

# National Urban Water Research Strategy

Issued February 2016



WATER SERVICES  
ASSOCIATION OF AUSTRALIA

## Overview of WSAA

WSAA IS THE INDUSTRY BODY THAT SUPPORTS THE AUSTRALIAN URBAN WATER INDUSTRY.

Its members and associate members provide water and wastewater services to over 20 million customers in Australia and New Zealand and many of Australia's largest industrial and commercial enterprises.

The Association facilitates collaboration, knowledge sharing, networking and cooperation within the urban water industry. It is proud of the collegiate nature of its members which has led to industry-wide approaches to national water issues.

WSAA can demonstrate success in the standardisation of industry performance monitoring and benchmarking, as well as many research outcomes of national significance. The Executive of the Association retain strong links with policy makers and legislative bodies and their influencers, in order to monitor emerging issues of importance to the urban water industry. WSAA is regularly consulted and its advice sought by decision makers when developing strategic directions for the water industry.

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## Contributors

This Strategy has been led by WSAA on behalf of the urban water industry, in extensive consultation with other organisations including:

- WSAA's public utility members in particular Water Corporation, Sydney Water, SA Water, Seqwater, and Coliban Water
- WSAA's private utility members and consultant members
- New South Wales Water Directorate
- Queensland Water Directorate
- Water Research Australia
- CSIRO
- Bureau of Meteorology
- Federal Department of Environment
- Australian Water Association
- Cooperative Research Centre for Water Sensitive Cities
- Australian Water Recycling Centre of Excellence
- National Centre of Excellence for Desalination Australia
- National Centre for Groundwater Research and Training
- VicWater
- Consultants

WSAA thanks all contributors for their enthusiasm, time and expertise.

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## Foreword



We look forward to working with our fellow urban water organisations and research bodies in delivering these research priorities together to strengthen the urban water industry.

**Adam Lovell, Executive Director, WSAA**

We are pleased and proud to present this new National Urban Water Research Strategy. It summarises the challenges facing the Australian urban water industry, identifies the research priorities of critical importance, and provides a framework for the delivery of the research.

This Strategy has been developed by WSAA on behalf of the Australian urban water industry. Urban water service providers, both public and private, are important drivers for urban water research, and WSAA, as their peak industry body, has been nominated to coordinate this Strategy. We recognise the important role that other organisations involved in urban water research play, such as research providers, government and industry associations. We have developed this Strategy collaboratively, and have consulted widely and internationally to understand the future research needs of urban water utilities.

Research remains vital to developing a water industry that is increasingly productive, innovative and that provides excellent customer service.

This national Strategy will also strengthen alignment between water industry research and the National Science and Research Priorities of the Australian Government, and help enable collaboration and avoid duplication of effort.

## INTRODUCTION

### *Australian urban water research in context*

The Australian urban water industry provides over 20 million customers with water and wastewater services, and plays a significant role in environmental stewardship and contribution to urban amenity. In some states and cities the same water service providers also provide stormwater, drainage and flood management services. The sector manages assets with a value of over \$160 billion (as at 1 July 2015) and is integral to the public health, liveability and productivity of our cities and communities.

Australia has a thriving urban water research and development sector that on an international level is well regarded and productive. There has been significant investment in Australian urban water research during the last fifteen years, largely in response to the severe drought experienced through many parts of Australia. We produce world class research on many topics, including drought management, integrated water management, water sensitive urban design, desalination, water recycling, water quality and climate adaptation and resilience.

The end of the Millennium Drought has brought increasing financial pressures, with a greater focus on investment efficiency, as well as an overall decrease in total urban water research funding, and the imminent end of several research partnerships, centres and/or organisations.

### *Why do we need a National Urban Water Research Strategy?*

Research remains an important investment for the urban water industry that has repeatedly been demonstrated to be cost-effective and vital to the future viability of the urban water industry. Benefits from research investment include innovative technology development, financial savings, improved risk management and public health, and better customer service.

Given the loss of urban water research organisations amidst a ‘drought in funding’, there is a strong need for a coordinated national approach to urban water research to streamline research efforts and maximise funding efficiencies. This coordination spans across multiple organisations from government, utilities, private and non-profit organisations. The abolition of the National Water Commission has meant there is no longer a central policy-making body on water. A lack of coordination of research at a national level may lead to poor alignment with national strategic directions, as well as overlaps and gaps between different programs that result in the inefficient use of the limited available urban water research funds. The need for stronger, national leadership in urban water policy was discussed in detail in a recent WSAA publication.<sup>1</sup> In addition, the recent launch of the National Innovation and Science Agenda might open up new funding opportunities for urban water research.

This National Urban Water Research Strategy (‘Research Strategy’) provides an important link between the high-level Science and Research Priorities of the Australian Government<sup>2</sup> and the development and delivery of urban water research within multiple separate organisations across Australia. It articulates the vision and common research priorities of the Australian urban water

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<sup>1</sup> Doing the important, as well as the urgent: Reforming the urban water sector. November 2015.

<https://www.wsaa.asn.au/WSAAPublications/Documents/Report%20-%20Reforming%20the%20urban%20water%20sector%20WSAA%20IPA.PDF>

<sup>2</sup> <http://www.science.gov.au/scienceGov/ScienceAndResearchPriorities/Pages/ThePriorities.aspx>

industry for the next 15 years, and provides a high-level framework for implementation. Its benefits will be:

- Strategic alignment between the Australian Government Science and Research Priorities and the urban water research investments,
- Efficient use of dwindling research funds through enhanced collaboration on common research priorities,
- Avoided duplication through a common industry vision and common priorities and collaborative delivery,
- Delivery of research that meets the collective needs of industry and responds to global trends,
- Enhanced reputation for the Australian urban water industry through encouraging and promoting Australian-led collaborative research projects,
- A platform for influencing the allocation of available research funding to address the needs of the urban water industry,
- Greater adoption of research outcomes through improved knowledge transfer,
- And ultimately better customer service.

### *Audience for the Research Strategy*

The audience for this Strategy are those that plan, fund, coordinate and/or deliver urban water research within, or on behalf of, the urban water industry. Including:

- Urban water research organisations
- State and Federal Governments
- Universities
- Research brokers
- Consultants
- and of course the urban water industry itself.

### *WSAA's role in developing the Research Strategy*

WSAA (The Water Services Association of Australia) has been tasked with coordinating this Strategy by the National Urban Water R&D Partnership Working Group (PWG)<sup>3</sup>. The PWG recommended WSAA lead the process, primarily because WSAA members increasingly control the majority of the urban water research funding in Australia. WSAA's last (internal) urban water research strategy has been recognised by the PWG as the closest document to a National Urban Water Research Strategy.

WSAA's last research strategy, which was released in 2013, was the first step in a significant realignment of research priorities for urban water. By this stage, many of the pressing issues around water quality and security of urban water supplies were largely understood and the supporting technology fairly advanced. The conversation had advanced to issues of customers and community interest. The last strategy therefore articulated our issues in relation to climate change and extreme events, began identifying liveable and resilient city aspirations, and set out to place customer value as the focal point.

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<sup>3</sup> The PWG was in place from 2012 - 2015 and was responsible for overseeing a variety of initiatives to advance processes in Australian urban water R&D. It consisted of executive-level representation from government, research organisations, private sector, public utilities/water service providers and research brokers relating to urban water R&D in Australia.

The current Research Strategy built on this previous Strategy and was developed in close collaboration with the urban water industry, and with relevant Australian and international research organisations. Water Research Australia has already committed to working from the Research Strategy. The consultative process used to develop this Strategy is outlined in Appendix 1.

### *Definition of research for the context of the Research Strategy*

Within the context of this Strategy, ‘research’ is understood as ‘applied research’, which is directed to specific, practical aims or objectives that contribute to the water industry. This research can be conducted by universities and research organisations, and also by consulting agencies, and water industry experts. Research, in the context of this Strategy, can be defined as the systematic investigation into, and study of, physical materials and knowledge sources, including industry expertise, in order to establish facts and reach new conclusions. Research outputs could include studies, benchmarking, collaborative information sharing, training, papers that inform policy and advocacy, restating existing knowledge in a form useful to industry, guidance, implementation, change management, standards development and adoption.

## **Research context**

This Research Strategy has been developed with the national and international research context in mind. Key sources for providing the context included<sup>4</sup>:

- Australian research priority areas
- International urban water research priority areas
- Global trends and threats.

A literature scan into the future factors impacting on the water industry found a number of common themes, including climate change, changing demographics, the rise of the ‘internet of things’, and changing political and economic landscapes. This is summarised in Figure 1. A more detailed overview of the Australian Research Priority areas is given in Appendix 2.

Figure 1 illustrates that the nature of research in urban water is changing. The focus is no longer just on ‘traditional’ research area such as water quality and treatment. Instead, urban water research is increasingly influenced by ‘macro-systemic’ questions from social (customer values, societal changes), analytical (‘big data’), financial and political (regulations, urban planning) fields. This trend is also visible in the research strategies of other international water research brokers, including those of Water Research Foundation (US) and the UK Water Industry Research.

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<sup>4</sup> Australian Government research priority areas:

<http://www.science.gov.au/scienceGov/ScienceAndResearchPriorities/Pages/ThePriorities.aspx>; ARUP (2014) The Future of Urban Water: Scenarios for Urban Water Utilities in 2040.; CSIRO Future of Water Supply Environmental Scan 2014 – Seqwater; World Economic Forum Global Risks 2014 [http://www3.weforum.org/docs/WEF\\_GlobalRisks\\_Report\\_2014.pdf](http://www3.weforum.org/docs/WEF_GlobalRisks_Report_2014.pdf); Hajkowicz S. A., Cook H., Littleboy A. (2012) Our future world. Global megatrends that will change the way we live. The 2012 Revision. CSIRO, Australia.; WBCSD (2010) Vision 2050. The new agenda for business. World Business Council for Sustainable Development; Association of Netherlands Municipalities and the Association of Regional Water Authorities (2014) Vision brochure. Wastewater Management Roadmap towards 2030. A sustainable approach to the collection and treatment of wastewater in the Netherlands.

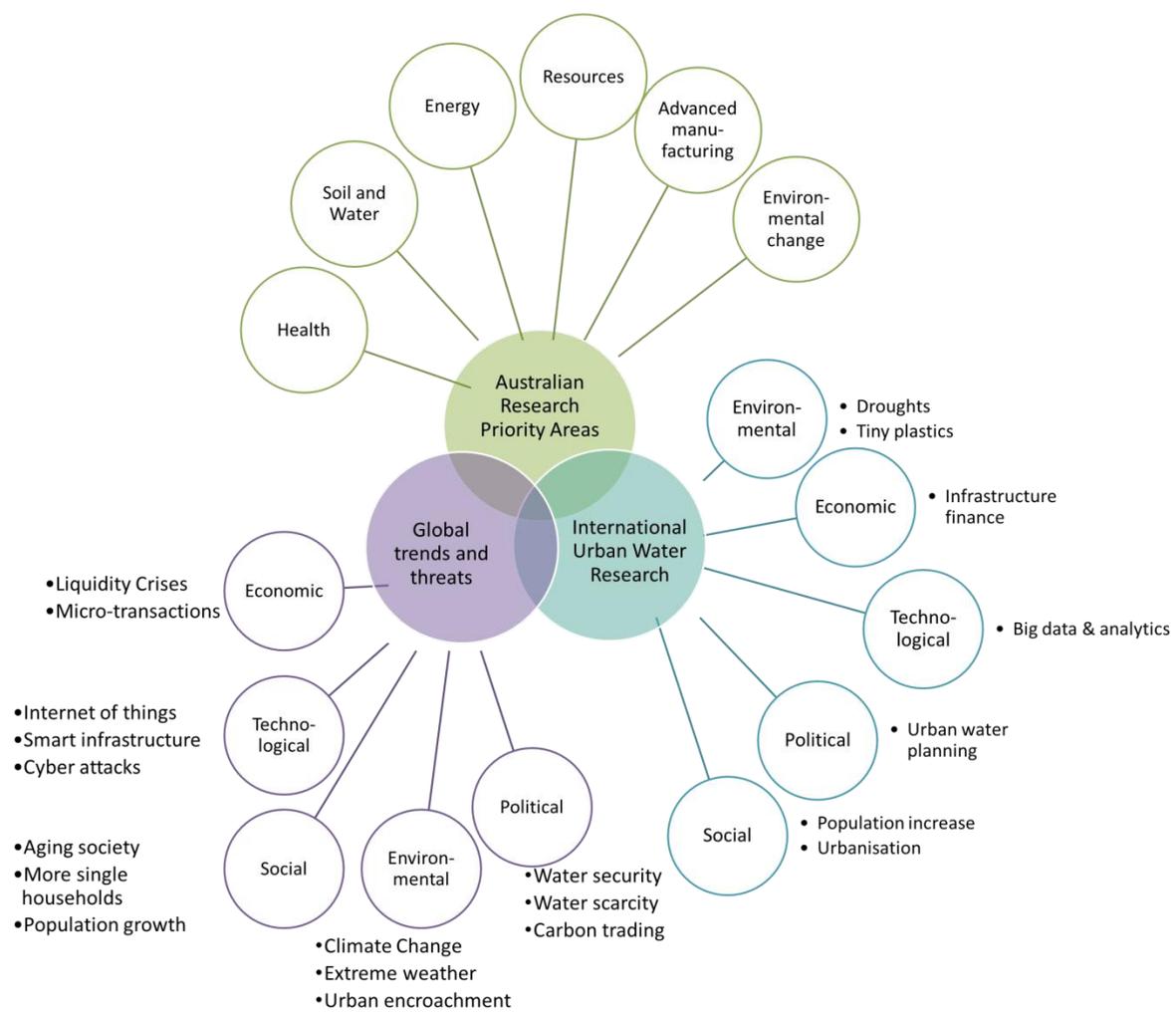


Figure 1: Overview of research fields relevant to the National Urban Water Research Strategy. More details on the Australian Research Priority Areas in Appendix 2.

## VISION AND RESEARCH PRIORITIES IN URBAN WATER

The following section describes the priorities that were developed building on the research context outlined above, and in collaboration with the urban water industry and relevant Australian and international research organisations. This collaborative process is outlined in Appendix 1.

### Vision

Australia's urban water industry embraces and invests in world leading research and innovation to achieve our vision of 'Customer driven, enriching life'.

### Key Priority Areas

Research priorities have been grouped into five, interlinked Key Priority Areas illustrated in Figure 2. The Key Priority Areas, which need to be addressed within the context of global changes and challenges (such as climate change, urbanisation and population growth, technology trends and financial pressures), are:

- Customers
- Liveability
- External business environment
- Utility Agility
- Assets, technology, data.

The National Urban Water Research Strategy proposes how conducting research into these areas will help the urban water industry to pre-empt anticipated future challenges and solve them.

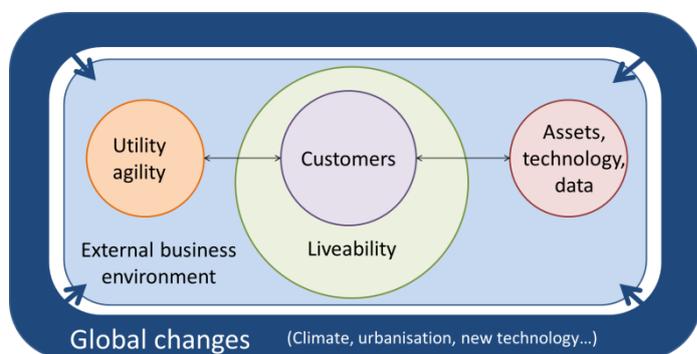


Figure 2: Priority research areas

### Drivers of priority areas

Figure 3 shows the links between these key priority areas and the challenges they contain, and how research can help deliver strategic responses to ultimately achieve the desired outcomes. The figure also attempts to show the many links between research priority topics and outcomes to be achieved, and that one research question helps address multiple water utility challenges. The four highest research priorities for 2016, which were selected in a consultative process (Appendix 1), are highlighted in blue boxes. *Please note: There are additional strategic responses to these challenges through collaboration and advocacy; however they are outside the scope of this Strategy. Also, this Strategy is not intended to be an exhaustive list of research activities and areas of research already underway.*

Further scoping of these priority areas has started and is in continual development. For up-to-date information on these projects, please contact WSAA.

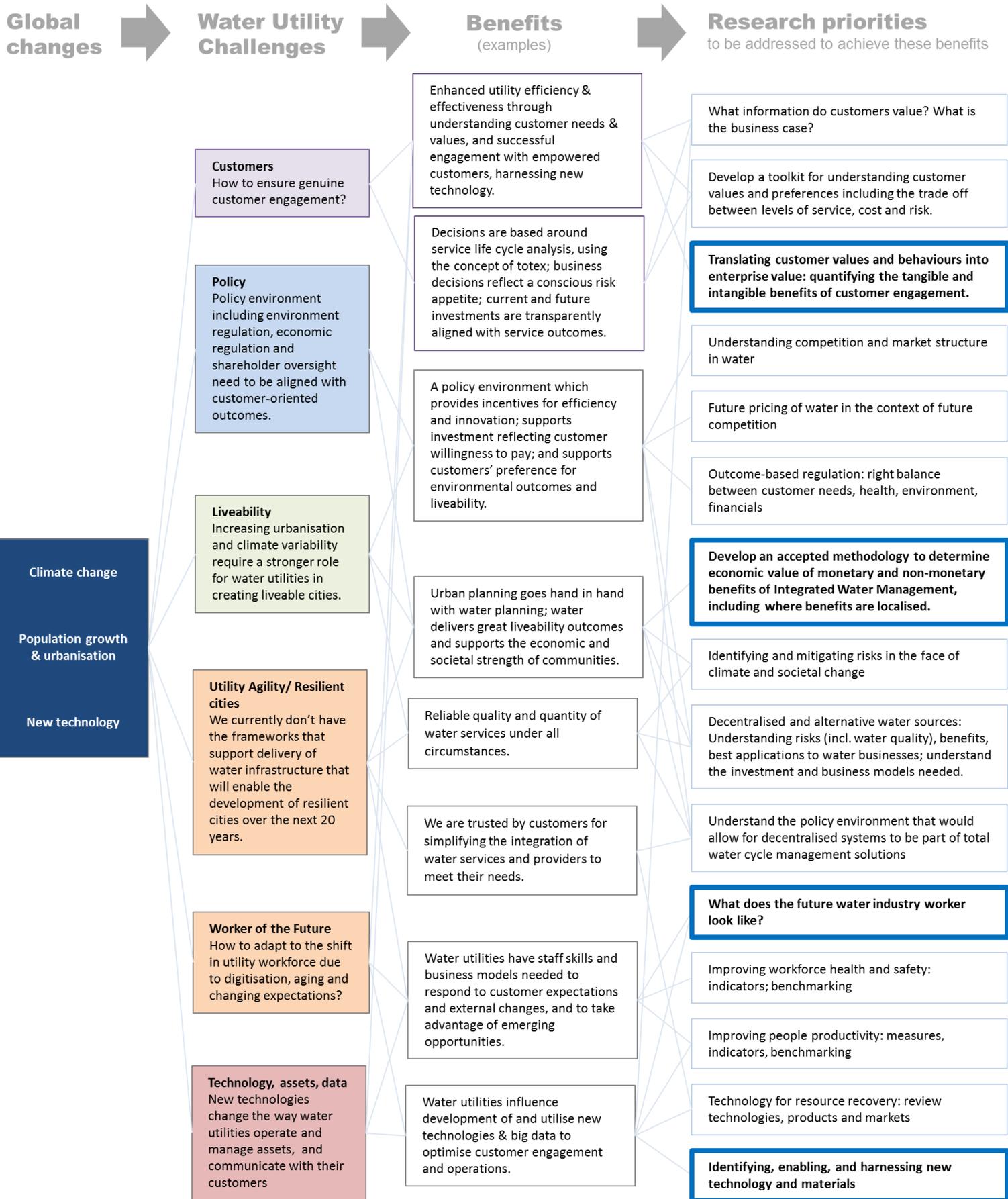


Figure 3: Future challenges (as depicted in Figure 2), benefits of resolving them, and research projects to address these challenges. Highest priority research areas are highlighted in blue boxes.

## *Customers*

### Current situation and anticipated challenges:

Customers are the *raison d'être* for water utilities, and regulators are seeking more evidence of delivering customer value. As a result of technology trends, customers are demanding more from utilities with greater emphasis on self-service and individual control, coupled with a low tolerance for repeat failures and disruption. Social media will increasingly drive behaviours, operations, and innovation.

### Aspired outcomes:

The customer-centric utility understands customers' needs and values. Customers are involved in decision making and system management. Water utilities are successfully integrated in customers' digital lifestyles and permanent connectivity; crowdsourcing and crowdfunding are additional new avenues of running water businesses.

**Highest research priority:** Translating customer values and behaviours into enterprise value: quantifying the tangible and intangible benefits of customer engagement.

## *External business environment*

### Current situation and anticipated challenges:

Governments and the community are concerned about the affordability of water services and are striving for ever greater efficiency and lower costs. These challenges will become increasingly noticeable as the climate change continues, cities densify, and there is more competition for state funding. The perceived infrastructure deficit and constrained fiscal climate mean there is greater potential for seeking out more opportunities for value-generation along the water cycle.

### Aspired outcomes:

Government understands and values the wide range of services that best-practice integrated water management offers, including non-monetary benefits such as liveability. A range of new funding sources are available to finance integrated water management projects that deliver much-valued community benefits. Businesses exploit the various resources that can be extracted from sewage, such as energy, heat and nutrients, and water. Colocation of essential services and value-added services to commercial and industrial customers creates new business opportunities. Urban-rural water trading is thriving.

## *Liveability*

### Current situation and anticipated challenges:

The water industry has a key role to play in liveability and community health, which was highlighted during the Millennium Drought. Water cycle managers need an equal seat at the planning table to ensure water security and the long-term reliability of water sources, in terms of quantity and quality, as our cities are facing climate change, demographic change, population growth and increasing environmental and agricultural needs. At the moment, there is a fractured approach to dealing with integrated planning issues at a state level, which creates a number of challenges and may lead to suboptimal water-management

outcomes<sup>5</sup>. Currently, it is difficult to justify additional expenditure for liveability outcomes, even where broader economic and societal value can be demonstrated.

#### Aspired outcomes:

Water utilities convincingly capture the monetary and non-monetary benefits that all elements of the urban water cycle provide to people, businesses, and the environment. The encompassing economic value of integrated water management is recognised by Governments. Integrated water planning is part of best-practice urban planning. New financial arrangements have been found to deliver and maintain these projects and services.

**Highest research priority in liveability and external business environment:** Develop an accepted methodology to determine economic value of monetary and non-monetary benefits, including where benefits are localised.

#### *Assets, technology, data*

##### Current situation and anticipated challenges:

Utilities are facing large replacement costs of infrastructure, particularly pipes that were laid 70-100 years ago. There is a need to not only push the current assets harder, but also to take a customer-value approach to asset replacement and maintenance. The focus is on delivering the required level of customer service at the lowest cost and at an appropriate risk for a given circumstance.

New technology (sensors, the internet of things) will change the way utilities interact with their customers, and enhance monitoring and operation of assets. How resilient can we become by making use of all the water that is available, and how can we manage associated water quality risks? How far can we extend asset life by better understanding our assets? Share-cars and 'Uber' created new, unprecedented, modes of transport—what could become the equivalent for the water industry?

##### Aspired outcomes:

Water utilities successfully harness new technology for delivering their services and to increase productivity. Networks are tightly monitored and increasingly remotely operated and maintained. A wide range of new technology and materials improve asset performance and operations; mining of a wide range of resources from sewage generates additional income to water businesses (recycled/ desalinated/ decentralised water, waste-to-energy). Water utilities tap into new pathways to connect with and understand their customers. Overall, customer value is improved.

**Highest research priority:** Identifying, enabling, and harnessing new materials and technology.

#### *Utility Agility*

##### Current situation and anticipated challenges:

Utilities need to be flexible to respond both to the multitude of changes discussed and those that we cannot yet foresee. Technology is one important key to this flexibility, but utilities need the skills to successfully

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<sup>5</sup> See also: *Doing the important, as well as the urgent: Reforming the urban water sector.* November 2015.  
<https://www.wsaa.asn.au/WSAAPublications/Documents/Report%20-%20Reforming%20the%20urban%20water%20sector%20WSAA%20IPA.PDF>

harness these benefits and deliver business and customer value. What business models are required to respond to remotely operated, decentralised systems? As utilities become increasingly customer-focused organisations, what are the non-technical skills that are required?

Aspired outcomes:

Water utilities skilfully apply new technology to provide value to their customers. Data is used for meaningful, empowering customer engagement, and for managing water cycle assets effectively and efficiently. Water utilities have the right business models to respond to external changes and continue to attract the right staff to deliver the highest customer value.

**Highest research priority:** What does the future water industry worker look like? What talent does the water industry need to attract and retain? How can we ensure that utilities are ready to employ their future staff?

## STRATEGY IMPLEMENTATION AND REVIEW

There are a number of avenues available for implementing this Strategy and addressing its research priorities, including engaging Australian and international research organisations and consultants. It is intended that the research priorities identified here are delivered in partnership with the urban water research sector, encompassing public, private and government organisations, and where beneficial also in collaboration with our international partners. Depending on the nature of the project, engaging consultants will be an additional pathway to addressing research needs. More details on the stakeholders and their role in the implementation of the Strategy are provided in Appendix 3.

Every two years WSAA and its stakeholders will review the relevance of this Strategy and update it if needed. A high-level framework for implementation pathways is presented in Figure 4.

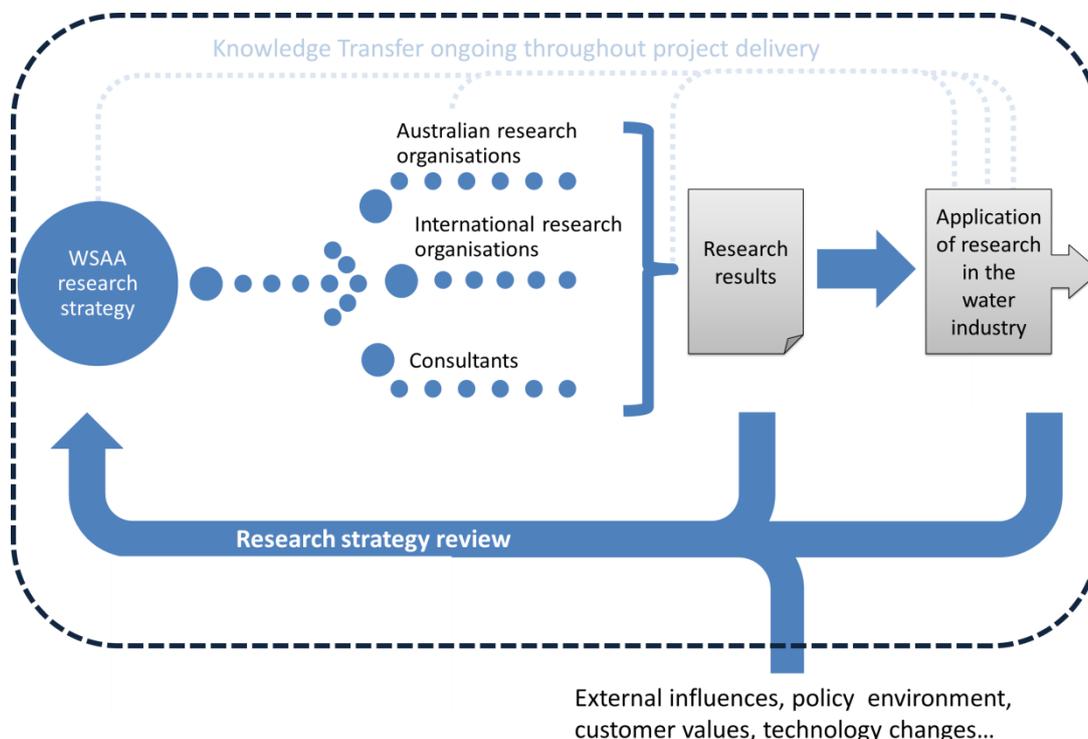


Figure 4: Implementation and review framework

## Appendix 1 – Consultation process

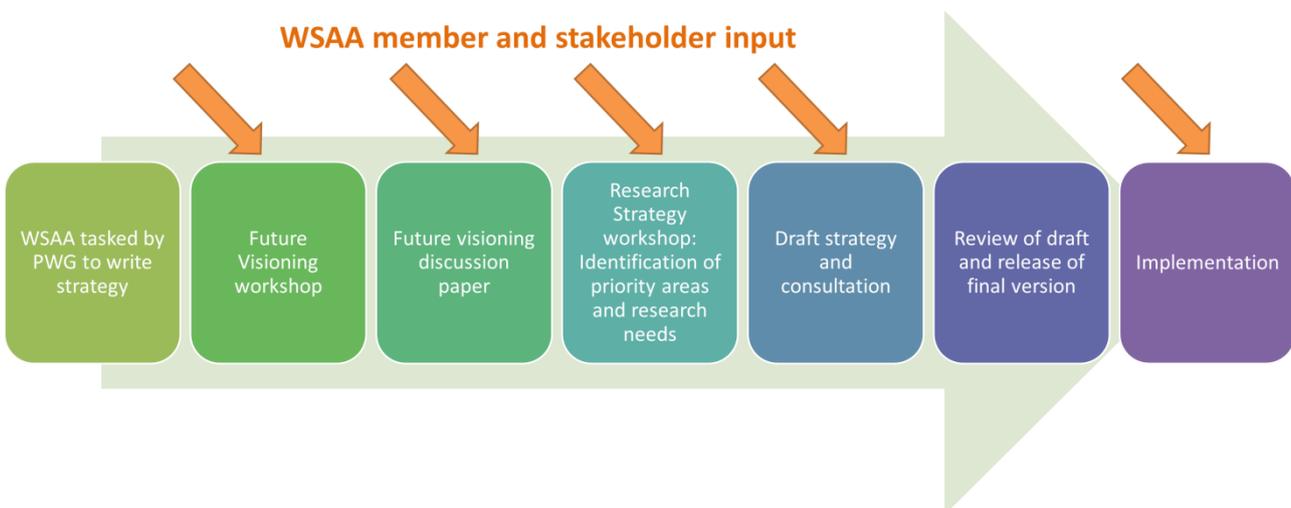
A graphical overview of the consultation process is given in the figure below.

WSAA held a Future Visioning Workshop in February 2015 in Perth. The one-day event was informed by a thorough review of visioning and future scanning work undertaken globally. The workshop was attended by representatives of each of the WSAA Board Committees, the WSAA Research Managers Network, Water Research Australia and CSIRO. Attendees were asked to brainstorm the broader strategic challenges and opportunities facing the Australian water utilities. The outcomes of the workshop were step-by-step pathways which map key research themes into the future, and the relationships between different research themes.

WSAA then published the Future Visioning Discussion Paper, which summarised the outcomes of the workshop, for review by the WSAA membership. Feedback on the Discussion Paper was received and a gap analysis performed on the research priorities. This feedback was incorporated into a second draft.

A second Research Strategy Workshop was held in July 2015 in Adelaide with the mostly the same participants as the first workshop. The participants were presented with the revised research priorities and asked to plot them on timelines and pick key research priorities for further scoping and prioritisation.

Additional workshops which were run as part of conferences on *Intelligent Water Networks* and *Water Reuse and Desalination*, provided further feedback and confirmed the identified priorities. All this work was then consolidated into the National Urban Water Research Strategy.



## Appendix 2 – Australian Government Research Priority areas

The Australian Government has identified nine strategic Science and Research Priorities in response to an international benchmarking study<sup>6</sup>. These priorities build on Australia's strengths in the global market and increase investment in topics of critical importance to Australia.

Figure 5 provides an overview of the Government's research priorities and the existing links to urban water. While urban water does not feature strongly in any priority, six priorities can be directly linked to urban

<sup>6</sup> Office of the Chief Scientist (2014), *Benchmarking Australian Science, Technology, Engineering and Mathematics*. Australian Government, Canberra.; <http://www.industry.gov.au/INDUSTRY/INDUSTRYINITIATIVES/Pages/Boosting-the-Commercial>Returns-from-Research.aspx>

water. A number of key priority areas to the urban water industry could be integrated into this framework, with examples detailed under the 'urban water lens' column. Further to this, a number of areas of key interest to the urban water industry were identified in this Research Strategy, including the valuation of non-monetary benefits, customer willingness to pay and the external business environment.

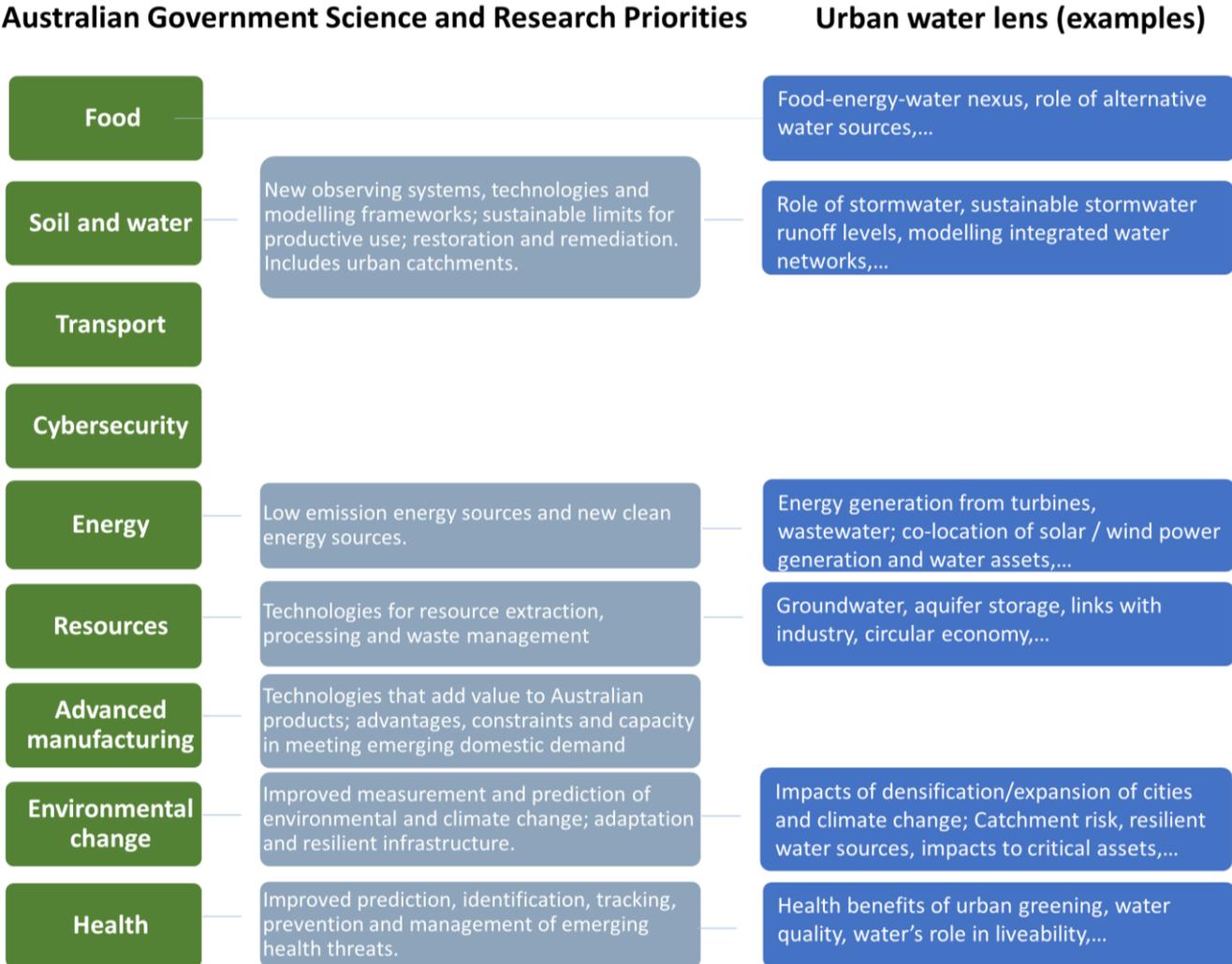


Figure 5: Australian Government Science and Research Priorities, and examples of what they could mean through the urban water lens

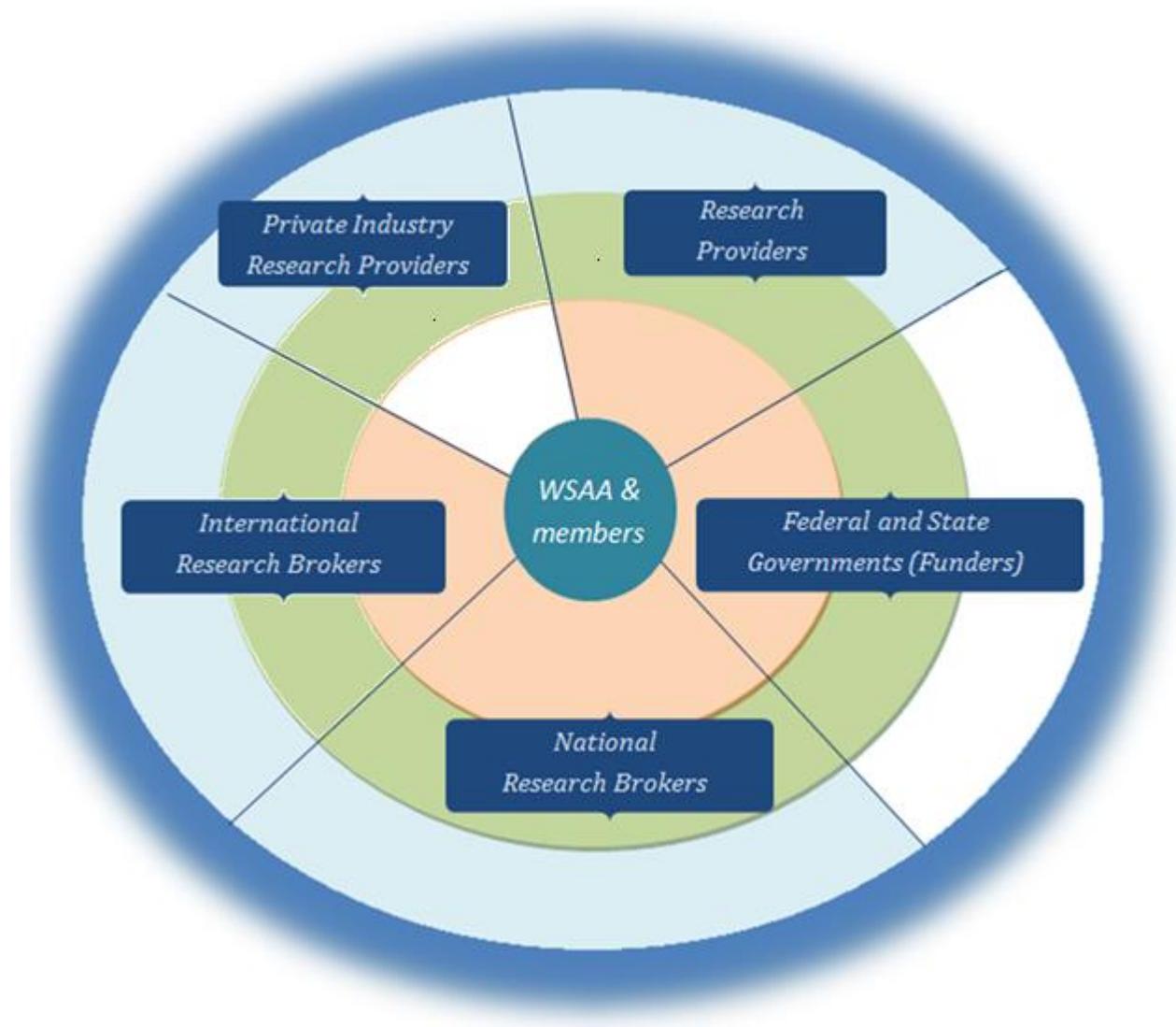
## Appendix 3 – Stakeholders in implementation

In the implementation of the Strategy, a range of stakeholders need to be considered who could get involved to various extents. A heatmap of these stakeholders and the relationship with WSAA is depicted in Figure 6 overleaf.

Table 1 provides an overview of how these stakeholders could get involved in the implementation of the Strategy.

**Table 1: Stakeholders relevant to the implementation of the Strategy, and their possible involvement.**

Stakeholder	Example organisations	Role in the implementation of the National Urban Water Research Strategy
WSAA members	Public and private utilities that are members of WSAA	Participation in projects: <ul style="list-style-type: none"> <li>- Financial contribution</li> <li>- In-kind contribution</li> <li>- Representation in project steering committees</li> </ul>
Australian research brokers	WaterRA, Goyder Institute	Co-develop proposals to deliver upcoming priority research projects
International research brokers	WERF, WRF, WaterReuse, GWRC	Co-funding of relevant projects, coordinated either by WSAA or other research brokers.  Avoiding duplication of efforts through consideration of the National Urban Water Research Strategy in development of their programs
Private Industry research collaborators	Consultants, private utilities, SMEs	Co-develop/ submit proposals to deliver upcoming priority research projects
Research collaborators	CSIRO, CRCWSC, universities, BoM	Co-develop/ submit proposals to deliver upcoming priority research projects
Federal Government	ARC, Department of Environment, Chief Scientist, Department for industry, innovation and science	Funding of research projects



**INNER Circle**

Funders: WSAA represented on advisory panels, influence over how funds are spent

Brokers: WSAA has a financial or in-kind investment, and/or is represented on the Board or advisory committee

Providers: WSAA represented on advisory panels to determine program direction

**MIDDLE Circle**

WSAA members drive the relationship and:

- Are members
- Contribute funds/in-kind
- Sit on Board or advisory

**OUTER Circle**

No formal relationship or investment, other than engagement in ad hoc projects, through WSAA or its members

**WATCHING BRIEF**

Non-water sectors to be scanned for ideas that can translate to water industry.

Figure 6: WSAA Research Strategy stakeholder heatmap: Stakeholders to be considered in the implementation of the Strategy and their relationship with WSAA.



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