part of the Victorian Government’s Super Trade Mission to South-East Asia, involving 405 delegates in eight industry sectors. The mission was led by the Hon Dr Denis Napthine (Premier of Victoria), who was

accompanied by three other ministers: the Hon Peter Walsh (Minister for Water), the Hon Ryan Smith (Minister for Environment and Climate Change), and the Hon Louise Asher (Minister for Innovation, Services and Small Business). Minister Smith accompanied Professor Wong’s sector (urbanisation and infrastructure), and was very helpful in introducing the CRCWSC to high level government officials in Malaysia and Indonesia.

In Malaysia, Minister Smith arranged for Professor Wong and Mr Phil Johnson (Chief Financial Officer of South East Water) to meet with the Deputy Minister and the General Secretary of the Ministry of Energy, Green Technology, and Water. The key outcome of that meeting was that a delegation led by the Deputy Minister and his department’s Secretary General plan to visit the CRCWSC in Melbourne.

In Indonesia, Professor Wong met with the Director General of Spatial Planning in the Ministry of Public Works, who was particularly interested in how the Ministry might participate in the activities of the CRCWSC. Professor Wong has been invited back to Indonesia to progress discussions on such participation.



Appendix 3

Summary of key education and training activities of the CRCWSC in 2012–13

13 July 2012 (Sydney) – The CRCWSC conducted a one-day workshop with NSW participants (and potential new CRCWSC participants) to present an overview of various sections of blueprint2012 and discuss how they could be applied by stakeholders.

25 September 2012 (Brisbane) – Brisbane City Council hosted a one-day South East Queensland Water Sensitive Cities Forum attended by approximately 90 delegates.

26 and 27 September 2012 (Brisbane) – Brisbane City Council hosted the inaugural Industry Partners Workshop of the CRCWSC at Council House, Brisbane. Councillor Matthew Shaw opened proceedings. The two-day workshop was attended by over 70 representatives from participant organisations throughout the country. The first day featured highlights of research outputs from the eight projects of the Cities as Water Supply Catchments program, followed by a session on defining the role of urban water management in influencing urban liveability. The morning of the second day was devoted to informing delegates of projects in CRCWSC Programs A, B, and C (Society, Water Sensitive Urbanism, and Future Technologies), allowing time for delegates to participate in detailed discussions on their scope. The afternoon session was devoted to projects in Program D (Adoption Pathways).

28 September 2012 (Brisbane) – Brisbane City Council hosted the CRCWSC Researchers Workshop, where researchers in Programs A, B, and D (Society, Water Sensitive Urbanism, and Adoption Pathways) assembled to plan their respective Programs' activities. Researchers from Program C (Future Technologies) had already met previously.

8 October 2012 (Melbourne) – Professor Tony Wong led a workshop entitled

“Transition towards Water Sensitive Cities” at the Riversymposium in Melbourne.

17 October 2012 (Sydney) – Professor Ana Deletic and Dr David McCarthy delivered a one-day training course entitled “Stormwater Harvesting – Water Sensitive Urban Design (WSUD)” at the Sydney Water Building, Parramatta, hosted by the NSW Sydney Metropolitan Catchment Management Authority. The number of course registrants was 30.

30 October 2012 (Melbourne) – Maddocks Lawyers hosted project inception workshops for Project A3.3 – Strategies for Influencing the Political Dynamics of Decision-Making (Professors James Walter and John Thwaites) and Mr Barnaby McIlrath (Project B5.1 – Statutory Planning for Water Sensitive Cities). A boardroom lunch workshop hosted by Professor Thwaites was attended by approximately 35 invited senior practitioners in urban water policies, including the Hon Peter Walsh (Minister for Water), Mr Ron Ben-David (Chairman, Essential Services Commission), and Mr John Ginivan (Executive Director, Planning and Policy Reform, Department of Planning and Community Development, VIC). Following the boardroom lunch workshop, Mr McIlrath convened a second workshop involving some 50 attendees representing local and state government CRCWSC participants, to discuss the extent to which town planning frameworks that currently exist across multiple jurisdictions promote or hinder the adoption of WSUD and water recycling.

14 November 2012 (Melbourne) – Monash University hosted a lunchtime CRCWSC seminar attended by approximately 35 people from our participant organisations, where Associate Professor Peter Breen presented his Project (B2.3, Urban Waterway Remediation in Developed Catchments), outlining the proposed research approaches

to waterways in catchments with high levels of urban development and how remediation templates for these streams could be developed. Dr Valentine Pauwels gave a presentation entitled “Modelling flooding: Can Australia learn from European practice?”, which focused on the improvement of a coupled hydrological/hydraulic model through the incorporation of satellite data.

21 November 2012 (Adelaide) – The Project D5.1 team, together with Professor Tony Wong, attended a workshop with Renewal SA and a project team from the CRC for Low Carbon Living to discuss the Tonsley Demonstration Project.

11 December 2012 (Brisbane) – The Eastern Region office hosted a half-day workshop on CRCWSC adoption pathways for Queensland participants, presented by Professor Jurg Keller, Dr Andre Taylor, and Ms Fiona Chandler.

19 and 20 December (Melbourne) – The CRCWSC Executive hosted a collaborative workshop with a small delegation from the US Engineering Research Center for Re-inventing the Nation's Urban Water Infrastructure (ReNUWIt). ReNUWIt is an interdisciplinary, multi-institution research organisation whose goal is to change the ways we manage urban water. The US delegation consisted of Professors Richard Luthy (Stanford University), David Sedlak (University of California, Berkeley), and Jorg Drewes (Colorado School of Mines).

15 February (Perth) – The Department of Housing (WA) organised and led a field tour of the site of the proposed Keralup development, for the CRCWSC and the Department of Water (WA). The CRCWSC representatives were Professors Geoffrey London, Shane Murray, Tony Wong, and Peter Davies, and Associate Professor Anas Ghadouani.



19 February (Melbourne) – Over 60 people attended a CRCWSC seminar entitled “How to create an ecologically healthy urban stream – what does the research tell us?” at the Monash University Law Chambers in Melbourne. The seminar explored, through presentations by three invited speakers, current scientific knowledge and evidence that could be used to guide the rehabilitation of degraded urban waterways to achieve multiple beneficial outcomes beyond its primary focus of improvement of waterway ecological health. A panel discussion followed the presentations.

14 March (Melbourne) – The CRCWSC participated in the Water Property Rights Seminar. This seminar presented the benefits of clarifying the rights to use these sources and the implications for utilities, councils, developers, and householders. The presenters included Mr Simon Want (Office of Living Victoria), Daniel De Sousa (Maddocks Lawyers), Professor John Thwaites (Monash Sustainability Institute), and Mr Robert Sadler (Barrister, Gordon and Jacksons). This seminar was well attended by CRCWSC Industry Partners and members of Stormwater Victoria.

18 March (Melbourne) – The CRCWSC presented a full-day stakeholder workshop entitled “Building Socio-Technical Flood Resilience in Cities and Towns”, led by Professor Ana Deletic and two international Leaders in the CRCWSC’s Program B: Professors Richard Ashley (UNESCO-IHE, Delft) and Karsten Arnbjerg-Nielsen (Technical University of Denmark). The objective of was to maximise end-user input into two CRCWSC projects. The workshop focused on understanding geographical and institutional context among CRCWSC participant organisations. It aimed to identify potential case studies and reference conditions to best represent the potential range of social-technical solutions that are most applicable to the differences in

geography and institutions.

3 and 4 April (Perth) – The second CRCWSC Industry Partners Workshop was attended by over 120 representatives from our participant organisations.

7 May (Melbourne) – A seminar entitled “The economics of water sensitive cities and liveability” was presented in conjunction with the Stormwater Industry Association of Victoria Annual Conference, with presentations from Mr Ian Johnson (South East Water), Professor David Pannell (University of Western Australia), and Dr Paul Raschky (Monash University). The presentations examined different methods used to quantify the economics of non-market benefits associated with urban water management for sustainability, resilience, and liveability in cities and towns. The seminar was attended by approximately 50 people.

8 and 9 May (Melbourne) – The second CRCWSC Researchers Workshop was attended by over 95 representatives from our research participant organisations.

20 May (Melbourne) – A meeting was held between Melbourne-based Executives and Professor van Leeuwen (KWR Watercycle Research Institute, The Netherlands), Mr Francis Pamminger (Yarra Valley Water), and Ms Leah Wheatley and Ms Amelia Tandler (Office of Living Victoria), to discuss liveability evaluation.

21 May (Sydney) – Professor Tony Wong and CRCWSC researcher Mr Phil Johnston facilitated a workshop entitled “Science-Policy Partnerships for Water Sensitive Cities” with NSW participants, to discuss potential models for science-policy partnerships involving local governments.

21 May (Brisbane) – Mr Ross Allen and Dr Cintia Dotto (Project D1.1, Integration and

Demonstration Through Urban Design) introduced and discussed the DanCE4 Water (Dynamic Adaptation for Enabling City Evolution for Water) modelling tool and the Cities as Water Supply Catchments Modelling Toolkit at a workshop for Queensland participants.

14 June (Innsbruck, Austria) – The research team from Project A4.1 (Cities as Water Supply Catchments – Society and Institutions), led by Professor Ana Deletic, visited Austria as part of the European Union FP7 project and convened a workshop with researchers from the programming team at the University of Innsbruck. The aim was to progress a framework for extending modelling software (already jointly developed) to examine urban water management scenarios.



Appendix 4

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Journal articles

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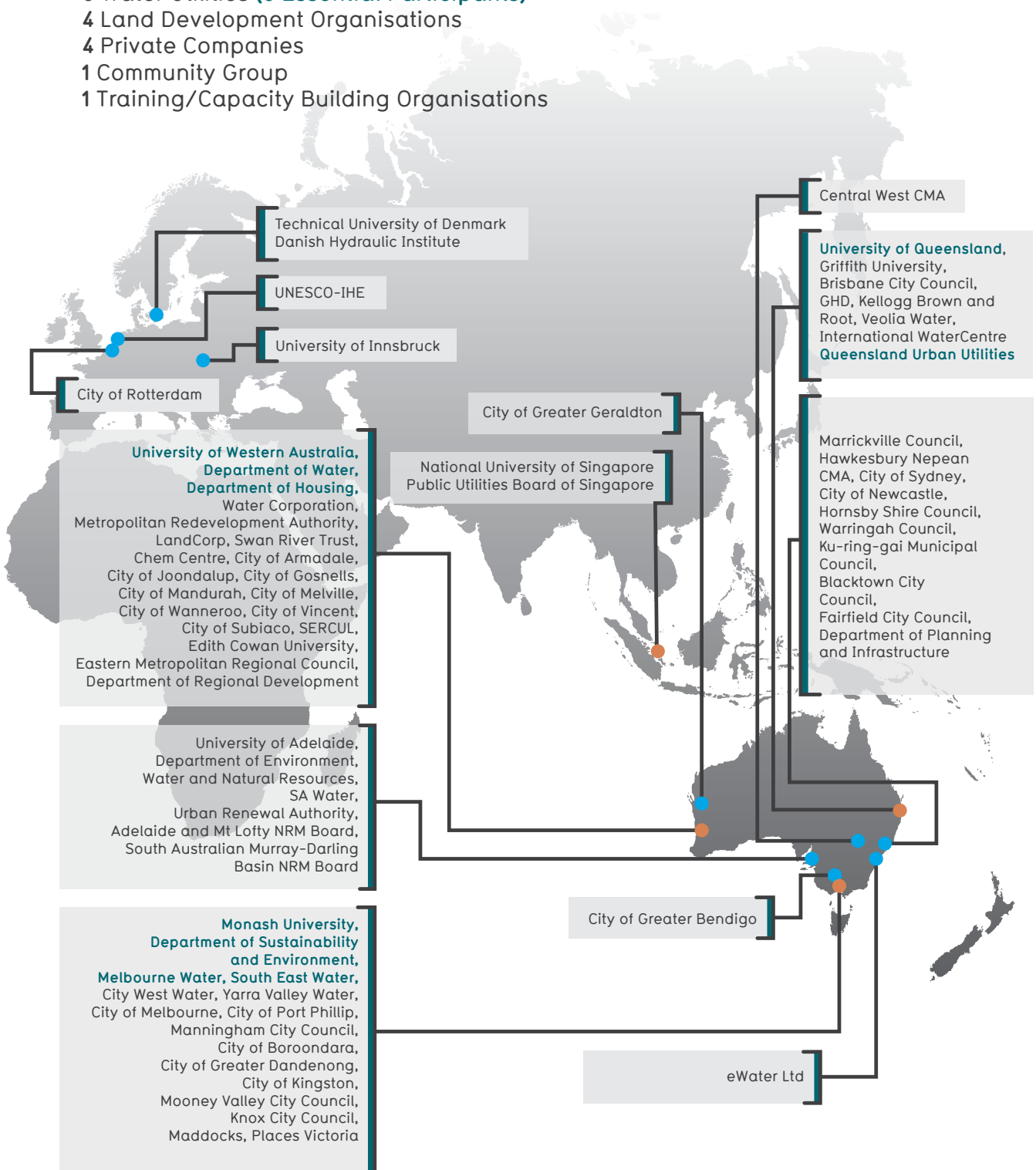
Glossary of terms

Beta (version of software)	A version of software that is in its final phase of testing, usually by potential industry end users, before its full release.
Biofilters	Biofilters (also known as bioretention systems and raingardens) are constructed biological treatment systems that use soil and vegetation to mitigate the impacts of increased stormwater runoff associated with urbanisation on the natural environment (particularly waterways). Biofilters integrated with the urban landscape can also contribute to urban cooling and amenity.
Choice experiment	A stated-preference method for eliciting individual values and preferences for non-market goods.
CRCWSC	Cooperative Research Centre for Water Sensitive Cities.
Green infrastructure	The network of natural landscape assets (green spaces and water systems) that underpin the economic, socio-cultural and environmental functioning of our cities and towns.
Heat mitigation	Actions to limit the magnitude or rate of warming of urban environments.
Human thermal comfort	A person's psychological state of mind in relation to satisfaction with their thermal environment. Human thermal comfort is influenced by heat exchange between the human body and the immediate environment.
Secondary effluent	Treated waste water, where 85 per cent of its biological oxygen demand and suspended solids have been removed.
Stated-preference approach	A technique using hypothetical questions to elicit preferences or values.
Stormwater	Water generated from predominantly impervious surfaces (roofs, roads, footpaths, and other hard surfaces) as a result of rainfall events. Rainwater (water originating from roofs) is a component of stormwater.
Stormwater harvesting	The collection, treatment, storage, and use of stormwater.
Stormwater management	Technological and institutional initiatives and interventions to mitigate the impacts on the natural environment of excess stormwater (quality and quantity) resulting from urbanisation.
Urban heat island	The effect of a localised increase in heat (temperature) of urban area's relative to surrounding natural or rural environments resulting from increased impervious surfaces and thermal mass.
Water sensitive urban design (WSUD)	An approach to the planning and design of urban environments focused on integrating the urban water cycle (including potable water, waste water, and stormwater) with the built and natural urban landscape. It is linked to ecologically sustainable development, with a focus on the sustainable management of urban water resources and environmental protection, while also enhancing socio-cultural conditions.



71 Partners

- 29 Local Governments
- 12 State Government Departments/Agencies (**3 Essential Participants**)
- 12 Research Organisations (**3 Essential Participants**)
- 8 Water Utilities (**3 Essential Participants**)
- 4 Land Development Organisations
- 4 Private Companies
- 1 Community Group
- 1 Training/Capacity Building Organisations



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CRC for Water Sensitive Cities

Telephone: +61 3 9905 9709

Email: admin@crcwsc.org.au

Website: www.watersensitivecities.org.au

Postal: P.O. Box 8000
Monash University, Clayton Campus
VIC 3800 Australia