CRC for
Water Sensitive Cities

Summary of Research Outputs

Tranche 1, 2012/13 – 2016/17

Australian Government
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Business Cooperative Research Centres Programme

Summary of Research Outputs (Tranche 1, 2012/13 – 2016/17)

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Introduction

Document purpose and audience

This document presents a summary of the research outputs delivered by the Cooperative Research Centre for Water Sensitive Cities (CRCWSC) during its first phase or tranche 1, from 2012/13 through to 2016/17.

This summary has been developed to provide CRCWSC participants and knowledge end users, including government, water utility and industry groups, with a quick guide to the key research outputs and how they relate to some of the key transition needs and issues facing practitioners in delivering water sensitive city outcomes.

The intent of this summary is to communicate the extent of research undertaken in tranche 1 and to inform future conversations regarding how we translate research outcomes into industry relevant tools and products.

How to use this document

Resources for each output in Part 1 can be found in Part 2. The flowchart outlines how to refer to each output resource:

1. Refer to the transition pathway page at the start of each output/ pathway category

2. Locate the Part 2 page numbers in the last paragraph

3. Refer to the page numbers to view output resources in Part 2 for a particular output in Part 1

Embracing the challenge

The CRCWSC was established to guide capital investments of more than AU$100 billion by the Australian water sector and more than AU$ billion of private sector investment in urban development over the next 15 years.

The CRCWSC, an Australian Government supported research centre, brings together interdisciplinary research expertise, subject matter experts and thought leaders to revolutionalise urban water management in Australia and overseas. Our vision is sustainable, resilient, productive and liveable water sensitive cities. To deliver this we by:

- developing knowledge across a broad range of relevant topics;
- synthesising the knowledge gained into powerful tools and communications that meet the needs of government, industry and the community; and
- influencing the key players who shape and manage our cities to adopt water sensitive solutions.

How this document is structured

All of the known completed and pending outputs associated with tranche 1 research projects are documented in **Part 1: Research outputs in relation to water sensitive city transition pathways**. Outputs are presented individually in summary tables and includes a short description of the output and the product type (e.g. factsheets, guidelines, frameworks, learning tools, models or databases etc.).

For ease of use, the 'Transition Pathways' framework has been used to group tranche 1 research outputs into key themes to assist document users locate research outputs which are relevant and of interest to different end user groups and contexts. The transition pathways framework identifies three key pathways along which change needs to be pursued if cities and regions desire to move towards more water sensitive systems and communities. These transition pathways are:

1. **Enabling structures** - the broader social, political and economic framework in which urban water management takes place;
2. **On-ground practices** - what gets done on the ground to deliver water sensitive city outcomes; and
3. **Socio-political capital** - support for pursuing the water sensitive city goals.

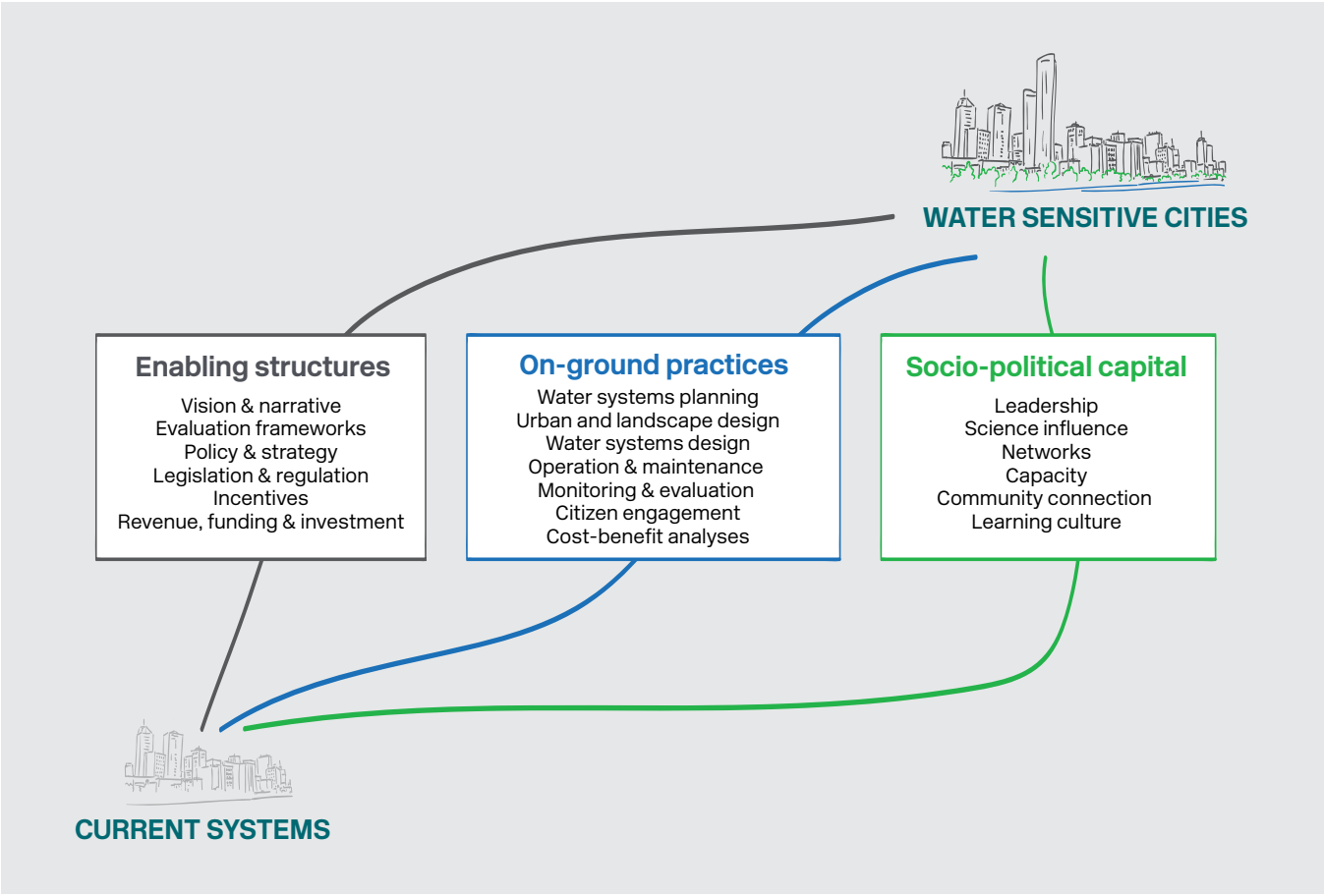

Figure 1 – Transition pathways

Not all elements identified in the transition pathways diagram have been explicitly addressed in Tranche 1 and therefore have no associated research outputs. These transition pathway elements are therefore not presented in this document. The following table shows the groupings of the research outputs summarised in this document.

There are also a number of Tranche 1 research outputs which can relate to more than one transition pathway element. In these cases, the research output is described under the most relevant transitions pathway element, and is also listed in italics under other categories.

1 Enabling structures	2 On-ground practices	3 Socio-political capital
a. Vision and narrative	a. Water systems planning	a. Science influence
b. Evaluation frameworks	b. Urban and landscape design	b. Capacity
c. Policy and strategy	c. Water systems design	c. Community connection
d. Legislation and regulation	d. Operation and maintenance	
	e. Citizen engagement	
	f. Cost benefit analyses	

Part 2: Resources relating to research outputs provides a comprehensive list of all available published resources that relate to each research output. These include the following types of resources:

- Publications (e.g. CRCWSC technical or milestone reports, peer reviewed academic journal articles, conference papers, book chapters etc.)
- Factsheets (e.g. Industry or Policy notes, Product features etc.)
- Guidelines or Frameworks
- Models or Databases
- Learning Tools (e.g. case studies, training resources, technologies, presentations, videos etc.)

Part 1

Research outputs in relation to water sensitive city transition pathways

1 Enabling Structures

a. Vision and narrative: Aspirations of a city, how to get there and why they are important

To enable the transition to water sensitive cities, the vision and narrative should feature a widely shared understanding of the role of water in a city which embraces all principles of water sensitivity in a locally contextualised way. The vision and narrative should also be embedded across sectors and linked to broader city aspirations.

Why this is important

Transformative change in the water sector towards water sensitive cities outcomes requires a clear vision supported by clear transitional strategies to guide this change. Without this vision and transition strategy, change will be difficult.

Tranche 1 research

Research focused on facilitating collaborative workshops to help stakeholders develop visions and supporting transition strategies for Australian cities.

Research activities summary

Overall, Tranche 1 research activities have:

- undertaken workshops and developed reports outlining long term future visions and supporting transition strategies for a number of Australian cities.

The following table provides a more detailed summary of the research activities, providing a list of relevant research outputs and the types of products produced. For additional resources related to each output described in this section, please see **Part 2 pp. 58-60**.

Research outputs	Description	Product type				
		Publications	Guidelines / Frameworks	Factsheets	Models / Databases	Learning Tools
Guidance manual for participatory processes (Mapping water sensitive city scenarios - Project A4.2)	• Guidelines for facilitating participatory processes with community and professional stakeholders to guide WSC transition planning, drawing on envisioning and backcasting techniques. This output is currently being developed in IRP1		x			
Report on Melbourne water sensitive city transition scenarios (Mapping water sensitive city scenarios - Project A4.2)	• Report documenting transition scenarios for Melbourne, integrating community, practitioner and science perspectives (focus on suburb scale i.e. Elwood)	x				x
Report on Perth water sensitive city transition scenarios (Mapping water sensitive city scenarios - Project A4.2)	• Report documenting transition scenarios for Perth, integrating different stakeholder perspectives	x				x
Report on Other cities water sensitive city transition scenarios (Mapping water sensitive city scenarios - Project A4.2)	• Report documenting transition scenarios for other Australian cities, integrating different stakeholder perspectives. This output is currently being developed in IRP1	x				x
Benchmarking Water Sensitive Cities (Society and Institutions - Project A4.1)	• Industry report providing guidance on benchmarking and building transition pathways	x				
A4.1 Project Synthesis Report (Society and Institutions - Project A4.1)	• This report brings together in one platform the many but inter-related outputs arising from the different sub-projects. It will provide insights from A4.1 on the uptake and mainstreaming of decentralised technologies from the perspective of governance, risk and risk perception • This output is currently being finalised	x				

1 Enabling Structures

b. Evaluation frameworks: Instruments to facilitate coordination towards desired outcomes

To enable the transition to water sensitive cities, evaluation frameworks should be used and correspond with water sensitive city goals. They should be shared by different sectors and levels of government to promote coordination, set priorities and clarify responsibilities.

Why this is important

Water system and urban planning and design is typically undertaken in silos, making integrated water solutions difficult.

Tranche 1 research

Research focused on developing tools for the industry to use to assist in water sensitive city collaborative planning and design processes.

Research activities summary

Overall, Tranche 1 research activities have:

- developed a range of models and frameworks to assist in the collaborative planning and design of water sensitive cities;
- demonstrated the use of these models through case study application; and
- developed capacity building training courses and guidelines to support the adoption of the models.

The following table provides a more detailed summary of the research activities, providing a list of relevant research outputs and the types of products produced. For additional resources related to each output described in this section, please see **Part 2 pp. 60-65**.

Research outputs	Description	Product type				
		Publications	Guidelines / Frameworks	Factsheets	Models / Databases	Learning Tools
Computational algorithms to model the integrated urban water system including socio-economic system, urban form and water infrastructure systems (Socio-technical modelling tools to examine urban water management scenarios - Project A4.3	• DAnCE4Water's algorithms provide detailed insight into the dynamic feedbacks between the socio-economic system, urban form and water infrastructure in response to water management strategies. • The model can be used from household – city scales				x	
Demonstration and application of DAnCE4Water in regional and community scale case studies (Socio-technical modelling tools to examine urban water management scenarios - Project A4.3)	• Application of DAnCE4Water to case studies (Elwood- local scale, and to South East Water – precinct scale)					x
Conceptual city-region scale urban metabolism evaluation framework (Catchment-scale landscape planning for water sensitive cities in an age of climate change -Project B1.2)	• A framework to evaluate the contributions of the various statutory and resource management plans and strategies of a city-region towards achieving the objectives of a water sensitive city		x			
UrbanBEATS conceptual representation of WSUD systems within a city-wide model (Sustainable technologies - Project C1.1)	• Allows for the setup of virtual case studies for assessment of performance of decentralised water infrastructure				x	
Integrated model components that can assess performance of WSUD systems for pollution, flooding and stormwater harvesting (Sustainable technologies - Project C1.1)	• Model components included in UrbanBEATS, WSC Toolkit (D1.1) and DAnCE4Water (A4.3)				x	
Water Sensitive Cities Index and indicator framework (Developing a water sensitive cities index - Project D6.2)	• Index and indicator framework to assess the water sensitivity of a place (metropolitan/sub-metropolitan scale)				x	
Case study applications of the Water Sensitive Cities Index and indicator framework (Developing a water sensitive cities index - Project D6.2)	• Documentation of application (testing and validation) of the Index to specific locations				x	

Research outputs	Description	Product type				
		Publications	Guidelines / Frameworks	Factsheets	Models / Databases	Learning Tools
Web-based platform to support WSC Index and provide secure access to online tools (Developing a water sensitive cities index - Project D6.2)	• Online tools on a website with secure login providing the means for self-assessment, visualisation, reporting templates etc.				x	
Water Sensitive Cities Modelling Toolkit (Version 2 beta) with supporting user guidance (Integration and demonstration through urban design - Project D1.1)(Water sensitive cities modelling toolkit - Project D1.5)	• A second beta version (for testing and validation) of the Water Sensitive Cites Modelling with supporting preliminary user guidance		x		x	
Seminars and training for the use of the Water Sensitive Cities Modelling Toolkit (Integration and demonstration through urban design - Project D1.1) (Water sensitive cities modelling toolkit - Project D1.5)	• Engagement with practitioners interested / involved in development and testing of the Toolkit, including the dissemination and discussion of research knowledge from research projects represented in the WSC Toolkit			x		
Industry short-courses to facilitate widespread industry uptake of the DAnCE4Water tool (Socio-technical modelling tools to examine urban water management scenarios - Project A4.3)	• Software manual and short courses to support the DAnCE4Water platform - an open source product that incorporates interfaces with commonly used water industry models (e.g. MUSIC, SWMM) to complement and add value to the existing set of tools available to support decision-making in the Australian water industry		x	x		
Impact Pathway Statements (Development of an evaluation and learning framework to inform CRCWSC impact assessment - Project D6.1)	• Map of adoption and impact pathways that will identify the intended audiences of CRCWSC research, explain how end users will utilise research outputs and describe the impacts that are expected to arise from the utilisation of these outputs				x	
Evaluation and learning framework (Development of an evaluation and learning framework to inform CRCWSC impact assessment -Project D6.1):	• An evaluation and learning framework that will critically inform key CRCWSC processes, protocols and pathways for adopting WSC concepts, tools and practices within national and international urban water contexts				x	
Web-based modelling platform to facilitate collaborative planning and decision-making processes	*For details refer to: 2a Water systems planning: Planning of urban water infrastructure*					
Spatially interlinked database to describe a virtual urban environment	*For details refer to: 2a Water systems planning: Planning of urban water infrastructure*					
Management guidelines for the repair of urban freshwaters	*For details refer to: 2b Urban and landscape design: Designing urban environments for water service delivery*					
Framework for the implementation of WSUD and urban greening for improved urban climate	*For details refer to: 2b Urban and landscape design: Designing urban environments for water service delivery*					

1 Enabling Structures

c. Policy and strategy: Policies and strategies that facilitate the delivery of desired outcomes

To enable the transition to water sensitive cities, policies and strategies should be coherently aligned to the water sensitive vision. They should coordinate effectively between sectors and levels of government and define how water sensitive goals should be achieved.

Why this is important

Policies which reinforce conventional water practices make it difficult to transition to new water sensitive systems.

Tranche 1 research

Research projects investigated different policies, strategies and governance structures to: (a) understand how these can hinder or support water sensitive city outcomes; and (b) develop recommendations and tools to guide future water sensitive city policy development and adaptation.

Research activities summary

Overall, Tranche 1 research activities have:

- built an understanding of the current policies, strategies and governance structures guiding water and environmental decisions; and
- developed recommendations and tools to guide water sensitive city policy development.

The following table provides a more detailed summary of the research activities, providing a list of relevant research outputs and the types of products produced. For additional resources related to each output described in this section, please see **Part 2 pp. 65-72**.

Research outputs	Description	Product type				
		Publications	Guidelines / Frameworks	Factsheets	Models / Databases	Learning Tools
Comparison of formal vs. informal policy mechanisms for monitoring pollution and improving environmental outcomes (Economic incentives and instruments - Project A1.3)	• Study on policy mechanisms comparing a formal regulatory mechanism with informal peer monitoring and social sanctions and examining its effectiveness in reducing pollution in waterways as compared to formal regulatory approaches	x				
Case study reports of urban water policy development in Victoria, Queensland and Western Australia in relation to political dynamics and policy influence	• Reports of case study research based on interviews with advisors and decision makers. This output is currently being finalised	x				x
New knowledge of urban water governance systems (both in Australia and beyond) (Better governance for complex decision making -Project A3.1)	• Published review of recent governance approaches and how they deal with complexity based on literature and interviews	x				
Policy framework inputs for stormwater management in areas with shallow water tables (Hydrology and nutrient transport processes in groundwater/surface water systems - Project B2.4)	• Input to policy frameworks for management of stormwater in urban areas with a shallow water table (2 – 4 m below ground)	x	x			
Preliminary report on the experience of key decision makers and stakeholders in the application of Water Sensitive Urban Design in the planning system (Statutory planning for WSUD - Project B5.1)	• Short written report on experiences with WSUD in the planning system based on interviews and surveys with stakeholders. This output is currently being finalised	x				
Comparative review and survey of statutory planning legislation, regulation and processes relevant to WSUD across five cities (Brisbane, Sydney, Melbourne, Adelaide and Perth) (Statutory planning for WSUD - Project B5.1)	• Surveys used to scope purposes of literature review of planning policy and legislation relevant to WSUD	x				
Recommendations on structuring climate adaptation responses in an urban flooding context (Building socio-technical flood resilience: adaptation across spatial and temporal scales – Project B4.2)	• This report presents and demonstrates a framework for structuring local adaptation responses using the inputs from multiple perspectives. • The adaptation response framing has been done by: (i) contextualizing climate change adaptation needs; (ii) analysing drivers of change; (iii) characterizing measures of adaptation; and (iv) establishing links between the measures with a particular emphasis on taking account of multiple perspectives. • This framework was demonstrated with reference to the management of flood risks in a case study Can Tho, Vietnam.	x				

Research outputs	Description	Product type				
		Publications	Guidelines / Frameworks	Factsheets	Models / Databases	Learning Tools
Issues paper on the current application of WSUD and options for reform and draft recommended model of planning regulation for WSUD (Statutory planning for WSUD - Project B5.1)	• Identification and assessment of key opportunities and constraints in planning systems relevant to the implementation of WSUD and integrated water management	x				
Final report on the current application of WSUD and options for reform and recommended model of planning regulation and policy benchmarks for WSUD (Statutory planning for WSUD - Project B5.1)	• The Final Report will identify best practice planning policies and standards for applying WSUD to developments of different planning scales. This output is currently being developed	x				
Literature reviews and industry notes on political dynamics, policy frameworks, tactics and strategies for researchers to influence policy (Strategies for influencing the political dynamics of decision making - Project A3.3	• A two-part published literature review, focusing on: (1) policy frameworks and theoretical aspects of political dynamics; and (2) tactics and strategies for influencing policy. Industry notes will summarise key aspects for simpler communication.	x				
Growth scenarios report detailing methods for incorporating ecological and water science into statutory planning (Catchment-scale landscape planning for water sensitive cities in an age of climate change - Project B1.2)	• Identification of possible reform to existing planning framework to underpin robustness in a water sensitive planning process • Based on tests of the robustness of current planning framework under a series of growth scenarios. This output is currently being developed	x				
Assessment of planning policies under various growth scenarios for three case study city-regions (Catchment-scale landscape planning for water sensitive cities in an age of climate change - Project B1.2)	• Documentation of initial policy 'test bed' model, which allows planners/policy makers to test policy impacts under multiple plausible growth scenarios, has been provided to end users from city regions • This output is currently being developed	x				
Recommendations of governance structures and strategies to support innovation and adaptability (Better governance for complex decision making - Project A3.1)	• Recommendations to embed capacity for innovation and flexibility into urban water governance from review of international best practice and public sector literature, and case studies	x				

Research outputs	Description	Product type				
		Publications	Guidelines / Frameworks	Factsheets	Models / Databases	Learning Tools
Policy recommendations regarding attribute ranking of stormwater benefits (Economic valuation - Project A1.1)	• Policy recommendations (through industry notes, the blueprint, and our publications) about how we can rank the various attributes provided by stormwater that have a value and there is a willingness to pay by the community	x				
Policy recommendations about the use of incentives for demand management (Economic incentives and instruments - Project A1.3)	• Policy recommendations about the use of incentives for demand management	x	x			
Guidance for enhancing flood resilience (Building socio-technical flood resilience: adaptation across spatial and temporal scales - Project B4.2)	• Guidelines for enhancing social and technical flood resilience in Australian urban systems	x	x		x	
Guidelines to support governance reform through policy change (Better governance for complex decision making -Project A3.1)	• Guidelines that help industry analyse governance structures to identify barriers and opportunities for change within their context, and design collaborative strategies to pursue change agendas		x			
Scenarios of plausible futures for rapidly growing metropolitan/city-regions (i.e. three case study regions) (Catchment-scale landscape planning for water sensitive cities in an age of climate change - Project B1.2)	• Scenarios available from which to test the robustness of water sensitive policies at the city and regional scale				x	
Co-governance case study (Society and Institutions - Project A4.1)	• Report examining Marrickville Council's experience with co-governance in the delivery of 3 sustainable urban water management projects					x

1 Enabling Structures

d. Legislation and regulation: Legislative and regulative instruments that ensure and enable water sensitive practices

To enable the transition to water sensitive cities, legislation and regulation should promote water sensitive practices and be outcome oriented, flexible, and coordinated between sectors.

Why this is important

Legislation and regulation that is highly prescriptive and reinforces traditional water systems can hinder the adoption of new technologies and therefore constrain, rather than incentivise, the use of water sensitive solutions.

Tranche 1 research

The research focused on understanding current legislative and regulatory frameworks, and how these help or hinder water sensitive city outcomes, to enable the development of tools and guidance to inform future reform which factors in risk management.

Research activities summary

Overall, Tranche 1 research activities have:

- built an understanding of the existing legislation and regulations guiding urban water and environmental decisions; and
- developed models and frameworks for urban water reform and risk allocation with supporting guidelines for planners in the land use, environmental, landscape and natural resource management fields.

The following table provides a more detailed summary of the research activities, providing a list of relevant research outputs and the types of products produced. For additional resources related to each output described in this section, please see **Part 2 pp. 72-74**.

Research outputs	Description	Product type				
		Publications	Guidelines / Frameworks	Factsheets	Models / Databases	Learning Tools
Legislative stocktake reports for Victoria, Western Australia and Queensland (Better regulatory frameworks for water sensitive cities - Project A3.2)	• A documented review of the existing legislation-based regulatory frameworks across three Australian jurisdictions and an assessment of the capacity of such frameworks to help or hinder water sensitive cities	x				
Assessment comparing statutory & non-statutory planning systems (Catchment-scale landscape planning for water sensitive cities in an age of climate change - Project B1.2)	• Comparative assessment of the statutory and non-statutory planning systems for the case study regions (i.e. SEQ, Greater Melbourne and Greater Perth) • Provides the background planning frameworks, as presently applied, to assist development of planning reform agenda	x				
Comparative analysis of Australian regulatory frameworks (Better regulatory frameworks for water sensitive cities - Project A3.2)	• Comparative analysis of current regulatory frameworks for urban water regulation with recommendations for reconfiguring for water sensitive service delivery • Based on review of Australian urban water regulation with appendices that include analyses for Brisbane, Melbourne and Perth • Examined water resources, service delivery and price regulation, built environment regulation, environmental regulation, and public health regulation	x				
Case study reports on regulation and risk management (Better regulatory frameworks for water sensitive cities - Project A3.2)	• Case studies into how current regulatory and risk allocation frameworks impact the delivery of innovative water sensitive projects	x			x	x
Risk allocation model (Better regulatory frameworks for water sensitive cities - Project A3.2)	• Review of current approaches to legal risk allocation • Preliminary model developed for the legal allocation of the risk of harms from water sensitive practices				x	

Research outputs	Description	Product type				
		Publications	Guidelines / Frameworks	Factsheets	Models / Databases	Learning Tools
Conceptual model of Australian urban water regulation (Better regulatory frameworks for water sensitive cities - Project A3.2)	• A conceptual model of urban water regulation in Australian cities and a detailed mapping of the systems for such regulation in Melbourne				x	
Guidelines for statutory and non-statutory planners (Catchment-scale landscape planning for water sensitive cities in an age of climate change - Project B1.2)	• Guidelines (and training) produced for statutory and non-statutory planners in the land use, environmental, landscape and natural resource management fields • This output is currently being developed		x	x		
Issues paper on the current application of WSUD and options for reform and draft recommended model of planning regulation for WSUD	*For details refer to: 1c Policy and strategy: Policies and strategies that facilitate the delivery of desired outcomes*					
Final report on the current application of WSUD and options for reform and recommended model of planning regulation and policy benchmarks for WSUD	*For details refer to: 1c Policy and strategy: Policies and strategies that facilitate the delivery of desired outcomes*					

2 On-ground practices

a. Water systems planning: Planning of urban water infrastructure

To enable the transition to water sensitive cities, water systems planning should be cross sectoral and highly integrated with urban and land use planning. Uncertainty should be addressed through flexibility and contingency planning that incorporates many future scenarios.

Why this is important

Planning of our water infrastructure to date is often done in isolation of the broader planning of our urban environments and other social and built infrastructure.

Tranche 1 research

Projects were aimed at creating whole-of-landscape planning frameworks for water infrastructure which engage with urban planning and consider all options to identify resilient and diverse strategies that account for future uncertainties.

Research activities summary

Overall, Tranche 1 research activities have:

- assessed tools and frameworks used to inform water infrastructure planning; and
- created guidance material and frameworks / models to inform collaborative planning processes.

The following table provides a more detailed summary of the research activities, providing a list of relevant research outputs and the types of products produced. For additional resources related to each output described in this section, please see **Part 2 pp. 75-76**.

Research outputs	Description	Product type				
		Publications	Guidelines / Frameworks	Factsheets	Models / Databases	Learning Tools
Growth scenarios report detailing methods for incorporating ecological and water science into statutory planning (Catchment-scale landscape planning for water sensitive cities in an age of climate change - Project B1.2)	• Identification of possible reform to existing planning framework to underpin robustness in a water sensitive planning process; Based on tests of the robustness of current planning framework under a series of growth scenarios. This output is currently being developed	x			x	
Urban water portfolio modelling for hedging supply risks (Valuation of economic, social and ecological costs and benefits - Project A1.2)	• An optimal urban water portfolio model that hedges against supply risks from all potential water assets, by taking into account uncertainties of water flows as well as differences in supply costs • Economic algorithm to determine the optimal balance of three sources of water – desalination, reservoirs and stormwater harvesting • Evidence of the economic value of stormwater harvesting as part of a portfolio of sources	x			x	x
Web-based modelling platform to facilitate collaborative planning and decision-making processes (Social-technical modelling tools to examine urban water management scenarios - Project A4.3)	• Provides interfaces with existing software tools, accesses cloud-computing capacity and allows multiple organisations to access common datasets, models and scenarios to facilitate collaboration				x	
Spatially interlinked database to describe a virtual urban environment (Social-technical modelling tools to examine urban water management scenarios - Project A4.3)	• Database of spatially interlinked biophysical, infrastructural and socio-demographic data, including publicly available data (e.g. land use, BOM)					
Guidance and recommendations on the development of effective and robust water management strategies (Social-technical modelling tools to examine urban water management scenarios - Project A4.3)	• Advice on development and implementation of adaptation strategies based on review of case studies • Key opportunities to link this with wastewater treatment models and receiving water modelling	x				
Guidance manual for participatory planning processes	*For details refer to 1a: Vision and narrative: Aspirations of a city, how to get there and why they are important"*					

2 On-ground practices

b. Urban and landscape design: Designing urban environments for integrated and multi-functional water service delivery

To enable the transition to water sensitive cities, urban and landscape design should enable water service delivery to be an integral part of the built environment. Well connected green spaces and public areas should be fundamental in fulfilling multiple functions with amenity and functional benefits, and local aspirations should directly inform the design process.

Why this is important

Design of our water infrastructure to date has been generally disconnected from the community's expectations that infrastructure should be aesthetically pleasing and provide enhanced ecological functioning. Concealing and separating water infrastructure from our built environments and landscapes disengages the community from these essential services and results in a loss of ecosystem services in our urban landscapes.

Tranche 1 research

Projects were aimed at building knowledge of how our urban water and built environments can be designed to be resilient to change, provide amenity, recreational and biodiversity values as well as treat urban water and optimise multiple sources of water.

Research activities summary

Overall, Tranche 1 research activities have:

- established evidence on how important water and green landscapes are in our urban environments; and
- created guidance material and frameworks / models to inform the design of our urban areas to protect waterway and groundwater health, and provide microclimate and amenity benefits.

The following table provides a more detailed summary of the research activities, providing a list of relevant research outputs and the types of products produced. For additional resources related to each output described in this section, please see **Part 2 pp. 76-90**.

Research outputs	Description	Product type				
		Publications	Guidelines / Frameworks	Factsheets	Models / Databases	Learning Tools
WATERWAY HEALTH						
Management guidelines for the repair of urban freshwaters (Planning, design and management to protect and restore receiving environments - Project B2.23)	• Technical manuals and fact sheets to guide the best practice repair of urban freshwaters		x	x	x	
Conceptual models describing the key stressors to urban waterways (typologies) (Planning, design and management to protect and restore receiving environments - Project B2.23)	• A framework to assist managers to determine the key drivers of ecosystem health and function differences among physiographic regions and with characteristics of urban development and infrastructure				x	
Set of indicators for assessing the ecological health of urban waterways (Planning, design and management to protect and restore receiving environments - Project B2.23)	• A set of parameters that can be readily measured in urban freshwaters and can provide a rapid assessment of ecosystem health	x			x	
SHALLOW GROUNDWATER ENVIRONMENTS (2-4m)						
Understanding of the groundwater/ surface water interactions in the Perth Coastal environment based on data assessment (Hydrology and nutrient transport processes - Project B2.4)	• Background information to assist understanding of groundwater/surface water interactions in the Perth Coastal environment based on meta-analysis of urban water monitoring datasets	x				
Data and knowledge gaps report for urban systems impacted by groundwater (Hydrology and nutrient transport processes - Project B2.4)	• Identification of urban water data and knowledge gaps for urban systems impacted by groundwater to help define research activities to further develop and validate conceptual model of groundwater/ surface water interactions	x				

Research outputs	Description	Product type				
		Publications	Guidelines / Frameworks	Factsheets	Models / Databases	Learning Tools
SHALLOW GROUNDWATER ENVIRONMENTS (2-4m)						
Mass balances for WSUD elements impacted by shallow water tables (Hydrology and nutrient transport processes Project B2.4)	• Empirical evidence to support the development of a conceptual model of surface water/groundwater interactions based on mass balances for WSUD elements impacted by shallow water tables	x				
Groundwater-borne nutrient load quantification for use in development of nutrient flows through water body systems (Hydrology and nutrient transport processes - Project B2.4)	• Empirical evidence to support the development of a nutrient flow through a water body system influenced by significant surface water/groundwater interactions, based on quantification of groundwater-borne nutrient load				x	x
Policy framework inputs for stormwater management in areas with shallow water tables	*For details refer to: 1c Policies and strategies that facilitate the delivery of desired outcomes*					

Research outputs	Description	Product type				
		Publications	Guidelines / Frameworks	Factsheets	Models / Databases	Learning Tools
GREEN SPACES AND GREEN INFRASTRUCTURE						
Integrated greenspace framework (Catchment-scale landscape planning for water sensitive cities in an age of climate change - Project B1.2)	• Determination if current plans in the case study regions incorporate a formal greenspace framework that implicitly links the urban areas hydrologically and ecologically within their region • For regions that do not have a formal greenspace framework, identification if there are elements within the existing plans that could be readily adapted into a greenspace framework	x				
Advice on the aesthetic design for raingardens based on landscape perceptions (Society and institutions - Project A4.1)	• Report on landscape perceptions and input into the adoption guidelines for biofilters	x				
New green technologies performance (Integrated multi-functional urban water systems - Project C4.1)	• Results from monitoring new technologies including living walls and green walls for greywater treatment and stormwater treatment	x				
Advice on integrating WSUD in existing and new urban areas (Urban intensification and green infrastructure - Project D5.1)	• Advice on integrating WSUD in urban areas based on a review of leading national and international best practice case studies • Selected case studies will inform and be part of the design guide	x				x
Adoption guidelines for the design, maintenance and operation of new green technologies (Integrated multi-functional urban water systems - Project C4.1)	• Design, maintenance and operational guidelines for green and living walls technologies. This output is currently being developed		x			

Research outputs	Description	Product type				
		Publications	Guidelines / Frameworks	Factsheets	Models / Databases	Learning Tools
GREEN SPACES AND GREEN INFRASTRUCTURE						
Design guide for the integration of WSUD in precincts (Urban intensification and green infrastructure - Project D5.1)	• Design guide for the integration of WSUD in precincts • Design guide for WSUD precincts with a focus on the integration of social, spatial and environmental aspects of urban precincts • This output is currently being developed		x			
Engagement models for industry and stakeholders regarding design of WSUD (Urban intensification and green infrastructure - Project D5.1)	• Development of models for engagement with industry and stakeholders specific to urban design issues related to WSUD (such as design workshops, charrettes, etc.)				x	
New hybrid biofiltration technologies (green and living walls) for greywater and/or stormwater treatment	*For details refer to: 2c Water systems design: Designing and implementing water service infrastructure*					

Research outputs	Description	Product type				
		Publications	Guidelines / Frameworks	Factsheets	Models / Databases	Learning Tools
MICROCLIMATE						
Quantified benefits of water sensitive urban design and urban greening on the urban climate and urban heat mitigation at a range of scales (Green cities and microclimate - Project B3.1)	• Empirical evidence of observational (including remote sensing) and climate modelling approaches to quantify the potential air temperature reductions and changes to human thermal comfort from the implementation of WSUD and urban greening	x			x	
Evaluation of the benefits of improved urban climates on heat-health outcomes (Green cities and microclimate - Project B3.1)	• Documentation of the heat-health thresholds for Australian capital cities and the spatial variability in heat vulnerability throughout cities • Determination of the effect on heat-health outcomes of urban heat mitigation (air temperature reductions) from WSUD and urban greening	x				
Evaluation of the benefits of improved urban climates on Human Thermal Comfort (Green cities and microclimate - Project B3.1)	• Documentation of the levels of Human Thermal Comfort in Australian Cities • Determination of the effect of WSUD and urban greening on human thermal comfort (including air temperature, humidity, wind speed and mean radiant temperature)	x				
Heat thresholds for Australian capital cities (Green cities and microclimate - Project B3.1)	• Determination of climatic-based thresholds (e.g. air temperature, apparent temperature) for Australian capital cities at which impacts on human health increase. These thresholds can act as a target for urban heat mitigation through WSUD and urban greening	x				
Guidelines for the design of WSUD and urban greening for improved urban climate (Green cities and microclimate - Project B3.1) (Design of public realm to enhance urban microclimates - Project B3.2)	• Practical guidance on the design and placement of WSUD and urban greening interventions to maximise their effectiveness in improving urban climates, based on observational research and the climate modelling research		x			

Research outputs	Description	Product type				
		Publications	Guidelines / Frameworks	Factsheets	Models / Databases	Learning Tools
MICROCLIMATE						
Online mapping tool of heat vulnerability (Green cities and microclimate - Project B3.1)	• Online tool that maps heat vulnerability of the population for Australian capital cities • This tool can be used to inform heat mitigation approaches.				x	
Urban heat component of the Water Sensitive Cities Toolkit (Design of public realm to enhance urban microclimates - Project B3.2)	• Simple approach for assessing the benefit of WSUD and urban greening into the Water Sensitive Cities Toolkit				x	
Framework for the implementation of WSUD and urban greening for improved urban climate (Green cities and microclimate - Project B3.1) (Design of public realm to enhance urban microclimates - Project B3.2)	• Framework for the strategic implementation of WSUD and urban greening based on research to maximise the cost-effectiveness of interventions and minimise the negative impacts of urban climates		x		x	
Urban climate modelling tools (Design of public realm to enhance urban microclimates - Project B3.2)	• Review, select, validate and apply urban climate models that are appropriate to scale (micro-, local- and meso-scale) to identify which models need to be developed or improved where necessary (for researchers/expert modellers only)				x	

2 On-ground practices

c. Water systems design: Designing and implementing water service infrastructure

To enable the transition to water sensitive cities, water systems design should focus on designing at multiple scales to achieve multiple objectives and to deliver a range of benefits. This requires the wider use of fit-for-purpose solutions, and the creation and utilisation of synergies between different areas of the water cycle.

Why this is important

Australian towns and cities often attempt to address 21st century issues with 19th century technologies, which are typically large scale and designed to deliver single objective solutions.

Tranche 1 research

Projects focused on the development of innovative urban water infrastructure that integrates the management of urban water systems, allows fit-for-purpose use of water and recovers resources embedded in urban water with the aim of maximising the multiple beneficial values of urban water.

Research activities summary

Overall, Tranche 1 research activities have:

- established evidence of the benefits and risks associated with new technologies (or green infrastructure); and
- developed new water technologies and datasets with accompanying guidance material to support adoption.

The following table provides a more detailed summary of the research activities, providing a list of relevant research outputs and the types of products produced. For additional resources related to each output described in this section, please see **Part 2 pp. 90-113**.

Research outputs	Description	Product type				
		Publications	Guidelines / Frameworks	Factsheets	Models / Databases	Learning Tools
RAINFALL DATA						
Stochastic rainfall simulation of the current climate (Urban rainfall in a changing climate - Project B1.1)	• Simulation of statistical properties of the current rainfall in Adelaide, Brisbane, Melbourne and Sydney				x	
Stochastic rainfall simulation of future climates (Urban rainfall in a changing climate - Project B1.1)	• High-resolution projections of the future rainfall for Adelaide, Brisbane, Melbourne and Sydney; along with reliable estimates of the uncertainty in these projections				x	
Stochastic rainfall simulation of future climates in Singapore (Impact of climate change on extreme rainfall and drainage design – Project B1.3)	• High-resolution projections of the future rainfall for Singapore, along with reliable estimates of the uncertainty in these projections. This output is currently being developed				x	
Stochastic model appropriate for downscaling rainfall to scales relevant for the design of water harvesting technologies (Urban rainfall in a changing climate - Project B1.1)	• Model based on multi-fractal cascades, suitable for high-resolution simulation, along with a reliable estimate of the uncertainty				x	
HARVESTING WATER						
Case studies of restoring hydrology using stormwater harvesting and retention (Stream ecology - Project B2.1)	• Case studies (e.g. Stringybark Creek) of hydrologic restoration using stormwater harvesting and other stormwater retention strategies					x
Stormwater harvesting and technologies model (Building socio-technical flood resilience – spatio-temporal flood risk modelling - Project B4.1)	• A dynamic model for stormwater harvesting and treatment technologies with a focus on describing how the technologies could be modelled as part of flood risk assessments				x	
Conceptual models and indicators to assess impact of stormwater harvesting on stream hydrology and water quality (Stream ecology - Project B2.1)	• Development and application of indicators, such as runoff frequency and rainfall retention capacity, to assess the impact of stormwater harvesting on the hydrology and water quality of streams • Development of predictive models of likely ecological responses				x	

Research outputs	Description	Product type				
		Publications	Guidelines / Frameworks	Factsheets	Models / Databases	Learning Tools
POLLUTANTS						
Chemical and microbial characteristics of stormwater (Risk and health: understanding stormwater quality hazards - Project C1.2)	• Characterisation of the chemical and microbial qualities of untreated stormwater	x				
Prioritisation of human health risks associated with untreated stormwater (Risk and health: understanding stormwater quality hazards - Project C1.2)	• Prioritisation of human health risks associated with chemical and microbial hazards in untreated stormwater	x				
Description of the influence of catchment characteristics on untreated stormwater quality (Risk and health: understanding stormwater quality hazards - Project C1.2)	• Advice on the influence of catchment characteristics on the chemical and microbial qualities of untreated stormwater	x				
Recommendations for undertaking risk assessment of untreated stormwater (Risk and health: understanding stormwater quality hazards – Project C1.2)	• Recommendations for assessing risks associated with untreated stormwater including the role of chemical surrogates	x				
Model to simulate micropollutant behaviour in WSUD systems (Sustainable technologies - Project C1.1)	• Model to simulate the key treatment processes within stormwater biofilters/ wetlands and bio-chemical degradation • Coupled with MUSIC hydraulic model (insitu tested)				x	
Development of a new method to identify which microbial pollutants are present and viable in stormwater before and after treatment (Fit-for-purpose water production - Project C1.3)	• Development and validation of a molecular-based method that combines next generation sequencing techniques with the chemical propodium monoazide (PMA) to determine the viability and risks of microbial pollutants to public health. This output is currently being developed				x	x
Understanding concurrent risks from several hazards (Building sociotechnical flood resilience – spatiotemporal flood risk modelling – Project B4.1)	• Identification of joint probabilities of sea surges and extreme rainfall and exploring reasons for concurrency				x	

Research outputs	Description	Product type				
		Publications	Guidelines / Frameworks	Factsheets	Models / Databases	Learning Tools
WETLAND AND BIOFITER DESIGNS						
Recommendations on the importance of vegetation for nitrogen processing in urban wetlands (Protection and restoration of urban freshwater ecosystems - Project B2.23) (Hydrology and nutrient transport processes - Project B2.4)	• A report that outlines how vegetation can alter the rates of nitrogen transformations, including denitrification, in urban wetlands				x	
Guidelines for the adoption (design, maintenance and operation) of biofiltration systems for stormwater treatment and harvesting (Sustainable technologies - Project C1.1) (Hydrology and nutrient transport processes - Project B2.4)	• Revised version of the FAWB guidelines focused on design for harvesting, plant selection and maintenance • Guidelines for WSUD design in urban areas with shallow water tables		x			
New designs for passive filters and biofilters to remove pathogens from urban stormwater (Sustainable technologies - Project C1.1)	• New generation biofilters to remove more pathogens					x
New hybrid biofiltration technologies (green and living walls) for greywater and/or stormwater treatment (Integrated multi-functional urban water systems -Project C4.1)	• T1 - Living walls for greywater treatment: Prototype of green technology that treats greywater, improves micro-climate and provides amenity to public space • T2 - Green walls for greywater treatment: Prototype of green technology that treats greywater, improves micro-climate and provides amenity to public space • T3 - Living walls for stormwater and greywater treatment: Prototype of green technology that treats greywater and stormwater (two different sources of water), improves micro-climate, and provides amenity to public space.					x
Model to predict faecal microorganism removal in existing stormwater biofilters (Sustainable technologies - Project C1.1)	• A very simple algorithm that can predict removal of most widely used pathogen indicator E.coli				x	
Model to simulate vegetation responses and quantify wetland ecosystem function (Integrated multi-functional urban water systems -Project C4.1) (Hydrology and nutrient transport processes - Project B2.4)	• A wetland eco-hydrological model to simulate vegetation responses to water balance variability and associated changes in biogeochemical cycles, and validated against above data. This will lead to better understanding and modelling of the operation of urban wetlands influenced by shallow groundwater systems				x	
Gap assessment of design tools for constructed wetlands (Integrated multi-functional urban water systems - Project C4.1):	• Currently no tools for environmental engineers to assess or design constructed wetlands exist. This output reviews the missing features of current models and reasons why new model developments are needed					

Research outputs	Description	Product type				
		Publications	Guidelines / Frameworks	Factsheets	Models / Databases	Learning Tools
SMART INFRASTRUCTURE						
Model to allow rapid analysis from smart meter datasets (Intelligent urban water systems - Project C5.1)	• A suite of novel algorithms that enable rapid analysis of "big data" on water usage derived from smart meters – significant demand management tool • Industry guidelines for applying the smart metering algorithms with examples from two case study populations in Karratha and Kalgoorlie • Web-based software application for visualising the results of the smart metering algorithms		x		x	x
Decision support tools for pumping optimisation with multiple water sources (Intelligent urban water systems - Project C5.1)	• Development of generalised decision support tools for multi-objective optimisation of pumping with multiple water sources (including a user friendly Excel Use Interface for industry end users) • Development of case study simulation and optimisation software tool (based on the NSGA-II multi-objective optimiser) for Orange Council, NSW. This tool accounts for alternative sources of water – natural catchment, stormwater, groundwater and imported water from an adjacent catchment - and was optimised for the multi-objectives of pumping cost, environmental flows and minimising reservoir spills • Development of an extended toolbox for EPANET (a water distribution system and pumping simulation tool) that allows complex rule-based decisions to be optimised to enable extensive exploration of optimisation of pumping, especially in multiple tank and multiple pump station systems	x			x	x

Research outputs	Description	Product type				
		Publications	Guidelines / Frameworks	Factsheets	Models / Databases	Learning Tools
RECYCLED WATER / WASTEWATER						
Literature review of current and novel treatment technologies for recycled water, identifying benefits and limitations of both (Fit-for-purpose water production - Project C1.3)	• Examination of the benefits and limitations of existing and possible future systems for treatment of recycled water. Key factors considered include: installation and operating costs, energy consumption, scalability, maintenance requirements, environmental and other external benefits, novelty, etc.	x				
Development and demonstration of novel urban wastewater resource recovery technologies (Resource recovery from wastewater - Project C2.1)	• Proof-of-concept in novel resource recovery – potential for further development of commercial outputs • Demonstration site now secured with Queensland Urban Utilities					x
Development of novel treatment systems for reclaimed water (Fit-for-purpose water production - Project C1.3)	• Low-cost and low-energy consuming filtration systems for treatment and reuse of reclaimed water					x
Guidelines for the use and application of novel wastewater treatment systems (Fit-for-purpose water production - Project C1.3)	• Supporting technical information for novel wastewater treatment systems. This output is currently being developed		x			
Performance assessment of Water Sensitive Urban Design (WSUD) options (Integrated multi-functional urban water systems – Project C4.1) (Hydrology and nutrient transport processes in groundwater/surface water systems – Project B2.4)	• Performance assessment of a living stream in reducing pollutant loads to the Canning River • Performance assessment of a constructed wetland in reducing nutrients and pollutants in water that flows from an urbanised catchment to the Canning River					

Research outputs	Description	Product type				
		Publications	Guidelines / Frameworks	Factsheets	Models / Databases	Learning Tools
CENTRALISED & DECENTRALISED SYSTEM INTERACTIONS						
Risk factors of residential recycled water schemes (Managing interactions between decentralised and centralised water systems – Project C3.1)	• A number of risk factors have been identified through a detailed literature review, interviews with industry practitioners and a review of 21 residential recycled water schemes. • The outcomes of this study provide a basis for further investigation through the qualitative definition of critical risks to the long-term viability of residential recycled water schemes	x				
Recommendations for modelling and integration of decentralised systems (Managing interactions between decentralised and centralised water systems - Project C3.1)	• Three models considered - Water distribution network model EPANET, SeweX, wastewater treatment plant (IWA's ASM, ADM) • Case studies provided on the application of the linkages of the various models	x				x
Models to assess the impacts of changes in water use practice on downstream collection systems (odour and corrosion, GHG emissions and sedimentation) (Managing interactions between decentralised and centralised water systems - Project C3.1)	• Models (based on SeweX model) to describe the impacts of implementation of decentralised systems on centralised systems. • The models will provide support for minimising the impacts and optimising the function of sewer networks				x	
Decision support platform to integrate models to assist decision-making (Managing interactions between decentralised and centralised water systems - Project C3.1)	• A platform for integrating the three models (Water distribution network model EPANET, SeweX, wastewater treatment plant - IWA's ASM, ADM) to aid decision-making. This output is currently being developed				x	
RISK						
Analytical framework for identifying risk perceptions (Society and institutions -Project A4.1)	• Framework identifying personal and professional attributes that might influence perceived risk of alternative urban water systems and sources, in order to understand and anticipate possible risk perceptions				x	
Report on current risk perceptions of Australian urban water practitioners towards alternative urban water systems, technologies and sources (Society and institutions - Project A4.1)	• Report drawing together conclusions from empirical study of risk perceptions of Australian urban water practitioners towards alternative urban water systems, technologies and sources; and highlighting barriers to their implementation in the water sensitive city	x				

Research outputs	Description	Product type				
		Publications	Guidelines / Frameworks	Factsheets	Models / Databases	Learning Tools
FLOODING						
Methods for describing hydrological hazards (Building socio-technical flood resilience – spatio-temporal flood risk modelling - Project B4.1)	• Methods for describing concurrent hydrological hazards developed in Denmark and to be tested in Australia		x			x
Flood risk modelling tool (Building socio-technical flood resilience – spatio-temporal flood risk modelling - Project B4.1)	• A flood risk modelling tool that integrates an economic valuation of physical assets threatened by these hydrological hazards. Method to be tested in Australia				x	
Module linking flood risk modelling tool with DAnCE4Water (Building socio-technical flood resilience – spatio-temporal flood risk modelling - Project B4.1)	• A module that dynamically links the integrated flood risk modelling tool with the DAnCE4Water platform (Dynamic Adaptation for enabling City Evolution for Water)				x	
Recommendations on mainstreaming approaches to deliver flood resilience (Building socio-technical flood resilience: adaptation across spatial and temporal scales - Project B4.2)	• A Report on opportunities for synergistic enhancement of flood resilience with opportunities for urban regeneration, multi-functional land use, ecosystem services, asset management and other urban developments in Australia	x				
Software tool to model flood management policies (Building socio-technical flood resilience: adaptation across spatial and temporal scales - Project B4.2)	• A novel technique for modelling flood management policies developed in the Netherlands and to be tested in Australia				x	
Accounting tool, with user guide recommendations for flood management (Building socio-technical flood resilience: adaptation across spatial and temporal scales - Project B4.2)	• Accounting tool that supports the application of the flood risk management policy model in Australian cities		x			
Case studies on new tools for adaptive flood risk management (Building socio-technical flood resilience: adaptation across spatial and temporal scales - Project B4.2)	• Application of the new tools for the development of adaptive flood risk management strategies to case studies (Elwood/Melbourne, Swan Coastal Plain/ Perth and Spaanse Polder/Rotterdam)					x

2 On-ground practices

d. Operation and maintenance: Integrating and managing green infrastructure as part of an asset portfolio

To enable the transition to water sensitive cities, operations and maintenance should consider green infrastructure and waterways as highly valuable parts of the asset base. Full integration with other assets should be achieved through comprehensive monitoring and asset management systems.

Why this is important

Asset management does not typically include green infrastructure, which results in these assets being overlooked in asset registers and maintenance budgets. The result is underperforming assets that compromise the function and the amenity of these investments.

Tranche 1 research

Research focused on developing operational methodologies to ensure these natural assets perform to their desired standard.

Research activities summary

Overall, Tranche 1 research activities have:

- developed methodologies to inform effective operational procedures of passive water treatment systems.

The following table provides a more detailed summary of the research activities, providing a list of relevant research outputs and the types of products produced. For additional resources related to each output described in this section, please see **Part 2 pp. 114**.

Research outputs	Description	Product type				
		Publications	Guidelines / Frameworks	Factsheets	Models / Databases	Learning Tools
RAINFALL DATA						
Validation and operational monitoring methodologies for passive water treatment systems (Fit-for-purpose water production - Project C1.3)	• This output provides: 1) validation methodologies to ensure natural treatment systems perform their desired function; and 2) operational monitoring regimes that demonstrate performance				x	

2 On-ground practices

e. Citizen engagement: Interacting and engaging with citizens in decision-making processes

To enable the transition to water sensitive cities, citizens should be treated as partners in decision-making and their meaningful involvement and empowerment should be actively pursued.

Why this is important

A key challenge to urban water reform is the disconnection between the community and their water systems.

Tranche 1 research

Projects were aimed at creating advice and guidance on engaging the community successfully with their water systems to allow them to make informed decisions.

Research activities summary

Overall, Tranche 1 research activities have:

- developed advice on how to engage and influence the community in water decision-making, including processes and terminology to use based on an understanding of how people make decisions.

The following table provides a more detailed summary of the research activities, providing a list of relevant research outputs and the types of products produced. For additional resources related to each output described in this section, please see **Part 2 pp. 114-116**.

Research outputs	Description	Product type				
		Publications	Guidelines / Frameworks	Factsheets	Models / Databases	Learning Tools
RAINFALL DATA						
Water sensitive citizen typology (Understanding social processes - Project A2.1)	• Advice on understanding types of people and how to influence their water behaviours and decision-making	x				
Recommendations for effective behaviour change strategies (Accelerating transitions by influencing behaviour - Project A2.2)	• Advice on how to change behaviours to promote more water conservation or water quality protection in households	x				
Best practice recommendations for community engagement in sustainable urban water management (Engaging communities - Project A2.3)	• A set of recommendations informed by systematic review of the national and international literature and project-based experimental studies	x				
Database of community friendly water terminology and visuals (Engaging communities - Project A2.3)	• An empirically tested set of water-related terms, information, and visuals that are comprehensible and engage citizens with water issues • This database is currently being developed.				x	
Report on Australian citizens water literacy	*For details refer to: 3c Community connection: Citizens' attitude and appreciation of water and its role in the place they live*					
Prioritised roadmap of household water behaviours for change	*For details refer to: 3c Community connection: Citizens' attitude and appreciation of water and its role in the place they live*					

2 On-ground practices

f. Cost benefit analyses: Quantifying the costs and benefits of water services

To enable the transition to water sensitive cities, cost benefit analyses should consider and quantify externalities and non-market values of water services. Investments should be based on the highest value option that incorporates market and non-market benefits as well as citizen preferences.

Why this is important

Australian towns and cities often try to meet 21st century challenges by re-investing in 19th century strategies that are now recognised as economically and environmentally inefficient and not in alignment with community values and expectations. Without the inclusion of environmental and social benefits into economic evaluation frameworks used in water-related decision making, it will be difficult to change the status quo.

Tranche 1 research

Research projects were aimed at building an understanding of the drivers behind water sensitive outcomes and their economic value to allow development of economic evaluation frameworks to help promote water sensitivity.

Research activities summary

Overall, Tranche 1 research activities have:

- enhanced our understanding of the economic value of water sensitive outcomes; and
- developed guidance and data to help with the use of economic evaluation frameworks in water-related decision making.

The following table provides a more detailed summary of the research activities, providing a list of relevant research outputs and the types of products produced. For additional resources related to each output described in this section, please see **Part 2 pp. 116-118**.

Research outputs	Description	Product type				
		Publications	Guidelines / Frameworks	Factsheets	Models / Databases	Learning Tools
Preferences (willingness to pay) for attributes of stormwater management (Economic valuation - Project A1.1)	• High-level messages of relative importance of outcomes from stormwater management across NSW and Vic • Evidence of communities' willingness to pay for stormwater management and the ecosystem services it provides	x			x	
Monetary and non-market values of water sensitive landscapes (Economic valuation - Project A1.1 and Valuation of economic, social and ecological costs and benefits - Project A1.2)	• Literature review collation of empirical evidence of monetary and non-market values of water sensitive landscapes / green spaces in a working paper • Evidence based on literature review of existing knowledge and indexing of values into a database	x				
Economic assessment of decentralised water supply system case studies (Valuation of economic, social and ecological costs and benefits - Project A1.2)	• Evidence of: 1) private benefits from rainwater tank installations and subsequent application of a public-private benefit framework to evaluate policy responses; and 2) integrated stage 1 project evaluation of the benefits of a local government water recycling scheme that uses treated wastewater on parks, open spaces, schools and playing fields	x			x	x
Economic assessment of WSUD technology case studies (Valuation of economic, social and ecological costs and benefits - Project A1.2)	• Evidence of economic benefits associated with rain gardens • Evidence of economic and ecosystem benefits associated with a living stream project • Evidence of the amenity value, recreational value, and ecosystem value of two CRCWSC designed constructed wetlands (Melbourne and China)	x				x

Research outputs	Description	Product type				
		Publications	Guidelines / Frameworks	Factsheets	Models / Databases	Learning Tools
Cost-benefit analysis of nutrient emission case study in Western Australia's Southern River catchment (Economic incentives and instruments - Project A1.3)	• Measurement of the rate at which emissions (nutrients) are changing - GIS analysis and database, hedonic analysis providing modelling results • Links between land use change and fertiliser use (and surface / groundwater interactions) • Assessment of the costs and benefits of different policies for reducing emissions including behaviour change among households, local authorities' policies and restrictions on developers to identify: (a) least-cost solution/s for Canning (treatments for public and private land); and (b) a cost-effective nutrient management plan. • This output is currently being developed.				x	x
Salient method to improve non-market evaluations with choice experiments (Economic valuation -Project A1.1)	• Method available to improve non-market valuation with choice experiments		x		x	
Guidelines for cost-benefit assessments of water sensitive city projects (Valuation of economic, social and ecological costs and benefits - Project A1.2)	• Practical guide on the process of cost benefit analysis. Report published as "Ranking projects for water-sensitive cities: A practical guide"		x			
Case studies and guidelines for the management of the interaction between wastewater treatment plants and urban populations (Valuation of economic, social and ecological costs and benefits - Project A1.2)	• Evidence from case studies: (1) Determination of non-market values and preferences for beneficial land uses in the odour buffers of wastewater treatment plants and pumping stations; and (2) Identification and quantification of potential onsite and offsite impacts from cyanobacterial events for regional towns • Specific guidelines on how water utilities should manage interactions between wastewater treatment plants and communities	x	x			x

Research outputs	Description	Product type				
		Publications	Guidelines / Frameworks	Factsheets	Models / Databases	Learning Tools
Urban water portfolio modelling for hedging supply risks	*For details refer to: 2a Water systems planning: Planning of urban water infrastructure*					
Quantified benefits of water sensitive urban design and urban greening on the urban climate and urban heat mitigation at a range of scales	*For details refer to: 2b Urban and landscape design: Designing urban environments for water service delivery*					
Evaluation of the benefits of improved urban climates on heat-health outcomes	*For details refer to: 2b Urban and landscape design: Designing urban environments for water service delivery*					
Evaluation of the benefits of improved urban climates on Human Thermal Comfort	*For details refer to: 2b Urban and landscape design: Designing urban environments for water service delivery*					
Literature review of current and novel treatment technologies for recycled water, identifying benefits and limitations of both	*For details refer to: 2c Water systems design: Designing and implementing water service infrastructure*					

3 Socio-Political Capital

a. Science influence: The practices of science and its influence

To enable the transition to water sensitive cities, researchers should engage with industry through robust partnerships which generate reliable, trusted and interdisciplinary science. New insights from collaborative research should be highly valued in decision-making and provide the basis for developing new, and adapting existing, policies and practices.

Why this is important

Science is a powerful and trusted source of information. However, the communication of science to the public and policy makers is not often successful. This is typically due to the level of detail provided, which makes it difficult for ready understanding and adoption in real world applications.

Tranche 1 research

Research focused on ensuring science informs policy and decisions by building the capacity of researchers to communicate outcomes and participate in policy development.

Research activities summary

Overall, Tranche 1 research activities have:

- developed capacity building approaches and training for researchers to influence policy.

The following table provides a more detailed summary of the research activities, providing a list of relevant research outputs and the types of products produced. For additional resources related to each output described in this section, please see Part 2 p. 119.

Research outputs	Description	Product type				
		Publications	Guidelines / Frameworks	Factsheets	Models / Databases	Learning Tools
Development and testing of capacity-building approaches for researchers to influence policy (Strategies for influencing the political dynamics of decision making - Project A3.3)	• Design and testing of capacity-building approaches (e.g. interactive workshops, panels, etc.) for researchers to influence policy and engage with stakeholders (e.g. media, policy-makers, etc.) • Development of a model for policy learning circles • Science-policy capacity building training				x	
Literature reviews and industry notes on political dynamics, policy frameworks, tactics and strategies for researchers to influence policy	*For details refer to: 1c Policy and strategy: Policies and strategies that facilitate the delivery of desired outcomes*					

3 Socio-Political Capital

b. Capacity: Knowledge, skills and experiences of practitioners

To enable the transition to water sensitive cities, practitioners' skills and knowledge should be cross-sectoral, multi-disciplinary and inter-organisational. Specialised skills and knowledge in core areas should be combined with a broad working knowledge of other relevant areas.

Why this is important

The transition to a water sensitive city requires practitioners to be knowledgeable across a number of different disciplines to drive the delivery of integrated solutions that look beyond traditional urban water engineering solutions.

Tranche 1 research

Research focused on building an understanding of the current skills and knowledge in the industry to inform the development of targeted training and capacity development modules to support learning. The development of tools and case studies to show how this new learning can deliver water sensitive outcomes was also critical to inform these capacity building initiatives.

Research activities summary

Overall, Tranche 1 research activities have:

- built an understanding of the existing water sensitive city skills and knowledge across multiple stakeholder groups and identified opportunities for improvement;
- developed tools to assist practitioners access and integrate multiple benefits of water sensitive cities; and
- developed training and guidelines to transfer new knowledge and build capacity for use of new tools such as the Water Sensitive Cities Toolkit.

The following table provides a more detailed summary of the research activities, providing a list of relevant research outputs and the types of products produced. For additional resources related to each output described in this section, please see **Part 2 pp. 119-121**.

Research outputs	Description	Product type				
		Publications	Guidelines / Frameworks	Factsheets	Models / Databases	Learning Tools
Australian and international skills and knowledge needs assessment report (Strengthening educational programs to foster future water sensitive cities leaders - Project D4.1)	• An assessment of the skills and knowledge needed to deliver water sensitive city outcomes across local and state governments, water utilities and the private sector in Australia, The Netherlands and a selected set of Asian cities	x				
A structured professional learning vision and set of recommendations for delivering water sensitive city outcomes (Strengthening educational programs to foster future water sensitive cities leaders - Project D4.1)	• A report identifying and recommending opportunities for the CRCWSC to: (i) invest in the development of new structured professional learning programs and courses (education and training), where gaps and sufficient demand exists; and (ii) partner where existing provision or capacity exists to deliver on identified skills and knowledge needs	x				
Masters level module on delivering Water Sensitive Cities (Strengthening educational programs to foster future water sensitive cities leaders - Project D4.1)	• A professionally targeted high level module syllabus and teaching materials that introduce water sensitivity and how to deliver it through innovations in governance, technology and economics.					x
Set of structured professional learning programs and courses with paying participants (Strengthening educational programs to foster future water sensitive cities leaders - Project D4.1)	• A set of structured professional learning programs and courses with paying participants, delivered by a mixture of CRCWSC participants and external partners to effectively build capacity in water sensitive city outcome delivery					x
Updated blueprint Chapter: Research Adoption and Implementation (Officer) (Integration and demonstration through urban design - Project D1.1)	• Revised and updated chapter describing the adoption, adaptation and implementation of research insights as part of Places Victoria's Officer development. This output is currently being developed.	x				x

Research outputs	Description	Product type				
		Publications	Guidelines / Frameworks	Factsheets	Models / Databases	Learning Tools
Case study applications of the Water Sensitive Cities Modelling Toolkit (Integration and demonstration through urban design - Project D1.1)(Water sensitive cities modelling toolkit - Project D1.5)	• Documentation of application (testing and validation) of the Toolkit to specific locations	x				x
Seminars, reports, and site visits for demonstration projects (Integration and demonstration through urban design - Project D1.1)(Water sensitive cities modelling toolkit - Project D1.5)	• Knowledge sharing seminars, presentations, reports and site visits focussed on CRCWSC research engagement, outcomes and insights for the Officer (Vic) and Marrickville (NSW) demonstration projects					x
Seminars and training on the application of the Water Sensitive Cities Modelling Toolkit (Integration and demonstration through urban design - Project D1.1)(Water sensitive cities modelling toolkit - Project D1.5)	• Engagement with practitioners' interested / involved in the application of the Toolkit, including the dissemination and discussion of research knowledge from research projects represented in the Toolkit					**x**
Engagement models for industry and stakeholders regarding design of WSUD	*For details refer to: 2b Urban and landscape design: Designing urban environments for water service delivery*					x
Analytical framework for identifying risk perceptions	*For details refer to: 2c Water systems design: Designing and implementing water service infrastructure*					
Report on current risk perceptions of Australian urban water practitioners towards alternative urban water systems, technologies and sources	*For details refer to: 2c Water systems design: Designing and implementing water service infrastructure*					
Development and testing of capacity-building approaches for researchers to influence policy	*For details refer to: 3a Science influence: The practices of science and its influence*					

3 Socio-Political Capital

c. Community connection: Citizens' attitude and appreciation of water and its role in the place they live

To enable the transition to water sensitive cities, citizens should be very knowledgeable about the water cycle and how the different elements of the system work together. They should be proud of their neighbourhood and water's role in the landscape, and welcome opportunities to be engaged in managing and protecting it.

Why this is important

The disconnection between the community's water literacy, values and behaviors and the water systems supporting them was identified as a key challenge to urban water reform.

Tranche 1 research

Projects were aimed at building an understanding of community norms and expectations in relation to water-use practices to allow potential behavioural pathways to be developed to reduce water footprints.

Research activities summary

Overall, Tranche 1 research activities have:

- enhanced our understanding of how our communities currently understand water issues and make water-related decisions.

See also 'On-Ground Practices - 2e. Citizen engagement' for more information related to research outcomes focused on how to engage with the community in the decision-making process.

The following table provides a more detailed summary of the research activities, providing a list of relevant research outputs and the types of products produced. For additional resources related to each output described in this section, please see **Part 2 pp. 121-124**.

Research outputs	Description	Product type				
		Publications	Guidelines / Frameworks	Factsheets	Models / Databases	Learning Tools
Report on the history of water use in Australia (Mapping water sensitive city scenarios - Project A2.1)	• Historical analysis of water use in Australian households from 1788 – 2014 that identifies the social, physical, institutional, and cultural factors that have influenced water use during this period • Description of cultures and contexts of water in three states.	x				
Report on Australian citizens water literacy (Engaging communities with water sensitive cities - Project A2.3)	• Report comprising national survey outcomes of current levels of knowledge about key water issues amongst Australian citizens • Report providing depth of understanding of literacy levels based on focus group analysis	x				
Prioritised roadmap of household water behaviours for change (Accelerating transitions by influencing behaviour - Project A2.2)	• Published database of water conservation and water quality behaviours • Identification of priority water conservation and water quality behaviours and actions to target behaviours in campaigns	x			x	
Data on the social norms for water conservation (Economic incentives and instruments -Project A1.3)	• Analysed data on using social comparisons as a tool for water conservation from three randomised trials				x	
Synthesis of flood resilience practices in Mekong Delta (Building socio-technical flood resilience: adaptation across spatial and temporal scales – Project B4.2)	• The video elaborates upon the "Living with water" lifestyle practised in Mekong Delta, as to how people have adapted to flooding and do not see it as a hindrance				x	

Research outputs	Description	Product type				
		Publications	Guidelines / Frameworks	Factsheets	Models / Databases	Learning Tools
Guidance manual for participatory planning processes	*For details refer to: 2a Water systems planning: Planning of urban water infrastructure*					
Water sensitive citizen typology	*For details refer to: 2e Citizen Engagement: Interacting and engaging with citizens in decision making*					
Recommendations for effective behaviour change strategies	*For details refer to: 2e Citizen Engagement: Interacting and engaging with citizens in decision making*					
Best practice recommendations for community engagement in sustainable urban water management	*For details refer to: 2e Citizen Engagement: Interacting and engaging with citizens in decision making*					
Database of community friendly water terminology and visuals	*For details refer to: 2e Citizen Engagement: Interacting and engaging with citizens in decision making*					
Preferences (willingness to pay) for attributes of stormwater management	*For details refer to: 2f Cost benefit analyses: Quantifying the costs and benefits of water services*					
Updated Blueprint Chapter: Research Adoption and Implementation (Officer)	*For details refer to: 3b Capacity: Knowledge, skills and experiences of practitioners*					


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Part 2

Resources relating to research outputs

Part 2: Resources relating to research outputs

This part provides a comprehensive list of published resources for each research output. For ease of use, the three 'Transitions Pathways' and associated elements described in Part 1 have been used to group the resources related to each research output in order to assist document users locate relevant resources.

For each transition pathway element, all relevant research outputs are described. Each output is followed by a list of all relevant and published resources. The reference for each resource contains a hyperlink to the resource. The product type that best describes each resource is also provided, along with a link to the relevant Tranche 1 project webpage.

All resources are available under open access arrangements where possible. Otherwise please contact your institution's library, the authors, or publishers to organise full access. Please also check relevant project webpages for additional resources such as PhD posters, Powerpoint presentations and videos.

1. Enabling Structures

a. Vision and narrative: Aspirations of a city, how to get there and why they are important

Reference	Product type	Project no.
***Guidance manual for participatory planning processes**: Guidelines for facilitating participatory processes with community and professional stakeholders to guide WSC transition planning, drawing on envisioning and backcasting techniques.*		
This output is currently being developed in IRP1.	–	A4.2
***Report on Melbourne water sensitive city transition scenarios**: Report documenting transition scenarios for Melbourne, integrating community, practitioner and science perspectives (focus on suburb scale i.e. Elwood)*		
Rogers, B. C. and Gunn, A. W. (2015). *Towards a Water Sensitive Elwood: A Community Vision and Transition Pathways.* Melbourne, Australia: Cooperative Research Centre for Water Sensitive Cities.	Publication	A4.2
***Report on Perth water sensitive city transition scenarios:** Report documenting transition scenarios for Perth, integrating different stakeholder perspectives.*		
Rogers, B. C., Hammer, K., Werbeloff, L. and Chesterfield, C. (2015). *Shaping Perth as a Water Sensitive City: Outcomes and perspectives from a participatory process to develop a vision and strategic transition framework*. Melbourne, Australia: Cooperative Research Centre for Water Sensitive Cities.	Publication	A4.2
***Report on Other cities water sensitive city transition scenarios**: Report documenting transition scenarios for other Australian cities, integrating different stakeholder perspectives.*		
This output is currently being developed in IRP1.	–	A4.2

Reference	Product type	Project no.
***Benchmarking Water Sensitive Cities**: Industry report providing guidance on benchmarking and building transition pathways.*		
Ferguson, B. C., Brown, R. R., de Haan, F. J. and Deletic, A. (2015). Analysis of institutional work on innovation trajectories in water infrastructure systems of Melbourne, Australia. *Environmental Innovation and Societal Transitions,* 15, pp. 42–64.	Publication	A4.1
Ferguson, B. C., Brown, R. R., Frantzeskaki, N., de Haan, F. J. and Deletic, A. (2013). The enabling institutional context for integrated water management: Lessons from Melbourne. *Water Research*, 47(20), pp. 7300–7314.	Publication	A4.1
Ferguson, B. C., Frantzeskaki, N. and Brown, R. R. (2013). A strategic program for transitioning to a Water Sensitive City. *Landscape and Urban Planning*, 117, pp. 32-45.	Publication; Guideline / Framework	A4.1
Farrelly, M. A. and Brown, R. R. (2014). Making the implicit, explicit: time for renegotiating the urban water supply hydrosocial contract? *Urban Water Journal,* 11(5), pp. 392-404.	Publication	A4.1
Rijke, J., Farrelly, M. A., Brown, R. R. and Zevenbergen, C. (2013). Configuring transformative governance to enhance resilient urban water systems. *Environmental Science and Policy*, 25, pp. 62-72.	Publication	A4.1
Brown, R. R, Farrelly, M. A. and Loorbach, D. (2013). Actors working the institutions in sustainability transitions: The case of Melbourne's stormwater management. *Global Environmental Change*, 23(4), pp. 701-718.	Publication	A4.1
Bos, J. J., Brown, R. R. and Farrelly, M. A. (2013). A design framework for creating social learning situations. *Global Environmental Change,* 23(2), pp. 398-412.	Publication; Guideline / Framework	A4.1
Bos, J. J. and Brown, R. R. (2012). Governance experimentation and factors of success in socio-technological transitions in the urban water sector. *Technological Forecasting and Social Change*, 79(7), pp. 1340-1353.	Publication	A4.1
Farrelly, M. A., Bos, J. J. and Brown, R. R. (2014). Innovation through experimentation: designing policy change programs. In: *13th International Conference on Urban Drainage*, 7-12 September, Sarawak, Malaysia.	Publication; Guideline / Framework	A4.1
Bos, J. J. and Brown, R.R. (2012). Reflections on research into the OurRiver - Cooks River Sustainability Initiative. In: *Proceedings of the 2nd National Stormwater Conference*, 15-19 October, Melbourne, Australia.	Publication	A4.1
CRCWSC Industry Note (2016). *Benchmarking Water Sensitive Cities.* Melbourne, Australia: Cooperative Research Centre for Water Sensitive Cities.	Factsheet	A4.1

Reference	Product type	Project no.
Brown, R. R., Rogers, B. C., Werbeloff, L. (2016). *Moving toward Water Sensitive Cities: A guidance manual for strategists and policy makers.* Melbourne, Australia: Cooperative Research Centre for Water Sensitive Cities.	Guideline / Framework	A4.1
***A4.1 Project Synthesis Report**: This report brings together in one platform the many but inter-related outputs arising from the different sub-projects. It will provide insights from A4.1 on the uptake and mainstreaming of decentralised technologies from the perspectives of governance, risk and risk perception.*		
This output is currently being finalised.	–	A4.1

b. Evaluation frameworks: Instruments to facilitate coordination towards desired outcomes

Reference	Product type	Project no.
***Computational algorithms to model the integrated urban water system including socio-economic system, urban form and water infrastructure systems:** DAnCE4Water's algorithms provide detailed insight into the dynamic feedbacks between the socio-economic system, urban form and water infrastructure in response to water management strategies. The model can be used from household – city scales*		
CRCWSC (2016). *Dynamic Adaptation for enabling City Evolution for Water (DAnCE4Water)*. Available at: http://dance4water.org/	Learning Tool; Model / Database	A4.3
De Haan, F. J., Ferguson, B. C., Deletic, A. and Brown, R. R. (2013). A socio-technical model to explore urban water systems scenarios. *Water Science and Technology*, 68(3), pp. 714-721.	Publication; Model / Database	A4.3
Kleidorfer, M., Sitzenfrei, R., Rogers, B. C., Dawson, R. and Rauch, W. (2014). Editorial: Modelling the urban water cycle as part of the city. *Water Science and Technology*, 70(11), pp. 1717-1720.	Publication; Model / Database	A4.3
Urich, C. and Rauch, W. (2014). Exploring critical pathways for urban water management to identify robust strategies under deep uncertainties. *Water Research*, 66, pp.374-389.	Publication; Model / Database	A4.3
Urich, C. and Rauch, W. (2014). Modelling the urban water cycle as an integrated part of the city: a review. *Water Science and Technology*, 70(11), pp. 1857-1872.	Publication; Model / Database	A4.3
Mair, M., Mikovits, C., Sengthaler, M., Schöpf, M., Kinzel, H., Urich, C., Kleidorfer, M., Sitzenfrei R. and Rauch W. (2014). The application of a Web-geographic information system for improving urban water cycle modelling. *Water Science and Technology*, 70(11), pp. 1838–1846.	Publication; Model / Database	A4.3
Urich, C., Bach, P., Sitzenfrei, R., Kleidorfer, M., McCarthy, D. T., Deletic, A. and Rauch, W. (2013). Modelling cities and water infrastructure dynamics. In: *Proceedings of the Institution of Civil Engineers: Engineering Sustainability*, 166(5), pp. 301-308.	Publication; Model / Database	A4.3

Reference	Product type	Project no.
Rauch, W., Bach, P. M., Brown, R. R., Deletic, A., Ferguson, B. C., de Haan, F. J., McCarthy, D. T., Kleidorfer, M., Tapper, N. J., Sitzenfrei, R. and Urich, C. (2012). Modelling transitions in urban drainage management. In: *Proceedings of the Ninth International Conference on Urban Drainage Modelling*, 4-6 September, University of Belgrade, Serbia.	Publication; Model / Database	A4.3
***Demonstration and application of DAnCE4Water in regional and community scale case studies**: Application of DAnCE4Water to case studies (Elwood – local scale, and South East Water – precinct scale).*		
CRCWSC (2016). *Dynamic Adaptation for enabling City Evolution for Water (DAnCE4Water)*. Available at: http://dance4water.org/	Learning Tool; Model / Database	A4.3
Rogers, B. C. and Gunn, A. W. (2015). *Towards a Water Sensitive Elwood: A Community Vision and Transition Pathways.* Melbourne, Australia: Cooperative Research Centre for Water Sensitive Cities.	Publication	A4.2
***Conceptual city-region scale urban metabolism evaluation framework:** A framework to evaluate the contributions of the various statutory and resource management plans and strategies of a city-region towards achieving the objectives of a water sensitive city.*		
Kenway, S. J., Pamminger, F. and Lant, P. (2013). The case for urban metabolism. What is it and how can it help the water sector? *Water: Journal of the Australian Water Association*, 40(1), pp. 6-7.	Publication	B1.2
Serrao-Neumann, S., Renouf, M., Kenway, S. J. and Low Choy, D. (2017). Connecting land-use and water planning: Prospects for an urban water metabolism approach. *Cities*, 60(A), pp. 13-27.	Publication	B1.2
Renouf, M. A. and Kenway, S. J. (2016). Evaluation Approaches for Advancing Urban Water Goals. *Journal of Industrial Ecology*. doi: 10.1111/jiec.12456.	Publication; Guideline / Framework	B1.2
Farooqui, T. A., Renouf, M. A. and Kenway, S. J. (2016). A metabolism perspective on alternative urban water servicing options using water mass balance. *Water Research,* 106, pp. 415-428.	Publication	B1.2
Serrao-Neumann, S., Schuch, G., Kenway, S. J. and Low Choy, D. (2014). Water sensitive cities and regions: tackling threats to water resources in metropolitan areas. In: *Association of European Schools of Planning (AESOP) Annual Congress*, 9-12 July, Utrecht, Netherlands.	Publication	B1.2
Serrao-Neumann, S. Schuch, G. Kenway, S. J. and Low Choy, D. (2014). Advancing the adaptation of the water resource sector in highly urbanised regions across Australia. In: *Climate Adaptation 2014: Future Challenges*,	Publication	B1.2

30 September – 2 October, Gold Coast, Australia.		
Reference	Product type	Project no.
Kenway, S. J., Pamminger, F., Priestley, A., Wolff, G., Gardner, T., Hermanowicz, S. and Rosenblum, E. (2013). Urban Metabolism: A Way to Make Cities More Efficient? In: R. Weller and J. Bolleter, eds., *Made in Australia: The Future of Australian Cities*. Perth: UWA Press, pp. 247-250.	Publication; Guideline / Framework	B1.2
Renouf, M. A., Kenway, S. J., Serrao-Neumann, S. and Low Choy, D. (2016). *Urban metabolism for planning water sensitive cities: Concept for an urban water metabolism evaluation framework.* Melbourne, Australia: Cooperative Research Centre for Water Sensitive Cities.	Guideline / Framework	B1.2
UrbanBEATS conceptual representation of WSUD systems within a city-wide model: *Allows for the setup of virtual case studies for assessment of performance of decentralised water infrastructure.*		
Bach, P. M., McCarthy, D. T. and Deletic, A. (2015). Can we model the implementation of water sensitive urban design in evolving cities? *Water Science and Technology*, 71(1), pp. 149-156.	Publication; Learning Tool; Model/ Database	C1.1
Bach, P. M., Deletic, A., Urich, C., Sitzenfrei, R., Kleidorfer, M., Rauch, W. and McCarthy, D. T. (2013). Modelling interactions between lot-scale decentralised water infrastructure and urban form–a case study on infiltration systems. *Water Resources Management*, 27(14), pp. 4845-4863.	Publication; Learning Tool; Model/ Database	C1.1
Bach, P. M., McCarthy, D. T. and Deletic, A. (2013). UrbanBEATS: A strategic planning tool for exploring water sensitive futures. In: *Water Sensitive Urban Design 2013: WSUD 2013*. Barton, ACT: Engineers Australia, pp. 168-175.	Publication	C1.1
UrbanBEATS (2017). *UrbanBEATS: Planning-support modelling of urban water futures*. Available at: http://urbanbeatsmodel.com/	Model / Database	C1.1
Integrated model components that can assess performance of WSUD systems for pollution, flooding and stormwater harvesting*: Model components included in UrbanBEATS, WSC Toolkit (D1.1) and DAnCE4Water (A4.3).*		
Bach, P. M., Staalesen, S., McCarthy, D. T. and Deletic, A. (2015). Revisiting land use classification and spatial aggregation for modelling integrated urban water systems. *Landscape and Urban Planning,* 143, pp. 43-55.	Publication	C1.1
Daly, E., Bach, P. M. and Deletic, A. (2014). Stormwater pollutant runoff: A stochastic approach. *Advances in Water Resources*, 74, pp. 148-155.	Publication; Model / Database	C1.1

Reference	Product type	Project no.
Bach, P. M., McCarthy, D. T., Urich, C., Sitzenfrei, R., Kleidorfer, M., Rauch, W. and Deletic, A. (2013). A planning algorithm for quantifying decentralised water management opportunities in urban environments. *Water Science and Technology*, 68(8), pp. 1857-1865.	Publication; Model / Database	C1.1
Bach, P. M., Rauch, W., Mikkelsen, P. S., McCarthy, D. T. and Deletic, A. (2014). A critical review of integrated urban water modelling–Urban drainage and beyond. *Environmental Modelling & Software*, 54, pp. 88-107.	Publication	C1.1
Browne, D., Deletic, A., Mudd, G. M. and Fletcher, T. D. (2013). A two-dimensional model of hydraulic performance of stormwater infiltration systems. *Hydrological Processes*, 27(19), pp. 2785-2799.	Publication; Model / Database	C1.1
Daly, E., Deletic, A., Hatt, B. E. and Fletcher, T. D. (2012). Modelling of stormwater biofilters under random hydrologic variability: a case study of a car park at Monash University, Victoria (Australia). *Hydrological Processes*, 26(22), pp. 3416-3424.	Publication; Learning Tool; Model / Database	C1.1
Lintern, A., Daly, E. and Deletic, A. (2012). Verifying a stormwater biofiltration model. In: *9th International Conference on Urban Drainage Modelling*, 4-7 September, Belgrade, Serbia.	Publication	C1.1
Bach, P. M., McCarthy, D. T., Urich, C., Sitzenfrei, R., Kleidorfer, M., Rauch, W. and Deletic, A. (2012). DAnCE4Water's BPM: A planning algorithm for decentralised water management options. In: *9th International Conference on Urban Drainage Modelling*, 4-7 September, Belgrade, Serbia.	Publication	C1.1
Water Sensitive Cities Index and indicator framework: *Index and indicator framework to assess the water sensitivity of a place (metropolitan/sub-metropolitan scale).*		
Chesterfield, C., Beck, L., Brown, R. R., Dunn, G., de Haan, F., Lloyd, S., Rogers, B., Urich, C. and Wong, T. H. F. (2016). Beyond benchmarking: A water sensitive cities index. In: *OzWater'16,* 10-12 May, Melbourne, Australia.	Publication	D6.2
CRCWSC (2016). *How water sensitive is your city?* Melbourne, Australia: Cooperative Research Centre for Water Sensitive Cities.	Factsheet	D6.2
CRCWSC (2016). *Water Sensitive Cities Index.* Available at:https://watersensitivecities.org.au/solutions/water-sensitive-cities-index/	Factsheet	D6.2
Case study applications of the Water Sensitive Cities Index and indicator framework: *Documentation of application (testing and validation) of the Index to specific locations.*		

Reference	Product type	Project no.
Chesterfield, C., Rogers, B., Beck, L., Brown, R. R., Dunn, G., de Haan, F., Lloyd, S, Urich, C. and Wong, T. H. F. (2016). A Water Sensitive Cities Index to support transitions to more liveable, sustainable, resilient and productive cities. In: *Singapore International Water Week*, 10-14 July, Marina Bay Sands, Singapore.	Learning Tool	D6.2
Chesterfield, C., Urich, C., Beck, L., Burge, K., Charette-Castonguay, A., Brown, R. R., Dunn, G., de Haan, F., Lloyd, S., Rogers, B. and Wong, T. H. F. (2016). A Water Sensitive Cities Index - Benchmarking cities in developed and developing countries. In: *International Low Impact Development Conference*, 26-29 June, Beijing, China.	Learning Tool	D6.2
Lloyd, S., Roberts, S. and Beck, L. (2016). *Water Sensitive Cities Benchmarking and Assessment: Moonee Valley City Council*. Melbourne, Australia: Cooperative Research Centre for Water Sensitive Cities.	Learning Tool	D6.2
Web-based platform to support WSC Index and provide secure access to online tools: *Online tools on a website with secure login providing the means for self-assessment, visualisation, reporting templates etc.*		
CRCWSC (2016). *WSC Interactive Index*. Available at: http://dance4water.org/interactive_index/	Learning Tool; Model / Database	D6.2
Water Sensitive Cities Modelling Toolkit (Version 2 beta) with supporting user guidance: *A second beta version (for testing and validation) of the Water Sensitive Cites Modelling with supporting preliminary user guidance.*		
Dotto, C. B. S., Allen, R., Wong, T. H. F. and Deletic, A. (2012). Development of an integrated software tool for strategic planning and conceptual design of water sensitive cities. In: *9th International Conference on Urban Drainage Modelling*, 4-7 September, Belgrade, Serbia.	Publication	D1.1, D1.5
CRCWSC (2016). *Water Sensitive Cities Toolkit.* Available at:https://watersensitivecities.org.au/solutions/water-sensitive-cities-toolkit/	Factsheet	D1.1, D1.5
Seminars and training for the use of the Water Sensitive Cities Modelling Toolkit: *Engagement with practitioners interested/involved in development and testing of the Toolkit, including the dissemination and discussion of research knowledge from research projects represented in the WSC Toolkit.*		
CRCWSC (2016). *Water Sensitive Cities Toolkit.* Available at:https://watersensitivecities.org.au/solutions/water-sensitive-cities-toolkit/	Factsheet	D1.1, D1.5
Industry short-courses to facilitate widespread industry uptake of the DAnCE4Water tool*: Software manual and short courses to support the DAnCE4Water platform – an open source product that incorporates interfaces with commonly used water industry models (e.g. MUSIC, SWMM) to complement and add value to the*		

existing set of tools available to support decision-making in the Australian water industry.		
Reference	Product type	Project no.
CRCWSC (2016). *Dynamic Adaptation for enabling City Evolution for Water (DAnCE4Water)*. Available at: http://dance4water.org/	Learning Tool; Model / Database	A4.3
Evaluation and learning framework: *An evaluation and learning framework that will critically inform key CRCWSC processes, protocols and pathways for adopting WSC concepts, tools and practices within national and international urban water contexts.*		
Farrelly, M. A., Bos, J. J. and Tawfik, S. (2016). *CRCWSC Evaluation and Learning Framework*. Melbourne, Australia: Cooperative Research Centre for Water Sensitive Cities.	Guideline / Framework; Publication	D6.1
Impact Pathway Statements: *Map of adoption and impact pathways that will identify the intended audiences of CRCWSC research, explain how end users will utilise research outputs and describe the impacts that are expected to arise from the utilisation of these outputs.*		
Farrelly, M. A., Bos, J. J. and Tawfik, S. (2016). *CRCWSC Evaluation and Learning Framework*. Melbourne, Australia: Cooperative Research Centre for Water Sensitive Cities.	Guideline / Framework; Publication	D6.1

c. Policy and strategy: Policies and strategies that facilitate the delivery of desired outcomes

Reference	Product type	Project no.
Comparison of formal vs. informal policy mechanisms for monitoring pollution and improving environmental outcomes*: Study on policy mechanisms comparing a formal regulatory mechanism with informal peer monitoring and social sanctions and examining its effectiveness in reducing pollution in waterways as compared to formal regulatory approaches.*		
Cason, T. N. and Gangadharan, L. (2016). Swords without covenants do not lead to self-governance. *Journal of Theoretical Politics*, 28(1), pp. 44-73.	Publication	A1.1
Cason, T. N. and Gangadharan, L. (2015). Promoting cooperation in nonlinear social dilemmas through peer punishment. *Experimental Economics*, 18(1), pp. 66-88.	Publication	A1.1
Cason, T., Friesen, L. and Gangadharan, L. (2016). Regulatory performance of audit tournaments and compliance observability. *European Economic Review*, 85, pp. 288-306.	Publication	A1.3
Case study reports of urban water policy development in Victoria, Queensland and Western Australia in relation to political dynamics and policy influence: *Reports of case study research based on interviews with advisors and decision makers.*		
This output is currently being finalised.	–	A3.3
New knowledge of urban water governance systems (both in Australia and beyond): *Published review of recent governance approaches and how they deal with complexity based on literature and interviews*		

Reference	Product type	Project no.
Olsson, L. and Head, B. W. (2015). Urban water governance in times of multiple stressors: an editorial. *Ecology and Society*, 20(1), p. 27. doi: 10.5751/ES-07300-200127.	Publication	A3.1
Taylor, J. (2014). Organizational culture and the paradox of performance management. *Public Performance & Management Review*, 38(1), pp. 7-22.	Publication	A3.1
Head, B. W. (2013). Evidence-Based Policymaking–Speaking Truth to Power? *Australian Journal of Public Administration*, 72(4), pp. 397-403.	Publication	A3.1
Cloete, S., Horberry, T. and Head, B. W. (2013). Urban water system safety: A human factors investigation. *Water: Journal of the Australian Water Association*, 40(8), pp. 56-61.	Publication	A3.1
Head, B. W., Ferguson, M., Cherney, A. and Boreham, P. (2014). Are policy-makers interested in social research? Exploring the sources and uses of valued information among public servants in Australia. *Policy and Society*, 33(2), pp. 89-101.	Publication	A3.1
Head, B.W., Cherney, A., Boreham, P. and Ferguson, M. (2013). Are policy-makers interested in social research? Exploring the sources of valued information among state and national-level public servants in Australia. In: *International Conference on Public Policy*, 26-28 June, Grenoble, France.	Publication	A3.1
Head, B. W. and O'Flynn, J. (2015). Australia: Building Policy Capacity for Managing Wicked Policy Problems. In: K. Miller and A. Massey, eds., *The International Handbook of Public Administration.* Cheltenham, UK: Edward Elgar, pp. 341–368.	Publication	A3.1
Bettini, Y. and Head, B. W. (2014). *'Next Practice' Governance for Water Sensitive Cities*. Melbourne, Australia: Cooperative Research Centre for Water Sensitive Cities.	Publication	A3.1
Bettini, Y. and Head, B. W. (2013). *Specifying the Urban Water Governance Challenge*. Melbourne: Cooperative Research Centre for Water Sensitive Cities.	Publication	A3.1
Policy framework inputs for stormwater management in areas with shallow water tables: *Input to policy frameworks for management of stormwater in urban areas with a shallow water table (2 – 4 m below ground).*		
Zhiliang, L. (2012). *Water Sensitive Urban Design: Cost balance model through life cycle costing methods*, masters thesis, University of Western Australia, Perth.	Publication	B2.4
Preliminary report on the experience of key decision makers and stakeholders in the application of Water Sensitive Urban Design in the planning system: *Short*		

written report on experiences with WSUD in the planning system based on interviews and surveys with stakeholders.		
Reference	Product type	Project no.
This output is currently being finalised.	–	B5.1
Comparative review and survey of statutory planning legislation, regulation and processes relevant to WSUD across five cities (Brisbane, Sydney, Melbourne, Adelaide and Perth): *Surveys used to scope purposes of literature review of planning policy and legislation relevant to WSUD.*		
'Better policy key to water sensitive urban design' (2016). *Australian Water Association Latest News*, 13 April.	Publication	B5.1
Choi, L. and McIlrath, B. (2016). *Victoria's Planning Framework for Water Sensitive Urban Design.* Melbourne, Australia: Cooperative Research Centre for Water Sensitive Cities.	Publication	B5.1
Choi, L. and McIlrath, B. (2016). *South Australia's Planning Framework for Water Sensitive Urban Design*. Melbourne, Australia: Cooperative Research Centre for Water Sensitive Cities.	Publication	B5.1
Choi, L. and McIlrath, B. (2016). *Queensland's Planning Framework for Water Sensitive Urban Design*. Melbourne, Australia: Cooperative Research Centre for Water Sensitive Cities.	Publication	B5.1
Choi, L. and McIlrath, B. (2016). *Western Australia's Planning Framework for Water Sensitive Urban Design*. Melbourne, Australia: Cooperative Research Centre for Water Sensitive Cities.	Publication	B5.1
Choi, L. and McIlrath, B. (2016). *New South Wales' Planning Framework for Water Sensitive Urban Design*. Melbourne, Australia: Cooperative Research Centre for Water Sensitive Cities.	Publication	B5.1
Issues paper on the current application of WSUD and options for reform and draft recommended model of planning regulation for WSUD*: Identification and assessment of key opportunities and constraints in planning systems relevant to the implementation of WSUD and integrated water management.*		
'Better policy key to water sensitive urban design' (2016). *Australian Water Association Latest News*, 13 April.	Publication	B5.1
Final report on the current application of WSUD and options for reform and recommended model of planning regulation and policy benchmarks for WSUD*: The Final Report will identify best practice planning policies and standards for applying WSUD to developments of different planning scales.*		
This output is currently being developed.	–	B5.1
Recommendations on structuring climate adaptation responses in an urban flooding context: *This report presents and demonstrates a framework for structuring local adaptation responses using the inputs from multiple perspectives. The adaptation response framing has been done by: (i) contextualizing climate change adaptation needs; (ii) analysing drivers of change; (iii) characterizing measures of adaptation; and*		

(iv) establishing links between the measures with a particular emphasis on taking account of multiple perspectives. This framework was demonstrated with reference to the management of flood risks in a case study Can Tho, Vietnam.		
Reference	Product type	Project no.
Radhakrishnan, M., Pathirana, A., Ashley, R. and Zevenbergen, C. (2017). Structuring Climate Adaptation through Multiple Perspectives: Framework and Case Study on Flood Risk Management. *Water*, *9*(2), 129, doi: 10.3390/w9020129.	Publication; Guideline / Framework	B4.2
Radhakrishnan, M., Pathirana, A., Ashley, R., Gersonius, B. and Zevenbergen, C. (2017). *Flexibility in adaptation planning. Guidelines for when, where & how to embed and value flexibility in an urban flood resilience context*. Melbourne, Australia: Cooperative Research Centre for Water Sensitive Cities.	Guideline / Framework; Learning Tool	B4.2
Literature reviews and industry notes on political dynamics, policy frameworks, tactics and strategies for researchers to influence policy: A two-part published literature review, focusing on: (1) policy frameworks and theoretical aspects of political dynamics; and (2) tactics and strategies for influencing policy. Industry notes will summarise key aspects for simpler communication.		
Walter, J. (2014). Political Leadership. In: A. Fenna, J. Robbins and J. Summers, eds., *Government and Politics in Australia*. Sydney, AUS: Pearson, pp. 242-258.	Publication	A3.3
Walter, J. and Ghazarian, Z. (2014). Politics and Government. In: C. Miller and L. Orchard, eds., *Australian Public Policy: Progressive Ideas in the Neo-Liberal Ascendancy*. Bristol, UK: Policy Press, pp. 299-314.	Publication	A3.3
Walter, J. (2014). "It is not a biography …", it is executive practice. In: G. Davis and R. A. W. Rhodes, eds., *The Craft of Governing*. Sydney: Allen & Unwin.	Publication	A3.3
Laing, M. (2015). *Scientists and Policy Influence: A Literature Review*. Melbourne, Australia: Cooperative Research Centre for Water Sensitive Cities.	Publication	A3.3
Growth scenarios report detailing methods for incorporating ecological and water science into statutory planning*: Identification of possible reform to existing planning framework to underpin robustness in a water sensitive planning process; Based on tests of the robustness of current planning framework under a series of growth scenarios.*		
This output is currently being developed.	–	B1.2
Assessment of planning policies under various growth scenarios for three case study city-regions*: Documentation of initial policy 'test bed' model, which allows planners/policy makers to test policy impacts under multiple plausible growth scenarios, has been provided to end users from city regions.*		
This output is currently being developed.	–	B1.2
Recommendations of governance structures and strategies to support innovation and adaptability: *Recommendations to embed capacity for innovation and flexibility into urban water governance from review of international best practice and public sector*		

literature, and case studies.		
Reference	Product type	Project no.
Head, B. W. (2014). Managing urban water crises: adaptive policy responses to drought and flood in Southeast Queensland, Australia. *Ecology and Society*, 19(2), p. 33. doi: 10.5751/ES-06414-190233.	Publication	A3.1
Bettini, Y., Brown, R. R. and De Haan, F. J. (2015). Exploring institutional adaptive capacity in practice: examining water governance adaptation in Australia. *Ecology and Society,* 20(1), p. 47. doi: 10.5751/ES-07291-200147.	Publication	A3.1
Bettini, Y. and Head, B. W. (2014). Opportunity Structures: Understanding Capacity for Policy Innovation. In: *The Australian Political Studies Association Annual Conference*, 29 September – 1 October, Sydney, Australia.	Publication	A3.1
Werbeloff, L. (2013). Mainstreaming WSUD: Indicators of institutional change. In: *Water Sensitive Urban Design 2013: WSUD 2013.* Barton, ACT: Engineers Australia, pp. 129-133.	Publication	A3.1
Head, B.W. (2014). The Collaboration Solution? Factors for Collaborative Success. In: J. O'Flynn, D. Blackman and J. Halligan, eds., *Crossing Boundaries in Public Management and Policy*. London, UK: Routledge, pp. 142-157.	Publication	A3.1
Head, B.W. (2014). Research and its Policy Relevance. In: R. J. Stimson, ed., *Handbook of Research Methods and Applications in Spatially Integrated Social Science*. Cheltenham, UK: Edward Elgar, pp. 603-616.	Publication	A3.1
Head, B.W. (2013). Evidence-based policy-making for innovation. In S. P. Osborne and L. Brown, eds., *Handbook of Innovation in Public Services*, Cheltenham UK: Edward Elgar, pp. 143-156.	Publication	A3.1
Wallington, T., Robinson, C. and Head, B.W. (2012). Crisis, change and water institutions in South-east Queensland: strategies for an integrated approach. In: T. Measham and S. Lockie, eds., *Risk and Social Theory in Environmental Management*. Melbourne, Australia: CSIRO Publishing, pp. 185-198.	Publication	A3.1
Lane, R., Bettini, Y., McCallum, T. and Head, B.W. (2017). The interaction of risk allocation and governance arrangements in innovative urban stormwater and recycling projects. *Landscape and Urban Planning*, 164, pp. 37-48.	Publication	A3.1 , A3.2
Bettini, Y. and Head, B.W. (2016). *Governance structures and strategies to support innovation and adaptability*. Melbourne, Australia: Cooperative Research Centre for Water Sensitive Cities.	Guideline / Framework	A3.1
Bettini, Y. (2015). *Fitzgibbon Chase: A case study in*	Learning	A3.1

technological innovation, regulation and planning policy connections. Melbourne, Australia: Cooperative Research Centre for Water Sensitive Cities.	Tool	
Reference	Product type	Project no.
Bettini, Y. and Head, B.W. (2016). *WA Groundwater Replenishment Trial: A case study of creating the enabling environment for regulatory change*. Melbourne, Australia: Cooperative Research Centre for Water Sensitive Cities.	Learning Tool	A3.1
van de Meene, S. J., Head, B. W., and Bettini, Y. (2017). *Toward effective change in urban water policy: the role of collaborative governance and cross-scale integration*. Melbourne, Australia: Cooperative Research Centre for Water Sensitive Cities.	Publication	A3.1
***Policy recommendations regarding attribute ranking of stormwater benefits**: Policy recommendations (through industry notes, the blueprint, and our publications) about how we can rank the various attributes provided by stormwater that have a value and there is a willingness to pay by the community.*		
CRCWSC Industry Note (2014). *Valuing stormwater management: Who is willing to pay?* Melbourne, Australia: Cooperative Research Centre for Water Sensitive Cities.	Factsheet	A1.1
***Policy recommendations about the use of incentives for demand management:** Policy recommendations about the use of incentives for demand management.*		
Brent, D., Friesen, L., Gangadharan, L. and Leibbrandt, A. (2016). *Behavioural insights from field experiments in environmental economics*. Melbourne, Australia: Monash University Department of Economics Working Paper Series.	Publication	A1.3
***Guidance for enhancing flood resilience:** Guidelines for enhancing social and technical flood resilience in Australian urban systems.*		
Salinas-Rodriguez, C., Ashley, R., Gersonius, B., Rijke, J., Pathirana, A. and Zevenbergen, C. (2014). Incorporation and application of resilience in the context of water-sensitive urban design: linking European and Australian perspectives. *Wiley Interdisciplinary Reviews: Water*, 1(2), pp. 173-186.	Publication	B4.2
Ashley, R., Shucksmith, J., Blanksby, J., Sharp, L., Tait, S., Shaffer, P. and Stam, J. (2013). Water sensitive urban design in a European context. In: *Water Sensitive Urban Design 2013: WSUD 2013*. Barton, ACT: Engineers Australia, pp. 209-219.	Publication; Guideline / Framework	B4.2
Salinas-Rodriguez, C., Ashley, R., Gersonius, B., Pathirana, A., Rijke, J. and Zevenbergen, C. (2013). Flood resilience incorporation and application in the context of water sensitive cities. In: *Water Sensitive Urban Design 2013: WSUD 2013*. Barton, ACT: Engineers Australia, pp.	Publication	B4.2

375-381.		
Reference	Product type	Project no.
Quan, N. H., Phi, H. L., Tran, P. G., Pathirana, A., Radhakrishnan M. and Quang, C. N. X. (2014). Urban retention basin in developing city: from theoretical effectiveness to practical feasibility. In: *13th International Conference on Urban Drainage*, 7-14 September, Sarawak, Malaysia.	Publication; Model / Database	B4.2
Bacchin, T., Ashley, R., Blecken, G., Viklander, M. and Gersonius, B. (2016). Green-blue Infrastructure for Sustainable Cities: Innovative Socio-technical Solutions Bringing Multifunctional value. In: *Novatech*, 28 June – 1 July, Lyon, France.	Publication	B4.2
Rijke, J., Ashley, R., Gersonius, B. and Sakic, R. (2016). *Adaptation mainstreaming for achieving flood resilience in cities*. Melbourne, Australia: Cooperative Research Centre for Water Sensitive Cities.	Guideline / Framework	B4.2
Veerbeek, W., Gersonius, B., Ashley, R., Rijke, J., Radhakrishnan, M. and Salinas-Rodriguez, C. (2016). *Appropriate Flood Adaptation: Adapting in the right way, in the right place and at the right time.* Melbourne, Australia: Cooperative Research Centre for Water Sensitive Cities.	Model / Database; Guideline / Framework	B4.2
Gersonius, B., Ashley, R., Salinas-Rodriguez, C., Rijke, J., Radhakrishnan, M. and Zevenbergen, C. (2016). *Flood Resilience in Water Sensitive Cities: Guidance for enhancing flood resilience in the context of an Australian Water Sensitive City*. Melbourne, Australia: Cooperative Research Centre for Water Sensitive Cities.	Guideline / Framework	B4.2
Radhakrishnan, M., Pathirana, A., Ashley, R., Gersonius, B. and Zevenbergen, C. (2017). *Flexibility in adaptation planning. Guidelines for when, where & how to embed and value flexibility in an urban flood resilience context*. Melbourne, Australia: Cooperative Research Centre for Water Sensitive Cities.	Guideline / Framework; Learning Tool	B4.2
***Guidelines to support governance reform through policy change**: Guidelines that help industry analyse governance structures to identify barriers and opportunities for change within their context, and design collaborative strategies to pursue change agendas.*		
Bettini, Y. and Head, B.W. (2016). *Governance structures and strategies to support innovation and adaptability*. Melbourne, Australia: Cooperative Research Centre for Water Sensitive Cities.	Guideline / Framework	A3.1
van de Meene, S. J., Head, B. W., and Bettini, Y. (2017). *Toward effective change in urban water policy: the role of collaborative governance and cross-scale integration*. Melbourne, Australia: Cooperative Research Centre for	Publication	A3.1

Water Sensitive Cities.		
Reference	Product type	Project no.
Scenarios of plausible futures for rapidly growing metropolitan/city regions (i.e. three case study regions): *Scenarios available from which to test the robustness of water sensitive policies at the city and regional scale.*		
Serrao-Neumann, S. and Low Choy, D. (2014). Multi-stakeholder scenarios for decision-making in the face of climate change: the matter of scale. In: *Urban Futures Squaring Circles*, 10-11 October, Lisbon, Portugal.	Publication	B1.2
Co-governance case study: *Report examining Marrickville Council's experience with co-governance in the delivery of 3 sustainable urban water management projects.*		
Tawfik, S. (2016). *Pursuing sustainable urban water management through co-governance: a case study of Marrickville Council.* Melbourne, Australia: Cooperative Research Centre for Water Sensitive Cities.	Learning Tool	A4.1

d. Legislation and regulation: Legislative and regulative instruments that ensure and enable water sensitive practices

Reference	Product type	Project no.
Legislative stocktake reports for Victoria, Western Australia and Queensland: *A documented review of the existing legislation-based regulatory frameworks across three Australian jurisdictions and an assessment of the capacity of such frameworks to help or hinder water sensitive cities.*		
De Sousa, D. (Maddocks Lawyers) (2014). *Final Report: Results of Legislative Stock-take for Western Australia.* Melbourne, Australia: Cooperative Research Centre for Water Sensitive Cities.	Publication	A3.2
De Sousa, D. (Maddocks Lawyers) (2013). *Final Report: Results of Legislative Stock-take for Victoria*. Melbourne, Australia: Cooperative Research Centre for Water Sensitive Cities.	Publication	A3.2
De Sousa, D., Cox, S. and Stanford, S. (Maddocks Lawyers) (2014). *Final Report: Results of Legislative Stock-take for Queensland*. Melbourne, Australia: Cooperative Research Centre for Water Sensitive Cities.	Publication	A3.2
Assessment comparing statutory & non-statutory planning systems*: Comparative assessment of the statutory and non-statutory planning systems for the case study regions (i.e. SEQ, Greater Melbourne and Greater Perth). Provides the background planning frameworks, as presently applied, to assist development of planning reform agenda.*		
Serrao-Neumann, S., Renouf, M., Kenway, S. J. and Low Choy, D. (2017). Connecting land-use and water planning: Prospects for an urban water metabolism approach. *Cities*, 60(A), pp. 13-27.	Publication	B1.2
Serrao-Neumann, S., Schuch, G., Kenway, S. J. and Low Choy, D. (2014). Water sensitive cities and regions:	Publication	B1.2

tackling threats to water resources in metropolitan areas. In: *Association of European Schools of Planning (AESOP) Annual Congress*, 9-12 July, Utrecht, Netherlands.		
Reference	Product type	Project no.
Serrao-Neumann, S. Schuch, G. Kenway, S. J. and Low Choy, D. (2014). Advancing the adaptation of the water resource sector in highly urbanised regions across Australia. In: *Climate Adaptation 2014: Future Challenges*, 30 September – 2 October, Gold Coast, Australia.	Publication	B1.2
Schuch, G., Serrao-Neumann, S., Kenway, S. J. and Low Choy, D. (2014). Are we there yet? Integrated water sensitive open space planning for climate change adaptation. In: *Climate Adaptation 2014: Future Challenges*, 30 September – 2 October, Gold Coast, Australia.	Publication; Guideline / Framework	B1.2
Schuch, G., Serrao-Neumann, S., Morgan, E. and Choy, D. L. (2017). Water in the city: Green open spaces, land use planning and flood management – An Australian case study. *Land Use Policy*, 63, pp. 539-550.	Learning Tool; Publication	B1.2
Comparative analysis of Australian regulatory frameworks: *Comparative analysis of current regulatory frameworks for urban water regulation with recommendations for reconfiguring for water sensitive service delivery; Based on review of Australian urban water regulation with appendices that include analyses for Brisbane, Melbourne and Perth; Examined water resources, service delivery and price regulation, built environment regulation, environmental regulation, and public health regulation.*		
McCallum, T. and Boulot, E. (2015). *Becoming a Water Sensitive City: A Comparative Review of Regulation in Australia.* Melbourne, Australia: Cooperative Research Centre for Water Sensitive Cities.	Publication	A3.2
Case study reports on regulation and risk management*: Case studies into how current regulatory and risk allocation frameworks impact the delivery of innovative water sensitive projects.*		
Bancroft, M. and Gardner, A. (2015). Opportunities and Obligations for Residential Developers to Undertake Wastewater Recycling and Stormwater Capture: A Western Australian Perspective. *Environmental and Planning Law Journal*, 32(4), pp. 372-391.	Publication	A3.2
Bennett, M. B., Gardner, A. W. and Vincent, K. (2014). Regulatory Renovation for Managed Aquifer Recharge Using Alternative Water Resources: A Western Australian Perspective. *The Journal of Water Law*, 24(1), pp. 5-14.	Publication	A3.2
Gardner, A. and Jensen, J. (2016). Legal Duties for Restoration of Waterways and Wetlands. *New Water Policy and Practice*, 2(2), pp. 10-20. doi: 10.18278/nwpp.2.2.3.	Publication	A3.2
McCallum, T. (2015). *Kalkallo: a case study in technological innovation amidst complex regulation*.	Learning Tool	A3.2

Melbourne, Australia: Cooperative Research Centre for Water Sensitive Cities.		
Reference	Product type	Project no.
Jensen, J. and Gardner, A. (2016). *Legal duties for restoration of waterways and wetlands: a Western Australian analysis and case study.* Melbourne, Australia: Cooperative Research Centre for Water Sensitive Cities.	Learning Tool	A3.2
Lane, R., Bettini, Y., McCallum, T. and Head, B.W. (2017). The interaction of risk allocation and governance arrangements in innovative urban stormwater and recycling projects. *Landscape and Urban Planning*, 164, pp. 37-48.	Publication	A3.1 , A3.2
***Risk allocation model**: Review of current approaches to legal risk allocation; Preliminary model developed for the legal allocation of the risk of harms from water sensitive practices.*		
McCallum, T., Campbell, C., Hodge, G. and Boulot, E. (2016). *The Risky Business of Water Sensitive City Innovation: A Legal Analysis of Risk Allocation.* Melbourne, Australia: Cooperative Research Centre for Water Sensitive Cities.	Publication; Guideline / Framework	A3.2
***Conceptual model of Australian urban water regulation:** A conceptual model of urban water regulation in Australian cities and a detailed mapping of the systems for such regulation in Melbourne.*		
Windholz, E. and Hodge, G. A. (2012). Conceptualising Social and Economic Regulation: Implications for Modern Regulators and Regulatory Activity. *Monash University Law Review*, 38(2), pp. 212-237.	Publication	A3.2
McCallum, T., Hodge, G., Freiberg, A. and O'Connor, P. (2014). Better Regulatory Frameworks for Water Sensitive Cities: An Australian Case Study. In: *5th Biennial Conference – ECPR Standing Group on Regulatory Governance*, 25-27 June, Barcelona, Spain.	Publication; Guideline / Framework	A3.2
McCallum, T. (2014). *Conceptualising Urban Water Regulation: The Melbourne system.* Melbourne, Australia: Cooperative Research Centre for Water Sensitive Cities.	Publication; Guideline / Framework	A3.2
***Guidelines for statutory and non-statutory planners:** Guidelines (and training) produced for statutory and non-statutory planners in the land use, environmental, landscape and natural resource management fields.*		
This output is currently being developed.	–	B1.2

2. On-ground practices

a. Water systems planning: Planning of urban water infrastructure

Reference	Product type	Project no.
***Growth scenarios report detailing methods for incorporating ecological and water science into statutory planning**: Identification of possible reform to existing planning framework to underpin robustness in a water sensitive planning process; Based on tests of the robustness of current planning framework under a series of growth scenarios.*		
This output is currently being developed.	–	B1.2
***Urban water portfolio modelling for hedging supply risks:** An optimal urban water portfolio model that hedges against supply risks from all potential water assets, by taking into account uncertainties of water flows as well as differences in supply costs; Economic algorithm to determine the optimal balance of three sources of water – desalination, reservoirs and stormwater harvesting; Evidence of the economic value of stormwater harvesting as part of a portfolio of sources.*		
Leroux, A. D. and Martin, V. L. (2014). *Hedging Supply Risks: An Optimal Urban Water Portfolio.* Melbourne, Australia: Monash University Department of Economics Working Paper Series.	Publication; Model / Database	A1.1
Leroux, A. D. and Martin, V. L. (2016). Hedging Supply Risks: An Optimal Water Portfolio. *American Journal of Agricultural Economics*, 98(1), pp. 276-296.	Publication; Model / Database	A1.1
Gangadharan, L., Harrison, G., Leroux, A. and Raschky, P. (2013). Multi-Attribute Risk Aversion in Charitable Giving. In: *20th Annual Conference of the European Association of Environmental and Resource Economists (EAERE)*, 26-29 June, Toulouse, France.	Publication	A1.1
CRCWSC Industry Note (2015). *What is the best mix for our urban water supply?* Melbourne, Australia: Cooperative Research Centre for Water Sensitive Cities.	Factsheet	A1.1
***Web-based modelling platform to facilitate collaborative planning and decision-making processes**: Provides interfaces with existing software tools, accesses cloud-computing capacity and allows multiple organisations to access common datasets, models and scenarios to facilitate collaboration*		
CRCWSC (2016). *Dynamic Adaptation for enabling City Evolution for Water (DAnCE4Water)*. Available at: http://dance4water.org/	Learning Tool; Model / Database	A4.3
***Spatially interlinked database to describe a virtual urban environment:** Database of spatially interlinked biophysical, infrastructural and sociodemographic data, including publicly available data (e.g. land use, BOM).*		
CRCWSC (2016). *Dynamic Adaptation for enabling City Evolution for Water (DAnCE4Water)*. Available at: http://dance4water.org/	Learning Tool; Model / Database	A4.3
***Guidance and recommendations on the development of effective and robust water management strategies:** Advice on development and implementation of adaptation strategies based on review of case studies; Key opportunities to link this with wastewater*		

treatment models and receiving water modelling.		
Reference	Product type	Project no.
Ferguson, B. C., Brown, R. R. and Deletic, A. (2013). Diagnosing transformative change in urban water systems: Theories and frameworks. *Global Environmental Change*, 23(1), pp. 264-280.	Publication	A4.3
Ferguson, B. C., Brown, R. R. and Deletic, A. (2013). A diagnostic procedure for transformative change based on transitions, resilience and institutional thinking. *Ecology and Society*, 18(4), p. 57. doi: 10.5751/ES-05901-180457.	Publication; Guideline / Framework	A4.3
Urich, C. and Rauch, W. (2014). Exploring critical pathways for urban water management to identify robust strategies under deep uncertainties. *Water Research*, 66, pp.374-389.	Publication; Model / Database	A4.3
Urich, C. and Rauch, W. (2014). Modelling the urban water cycle as an integrated part of the city: a review. *Water Science and Technology*, 70(11), pp. 1857-1872.	Publication; Model / Database	A4.3
Urich, C., Bach, P., Sitzenfrei, R., Kleidorfer, M., McCarthy, D. T., Deletic, A. and Rauch, W. (2013). Modelling cities and water infrastructure dynamics. In: *Proceedings of the Institution of Civil Engineers: Engineering Sustainability*, 166(5), pp. 301-308.	Publication; Model / Database	A4.3
Malekpour, S., de Haan, F. J. and Brown, R. R. (2013). Marrying exploratory modelling to strategic planning: Towards participatory model use. In: *20th International Congress on Modelling and Simulation (Modsim2013)*, 1-6 December, Adelaide, Australia.	Publication	A4.3

b. Urban and landscape design: Designing urban environments for integrated and multi-functional water service delivery

Reference	Product type	Project no.
Management guidelines for the repair of urban freshwaters: *Technical manuals and fact sheets to guide the best practice repair of urban freshwaters.*		
Bhaskar, A. S., Beesley, L., Burns, M. J., Fletcher, T. D., Hamel, P., Oldham, C. E. and Roy, A. H. (2016). Will it rise or will it fall? Managing the complex effects of urbanization on base flow. *Freshwater Science*, 35(1), pp. 293-310.	Publication; Guideline / Framework	B2.23, B2.4
Conceptual models describing the key stressors to urban waterways (typologies)*: A framework to assist managers to determine the key drivers of ecosystem health and function differences among physiographic regions and with characteristics of urban development and infrastructure.*		
Utz, R. M., Hopkins, K. G., Beesley, L., Booth, D. B., Hawley, R. J., Baker, M. E., Freeman, M. C. and Jones, K. L. (2016). Ecological resistance in urban streams: the role of natural and legacy attributes. *Freshwater Science*, 35(1), pp. 380-397.	Publication	B2.23

Reference	Product type	Project no.
Beesley, L., Pettit, N., Gwinn, D. C. and Davies, P. M. (2016). Are our urban streams on fire? Using studies on fire to learn about the Urban Stream Syndrome. In: *8th Australian River Management Conference,* 31 July – 3 August, Blue Mountains, New South Wales.	Publication	B2.23
Set of indicators for assessing the ecological health of urban waterways: *A set of parameters that can be readily measured in urban freshwaters and can provide a rapid assessment of ecosystem health.*		
Middleton, J., Beesley, L., Gwinn, D., Close, P., Quinton, B., Storer, T. and Davies, P. (2015). The 'urban stream syndrome' in a flat sandy landscape: hydrologic stress, riparian buffers and nutrients drive stream integrity. In: *28th Annual Conference of the Australasian Wildlife Management Society*, 23-26 November, Perth, Australia.	Factsheet	B2.23
Understanding of the groundwater/ surface water interactions in the Perth Coastal environment based on data assessment: *Background information to assist understanding of groundwater/surface water interactions in the Perth Coastal environment based on meta-analysis of urban water monitoring datasets.*		
Adyel, T. M., Oldham, C. E. and Hipsey, M. R. (2016). Stormwater nutrient attenuation in a constructed wetland with alternating surface and subsurface flow pathways: Event to annual dynamics. *Water Research*, 107, pp. 66-82.	Publication	B2.4
Bhaskar, A. S., Beesley, L., Burns, M. J., Fletcher, T. D., Hamel, P., Oldham, C. E. and Roy, A. H. (2016). Will it rise or will it fall? Managing the complex effects of urbanization on base flow. *Freshwater Science*, 35(1), pp. 293-310.	Publication; Guideline / Framework	B2.23, B2.4
Adyel, T. M., Hipsey, M. R. and Oldham C. E. (2016). A multi-functional, multi-compartment constructed wetland to support urban waterway restoration. In: *Singapore International Water Week*, 10-14 July, Marina Bay Sands, Singapore.	Publication	B2.4
Adyel, T. M., Conti, A. L. R., Ocampo, C. J., Coletti, J. Z., Hipsey, M. R. and Oldham, C. E. (2015). Ecohydrology and stormwater nutrient attenuation performance of constructed wetland in Western Australia. In: *Proceedings of the 36th International Association for Hydro-Environment Engineering and Research World Congress*, 28 June– 3 July, The Hague, The Netherlands.	Publication	B2.4
Ocampo, C. J and Oldham, C. E. (2013). The impact of urbanisation on hydrology in areas with significant groundwater surface water interactions: Three case studies. In: *Water Sensitive Urban Design 2013: WSUD 2013*. Barton, ACT: Engineers Australia, pp. 503-516.	Publication	B2.4

Reference	Product type	Project no.
Wang, B., Oldham, C. E. and Hipsey, M. R. (2016). Comparison of Machine Learning Techniques and Variables for Groundwater Dissolved Organic Nitrogen Prediction in an Urban Area. *Procedia Engineering*, 154, pp. 1176-1184.	Publication	B2.4
Ruibal-Conti, A. L., Ocampo, C. J., Adyel, T. M., Hipsey, M. R. and Oldham, C.E. (2015). *Performance assessment the of Anvil Way Compensation Basin living stream: 2004-2013*. Melbourne, Australia: Cooperative Research Centre for Water Sensitive Cities.	Publication	B2.4, C4.1
Adyel, T. M, Ocampo, C. J., Tareque, H., Oldham, C. E. and Hipsey, M. R. (2015). *Performance assessment of Wharf St Constructed Wetland 2009-2014*. Melbourne, Australia: Cooperative Research Centre for Water Sensitive Cities.	Publication	B2.4, C4.1
Ocampo, C. J., Rennie, B. and Oldham, C. E. (2017). *Performance of two urban stormwater biofilters in an area with seasonally high groundwater*. Melbourne, Australia: Cooperative Research Centre for Water Sensitive Cities.	Publication	B2.4
Data and knowledge gaps report for urban systems impacted by groundwater: *Identification of urban water data and knowledge gaps for urban systems impacted by groundwater to help define research activities to further develop and validate conceptual model of groundwater/ surface water interactions.*		
Adyel, T. M., Oldham, C. E. and Hipsey, M. R. (2016). Stormwater nutrient attenuation in a constructed wetland with alternating surface and subsurface flow pathways: Event to annual dynamics. *Water Research*, 107, pp.66-82.	Publication	B2.4
Bhaskar, A. S., Beesley, L., Burns, M. J., Fletcher, T. D., Hamel, P., Oldham, C. E. and Roy, A. H. (2016). Will it rise or will it fall? Managing the complex effects of urbanization on base flow. *Freshwater Science*, 35(1), pp. 293-310.	Publication; Guideline / Framework	B2.23, B2.4
Abbott, B. W., Baranov, V., Mendoza-Lera, C., Nikolakopoulou, M., Harjung, A., Kolbe, T., Balasubramanian, M. N., Vaessen, T. N., Ciocca, F., Campeau, A. and Wallin, M. B. (2016). Using multi-tracer inference to move beyond single-catchment ecohydrology. *Earth-Science Reviews*, 160, pp.19-42.	Publication	B2.4
Adyel, T., Hipsey, M. R. and Oldham C. E. (2016). A multi-functional, multi-compartment constructed wetland to support urban waterway restoration. In: *Singapore International Water Week*, 10-14 July, Marina Bay Sands, Singapore.	Publication	B2.4
Adyel, T. M., Conti, A. L. R., Ocampo, C. J., Coletti, J. Z., Hipsey, M. R. and Oldham, C. E. (2015). Ecohydrology and stormwater nutrient attenuation performance of constructed	Publication	B2.4

wetland in Western Australia. In: *Proceedings of the 36th International Association for Hydro-Environment Engineering and Research World Congress*, 28 June– 3 July, The Hague, The Netherlands.		
Reference	Product type	Project no.
Ocampo, C. J and Oldham, C. E. (2013). The impact of urbanisation on hydrology in areas with significant groundwater surface water interactions: Three case studies. In: *Water Sensitive Urban Design 2013: WSUD 2013*. Barton, ACT: Engineers Australia, pp. 503-516.	Publication	B2.4
Wang, B., Oldham, C. E. and Hipsey, M. R. (2016). Comparison of Machine Learning Techniques and Variables for Groundwater Dissolved Organic Nitrogen Prediction in an Urban Area. *Procedia Engineering*, 154, pp. 1176-1184.	Publication	B2.4
Ruibal-Conti, A. L., Ocampo, C. J., Adyel, T. M., Hipsey, M. R. and Oldham, C.E. (2015). *Performance assessment the of Anvil Way Compensation Basin living stream: 2004-2013*. Melbourne, Australia: Cooperative Research Centre for Water Sensitive Cities.	Publication	B2.4, C4.1
Adyel, T. M, Ocampo, C. J., Tareque, H., Oldham, C. E. and Hipsey, M. R. (2015). *Performance assessment of Wharf St Constructed Wetland 2009-2014*. Melbourne, Australia: Cooperative Research Centre for Water Sensitive Cities.	Publication	B2.4, C4.1
Ocampo, C. J., Rennie, B. and Oldham, C. E. (2017). *Performance of two urban stormwater biofilters in an area with seasonally high groundwater*. Melbourne, Australia: Cooperative Research Centre for Water Sensitive Cities.	Publication	B2.4
Mass balances for WSUD elements impacted by shallow water tables: *Empirical evidence to support the development of a conceptual model of surface water/ groundwater interactions based on mass balances for WSUD elements impacted by shallow water tables.*		
Adyel, T. M., Oldham, C. E. and Hipsey, M. R. (2016). Stormwater nutrient attenuation in a constructed wetland with alternating surface and subsurface flow pathways: Event to annual dynamics. *Water Research*, 107, pp.66-82.	Publication	B2.4
Bhaskar, A. S., Beesley, L., Burns, M. J., Fletcher, T. D., Hamel, P., Oldham, C. E. and Roy, A. H. (2016). Will it rise or will it fall? Managing the complex effects of urbanization on base flow. *Freshwater Science*, 35(1), pp. 293-310.	Publication; Guideline / Framework	B2.23, B2.4
Adyel, T., Hipsey, M. R. and Oldham C. E. (2016). A multi-functional, multi-compartment constructed wetland to support urban waterway restoration. In: *Singapore International Water Week*, 10-14 July, Marina Bay Sands, Singapore.	Publication	B2.4

Reference	Product type	Project no.
Adyel, T. M., Conti, A. L. R., Ocampo, C. J., Coletti, J. Z., Hipsey, M. R. and Oldham, C. E. (2015). Ecohydrology and stormwater nutrient attenuation performance of constructed wetland in Western Australia. In: *Proceedings of the 36th International Association for Hydro-Environment Engineering and Research World Congress*, 28 June– 3 July, The Hague, The Netherlands.	Publication	B2.4
Ocampo, C. J and Oldham, C. E. (2013). The impact of urbanisation on hydrology in areas with significant groundwater surface water interactions: Three case studies. In: *Water Sensitive Urban Design 2013: WSUD 2013*. Barton, ACT: Engineers Australia, pp. 503-516.	Publication	B2.4
Wang, B., Oldham, C. E. and Hipsey, M. R. (2016). Comparison of Machine Learning Techniques and Variables for Groundwater Dissolved Organic Nitrogen Prediction in an Urban Area. *Procedia Engineering*, 154, pp. 1176-1184.	Publication	B2.4
Ruibal-Conti, A. L., Ocampo, C. J., Adyel, T. M., Hipsey, M. R. and Oldham, C.E. (2015). *Performance assessment the of Anvil Way Compensation Basin living stream: 2004-2013*. Melbourne, Australia: Cooperative Research Centre for Water Sensitive Cities.	Publication	B2.4, C4.1
Adyel, T. M, Ocampo, C. J., Tareque, H., Oldham, C. E. and Hipsey, M. R. (2015). *Performance assessment of Wharf St Constructed Wetland 2009-2014*. Melbourne, Australia: Cooperative Research Centre for Water Sensitive Cities.	Publication	B2.4, C4.1
Ocampo, C. J., Rennie, B. and Oldham, C. E. (2017). *Performance of two urban stormwater biofilters in an area with seasonally high groundwater*. Melbourne, Australia: Cooperative Research Centre for Water Sensitive Cities.	Publication	B2.4
Groundwater-borne nutrient load quantification for use in development of nutrient flows through water body systems: *Empirical evidence to support the development of a nutrient flow through a water body system influenced by significant surface water/ groundwater interactions, based on quantification of groundwater-borne nutrient load.*		
Adyel, T. M., Oldham, C. E. and Hipsey, M. R. (2016). Stormwater nutrient attenuation in a constructed wetland with alternating surface and subsurface flow pathways: Event to annual dynamics. *Water Research*, 107, pp. 66-82.	Publication	B2.4
Bhaskar, A. S., Beesley, L., Burns, M. J., Fletcher, T. D., Hamel, P., Oldham, C. E. and Roy, A. H. (2016). Will it rise or will it fall? Managing the complex effects of urbanization on base flow. *Freshwater Science*, 35(1), pp. 293-310.	Publication; Guideline / Framework	B2.23, B2.4
Adyel, T., Hipsey, M. R. and Oldham C. E. (2016). A	Publication	B2.4

multi-functional, multi-compartment constructed wetland to support urban waterway restoration. In: *Singapore International Water Week*, 10-14 July, Marina Bay Sands, Singapore.		
Reference	Product type	Project no.
Adyel, T. M., Conti, A. L. R., Ocampo, C. J., Coletti, J. Z., Hipsey, M. R. and Oldham, C. E. (2015). Ecohydrology and stormwater nutrient attenuation performance of constructed wetland in Western Australia. In: *Proceedings of the 36th International Association for Hydro-Environment Engineering and Research World Congress*, 28 June– 3 July, The Hague, The Netherlands.	Publication	B2.4
Wang, B., Oldham, C. E. and Hipsey, M. R. (2016). Comparison of Machine Learning Techniques and Variables for Groundwater Dissolved Organic Nitrogen Prediction in an Urban Area. *Procedia Engineering*, 154, pp. 1176-1184.	Publication	B2.4
Ruibal-Conti, A. L., Ocampo, C. J., Adyel, T. M., Hipsey, M. R. and Oldham, C.E. (2015). *Performance assessment the of Anvil Way Compensation Basin living stream: 2004-2013*. Melbourne, Australia: Cooperative Research Centre for Water Sensitive Cities.	Publication	B2.4, C4.1
Adyel, T. M, Ocampo, C. J., Tareque, H., Oldham, C. E. and Hipsey, M. R. (2015). *Performance assessment of Wharf St Constructed Wetland 2009-2014*. Melbourne, Australia: Cooperative Research Centre for Water Sensitive Cities.	Publication	B2.4, C4.1
Ocampo, C. J., Rennie, B. and Oldham, C. E. (2017). *Performance of two urban stormwater biofilters in an area with seasonally high groundwater*. Melbourne, Australia: Cooperative Research Centre for Water Sensitive Cities.	Publication	B2.4
***Integrated greenspace framework**: Determination if current plans in the case study regions incorporate a formal greenspace framework that implicitly links the urban areas hydrologically and ecologically within their region. For regions that do not have a formal greenspace framework, identification if there are elements within the existing plans that could be readily adapted into a greenspace framework.*		
Schuch, G., Serrao-Neumann, S., Kenway, S. J. and Low Choy, D. (2014). Are we there yet? Integrated water sensitive open space planning for climate change adaptation. In: *Climate Adaptation 2014: Future Challenges*, 30 September – 2 October, Gold Coast, Australia.	Publication; Guideline / Framework	B1.2
Schuch, G., Serrao-Neumann, S., Morgan, E. and Choy, D. L. (2017). Water in the city: Green open spaces, land use planning and flood management – An Australian case study. *Land Use Policy*, 63, pp. 539-550.	Publication; Learning Tool	B1.2

Reference	Product type	Project no.
Advice on the aesthetic design for raingardens based on landscape perceptions: *Report on landscape perceptions and input into the adoption guidelines for biofilters.*		
Dobbie, M. F. (2013). Public aesthetic preferences to inform sustainable wetland management in Victoria, Australia. *Landscape and Urban Planning*, 120, pp. 178-189.	Publication	A4.1
Dobbie, M. F. and Green, R. (2013). Public perceptions of freshwater wetlands in Victoria, Australia. *Landscape and Urban Planning*, 110, pp. 143-154.	Publication	A4.1
Dobbie, M. F. (2016). *Designing raingardens for community acceptance*. Melbourne, Australia: Cooperative Research Centre for Water Sensitive Cities.	Publication; Guideline / Framework	A4.1
Payne, E. G. I., Hatt, B. E., Deletic, A., Dobbie, M. F., McCarthy, D. T. and Chandrasena, G. I. (2015). *Adoption Guidelines for Stormwater Biofiltration Systems*. Melbourne, Australia: Cooperative Research Centre for Water Sensitive Cities.	Guideline / Framework	A4.1, C1.1
New green technologies performance*: Results from monitoring new technologies including living walls and green walls for greywater treatment and stormwater treatment.*		
Fowdar, H. S., Breen, P., Hatt, B. E., Cook, P. L. M. and Deletic, A. (2014). Innovation for rapid denitrification in biofiltration systems. In: *Stormwater 2014: The 3rd National Conference on Urban Water Management*, 14-17 October, Adelaide, Australia.	Publication	C4.1
Fowdar, H. S., Hatt, B. E., Breen, P., Cook, P. L. M. and Deletic, A. (2015). Evaluation of sustainable electron donors for nitrate removal in different water media. *Water Research*, 85, pp. 487-496.	Publication	C4.1
Fowdar, H. S., Hatt, B. E., Breen, P., Cook, P. L. M. and Deletic, A. (2017). Designing living walls for greywater treatment. *Water Research*, 110, pp. 218-232.	Publication	C4.1
Fowdar, H. S., Hatt, B. E., Cresswell, T., Harrison, J. J., Cook, P. L. M. and Deletic, A. (2017). Phosphorus fate and dynamics in greywater biofiltration systems. *Environmental Science and Technology*, 51(4), pp. 2280–2287.	Publication	C4.1
Prodanovic, V., Hatt, B. E., McCarthy, D., Zhang, K. and Deletic, A. (2017). Green walls for greywater reuse: Understanding the role of media on pollutant removal. *Ecological Engineering*, 102, pp. 625-635.	Publication	C4.1
Advice on integrating WSUD in existing and new urban areas*: Advice on integrating WSUD in urban areas based on a review of leading national and international best practice case studies. Selected case studies will inform and be part of the design guide.*		
Bertram, N. (2015). Melbourne's lowlands: two swampy suburbs with broader implications for urban design.	Learning Tool	D5.1

Presented at: *2nd Water Sensitive Cities Conference*, 8-9 September, Brisbane, Australia.		
Reference	Product type	Project no.
Rogers, B., Bertram, N. and Arnbjerg-Nielsen, K. (2015). Exploring Elwood's flood challenges: a collaborative approach for a complex problem. Presented at: *2nd Water Sensitive Cities Conference*, 8-9 September, Brisbane, Australia.	Learning Tool	D5.1
Skinner, P. and Webster-Mannison, M. (2013). Designing urban cool pools. In: *Water Sensitive Urban Design 2013: WSUD 2013*. Barton, ACT: Engineers Australia, pp. 81-86.	Publication	D5.1
***Adoption guidelines for the design, maintenance and operation of new green technologies**: Design, maintenance and operational guidelines for green and living walls technologies.*		
This output is currently being developed.	–	C4.1
***Design guide for the integration of WSUD in precincts**: Design guide for the integration of WSUD in precincts; Design guide for WSUD precincts with a focus on the integration of social, spatial and environmental aspects of urban precincts.*		
This output is currently being developed.	–	D5.1
***Engagement models for industry and stakeholders regarding design of WSUD:** Development of models for engagement with industry and stakeholders specific to urban design issues related to WSUD (such as design workshops, charrettes, etc.).*		
Rogers, B., Bertram, N. and Arnbjerg-Nielsen, K. (2015). Exploring Elwood's flood challenges: a collaborative approach for a complex problem. Presented at: *2nd Water Sensitive Cities Conference*, 8-9 September, Brisbane, Australia.	Learning Tool	D5.1
CRCWSC (2016). *Toward water sensitive cities: a collaborative approach*. Melbourne, Australia: Cooperative Research Centre for Water Sensitive Cities.	Factsheet	D5.1, A4.2 B4.2
***Quantified benefits of water sensitive urban design and urban greening on the urban climate and urban heat mitigation at a range of scales:** Empirical evidence of observational (including remote sensing) and climate modelling approaches to quantify the potential air temperature reductions and changes to human thermal comfort from the implementation of WSUD and urban greening.*		
Walsh, C. J., Fletcher, T. D., Vietz, G. J., Thompson, R., Tapper, N. J., Beringer, J., Coutts, A. and Allen, R. (2012). New Urban Storm Water Management Approaches: Using the Water Generated by Cities for Ecosystem Services. *CityGreen*, 5, pp. 154-163.	Publication	B2.1, B3.1
Coutts, A. M., Harris, R. J., Phan, T., Livesley, S. J., Williams, N. S. and Tapper, N. J. (2016). Thermal infrared remote sensing of urban heat: Hotspots, vegetation, and an assessment of techniques for use in urban planning. *Remote Sensing of Environment*, 186, pp. 637-651.	Publication	B3.2

Reference	Product type	Project no.
Demuzere, M., Coutts, A. M., Göhler, M., Broadbent, A. M., Wouters, H., van Lipzig, N. P. M. and Gebert, L. (2014). The implementation of biofiltration systems, rainwater tanks and urban irrigation in a single-layer urban canopy model. *Urban Climate*, 10(1), pp. 148-170.	Publication	B3.1
Coutts, A. M., Daly, E., Beringer, J. and Tapper, N. J. (2013). Assessing practical measures to reduce urban heat: Green and cool roofs. *Building and Environment*, 70, pp. 266-276.	Publication	B3.1
Coutts, A. M., White, E. C., Tapper, N. J., Beringer, J. and Livesley, S. J. (2016). Temperature and human thermal comfort effects of street trees across three contrasting street canyon environments. *Theoretical and Applied* Climatology, 124(1), pp. 55-68.	Publication	B3.1
Thom, J. K., Coutts, A. M., Broadbent, A. M. and Tapper, N. J. (2016). The influence of increasing tree cover on mean radiant temperature across a mixed development suburb in Adelaide, Australia. *Urban Forestry and Urban Greening*, 20, 233-242.	Publication	B3.2
Broadbent, A. M. (2016). *The effect of water sensitive urban design and outdoor water-use practices on urban microclimate*, doctoral thesis, Monash University, Melbourne.	Publication	B3.2
Coutts, A. M., Demuzere, M., Tapper, N. J., Daly, E., Beringer, J., Nury, S., Broadbent, A. M., Harris, R. J., Gebert, L. and Nice, K. (2014). *The impacts of harvesting solutions and WSUD on evaporation and the water balance and feedbacks to urban hydrology and stream ecology*. Melbourne, Australia: Cooperative Research Centre for Water Sensitive Cities.	Publication	B3.1
Coutts, A. M., Tapper, N. J., Beringer, J., Daly, E., White, E., Broadbent, A. M., Pettigrew, J., Harris, R. J., Gebert, L., Nice, K., Hamel, P., Fletcher, T. D. and Kalla, M. (2013). *Green Cities and Micro-climate – Interim Report 2: Determine the microclimate influence of harvesting solutions and WSUD at the micro-scale*. Melbourne, Australia: Cooperative Research Centre for Water Sensitive Cities.	Publication	B3.1
Coutts, A. M. and Harris, R. J. (2013). *Urban Heat Island Report: A multi-scale assessment of urban heating in Melbourne during an extreme heat event: policy approaches for adaptation*. Melbourne, Australia: Victorian Centre for Climate Change Adaption Research.	Publication	B3.1
Coutts, A. M., Tapper, N. J., Loughnan, M., Demuzere, M., Broadbent, A. M., Motazedian, A., White, E., Phan, T.,	Factsheet	B3.1

Thom. J., Gebert, L. and Pankhania, D. (2016). *Determine the microclimatic influence of harvesting solutions and WSUD at the micro-scale: Frequently Asked Questions*. Melbourne, Australia: Cooperative Research Centre for Water Sensitive Cities.		
Reference	Product type	Project no.
Evaluation of the benefits of improved urban climates on heat-health outcomes: *Documentation of the heat-health thresholds for Australian capital cities and the spatial variability in heat vulnerability throughout cities; Determination of the effect on heat-health outcomes of urban heat mitigation (air temperature reductions) from WSUD and urban greening.*		
Tapper, N. J., Coutts, A. M., Loughnan, M. and Pankhania, D. (2015). Urban populations' vulnerability to climate extremes: mitigating urban heat through technology and water-sensitive urban design. In: S. Lehmann, ed., *Low Carbon Cities: Transforming Urban Systems, Volume 3, Earthscan Book Series on Sustainable Design*. New York, NY: Routledge, pp. 361-374.	Publication	B3.1
Tapper, N. J. (2012). Adapting Urban Environments to Climate Change: A Case Study of Melbourne Australia. In: M. Robertson, ed., *Schooling for Sustainable Development: A Focus on Australia, New Zealand, and the Oceanic Region*. Netherlands: Springer, pp. 185-198.	Publication	B3.1
Coutts, A. M., Tapper, N. J., Loughnan, M., Demuzere, M., Broadbent, A. M., Motazedian, A., White, E., Phan, T., Thom. J., Gebert, L. and Pankhania, D. (2016). *Determine the microclimatic influence of harvesting solutions and WSUD at the micro-scale: Frequently Asked Questions*. Melbourne, Australia: Cooperative Research Centre for Water Sensitive Cities.	Factsheet	B3.1
Evaluation of the benefits of improved urban climates on Human Thermal Comfort: *Documentation of the levels of Human Thermal Comfort in Australian Cities; Determination of the effect of WSUD and urban greening on human thermal comfort (including air temperature, humidity, wind speed and mean radiant temperature).*		
Lam, C. K. C., Loughnan, M. and Tapper, N. J. (2016). Visitors' perception of thermal comfort during extreme heat events at the Royal Botanic Garden Melbourne. *International Journal of Biometeorology*, pp. 1-16.	Publication	B3.2
Loughnan, M., Carroll, M. and Tapper, N. J. (2015). The relationship between housing and heat wave resilience in older people. *International Journal of Biometeorology*, 59(9), pp. 1291-1298.	Publication	B3.1
Coutts, A. M., Tapper, N. J., Beringer, J., Loughnan, M. and Demuzere, M. (2013). Watering our cities: the capacity for water sensitive urban design to support urban cooling and improve human thermal comfort in the Australian	Publication	B3.1

context. *Progress in Physical Geography*, 37(1), pp. 2-28.		
Reference	Product type	Project no.
Loughnan, M., Carroll, M. and Tapper, N. J. (2014). Learning from our older people: Pilot study findings on responding to heat. *Australasian Journal on Ageing*, 33(4), pp. 271-277.	Publication	B3.1
Salmond, J. A., Tadaki, M., Vardoulakis, S., Arbuthnott, K., Coutts, A. M., Demuzere, M., Dirks, K. N., Heaviside, C., Lim, S., Macintyre, H., McInnes, R. N. and Wheeler, B. W. (2016). Health and climate related ecosystem services provided by street trees in the urban environment. *Environmental Health*. 15(Suppl 1), pp. 95-111.	Publication	B3.2
Lam, C. K. C., Loughnan, M. and Tapper, N. J. (2014). Outdoor human thermal comfort in Melbourne's botanic gardens. In: *20th International Congress of Biometeorology*, 28 September – 1 October, Cleveland, United States.	Publication	B3.1
Loughnan, M., and Carroll, M. (2015). People who are elderly or have chronic conditions. In: R. Walker and W. Mason, eds., *Climate Change Adaptation for Health and Social Services.* Clayton, Australia: CSIRO Publishing, pp. 93-110.	Publication	B3.1
Coutts, A. M., Loughnan, M., Tapper, N. J., White, E., Thom, J., Broadbent, A. M. and Harris, R. J. (2014). *The impacts of WSUD solutions on human thermal comfort.* Melbourne, Australia: Cooperative Research Centre for Water Sensitive Cities.	Publication	B3.1
Heat thresholds for Australian capital cities: *Determination of climatic-based thresholds (e.g. air temperature, apparent temperature) for Australian capital cities at which impacts on human health increase. These thresholds can act as a target for urban heat mitigation through WSUD and urban greening.*		
Jacobs, S. J., Vihma, T. and Pezza, A. B. (2015). Heat stress during the Black Saturday event in Melbourne, Australia. *International Journal of Biometeorology*, 59(6), pp. 759-770.	Publication	B3.1
Loughnan, M., Tapper, N. J. and Phan, T. (2014). Identifying vulnerable populations in subtropical Brisbane, Australia: A guide for heatwave preparedness and health promotion. *ISRN Epidemiology*, 2014, pp. 1-12. doi: 10.1155/2014/821759.	Publication; Model / Database	B3.1
Loughnan, M., Tapper, N. J. and Loughnan, T. (2014). The impact of "unseasonably" warm spring temperatures on acute myocardial infarction hospital admissions in Melbourne, Australia: A city with a temperate climate. *Journal of Environmental and Public Health*, 2014, pp. 1-8. doi: 10.1155/2014/483785.	Publication	B3.1

Reference	Product type	Project no.
Loughnan, M., Tapper, N. J., Phan, T. and McInnes, J. A. (2014). Can a spatial index of heat-related vulnerability predict emergency service demand in Australian capital cities? *International Journal of Emergency Services*, 3(1), pp. 6-33.	Publication; Model / Database	B3.1
Loughnan, M., Nicholls, N. and Tapper, N. J. (2012). Mapping heat health risks in urban areas. *International Journal of Population Research*, *2012*, pp. 1-12. doi: 10.1155/2012/518687.	Publication; Model / Database	B3.1
Earl, N., Simmonds, I. and Tapper, N. J. (2016). Weekly cycles in peak time temperatures and urban heat island intensity. *Environmental Research Letters*, 11(7), pp. 1-10. doi: 10.1088/1748-9326/11/7/074003.	Publication	B3.2
Loughnan, M., Tapper, N. J., Phan, T., Lynch, K. and McInnes, J. A. (2013). *A spatial vulnerability analysis of urban populations during extreme heat events in Australian capital cities*. Gold Coast, Australia: National Climate Change Adaptation Research Facility.	Publication; Model / Database	B3.1
Coutts, A. M., Tapper, N. J., Loughnan, M., Demuzere, M., Broadbent, A. M., Motazedian, A., White, E., Phan, T., Thom. J., Gebert, L. and Pankhania, D. (2016). *Determine the microclimatic influence of harvesting solutions and WSUD at the micro-scale: Frequently Asked Questions*. Melbourne, Australia: Cooperative Research Centre for Water Sensitive Cities.	Factsheet	B3.1
Guidelines for the design of WSUD and urban greening for improved urban climate: *Practical guidance on the design and placement of WSUD and urban greening interventions to maximise their effectiveness in improving urban climates, based on observational research and the climate modelling research.*		
Coutts, A. M., Daly, E., Beringer, J. and Tapper, N. J. (2013). Assessing practical measures to reduce urban heat: Green and cool roofs. *Building and Environment*, 70, pp. 266-276.	Publication	B3.1
Thom, J. K., Coutts, A. M., Broadbent, A. M. and Tapper, N. J. (2016). The influence of increasing tree cover on mean radiant temperature across a mixed development suburb in Adelaide, Australia. *Urban Forestry and Urban Greening*, 20, 233-242.	Publication	B3.2
Broadbent, A. M. (2016). *The effect of water sensitive urban design and outdoor water-use practices on urban microclimate*, doctoral thesis, Monash University, Melbourne.	Publication	B3.2
Tapper, N. J., Coutts, A. M., Loughnan, M. and Pankhania, D. (2015). Urban populations' vulnerability to climate extremes: mitigating urban heat through technology and	Publication	B3.1

water-sensitive urban design. In: S. Lehmann, ed., *Low Carbon Cities: Transforming Urban Systems, Volume 3, Earthscan Book Series on Sustainable Design*. New York, NY: Routledge, pp. 361-374.		
Reference	Product type	Project no.
Coutts, A. M., Loughnan, M., Tapper, N. J., White, E., Thom, J., Broadbent, A. M. and Harris, R. J. (2014). *The impacts of WSUD solutions on human thermal comfort.* Melbourne, Australia: Cooperative Research Centre for Water Sensitive Cities.	Publication	B3.1
Coutts, A. M., Demuzere, M., Tapper, N. J., Daly, E., Beringer, J., Nury, S., Broadbent, A. M., Harris, R. J., Gebert, L. and Nice, K. (2014). *The impacts of harvesting solutions and WSUD on evaporation and the water balance and feedbacks to urban hydrology and stream ecology*. Melbourne, Australia: Cooperative Research Centre for Water Sensitive Cities.	Publication	B3.1
Coutts, A. M. and Harris, R. J. (2013). *Urban Heat Island Report: A multi-scale assessment of urban heating in Melbourne during an extreme heat event: policy approaches for adaptation*. Melbourne, Australia: Victorian Centre for Climate Change Adaptation Research.	Publication	B3.1
Coutts, A. M., Tapper, N. J., Loughnan, M., Demuzere, M., Broadbent, A. M., Motazedian, A., White, E., Phan, T., Thom. J., Gebert, L. and Pankhania, D. (2016). *Determine the microclimatic influence of harvesting solutions and WSUD at the micro-scale: Frequently Asked Questions*. Melbourne, Australia: Cooperative Research Centre for Water Sensitive Cities.	Factsheet	B3.1
Online mapping tool of heat vulnerability: *Online tool that maps heat vulnerability of the population for Australian capital cities. This tool can be used to inform heat mitigation approaches.*		
Loughnan, M., Tapper, N. J. and Phan, T. (2014). Identifying vulnerable populations in subtropical Brisbane, Australia: A guide for heatwave preparedness and health promotion. *ISRN Epidemiology*, 2014, pp. 1-12. doi: 10.1155/2014/821759.	Publication; Model / Database	B3.1
Loughnan, M., Tapper, N. J., Phan, T. and McInnes, J. A. (2014). Can a spatial index of heat-related vulnerability predict emergency service demand in Australian capital cities? *International Journal of Emergency Services*, 3(1), pp. 6-33.	Publication; Model / Database	B3.1
Loughnan, M., Nicholls, N. and Tapper, N. J. (2012). Mapping heat health risks in urban areas. *International Journal of Population Research*, *2012*, pp. 1-12. doi: 10.1155/2012/518687.	Publication; Model / Database	B3.1

Reference	Product type	Project no.
Loughnan, M., Tapper, N. J., Phan, T., Lynch, K. and McInnes, J. A. (2013). *A spatial vulnerability analysis of urban populations during extreme heat events in Australian capital cities*. Gold Coast, Australia: National Climate Change Adaptation Research Facility.	Publication; Model / Database	B3.1
NCCARF, CRCWSC, Monash University (2016). *Mapping Heatwave Vulnerability*. Available at: http://www.mappingvulnerabilityindex.com/	Learning Tool	B3.1
Urban heat component of the Water Sensitive Cities Toolkit: *Simple approach for assessing the benefit of WSUD and urban greening into the Water Sensitive Cities Toolkit.*		
CRCWSC (2016). *Water Sensitive Cities Toolkit.* Available at:https://watersensitivecities.org.au/solutions/water-sensitive-cities-toolkit/	Factsheet	D1.5, B3.2
Framework for the implementation of WSUD and urban greening for improved urban climate: *Framework for the strategic implementation of WSUD and urban greening based on research to maximise the cost-effectiveness of interventions and minimise the negative impacts of urban climates.*		
Norton, B. A., Coutts, A. M., Livesley, S. J., Harris, R. J., Hunter, A. M. and Williams, N. S. G. (2015). Planning for cooler cities: A framework to prioritise green infrastructure to mitigate high temperatures in urban landscapes. *Landscape and Urban Planning*, 134, pp. 127-138.	Guideline / Framework; Publication	B3.1
Williams, N., Coutts, A. M. and Livesley, S. J. (2014). 'Our cities need more trees and water, not less, to stay liveable', *The Conversation*, 10 February. Available at: http://theconversation.com/our-cities-need-more-trees-and-water-not-less-to-stay-liveable-22166	Publication	B3.1
Coutts, A. M., Tapper, N. J., Loughnan, M., Demuzere, M., Broadbent, A. M., Motazedian, A., White, E., Phan, T., Thom. J., Gebert, L. and Pankhania, D. (2016). *Determine the microclimatic influence of harvesting solutions and WSUD at the micro-scale: Frequently Asked Questions*. Melbourne, Australia: Cooperative Research Centre for Water Sensitive Cities.	Factsheet	B3.1
Urban climate modelling tools: *Review, select, validate and apply urban climate models that are appropriate to scale (micro-, local- and meso-scale) to identify which models need to be developed or improved where necessary (for researchers/expert modellers only).*		
Demuzere, M., Oleson, K., Coutts, A. M., Pigeon, G. and Van Lipzig, N. P. M. (2013). Simulating the surface energy balance over two contrasting urban environments using the Community Land Model Urban. *International Journal of Climatology*, 33(15), pp. 3182-3205.	Publication; Model / Database	B3.1, B3.2

Reference	Product type	Project no.
Nice, K., Coutts, A. M., Beringer, J., Tapper, N. J. and Krahenhoff, S. (2015). VTUF-3D: An urban micro-climate model to assess temperature moderation from increased vegetation and water in urban canyons. In: *9th International Conference on Urban Climate*, 20-24 July, Toulouse, France.	Publication; Model / Database	B3.2

c. Water systems design: Designing and implementing water service infrastructure

Reference	Product type	Project no.
Stochastic rainfall simulation of the current climate: *Simulation of statistical properties of the current rainfall in Adelaide, Brisbane, Melbourne and Sydney.*		
Raut, B. A., Jakob, C. and Reeder, M. J. (2014). Rainfall Changes over Southwestern Australia and Their Relationship to the Southern Annular Mode and ENSO. *Journal of Climate*, 27, pp. 5801–5814.	Publication	B1.1
Stochastic model appropriate for downscaling rainfall to scales relevant for the design of water harvesting technologies: *Model based on multi-fractal cascades, suitable for high-resolution simulation, along with a reliable estimate of the uncertainty.*		
Raut, B. A., de la Fuente, L., Seed, A. W., Jakob, C. and Reeder, M. J. (2012). Application of a Space-Time Stochastic Model for Downscaling Future Rainfall Projections. In: *Hydrology and Water Resource Symposium* (HWRS). Barton, ACT: Engineers Australia, pp. 579–586.	Publication; Model / Database	B1.1
Stochastic rainfall simulation of future climates*: High-resolution projections of the future rainfall for Adelaide, Brisbane, Melbourne and Sydney; along with reliable estimates of the uncertainty in these projections.*		
Raut, B. A., de la Fuente, L., Seed, A. W., Jakob, C. and Reeder, M. J. (2012). Application of a Space-Time Stochastic Model for Downscaling Future Rainfall Projections. In: *Hydrology and Water Resource Symposium* (HWRS). Barton, ACT: Engineers Australia, pp. 579–586.	Publication; Model / Database	B1.1
Stochastic rainfall simulation of future climates in Singapore: *High-resolution projections of the future rainfall for Singapore, along with reliable estimates of the uncertainty in these projections. This output is currently being developed.*		
CRCWSC (2017). *Impact of climate change on extreme rainfall and drainage design*. Melbourne, Australia: Cooperative Research Centre for Water Sensitive Cities.	Factsheet	B1.3
Case studies of restoring hydrology using stormwater harvesting and retention: *Case studies (e.g. Stringybark Creek) of hydrologic restoration using stormwater harvesting and other stormwater retention strategies.*		
Walsh, C. J. and Fletcher, T. D. (2015). Stream experiments at the catchment scale: the challenges and rewards of collaborating with community and government to push policy boundaries. *Freshwater Science*, 34(3), pp.	Publication	B2.1

1159-1160.		
Reference	Product type	Project no.
Nemes, V., La Nauze, A., Walsh, C. J., Fletcher, T. D., Bos, D. G., RossRakesh, S. and Stoneham, G. (2016). Saving a creek one bid at a time: a uniform price auction for urban stormwater retention. *Urban Water Journal*, 13(3), pp. 232-241.	Publication	B2.1
Walsh, C. J., Fletcher, T. D., Bos, D. G. and Imberger, S. J. (2015). Restoring a stream through retention of urban stormwater runoff: a catchment-scale experiment in a social–ecological system. *Freshwater Science*, 34(3), pp.1161-1168.	Publication	B2.1
Brown, H. L., Bos, D. G., Walsh, C. J., Fletcher, T. D. and RossRakesh, S. (2016). More than money: how multiple factors influence householder participation in at-source stormwater management. *Journal of Environmental Planning and Management*, 59(1), pp. 79-97.	Publication	B2.1
Hamel, P., McHugh, I., Coutts, A., Daly, E., Beringer, J. and Fletcher, T. D. (2014). Automated Chamber System to Measure Field Evapotranspiration Rates. *Journal of Hydrologic Engineering*, 20(2) [Available at: http://dx.doi.org/10.1061/(ASCE)HE.1943-5584.0001006].	Publication	B2.1
Burns, M. J., Fletcher, T. D., Duncan, H. P., Hatt, B. E., Ladson, A. R. and Walsh, C. J. (2015). The performance of rainwater tanks for stormwater retention and water supply at the household scale: an empirical study. *Hydrological Processes*, 29(1), pp. 152-160.	Publication	B2.1
Vietz, G. J., Sammonds, M. J., Walsh, C. J., Fletcher, T. D., Rutherfurd, I. D. and Stewardson, M. J. (2014). Ecologically relevant geomorphic attributes of streams are impaired by even low levels of watershed effective imperviousness. *Geomorphology*, 206, pp. 67-78.	Publication	B2.1
Virahsawmy, H. K., Stewardson, M. J., Vietz, G. and Fletcher, T. D. (2014). Factors that affect the hydraulic performance of raingardens: implications for design and maintenance. *Water Science and Technology*, 69(5), pp. 982-988.	Publication	B2.1
Vietz, G. J., Walsh, C. J. and Fletcher, T. D. (2016). Urban hydrogeomorphology and the urban stream syndrome: Treating the symptoms and causes of geomorphic change. *Progress in Physical Geography*, 40(3), pp. 480-492.	Publication	B2.1
Walsh, C. J., Fletcher, T. D. and Burns, M. J. (2012). Urban stormwater runoff: a new class of environmental flow problem. *PLoS One*, 7(9), pp. 1-10.	Publication	B2.1
Houshmand, A., Vietz, G. J. and Hatt, B. E. (2014).	Publication	B2.1

Improving urban stream condition by redirecting sediments: A review of associated contaminants. In: *Proceedings of the 7th Australian Stream Management Conference: Catchments to Coast*, 30 June – 2 July, Townsville, Queensland.		
Reference	Product type	Project no.
Fletcher, T. D., Walsh, C. J., Imberger, S., Bos, D. G. and Burns, M. J. (2014). A catchment-scale experiment on stream restoration through dispersed upland stormwater retention. In: *3rd Symposium on Urbanization and Stream Ecology*, 15-17 May, Portland, Oregon.	Publication	B2.1
Vietz, G. J. (2013). Water(way) sensitive urban design: Addressing the causes of channel degradation through catchment-scale management of water and sediment. In: *Water Sensitive Urban Design 2013: WSUD 2013.* Barton, ACT: Engineers Australia, pp. 220-226.	Publication	B2.1
Poelsma, P. J., Fletcher, T. D. and Burns, M. J. (2013). Restoring natural flow regimes: the importance of multiple scales. In: *Novatech*, 23-27 June, Lyon, France.	Publication	B2.1
Walsh, C. J., Fletcher, T. D., Vietz, G. J., Thompson, R., Tapper, N., Beringer, J., Coutts, A. and Allen, R. (2012). New Urban Storm Water Management Approaches: Using the Water Generated by Cities for Ecosystem Services. *CityGreen*, 5, pp. 154-163.	Publication	B2.1
Little Stringybark Creek. *Environmental Benefit calculator*. Available at: https://urbanstreams.net/tools/EBcalc/	Model / Database	B2.1
Hamel, P., Fletcher, T. D., Daly, E. and Beringer, J. (2012). Water retention by raingardens: implications for local-scale soil moisture and water fluxes. In: *WSUD 2012: Water sensitive urban design; Building the Water Sensitive Community; 7th International Conference on Water Sensitive Urban Design.* Barton, ACT: Engineers Australia, pp. 137-144.	Publication	B2.1
***Stormwater harvesting and technologies model**: A dynamic model for stormwater harvesting and treatment technologies with a focus on describing how the technologies could be modelled as part of flood risk assessments.*		
Locatelli, L., Gabriel, S., Mark, O., Mikkelsen, P. S., Arnbjerg-Nielsen, K., Taylor, H., Bockhorn, B., Larsen, H., Kjølby, M. J., Blicher, A. S. and Binning, P. J. (2015). Modelling the impact of retention–detention units on sewer surcharge and peak and annual runoff reduction. *Water Science and Technology*, 71(6), pp. 898-903.	Publication; Model / Database	B4.1
Locatelli, L., Mark, O., Mikkelsen, P. S., Arnbjerg-Nielsen, K., Wong, T. and Binning, P. J. (2015). Determining the extent of groundwater interference on the performance of infiltration trenches. *Journal of Hydrology*, 529(3), pp.	Publication; Model / Database	B4.1

1360-1372.		
Reference	Product type	Project no.
Locatelli, L., Mark, O., Mikkelsen, P. S., Arnbjerg-Nielsen, K., Jensen, M. B. and Binning, P. J. (2014). Modelling of green roof hydrological performance for urban drainage applications. *Journal of Hydrology*, 519(D), pp. 3237-3248.	Publication; Model / Database	B4.1
Locatelli, L., Mark, O., Mikkelsen, P. S., Arnbjerg-Nielsen, K., Deletic, A., Roldin, M. and Binning, P. J. (2017). Hydrologic impact of urbanization with extensive stormwater infiltration. *Journal of Hydrology*, 544, pp. 524-537.	Publication; Model / Database	B4.1
DHI. (2015). *Storm Water Runoff from Green Urban Area: Summary for Modellers*. Report prepared for the Cooperative Research Centre for Water Sensitive Cities.	Learning Tool	B4.1
Conceptual models and indicators to assess impact of stormwater harvesting on stream hydrology and water quality: *Development and application of indicators, such as runoff frequency and rainfall retention capacity, to assess the impact of stormwater harvesting on the hydrology and water quality of streams; Development of predictive models of likely ecological responses.*		
Sammonds, M. J. and Vietz, G. J. (2015). Setting stream naturalisation goals to achieve ecosystem improvement in urbanising greenfield catchments. *Area*, 47(4), pp. 386-395.	Publication	B2.1
Burns, M. J., Walsh, C. J., Fletcher, T. D., Ladson, A. R. and Hatt, B. E. (2015). A landscape measure of urban stormwater runoff effects is a better predictor of stream condition than a suite of hydrologic factors. *Ecohydrology*, 8(1), pp. 160-171.	Publication; Model / Database	B2.1
Burns, M. J., Fletcher, T. D., Walsh, C. J., Ladson, A. R. and Hatt, B. E. (2014). Flow-regime management at the urban land-parcel scale: test of feasibility. *Journal of Hydrologic Engineering*, 20(12) [Available at: http://dx.doi.org/10.1061/(ASCE)HE.1943-5584.0001002].	Publication; Model / Database	B2.1
Fletcher, T. D., Vietz, G. and Walsh, C. J. (2014). Protection of stream ecosystems from urban stormwater runoff: the multiple benefits of an ecohydrological approach. *Progress in Physical Geography*, 38(5), pp. 543-555.	Publication	B2.1
Fletcher, T. D., Andrieu, H. and Hamel, P. (2013). Understanding, management and modelling of urban hydrology and its consequences for receiving waters: A state of the art. *Advances in Water Resources*, 51, pp. 261-279.	Publication	B2.1
Hamel, P. and Fletcher, T. D. (2014). Modelling the impact of stormwater source control infiltration techniques on catchment baseflow. *Hydrological Processes*, *28*(24), pp. 5817-5831.	Publication; Model / Database	B2.1

Reference	Product type	Project no.
Hamel, P. and Fletcher, T. D. (2014). The impact of stormwater source-control strategies on the (low) flow regime of urban catchments. *Water Science and Technology*, 69(4), pp. 739-745.	Publication	B2.1
Burns, M. J., Fletcher, T. D., Walsh, C. J., Ladson, A. R. and Hatt, B. E. (2012). Hydrologic shortcomings of conventional urban stormwater management and opportunities for reform. *Landscape and Urban Planning*, 105(3), pp. 230-240.	Publication	B2.1
Hamel, P., Daly, E. and Fletcher, T. D. (2015). Which baseflow metrics should be used in assessing flow regimes of urban streams? *Hydrological Processes*, 29(20), pp. 4367-4378.	Publication	B2.1
Hamel, P., Daly, E. and Fletcher, T. D. (2013). Source-control stormwater management for mitigating the impacts of urbanisation on baseflow: A review. *Journal of Hydrology*, 485, pp. 201-211.	Publication	B2.1
Braud, I., Fletcher, T. D. and Andrieu, H. (2013). Hydrology of peri-urban catchments: processing and modelling. *Journal of Hydrology*, 485, pp. 1-4.	Publication	B2.1
Walsh, C. J. and Webb, J. A. (2016). Interactive effects of urban stormwater drainage, land clearance, and flow regime on stream macroinvertebrate assemblages across a large metropolitan region. *Freshwater Science*, 35(1), pp. 324-339.	Publication; Model / Database	B2.1
Vietz, G. J., Walsh, C. J., Sammonds, M. S., Rutherfurd, I. D. (2014). Flows that cause geomorphic change in urban streams and what stormwater control measures can do. In: *3rd Symposium on Urbanization and Stream Ecology*, 15-17 May, Portland, Oregon.	Publication; Model / Database	B2.1
Burns, M. J., Walsh, C. J., Fletcher, T. D., Ladson, A. R. and Hatt, B. E. (2014). A macroinvertebrate assemblage composition index is better predicted by a landscape measure of urban stormwater effects than by hydrologic indicators. In: *3rd Symposium on Urbanization and Stream Ecology*, 15-17 May, Portland, Oregon.	Publication; Model / Database	B2.1
Burns, M. J., Fletcher, T. D., Walsh, C. J., Ladson, A. R. and Hatt, B. E. (2013). Setting objectives for hydrologic restoration: from site-scale to catchment-scale. In: *Novatech*, 23-27 June, Lyon, France.	Publication; Guideline / Framework	B2.1
Vietz, G. J., Stewardson, M. J., Walsh, C. J. and Fletcher, T. D. (2012). Another reason urban streams are stuffed: geomorphic history, challenges and opportunities. In: *Proceedings of the 6th Australian Stream Management Conference*, 6-8 February, Canberra, Australia.	Publication	B2.1

Reference	Product type	Project no.
Burns, M. J., Fletcher, T. D., Duncan, H. P., Hatt, B. E., Ladson, A. R. and Walsh, C. J. (2012). The stormwater retention performance of rainwater tanks at the landparcel scale. In: *WSUD 2012: Water sensitive urban design; Building the Water Sensitive Community; 7th International Conference on Water Sensitive Urban Design.* Barton, ACT: Engineers Australia, pp. 195-203.	Publication; Model / Database	B2.1
Little Stringybark Creek. *Environmental Benefit calculator*. Available at: https://urbanstreams.net/tools/EBcalc/	Model / Database	B2.1
***Chemical and microbial characteristics of stormwater**: Characterisation of the chemical and microbial qualities of untreated stormwater.*		
Chong, M. N., Sidhu, J., Aryal, R., Tang, J., Gernjak, W., Escher, B. and Toze, S. (2013). Urban stormwater harvesting and reuse: a probe into the chemical, toxicology and microbiological contaminants in water quality. *Environmental Monitoring and Assessment*, 185(8), pp. 6645-6652.	Publication	C1.2
Sidhu, J. P. S., Ahmed, W., Gernjak, W., Aryal, R., McCarthy, D. T., Palmer, A., Kolotelo, P. and Toze, S. (2013). Sewage pollution in urban stormwater runoff as evident from the widespread presence of multiple microbial and chemical source tracking markers. *Science of the Total Environment*, 463-464, pp. 488-496.	Publication	C1.2
Tang, J. Y., Aryal, R., Deletic, A., Gernjak, W., Glenn, E., McCarthy, D. T. and Escher, B. I. (2013). Toxicity characterization of urban stormwater with bioanalytical tools. *Water Research*, 47(15), pp. 5594-5606.	Publication	C1.1, C1.2
Aryal, R., Chong, M. N. and Gernjak, W. (2012). Influence of pH on organic and inorganic colloids in stormwater. *Journal of Water and Environment Technology*, 10(3), pp. 267-276.	Publication	C1.2, C1.3
Rippy, M. A., Deletic, A., Black, J., Aryal, R., Lampard, J. L., Tang, J. Y. M., McCarthy, D., Kolotelo, P., Sidhu, J. and Gernjak, W. (2017). Pesticide occurrence and spatio-temporal variability in urban run-off across Australia. *Water Research*, 115, pp. 245-255.	Publication	C1.2
Gernjak, W., Lampard, J. and Tang, J. (2016). *CRCWSC Stormwater Quality Database*. Melbourne, Australia: Cooperative Research Centre for Water Sensitive Cities.	Model / Database	C1.2
Gernjak, W., Lampard, J. and Tang, J. Y. M (2017) *Characterisation of chemical hazards in stormwater*. Melbourne, Australia: Cooperative Research Centre for Water Sensitive Cities.	Publication	C1.2
***Prioritisation of human health risks associated with untreated stormwater:** Prioritisation of human health risks associated with chemical and microbial hazards in*		

untreated stormwater.		
Reference	Product type	Project no.
Sidhu, J., Gernjak, W. and Toze, S. (eds.) (2012). Health Risk Assessment of Urban Stormwater. *Urban Water Security Research Alliance Technical Report No. 102*. Available at: http://www.urbanwateralliance.org.au/publications/technicalreports/	Publication	C1.2
***Description of the influence of catchment characteristics on untreated stormwater quality**: Advice on the influence of catchment characteristics on the chemical and microbial qualities of untreated stormwater.*		
McCarthy, D. T., Hathaway, J. M., Hunt, W. F. and Deletic, A. (2012). Intra-event variability of Escherichia coli and total suspended solids in urban stormwater runoff. *Water Research*, 46(20), pp. 6661-6670.	Publication	C1.1, C1.2
Rippy, M. A., Deletic, A., Black, J., Aryal, R., Lampard, J. L., Tang, J. Y. M., McCarthy, D., Kolotelo, P., Sidhu, J. and Gernjak, W. (2017). Pesticide occurrence and spatio-temporal variability in urban run-off across Australia. *Water Research*, 115, pp. 245-255.	Publication	C1.2
Sidhu, J., Gernjak, W. and Toze, S. (eds.) (2012). Health Risk Assessment of Urban Stormwater. *Urban Water Security Research Alliance Technical Report No. 102*. Available at: http://www.urbanwateralliance.org.au/publications/technicalreports/	Publication	C1.2
Gernjak, W., Lampard, J. and Tang, J. Y. M (2017) *Characterisation of chemical hazards in stormwater*. Melbourne, Australia: Cooperative Research Centre for Water Sensitive Cities.	Publication	C1.2
***Recommendations for undertaking risk assessment of untreated stormwater**: Recommendations for assessing risks associated with untreated stormwater including the role of chemical surrogates.*		
Sidhu, J. P. S., Ahmed, W., Gernjak, W., Aryal, R., McCarthy, D. T., Palmer, A., Kolotelo, P. and Toze, S. (2013). Sewage pollution in urban stormwater runoff as evident from the widespread presence of multiple microbial and chemical source tracking markers. *Science of the Total Environment*, 463-464, pp. 488-496.	Publication	C1.2
Tang, J. Y., Aryal, R., Deletic, A., Gernjak, W., Glenn, E., McCarthy, D. T. and Escher, B. I. (2013). Toxicity characterization of urban stormwater with bioanalytical tools. *Water Research*, 47(15), pp. 5594-5606.	Publication	C1.1, C1.2
Sidhu, J., Gernjak, W. and Toze, S. (eds.) (2012). Health Risk Assessment of Urban Stormwater. *Urban Water Security Research Alliance Technical Report No. 102*. Available at: http://www.urbanwateralliance.org.au/publications/technicalreports/	Publication	C1.2

Reference	Product type	Project no.
***Model to simulate micropollutant behaviour in WSUD systems**: Model to simulate the key treatment processes within stormwater biofilters/wetlands and bio-chemical degradation; Coupled with MUSIC hydraulic model (insitu tested).*		
Zhang, K., Randelovic, A., Page, D., McCarthy, D. T. and Deletic, A. (2014). The validation of stormwater biofilters for micropollutant removal using in situ challenge tests. *Ecological Engineering*, 67, pp. 1-10.	Publication; Guideline / Framework	C1.1
Zhang, K., Randelovic, A., Deletic, A., Page, D. and McCarthy, D. T. (2016). Stormwater biofilters: A new validation modelling tool. *Ecological Engineering*, 87, pp. 53-61.	Publication; Model / Database	C1.1
Randelovic, A., Zhang, K., Jacimovic, N., McCarthy, D. T. and Deletic, A. (2014). Development of a transport and fate model for organic micropollutants at a stormwater biofilter site. In: *Proceedings of the 13th International Conference on Urban Drainage*, 7-12 September, Sarawak, Malaysia.	Learning Tool; Model / Database	C1.1
Deletic, A., McCarthy, D. T., Chandrasena, G. I., Li, Y. L., Hatt, B. E., Payne, E. G. I., Zhang, K., Henry, R., Kolotelo, P., Randjelovic, A., Meng, Z., Glaister, B., Pham, T. and Ellerton, J. (2014). *Biofilters and wetlands for stormwater treatment and harvesting*. Melbourne, Australia: Cooperative Research Centre for Water Sensitive Cities.	Publication; Model / Database	C1.1
***Development of a new method to identify which microbial pollutants are present and viable in stormwater before and after treatment**: Development and validation of a molecular-based method that combines next generation sequencing techniques with the chemical propodium monoazide (PMA) to determine the viability and risks of microbial pollutants to public health.*		
This output is currently being developed.	–	C1.3
***Understanding concurrent risks from several hazards**: Identification of joint probabilities of sea surges and extreme rainfall and exploring reasons for concurrency.*		
Åstrøm, H. L. A., Sunyer, M., Madsen, H., Rosbjerg, D. and Arnbjerg-Nielsen, K. (2016). Explanatory analysis of the relationship between atmospheric circulation and flood generating events in a coastal city. *Hydrological Processes*, 30(16), pp. 2773-2788.	Publication; Model / Database	B4.1
***Recommendations on the importance of vegetation for nitrogen processing in urban wetlands:** A report that outlines how vegetation can alter the rates of nitrogen transformations, including denitrification, in urban wetlands.*		
Khakbaz, G., Hipsey, M. R. and Oldham, C. E. (2016). Effect of hydrological variability on the performance of stormwater constructed wetlands: Assessment of the gaps in current modelling approaches. In: *Stormwater 2016*, 29 August - 2 September, Surfers Paradise, Australia.	Publication; Model / Database	B2.4
Wang, B., Oldham, C. E. and Hipsey, M. R. (2016). Comparison of Machine Learning Techniques and	Publication	B2.4

Variables for Groundwater Dissolved Organic Nitrogen Prediction in an Urban Area. *Procedia Engineering*, 154, pp. 1176-1184.		
Reference	Product type	Project no.
Ruibal-Conti, A. L., Ocampo, C. J., Adyel, T. M., Hipsey, M. R. and Oldham, C.E. (2015). *Performance assessment the of Anvil Way Compensation Basin living stream: 2004-2013*. Melbourne, Australia: Cooperative Research Centre for Water Sensitive Cities.	Publication	B2.4, C4.1
Adyel, T. M, Ocampo, C. J., Tareque, H., Oldham, C. E. and Hipsey, M. R. (2015). *Performance assessment of Wharf St Constructed Wetland 2009-2014*. Melbourne, Australia: Cooperative Research Centre for Water Sensitive Cities.	Publication	B2.4, C4.1
Ocampo, C. J., Rennie, B. and Oldham, C. E. (2017). *Performance of two urban stormwater biofilters in an area with seasonally high groundwater*. Melbourne, Australia: Cooperative Research Centre for Water Sensitive Cities.	Publication	B2.4
Guidelines for the adoption (design, maintenance and operation) of biofiltration systems for stormwater treatment and harvesting: *Revised version of the FAWB guidelines focused on design for harvesting, plant selection and maintenance; Guidelines for WSUD design in urban areas with shallow water tables.*		
Ruibal-Conti, A. L., Ocampo, C. J., Adyel, T. M., Hipsey, M. R. and Oldham, C.E. (2015). *Performance assessment the of Anvil Way Compensation Basin living stream: 2004-2013*. Melbourne, Australia: Cooperative Research Centre for Water Sensitive Cities.	Publication	B2.4, C4.1
Adyel, T. M, Ocampo, C. J., Tareque, H., Oldham, C. E. and Hipsey, M. R. (2015). *Performance assessment of Wharf St Constructed Wetland 2009-2014*. Melbourne, Australia: Cooperative Research Centre for Water Sensitive Cities.	Publication	B2.4, C4.1
Ocampo, C. J., Rennie, B. and Oldham, C. E. (2017). *Performance of two urban stormwater biofilters in an area with seasonally high groundwater*. Melbourne, Australia: Cooperative Research Centre for Water Sensitive Cities.	Publication	B2.4
Payne, E. G. I., Hatt, B. E., Deletic, A., Dobbie, M. F., McCarthy, D. T. and Chandrasena, G. I. (2015). *Adoption Guidelines for Stormwater Biofiltration Systems*. Melbourne, Australia: Cooperative Research Centre for Water Sensitive Cities.	Guideline / Framework	C1.1
Payne, E. G. I., Hatt, B. E., Deletic, A., Dobbie, M. F., McCarthy, D. T. and Chandrasena, G. I. (2015). *Adoption Guidelines for Stormwater Biofiltration Systems - Summary Report*. Melbourne, Australia: Cooperative Research Centre for Water Sensitive Cities.	Guideline / Framework	C1.1

Reference	Product type	Project no.
Oversby, B., Payne, E. G. I., Fletcher, T. D., Byleveld, G. and Hatt, B. E. (2014). *Vegetation guidelines for stormwater biofilters in the south-west of Western Australia*. Clayton, Australia: Monash Water for Liveability Centre.	Guideline / Framework	C4.1
***New designs for passive filters and biofilters to remove pathogens from urban stormwater**: New generation biofilters to remove more pathogens.*		
Li, Y. L., Deletic, A. and McCarthy, D. T. (2014). Removal of E. coli from urban stormwater using antimicrobial-modified filter media. *Journal of Hazardous Materials,* 271, pp.73-81.	Publication	C1.1
Li, Y. L., McCarthy, D. T. and Deletic, A. (2014). Stable copper-zeolite filter media for bacteria removal in stormwater. *Journal of Hazardous Materials*, 273, pp. 222-230.	Publication	C1.1
Chandrasena, G. I., Pham, T., Payne, E. G. I., Deletic, A. and McCarthy, D. T. (2014). E. coli removal in laboratory scale stormwater biofilters: Influence of vegetation and submerged zone. *Journal of Hydrology*, 519(A), pp. 814-822.	Publication	C1.1
Chandrasena, G. I., Deletic, A. and McCarthy, D. T. (2014). Survival of Escherichia coli in stormwater biofilters. *Environmental Science and Pollution Research*, 21(8), pp. 5391-5401.	Publication	C1.1
Zinger, Y., Blecken, G. T., Fletcher, T. D., Viklander, M. and Deletic, A. (2013). Optimising nitrogen removal in existing stormwater biofilters: Benefits and tradeoffs of a retrofitted saturated zone. *Ecological Engineering*, 51, pp. 75-82.	Publication	C1.1
Li, Y. L., Deletic, A., Alcazar, L., Bratieres, K., Fletcher, T. D. and McCarthy, D. T. (2012). Removal of Clostridium perfringens, Escherichia coli and F-RNA coliphages by stormwater biofilters. *Ecological Engineering*, 49, pp. 137-145.	Publication	C1.1
Le Coustumer, S., Fletcher, T. D., Deletic, A., Barraud, S. and Poelsma, P. (2012). The influence of design parameters on clogging of stormwater biofilters: a large-scale column study. *Water Research*, 46(20), pp. 6743-6752.	Publication	C1.1
Guest, R. M., Schang, C., Deletic, A. and McCarthy, D. T. (2012). Zinc-sulphate-heptahydrate coated activated carbon for microbe removal from stormwater. *Water Science and Technology*, 66(7), pp. 1582-1589.	Publication	C1.1
Chandrasena, G. I., Deletic, A., Ellerton, J. and McCarthy, D. T. (2012). Evaluating Escherichia coli removal performance in stormwater biofilters: a laboratory-scale	Publication	C1.1

study. *Water Science and Technology*, 66(5), pp. 1132-1138.		
Reference	Product type	Project no.
Chandrasena, G. I., Deletic, A. and McCarthy, D. T. (2013). Evaluating Escherichia coli removal performance in stormwater biofilters: a preliminary modelling approach. *Water Science and Technology*, 67(11), pp. 2467-2475.	Publication; Model / Database	C1.1
Chandrasena, G. I., Filip, S., Zhang, K., Osborne, C. A., Deletic, A. and McCarthy, D. T. (2012). Pathogen and indicator microorganism removal in field scale stormwater biofilters. In: *WSUD 2012: Water sensitive urban design; Building the water sensitive community; 7th international conference on water sensitive urban design*. Barton, ACT: Engineers Australia, pp. 609-617.	Publication	C1.1
Kandra, H., McCarthy, D. T. and Deletic, A. (2013). Assessing nature of clogging in zeolite based stormwater filters. In: *Water Sensitive Urban Design 2013: WSUD 2013.* Barton, ACT: Engineers Australia, pp. 63-73.	Publication	C1.1
Payne, E. G. I., Pham, T., Hatt, B. E., Fletcher, T. D., Cook, P. L. M. and Deletic, A. (2013). Stormwater biofiltration - the challenges of inorganic and organic nitrogen removal. In: *Water Sensitive Urban Design 2013: WSUD 2013*. Barton, ACT: Engineers Australia, pp. 153-160.	Publication	C1.1
Glaister, B. J., Cook, P. L. M., Fletcher, T. D. and Hatt, B. E. (2013). Long-term phosphorus accumulation in stormwater biofiltration systems at the field scale. In: *Water Sensitive Urban Design 2013: WSUD 2013*. Barton, ACT: Engineers Australia, pp. 114-128.	Publication	C1.1
Deletic, A., McCarthy, D. T., Chandrasena, G. I., Li, Y. L., Hatt, B. E., Payne, E. G. I., Zhang, K., Henry, R., Kolotelo, P., Randjelovic, A., Meng, Z., Glaister, B., Pham, T. and Ellerton, J. (2014). *Biofilters and wetlands for stormwater treatment and harvesting*. Melbourne, Australia: Cooperative Research Centre for Water Sensitive Cities.	Publication; Model / Database	C1.1
***New hybrid biofiltration technologies (green and living walls) for greywater and/or stormwater treatment**:* ● *T1 - Living walls for greywater treatment: Prototype of green technology that treats greywater, improves micro-climate and provides amenity to public space;* ● *T2 - Green walls for greywater treatment: Prototype of green technology that treats greywater, improves micro-climate and provides amenity to public space; and* ● *T3 - Living walls for stormwater and greywater treatment: Prototype of green technology that treats greywater and stormwater (two different sources of water), improves micro-climate, and provides amenity to public space.*		
Fowdar, H. S., Breen, P., Hatt, B. E., Cook, P. L. M. and Deletic, A. (2014). Innovation for rapid denitrification in biofiltration systems. In: *Stormwater 2014: The 3rd National*	Publication	C4.1

Conference on Urban Water Management, 14-17 October, Adelaide, Australia.		
Reference	Product type	Project no.
Fowdar, H. S., Hatt, B. E., Breen, P., Cook, P. L. M. and Deletic, A. (2015). Evaluation of sustainable electron donors for nitrate removal in different water media. *Water Research*, 85, pp. 487-496.	Publication	C4.1
Fowdar, H. S., Hatt, B. E., Breen, P., Cook, P. L. M. and Deletic, A. (2017). Designing living walls for greywater treatment. *Water Research*, 110, pp. 218-232.	Publication	C4.1
Fowdar, H. S., Hatt, B. E., Cresswell, T., Harrison, J. J., Cook, P. L. M. and Deletic, A. (2017). Phosphorus fate and dynamics in greywater biofiltration systems. *Environmental Science and Technology*, 51(4), pp. 2280–2287.	Publication	C4.1
Prodanovic, V., Hatt, B. E., McCarthy, D., Zhang, K. and Deletic, A. (2017). Green walls for greywater reuse: Understanding the role of media on pollutant removal. *Ecological Engineering*, 102, pp. 625-635.	Publication	C4.1
Model to predict faecal microorganism removal in existing stormwater biofilters: *A very simple algorithm that can predict removal of most widely used pathogen indicator E.coli.*		
Chandrasena, G. I., Deletic, A. and McCarthy, D. T. (2014). Survival of Escherichia coli in stormwater biofilters. *Environmental Science and Pollution Research*, 21(8), pp. 5391-5401.	Publication	C1.1
Chandrasena, G. I., Deletic, A. and McCarthy, D. T. (2013). Evaluating Escherichia coli removal performance in stormwater biofilters: a preliminary modelling approach. *Water Science and Technology*, 67(11), pp. 2467-2475.	Publication; Model / Database	C1.1
McCarthy, D. T., Deletic, A., Mitchell, V. G. and Diaper, C. (2013). Predicting between-event variability of Escherichia coli in urban storm water. *Journal of Environmental Engineering*, 139(5), pp. 728-737.	Publication; Model / Database	C1.1
Chandrasena, G. I., Deletic, A. and McCarthy, D. T. (2012). A Preliminary Model on E.coli Removal in Stormwater Biofilters. In: *9th International Conference on Urban Drainage Modelling*, 4-7 September, Belgrade, Serbia.	Publication	C1.1
Deletic, A., McCarthy, D. T., Chandrasena, G. I., Li, Y. L., Hatt, B. E., Payne, E. G. I., Zhang, K., Henry, R., Kolotelo, P., Randjelovic, A., Meng, Z., Glaister, B., Pham, T. and Ellerton, J. (2014). *Biofilters and wetlands for stormwater treatment and harvesting*. Melbourne, Australia: Cooperative Research Centre for Water Sensitive Cities.	Publication; Model / Database	C1.1
Model to simulate vegetation responses and quantify wetland ecosystem function: *A wetland eco-hydrological model to simulate vegetation responses to water balance variability and associated changes in biogeochemical cycles, and validated against*		

above data. This will lead to better understanding and modelling of the operation of urban wetlands influenced by shallow groundwater systems.		
Reference	Product type	Project no.
Khakbaz, G., Hipsey, M. R. and Oldham, C. E. (2016). Effect of hydrological variability on the performance of stormwater constructed wetlands: Assessment of the gaps in current modelling approaches. In: *Stormwater 2016*, 29 August – 2 September, Surfers Paradise, Australia.	Publication; Model / Database	B2.4, C4.1
Adyel, T. M., Conti, A. L. R., Ocampo, C. J., Coletti, J. Z., Hipsey, M. R. and Oldham, C. E. (2015). Ecohydrology and stormwater nutrient attenuation performance of constructed wetland in Western Australia. In: *Proceedings of the 36th International Association for Hydro-Environment Engineering and Research World Congress*, 28 June– 3 July, The Hague, The Netherlands.	Publication	B2.4, C4.1
***Gap assessment of design tools for constructed wetlands**: Currently no tools for environmental engineers to assess or design constructed wetlands exist. This output reviews the missing features of current models and reasons why new model developments are needed.*		
Khakbaz, G., Hipsey, M. R. and Oldham, C. E. (2016). Effect of hydrological variability on the performance of stormwater constructed wetlands: Assessment of the gaps in current modelling approaches. In: *Stormwater 2016*, 29 August – 2 September, Surfers Paradise, Australia.	Publication; Model / Database	B2.4, C4.1
***Model to allow rapid analysis from smart meter datasets:** A suite of novel algorithms that enable rapid analysis of "big data" on water usage derived from smart meters – significant demand management tool; Industry guidelines for applying the smart metering algorithms with examples from two case study populations in Karratha and Kalgoorlie; Web-based software application for visualising the results of the smart metering algorithms.*		
Cardell-Oliver, R. and Peach, G. (2013). Making sense of smart metering data: A data mining approach for discovering water use patterns. *Water: Journal of the Australian Water Association*, 40(2), pp. 124–128.	Publication; Model / Database	C5.1
Cardell-Oliver, R. (2013). Water use signature patterns for analyzing household consumption using medium resolution meter data. *Water Resources Research*, 49(12), pp. 8589-8599.	Publication; Model / Database	C5.1
Cardell-Oliver, R., Wang, J. and Gigney, H. (2016). Smart meter analytics to pinpoint opportunities for reducing household water use. *Journal of Water Resources Planning and Management*, 142(6) [Available at: http://dx.doi.org/10.1061/(ASCE)WR.1943-5452.0000634].	Publication; Model / Database	C5.1
Wang, J., Cardell-Oliver, R. and Liu, W. (2015). Efficient Discovery of Recurrent Routine Behaviours in Smart Meter Time Series by Growing Subsequences. In: T. Cao, E. P.	Publication; Model / Database	C5.1

Lim, Z. H. Zhou, T. B. Ho, D. Cheung and H. Motoda, eds., *Advances in Knowledge Discovery and Data Mining. PAKDD 2015. Lecture Notes in Computer Science*, *Volume 9078*. Switzerland: Springer International Publishing, pp. 522-533.		
Reference	Product type	Project no.
Cardell-Oliver, R. (2014). A habit discovery algorithm for mining temporal recurrence patterns in metered consumption data. In: *1st International Workshop on Machine Learning for Urban Sensor Data (SenseML)*, 15 September, Nancy, France.	Publication; Model / Database	C5.1
Cardell-Oliver R. (2016). A Habit Detection Algorithm (HDA) for Discovering Recurrent Patterns in Smart Meter Time Series. In: M. Atzmueller, A. Chin, F. Janssen, I. Schweizer and C. Trattner, eds., *Big Data Analytics in the Social and Ubiquitous Context. Lecture Notes in Computer Science*, *Volume 9546*. Switzerland: Springer International Publishing, pp. 109-127.	Publication; Model / Database	C5.1
Wang, J., Cardell-Oliver, R. and Liu, W. (2016). An incremental algorithm for discovering routine behaviours from smart meter data. *Knowledge-Based Systems*, 113, pp. 61-74.	Publication; Model / Database	C5.1
Wang, J., Cardell-Oliver, R. and Liu, W. (2015). Discovering Routine Behaviours in Smart Water Meter Data. In: *10th International Conference on Intelligent Sensors, Sensor Networks and Information Processing,* 7-9 April, Singapore.	Publication; Model / Database	C5.1
Cardell-Oliver, R. (2013). Discovering water use activities for smart metering. In: *8th International Conference on Intelligent Sensors, Sensor Networks and Information Processing*, 2-5 April, Melbourne, Australia.	Publication	C5.1
CRCWSC and University of Western Australia (2015). *Interactive graphics for exploring water use signature patterns*. Available at: http://staffhome.ecm.uwa.edu.au/~00047104/waterusesignatures-june2015/	Model / Database	C5.1
Cardell-Oliver, R. and Gigney, H. (2015). *Using smart meters and data mining to inform demand management*. Melbourne, Australia: Cooperative Research Centre for Water Sensitive Cities.	Guideline / Framework; Model / Database	C5.1
Decision support tools for pumping optimisation with multiple water sources: *Development of generalised decision support tools for multi-objective optimisation of pumping with multiple water sources (including a user friendly Excel Use Interface for industry end users); Development of case study simulation and optimisation software tool (based on the NSGA-II multi-objective optimiser) for Orange Council, NSW. This tool accounts for alternative sources of water – natural catchment, stormwater, groundwater and imported water from an adjacent catchment – and was optimised for the*		

multi-objectives of pumping cost, environmental flows and minimizing reservoir spills; Development of an extended toolbox for EPANET (a water distribution system and pumping simulation tool) that allows complex rule-based decisions to be optimised to enable extensive exploration of optimisation of pumping, especially in multiple tank and multiple pump station systems.		
Reference	Product type	Project no.
Blinco, L. J., Simpson, A. R., Lambert, M. F. and Marchi, A. (2016). Comparison of Pumping Regimes for Water Distribution Systems to Minimize Cost and Greenhouse Gases. *Journal of Water Resources Planning and Management*, 142(6) [Available at: http://dx.doi.org/10.1061/(ASCE)WR.1943-5452.0000633].	Publication; Model / Database	C5.1
Marchi, A., Simpson, A. R. and Lambert, M. F. (2016). Optimization of Pump Operation Using Rule-Based Controls in EPANET2: New ETTAR Toolkit and Correction of Energy Computation. *Journal of Water Resources Planning and Management*, 142(7) [Available at: http://dx.doi.org/10.1061/(ASCE)WR.1943-5452.0000637].	Publication; Model / Database	C5.1
Cardell-Oliver, R., Scott, V., Chapman, T., Morgan, J. and Simpson, A. (2015). Designing Sensor Networks for Leak Detection in Water Pipeline Systems. In: *10th International Conference on Intelligent Sensors, Sensor Networks and Information Processing*, 7-9 April, Singapore.	Publication; Model / Database	C5.1
Blinco, L. J. (2016). 'The importance of multi-disciplinary research for alternative water sources', *Intelligent Water Decisions*, 17 May 2016. Available at: http://waterdecisions.org/important-expertise-alternative-supply/	Learning Tool	C5.1
Marchi, A., Simpson, A. R., Blinco, L. J. and Lambert, M. F. (2016). Alternative Water Sources Pumping Optimisation Tool for the Orange Water Supply System. *Presentation to Orange City Council and Geolyse,* 23 June, Sydney, Australia.	Learning Tool	C5.1
Shiddiqi, A. M., Cardell-Oliver, R. and Datta, A. (2017). Sensor placement strategy for locating leaks using lean graphs. In: *CySWATER '17 Proceedings of the 3rd International Workshop on Cyber-Physical Systems for Smart Water Networks*, 21 April, Pittsburgh, Pennsylvania.	Guideline / Framework; Publication	C5.1
Blinco, L. J., Lambert, M. F., Simpson, A. R. and Marchi, A., (2017). Framework for the optimization of operation and design of systems with different alternative water sources. *Earth Perspectives*, 4(3), pp. 1-26.	Guideline / Framework; Publication	C5.1
Literature review of current and novel treatment technologies for recycled water, identifying benefits and limitations of both*: Examination of the benefits and limitations of existing and possible future systems for treatment of recycled water. Key factors considered include: installation and operating costs, energy consumption, scalability, maintenance requirements, environmental and other external benefits,*		

novelty, etc.		
Reference	Product type	Project no.
Grant, S. B., Saphores, J., Feldman, D. L., Hamilton, A. J., Fletcher, T. D., Cook, P. L. M., Stewardson, M., Sanders, B. F., Levin, L. A., Ambrose, R. F., Deletic, A., Brown, R. R., Jiang, S. C., Rosso, D., Cooper, W. J. and Marusic, I. (2012). Taking the "waste" out of "wastewater" for human water security and ecosystem sustainability. *Science*, 337(6095), pp. 681-686.	Publication	C1.3
***Development of novel treatment systems for reclaimed water**: Low-cost and low-energy consuming filtration systems for treatment and reuse of reclaimed water.*		
Andres Garcia, E., Agullo-Barcelo, M., Bond, P., Keller, J., Gernjak, W. and Radjenovic, A. (2016). Decentralized grey-water treatment system based on combined adsorption and electrochemical oxidation. In: *IWA World Water Congress*, 9-13 October, Brisbane, Australia.	Publication	C1.3
***Guidelines for the use and application of novel wastewater treatment systems**: Supporting technical information for novel wastewater treatment systems.*		
This output is currently being developed.	–	C1.3
***Development and demonstration of novel urban wastewater resource recovery technologies**: Proof-of-concept in novel resource recovery – potential for further development of commercial outputs; Demonstration site now secured with Queensland Urban Utilities.*		
Puyol, D. P., Batstone, D. J., Hülsen, T., Astals, S., Peces, M. and Krömer, J. O. (2016). Resource recovery from wastewater by biological technologies: opportunities, challenges and prospects. *Frontiers in Microbiology*, 7, pp. 1-23.	Publication	C2.1
Matassa, S., Batstone, D. J., Hülsen, T., Schnoor, J. and Verstraete, W. (2015). Can direct conversion of used nitrogen to new feed and protein help feed the world? *Environmental Science and Technology*, 49, pp. 5247−5254.	Publication	C2.1
Batstone, D. J., Hülsen, T., Mehta, C. M. and Keller, J. (2015). Platforms for energy and nutrient recovery from domestic wastewater: A review. *Chemosphere*, 140, pp. 2-11.	Publication	C2.1
Hülsen, T., Batstone, D. J. and Keller, J. (2014). Phototrophic bacteria for nutrient recovery from domestic wastewater. *Water Research*, 50, pp. 18-26.	Publication	C2.1
Hülsen, T., Barry, E. M., Lu, Y., Puyol, D., Keller, J. and Batstone, D. J. (2016). Domestic wastewater treatment with purple phototrophic bacteria using a novel continuous photo anaerobic membrane bioreactor. *Water Research*, 100, pp. 486-495.	Publication	C2.1

Reference	Product type	Project no.
Hülsen, T., Barry, E. M., Lu, Y., Puyol, D. and Batstone, D. J. (2016). Low temperature treatment of domestic wastewater by purple phototrophic bacteria: Performance, activity, and community. *Water Research*, 100, pp.537-545.	Publication	C2.1
Puyol, D., Huelsen, T., Barry, E., Keller, J. and Batstone, D. J. (2014). A kinetic model based on utilization of purple phototrophic bacteria for nutrient recovery. In: *XI Latin American Symposium of Anaerobic Digestion*, 25-28 November, Havana, Cuba.	Publication	C2.1
Burgess, J., Batstone, D. J., Muster, T. and Pamminger, F. (2015). Wastewater – An untapped resource? Report of a study by the Australian Academy of Technological Sciences and Engineering. Melbourne, Australia: Australian Academy of Technological Sciences and Engineering.	Publication	C2.1
***Performance assessment of Water Sensitive Urban Design (WSUD) options**: Performance assessment of a living stream in reducing pollutant loads to the Canning River; Performance assessment of a constructed wetland in reducing nutrients and pollutants in water that flows from an urbanised catchment to the Canning River.*		
Ruibal-Conti, A. L., Ocampo, C. J., Adyel, T. M., Hipsey, M. R. and Oldham, C.E. (2015). *Performance assessment the of Anvil Way Compensation Basin living stream: 2004-2013*. Melbourne, Australia: Cooperative Research Centre for Water Sensitive Cities.	Publication	B2.4, C4.1
Adyel, T. M, Ocampo, C. J., Tareque, H., Oldham, C. E. and Hipsey, M. R. (2015). *Performance assessment of Wharf St Constructed Wetland 2009-2014*. Melbourne, Australia: Cooperative Research Centre for Water Sensitive Cities.	Publication	B2.4, C4.1
Adyel, T. M., Oldham, C. E. and Hipsey, M. R. (2016). Stormwater nutrient attenuation in a constructed wetland with alternating surface and subsurface flow pathways: Event to annual dynamics. *Water Research,* 107, pp.66-82.	Publication	B2.4, C4.1
Department of Parks and Wildlife (2016). *Performance assessment of the Anvil Way Compensation Basin Living Stream 2004–13: Summary report – February 2016*. Bentley, Western Australia: Department of Parks and Wildlife.	Publication	B2.4, C4.1
Department of Parks and Wildlife (2016). *Performance assessment of the Wharf Street Constructed Wetland 2009-14: Summary report – February 2016*. Bentley, Western Australia: Department of Parks and Wildlife.	Publication	B2.4, C4.1
Adyel, T. M., Hipsey, M. R. and Oldham, C. E. (2017). Temporal dynamics of stormwater nutrient attenuation of an urban constructed wetland experiencing summer low flows and macrophyte senescence. *Ecological Engineering*, 102,	Publication	B2.4, C4.1

pp. 641-661.		
Reference	Product type	Project no.
Risk factors of residential recycled water schemes: *A number of risk factors have been identified through a detailed literature review, interviews with industry practitioners and a review of 21 residential recycled water schemes. The outcomes of this study provide a basis for further investigation through the qualitative definition of critical risks to the long-term viability of residential recycled water schemes.*		
West, C., Kenway, S., Hassall, M. and Yuan, Z. (2016). Why do residential recycled water schemes fail? A comprehensive review of risk factors and impact on objectives. *Water Research*, 102, pp. 271-281.	Publication	C3.1
West, C., Kenway, S. and Yuan, Z. (2015). *Risks to the long-term viability of residential non-potable water schemes: a review*. Melbourne, Australia: Cooperative Research Centre for Water Sensitive Cities.	Publication	C3.1
Recommendations for modelling and integration of decentralised systems*: Three models considered – Water distribution network model EPANET, SeweX, wastewater treatment plant (IWA's ASM, ADM); Case studies provided on the application of the linkages of the various models.*		
Sharma, K., Jiang, G., Ganigue, R., Cesca, J., Yuan, Z. and Vuong, L. (2015). SeweX Modelling to Support Corrosion and Odour Management in Sewers. *Water: Journal of the Australian Water Association*, 42(7), pp. 71-78.	Publication; Model / Database	C3.1
Models to assess the impacts of changes in water use practice on downstream collection systems (odour and corrosion, GHG emissions and sedimentation): *Models (based on SeweX model) to describe the impacts of implementation of decentralised systems on centralised systems. The models will provide support for minimising the impacts and optimising the function of sewer networks.*		
Sun, J., Hu, H., Sharma, K., Ni, B. J. and Yuan, Z. (2014). Stratified Microbial Structure and Activity in Sulfide- and Methane- Producing Anaerobic Sewer Biofilms. *Applied and Environmental Microbiology*, 80(22), pp. 7042-7052.	Publication; Model / Database	C3.1
Jiang, G., Sun, J., Sharma, K. R. and Yuan, Z. (2015). Corrosion and odor management in sewer systems. *Current Opinion in Biotechnology*, 33, pp. 192-197.	Publication	C3.1
Sun, J., Pikaar, I., Sharma, K. R., Keller, J. and Yuan, Z. (2015). Feasibility of sulfide control in sewers by reuse of iron rich drinking water treatment sludge. *Water Research*, 71, pp. 150-159.	Publication; Model / Database	C3.1
Pikaar, I., Sharma, K. R., Hu, S., Gernjak, W., Keller, J. and Yuan, Z. (2014). Reducing sewer corrosion through integrated urban water management. *Science*, 345(6198), pp. 812-814.	Publication	C3.1
Sun, J., Hu, S., Sharma, K. R., Bustamante, H. and Yuan, Z. (2015). Impact of reduced water consumption on sulfide	Publication	C3.1

and methane production in rising main sewers. *Journal of Environmental Management*, 154, pp. 307-315.		
Reference	Product type	Project no.
Sharma, K., Jiang, G., Ganigue, R., Cesca, J., Yuan, Z. and Vuong, L. (2015). SeweX Modelling to Support Corrosion and Odour Management in Sewers. *Water: Journal of the Australian Water Association*, 42(7), pp. 71-78.	Publication; Model / Database	C3.1
Liu, Y., Tugtas, A. E., Sharma, K. R., Ni, B. J. and Yuan, Z. (2016). Sulfide and methane production in sewer sediments: Field survey and model evaluation. *Water Research*, 89, pp. 142-150.	Publication	C3.1
***Decision support platform to integrate models to assist decision-making**: A platform for integrating the three models (Water distribution network model EPANET, SeweX, wastewater treatment plant - IWA's ASM, ADM) to aid decision-making.*		
This output is currently being developed.	–	C3.1
***Analytical framework for identifying risk perceptions:** Framework identifying personal and professional attributes that might influence perceived risk of alternative urban water systems and sources, in order to understand and anticipate possible risk perceptions.*		
Dobbie, M. F. and Brown, R. R. (2014). A Framework for Understanding Risk Perception, Explored from the Perspective of the Water Practitioner. *Risk Analysis*, 34(2), pp. 294-308.	Guideline / Framework; Publication	A4.1
***Report on current risk perceptions of Australian urban water practitioners towards alternative urban water systems, technologies and sources:** Report drawing together conclusions from empirical study of risk perceptions of Australian urban water practitioners towards alternative urban water systems, technologies and sources; and highlighting barriers to their implementation in the water sensitive city.*		
Dobbie, M. F., Brown, R. R. and Farrelly, M. A. (2016). Risk governance in the water sensitive city: Practitioner perspectives on ownership, management and trust. *Environmental Science and Policy*, 55(1), pp. 218-227.	Publication	A4.1
Dobbie, M. F., Brookes, K. L. and Brown, R. R. (2014). Transition to a water-cycle city: risk perceptions and receptivity of Australian urban water practitioners. *Urban Water Journal*, 11(6), pp. 427-443.	Publication	A4.1
Dobbie, M. F. and Brown, R. R. (2013). Integrated urban water management in the water-sensitive city: systems, silos and practitioners' risk perceptions. *Water: Journal of the Australian Water Association*, 40(4), pp. 83-91.	Publication	A4.1
Dobbie, M. F. and Brown, R. R. (2014). Transition to a water-cycle city: sociodemographic influences on Australian urban water practitioners' risk perceptions towards	Publication	A4.1

alternative water systems. *Urban Water Journal*, 11(6), pp. 444-460.		
Reference	Product type	Project no.
Dobbie, M. F. and Brown, R. R. (2012). Risk perceptions and receptivity of Australian urban water practitioners to stormwater harvesting and treatment systems. *Water Science and Technology: Water Supply*, 12(6), pp. 888–894.	Publication	A4.1
Methods for describing hydrologic hazards: *Methods for describing concurrent hydrologic hazards developed in Denmark and to be tested in Australia*		
Åstrøm, H. L. A., Sunyer, M., Madsen, H., Rosbjerg, D. and Arnbjerg-Nielsen, K. (2016). Explanatory analysis of the relationship between atmospheric circulation and flood generating events in a coastal city. *Hydrological Processes*, 30(16), pp. 2773-2788.	Publication; Model / Database	B4.1
Åstrøm, H. L. A., Sunyer, M. A., Madsen, H., Hansen, P. F., Rosbjerg, D. and Arnbjerg-Nielsen, K. (2014). Describing concurrent flood hazards in a risk assessment decision framework using a Bayesian network methodology. In: *13th International Conference on Urban Drainage*, 7-12 September, Sarawak, Malaysia.	Publication	B4.1
DHI. (2015). *Storm Water Runoff from Green Urban Areas: Summary for Modellers*. Report prepared for the Cooperative Research Centre for Water Sensitive Cities.	Learning Tool	B4.1
Flood risk modelling tool: *A flood risk modelling tool that integrates an economic valuation of physical assets threatened by these hydrological hazards. Method to be tested in Australia.*		
Olesen, L., Löwe, R and Arnbjerg-Nielsen, K. (2017). *Flood Damage Assessment: Literature review and recommended procedure*. Cooperative Research Centre for Water Sensitive Cities, Melbourne, Australia.	Publication; Guideline / Framework	B4.1
Module linking flood risk modelling tool with DAnCE4Water: *A module that dynamically links the integrated flood risk modelling tool with the DAnCE4Water platform (Dynamic Adaptation for enabling City Evolution for Water).*		
CRCWSC (2016). *Dynamic Adaptation for enabling City Evolution for Water (DAnCE4Water)*. Available at: http://dance4water.org/	Learning Tool; Model / Database	A4.3, B4.1
Recommendations on mainstreaming approaches to deliver flood resilience: *A Report on opportunities for synergistic enhancement of flood resilience with opportunities for urban regeneration, multi-functional land use, ecosystem services, asset management and other urban developments in Australia.*		
Madsen, H. M., Brown, R. R., Elle, M. and Mikkelsen, P. S. (2013). A comparative socio-technical discourse analysis of Water Sensitive Urban Design for Melbourne, Australia and Copenhagen, Denmark. In: *Proceedings of the 8th International Water Sensitive Urban Design Conference*,	Publication	B4.1

25-29 November, Gold Coast, Australia.		
Reference	Product type	Project no.
Salinas-Rodriguez, C., Ashley, R., Gersonius, B., Rijke, J., Pathirana, A. and Zevenbergen, C. (2014). Incorporation and application of resilience in the context of water-sensitive urban design: linking European and Australian perspectives. *Wiley Interdisciplinary Reviews: Water*, 1(2), pp. 173-186.	Publication	B4.2
Ashley, R., Lundy, L., Ward, S., Shaffer, P., Walker, A. L,. Morgan, C., Saul, A., Wong, T. and Moore, S. (2013). Water-sensitive urban design: opportunities for the UK. In: *Proceedings of the Institution of Civil Engineers – Municipal Engineer*, 166(2), pp. 65-76.	Publication	B4.2
Ashley, R., Shucksmith, J., Blanksby, J., Sharp, L., Tait, S., Shaffer, P. and Stam, J. (2013). Water sensitive urban design in a European context. In: *Water Sensitive Urban Design 2013: WSUD 2013*. Barton, ACT: Engineers Australia, pp. 209-219.	Publication; Guideline / Framework	B4.2
Ashley, R., Gersonius, B., Pathirana, A., Rijke, J. and Zevenbergen, C. (2013). Flood resilience incorporation and application in the context of water sensitive cities. In: *Water Sensitive Urban Design 2013: WSUD 2013*. Barton, ACT: Engineers Australia, pp. 375-381.	Publication	B4.2
Bacchin, T. K., Ashley, R., Sijmons, D., Zevenbergen, C. and and van Timmeren, A. (2014). Green-blue multifunctional infrastructure: an urban landscape system design new approach. In: *13th International Conference on Urban Drainage*, 7-14 September, Sarawak, Malaysia.	Publication; Model / Database	B4.2
Bacchin, T., Ashley, R., Blecken, G., Viklander, M. and Gersonius, B. (2016). Green-blue Infrastructure for Sustainable Cities: Innovative Socio-technical Solutions Bringing Multifunctional value. In: *Novatech*, 28 June – 1 July, Lyon, France.	Publication	B4.2
Rijke, J., Ashley, R., Gersonius, B. and Sakic, R. (2016). *Adaptation mainstreaming for achieving flood resilience in cities*. Melbourne, Australia: Cooperative Research Centre for Water Sensitive Cities.	Guideline / Framework	B4.2
Gersonius, B., Ashley, R., Salinas-Rodriguez, C., Rijke, J., Radhakrishnan, M. and Zevenbergen, C. (2016). *Flood Resilience in Water Sensitive Cities: Guidance for enhancing flood resilience in the context of an Australian Water Sensitive City*. Melbourne, Australia: Cooperative Research Centre for Water Sensitive Cities.	Guideline / Framework	B4.2
Software tool to model flood management policies: *A novel technique for modelling flood management policies developed in the Netherlands and to be tested in Australia.*		

Reference	Product type	Project no.
Salinas-Rodriguez, C., Ashley, R., Gersonius, B., Rijke, J., Pathirana, A. and Zevenbergen, C. (2014). Incorporation and application of resilience in the context of water-sensitive urban design: linking European and Australian perspectives. *Wiley Interdisciplinary Reviews: Water*, 1(2), pp. 173-186.	Publication	B4.2
Rijke, J., Smith, J. V., Gersonius, B., van Herk, S., Pathirana, A., Ashley, R., Wong, T. and Zevenbergen, C. (2014). Operationalising resilience to drought: Multi-layered safety for flooding applied to droughts. *Journal of Hydrology,* 519(C), pp. 2652-2659.	Publication; Guideline / Framework	B4.2
Salinas-Rodriguez, C., Ashley, R., Gersonius, B., Pathirana, A., Rijke, J. and Zevenbergen, C. (2013). Flood resilience incorporation and application in the context of water sensitive cities. In: *Water Sensitive Urban Design 2013: WSUD 2013*. Barton, ACT: Engineers Australia, pp. 375-381.	Publication	B4.2
Bacchin, T. K., Ashley, R., Sijmons, D. and Zevenbergen, C. (2014). Green-blue multifunctional infrastructure: an urban landscape system design new approach. In: *13th International Conference on Urban Drainage*, 7-14 September, Sarawak, Malaysia.	Publication; Model / Database	B4.2
Bacchin, T., Ashley, R., Blecken, G., Viklander, M. and Gersonius, B. (2016). Green-blue Infrastructure for Sustainable Cities: Innovative Socio-technical Solutions Bringing Multifunctional value. In: *Novatech*, 28 June – 1 July, Lyon, France.	Publication	B4.2
Ashley, R., Digman, C., Horton, B., Gersonius, B., Smith, B., Shaffer, P. and Baylis, A. (2016). Using the multiple benefits of SuDS tool (BeST) to deliver long-term benefits. In: *Novatech*, 28 June – 1 July, Lyon, France.	Publication	B4.2
Ashley, R., Walker, A., D'Arcy, B., Wilson, S., Illman, S., Shaffer, P., Woods-Ballard, B. and Chatfield, P. (2015). UK sustainable drainage systems: past, present and future. *Proceedings of ICE - Civil Engineering*, 168(3), pp.125-130.	Publication	B4.2
Salinas-Rodriguez, C., Radhakrishnan, M., Ashley, R. and Gersonius, B. (2016). *Extended ATP approach to include the four domains of Flood Risk Management: Manual and prototype software tool.* Melbourne, Australia: Cooperative Research Centre for Water Sensitive Cities.	Model / Database; Learning Tool	B4.2
Veerbeek, W., Gersonius, B., Ashley, R., Rijke, J., Radhakrishnan, M. and Salinas-Rodriguez, C. (2016). *Appropriate Flood Adaptation: Adapting in the right way, in the right place and at the right time.* Melbourne, Australia: Cooperative Research Centre for Water Sensitive Cities.	Model / Database; Guideline / Framework	B4.2

Reference	Product type	Project no.
Gersonius, B., Ashley, R., Salinas-Rodriguez, C., Rijke, J., Radhakrishnan, M. and Zevenbergen, C. (2016). *Flood Resilience in Water Sensitive Cities: Guidance for enhancing flood resilience in the context of an Australian Water Sensitive City*. Melbourne, Australia: Cooperative Research Centre for Water Sensitive Cities.	Guideline / Framework	B4.2
Accounting tool, with user guide recommendations for flood management: *Accounting tool that supports the application of the flood risk management policy model in Australian cities.*		
Radhakrishnan, M., Quang, C. N. X., Pathirana, A., Phi, H. L., Quan, N. H. and Ashley, R. (2014). Evaluation of Retrofitting Options in Urban Drainage Systems based on Flexibility: A Case Study for Nhieu Loc-Thi Nghe Basin in Ho Chi Minh City. In: *Proceedings of 11th International Conference on Hydroinformatics – Informatics and the Environment: Data and Model Integration in a Heterogeneous Hydro World*, 17-21 August, New York, United States.	Publication	B4.2
Radhakrishnan, M., Pathirana, A., Gersonius, B., Zevenbergen, C. and Ashley, R. (2013). Resilience approach to urban flood risk management systems using real in options – a review. In: *Water Sensitive Urban Design 2013: WSUD 2013*. Barton, ACT: Engineers Australia, pp. 134-146.	Publication	B4.2
Pathirana, A., Urrestarazu, S., Hayde, L., De Fraiture, C. and Salinas-Rodriguez, C. (2013). Value of SuDS beyond urban flood management: The ecosystem services value of green/blue solutions. In: *Water Sensitive Urban Design 2013: WSUD 2013*. Barton, ACT: Engineers Australia, pp. 192-202.	Publication	B4.2
Radhakrishnan, M., Quang, C. N. X., Pathirana, A., Phi, H. L., Quan, N. H. and Ashley, R. (2014). Retrofitting urban drainage capacity to cope with change: A case study for Nhieu Loc – Thi Nghe Basin change in Ho Chi Minh city. In: *13th International Conference on Urban Drainage*, 7-14 September, Sarawak, Malaysia.	Publication; Learning Tool	B4.2
Ashley, R., Digman, C., Horton, B., Gersonius, B., Smith, B., Shaffer, P. and Baylis, A. (2016). Using the multiple benefits of SuDS tool (BeST) to deliver long-term benefits. In: *Novatech*, 28 June – 1 July, Lyon, France.	Publication	B4.2
Ashley, R., Walker, A., D'Arcy, B., Wilson, S., Illman, S., Shaffer, P., Woods-Ballard, B. and Chatfield, P. (2015). UK sustainable drainage systems: past, present and future. *Proceedings of ICE - Civil Engineering*, 168(3), pp. 125-130.	Publication	B4.2

Reference	Product type	Project no.
Case studies on new tools for adaptive flood risk management: *Application of the new tools for the development of adaptive flood risk management strategies to case studies (Elwood/Melbourne, Swan Coastal Plain/ Perth and Spaanse Polder/Rotterdam).*		
Locatelli, L., Mark, O., Mikkelsen, P. S., Arnbjerg-Nielsen, K., Deletic, A., Roldin, M. and Binning, P. J. (2017). Hydrologic impact of urbanization with extensive stormwater infiltration. *Journal of Hydrology*, 544, pp. 524-537.	Publication; Model / Database	B4.1
Radhakrishnan, M., Quang, C. N. X., Pathirana, A., Phi, H. L., Quan, N. H. and Ashley, R. (2014). Evaluation of Retrofitting Options in Urban Drainage Systems based on Flexibility: A Case Study for Nhieu Loc-Thi Nghe Basin in Ho Chi Minh City. In: *Proceedings of 11th International Conference on Hydroinformatics – Informatics and the Environment: Data and Model Integration in a Heterogeneous Hydro World*, 17-21 August, New York, United States.	Publication	B4.2
Quan, N. H., Phi, H. L., Tran, P. G., Pathirana, A., Radhakrishnan M. and Quang, C. N. X. (2014). Urban retention basin in developing city: from theoretical effectiveness to practical feasibility. In: *13th International Conference on Urban Drainage*, 7-14 September, Sarawak, Malaysia.	Publication; Model / Database	B4.2
Radhakrishnan, M., Quang, C. N. X., Pathirana, A., Phi, H. L., Quan, N. H. and Ashley, R. (2014). Retrofitting urban drainage capacity to cope with change: A case study for Nhieu Loc – Thi Nghe Basin change in Ho Chi Minh city. In: *13th International Conference on Urban Drainage*, 7-14 September, Sarawak, Malaysia.	Publication; Learning Tool	B4.2
Ashley, R., Digman, C., Horton, B., Gersonius, B., Smith, B., Shaffer, P. and Baylis, A. (2016). Using the multiple benefits of SuDS tool (BeST) to deliver long-term benefits. In: *Novatech*, 28 June – 1 July, Lyon, France.	Publication	B4.2
Ashley, R., Walker, A., D'Arcy, B., Wilson, S., Illman, S., Shaffer, P., Woods-Ballard, B. and Chatfield, P. (2015). UK sustainable drainage systems: past, present and future. *Proceedings of ICE - Civil Engineering*, 168(3), pp. 125-130.	Publication	B4.2
Gersonius, B., Ashley, R., Salinas-Rodriguez, C., Rijke, J., Radhakrishnan, M. and Zevenbergen, C. (2016). *Flood Resilience in Water Sensitive Cities: Guidance for enhancing flood resilience in the context of an Australian Water Sensitive City*. Melbourne, Australia: Cooperative Research Centre for Water Sensitive Cities.	Guideline / Framework	B4.2

d. Operation and maintenance: Integrating and managing green infrastructure as part of an asset portfolio

Reference	Product type	Project no.
Validation and operational monitoring methodologies for passive water treatment systems: *This output provides: 1) validation methodologies to ensure natural treatment systems perform their desired function; and 2) operational monitoring regimes that demonstrate performance.*		
Zhang, K., Randelovic, A., Page, D., McCarthy, D. T. and Deletic, A. (2014). The validation of stormwater biofilters for micropollutant removal using in situ challenge tests. *Ecological Engineering*, 67, pp. 1-10.	Publication; Guideline / Framework	C1.1
Zhang, K., Randelovic, A., Deletic, A., Page, D. and McCarthy, D. T. (2016). Stormwater biofilters: A new validation modelling tool. *Ecological Engineering*, 87, pp. 53-61.	Publication; Model / Database	C1.1
Zhang, K., Deletic, A., Page, D. and McCarthy, D. T. (2015). Surrogates for herbicide removal in stormwater biofilters. *Water Research*, 81, pp. 64-71.	Publication	C1.3
Zhang, K., Randelovic, A., Aguiar, L. M., Page, D., McCarthy, D. T. and Deletic, A. (2015). Methodologies for pre-validation of biofilters and wetlands for stormwater treatment. *PloS one*, 10(5), pp. 1-21. doi: 10.1371/journal.pone.0125979.	Publication; Guideline / Framework	C1.3
Zhang, K., Deletic, A., Page, D. and McCarthy, D. T. (2015). Validation framework for water-sensitive urban design treatment systems. *Water: Journal of the Australian Water Association*, 42(6), pp. 70-73.	Publication; Guideline / Framework	C1.3
Zhang, K., Aguiar, L., Randelovic, A., McCarthy, D. T. and Deletic, A. (2013). Determination of operational and challenge conditions for validation of stormwater biofilters and wetlands. In: *Water Sensitive Urban Design 2013: WSUD 2013*. Barton, ACT: Engineers Australia, pp. 87-94.	Publication; Guideline / Framework	C1.3

e. Citizen engagement: Interacting and engaging with citizens in decision-making processes

Reference	Product type	Project no.
Water sensitive citizen typology*: Advice on understanding types of people and how to influence their water behaviours and decision-making*		
Dean, A. J., Lindsay, J., Fielding, K. S. and Smith, L. D. (2016). Fostering water sensitive citizenship–Community profiles of engagement in water-related issues. *Environmental Science and Policy*, 55(1), pp. 238-247.	Publication	A2.1

Reference	Product type	Project no.
Lindsay, J. (2014). Changing water cultures to achieve water sensitive cities: The importance of communities and households. In: *XVIII ISA World Congress of Sociology: Facing an unequal world: Challenges for global sociology*, 13-19 July, Yokohama, Japan.	Publication	A2.1
Supski, S. and Lindsay, J. (2013). *Australian Domestic Water Use Cultures: A Literature Review.* Melbourne, Australia: Cooperative Research Centre for Water Sensitive Cities.	Publication	A2.1
Dean, A., Lindsay, J., Fielding, K. and Smith, L. (2016) *Community profiles of engagement with water: Identifying 'footholds' for building engaged communities.* Melbourne, Australia: Cooperative Research Centre for Water Sensitive Cities.	Publication	A2.1
Recommendations for effective behaviour change strategies: *Advice on how to change behaviours to promote more water conservation or water quality protection in households.*		
Wright, P., Dean, A., Kneebone, S. and Smith, L. (2016). *Behavioural roadmap: prioritising water saving behaviours in households using measurements of impact and likelihood*. Melbourne, Australia: Cooperative Research Centre for Water Sensitive Cities.	Guideline / Framework; Publication	A2.2
Lauren, N., Fielding, K. S., Smith, L. and Louis, W. R. (2016). You did, so you can and you will: Self-efficacy as a mediator of spillover from easy to more difficult pro-environmental behaviour. *Journal of Environmental Psychology*, 48, pp. 191-199.	Publication	A2.2
Dean, A. and Smith, L. (2017). *Guide to promoting water sensitive behaviours*. Melbourne, Australia: Cooperative Research Centre for Water Sensitive Cities.	Guideline / Framework; Publication	A2.2
Best practice recommendations for community engagement in sustainable urban water management: *A set of recommendations informed by systematic review of the national and international literature and project-based experimental studies.*		
Dean, A. J., Fielding, K. S., Lindsay, J., Newton, F. J. and Ross, H. (2016). How social capital influences community support for alternative water sources. *Sustainable Cities and Society*, 27, pp. 457-466.	Publication	A2.3
Dean, A. J., Fielding, K. S., Ross, H. and Newton, F. (2016). *Community Engagement in the Water Sector: An outcome-focused review of different engagement approaches*. Melbourne, Australia: Cooperative Research Centre for Water Sensitive Cities.	Publication	A2.3
Database of community friendly water terminology and visuals*: An empirically tested set of water-related terms, information, and visuals that are comprehensible and engage citizens with water issues. This database is currently being developed.*		

Reference	Product type	Project no.
CRCWSC Industry Note (2016). *Water-related jargon: How much does the community understand?* Melbourne, Australia: Cooperative Research Centre for Water Sensitive Cities.	Factsheet	A2.3
Fielding, K., Dean, A. and Newton, F. (2016). *Community understanding of water terminology*. Melbourne, Australia: Cooperative Research Centre for Water Sensitive Cities.	Publication	A2.3

f. Cost benefit analyses: Quantifying the costs and benefits of water services

Reference	Product type	Project no.
Preferences (willingness to pay) for attributes of stormwater management: *High-level messages of relative importance of outcomes from stormwater management across NSW and VIC; Evidence of communities' willingness to pay for stormwater management and the ecosystem services it provides.*		
Brent, D., Gangadharan, L., Leroux, A. and Raschky, P. (2014). *Putting One's Money Where One's Mouth is: Creating Saliency in the field.* Melbourne, Australia: Monash University Department of Economics Working Paper Series.	Publication; Guideline / Framework	A1.1
Brent, D., Friesen, L., Gangadharan, L. and Leibbrandt, A. (2016). *Behavioural insights from field experiments in environmental economics*. Melbourne, Australia: Monash University Department of Economics Working Paper Series.	Publication	A1.3
Dorner, Z., Brent, D. and Leroux, A. (2016). *Eliciting Risk Preferences for Intrinsic Attributes*. Melbourne, Australia: Monash University Department of Economics Working Paper Series.	Publication; Model / Database	A1.1
CRCWSC Industry Note (2014). *Valuing stormwater management: Who is willing to pay?* Melbourne, Australia: Cooperative Research Centre for Water Sensitive Cities.	Factsheet	A1.1
CRCWSC Industry Note (2016). *Allowed use and security: Community preferences for new water supply sources.* Melbourne, Australia: Cooperative Research Centre for Water Sensitive Cities.	Factsheet	A1.1
Monetary and non-market values of water sensitive landscapes: *Literature review collation of empirical evidence of monetary and non-market values of water sensitive landscapes/green spaces in a working paper; Evidence based on literature review of existing knowledge and indexing of values into a database*		
Brent, D., Friesen, L., Gangadharan, L. and Leibbrandt, A. (2016). *Behavioural insights from field experiments in environmental economics*. Melbourne, Australia: Monash University Department of Economics Working Paper Series.	Publication	A1.3

Reference	Product type	Project no.
Dorner, Z., Brent, D. and Leroux, A. (2016). *Eliciting Risk Preferences for Intrinsic Attributes*. Melbourne, Australia: Monash University Department of Economics Working Paper Series.	Publication; Model / Database	A1.1
Zhang, F. and Fogarty, J. (2016). *Nonmarket Valuation of Water Sensitive Cities: Current Knowledge and Issues*. Melbourne, Australia: Cooperative Research Centre for Water Sensitive Cities.	Publication	A1.2
***Economic assessment of decentralised water supply system case studies**: Evidence of: 1) private benefits from rainwater tank installations and subsequent application of a public-private benefit framework to evaluate policy responses; and 2) integrated stage 1 project evaluation of the benefits of a local government water recycling scheme to use treated wastewater on parks, open spaces, schools and playing fields.*		
Zhang, F., Polyakov, M., Fogarty, J. and Pannell, D. J. (2015). The capitalized value of rainwater tanks in the property market of Perth, Australia. *Journal of Hydrology*, 522, pp. 317-325.	Publication	A1.2
Zhang, F., Polyakov, M., Fogarty, J. and Pannell, D. J. (2015). *The capitalized value of rainwater tanks in the property market of Perth, Australia.* Melbourne, Australia: Cooperative Research Centre for Water Sensitive Cities.	Publication	A1.2
***Economic assessment of WSUD technology case studies:** Evidence of economic benefits associated with rain gardens; Evidence of economic and ecosystem benefits associated with a living stream project; and Evidence of the amenity value, recreational value, and ecosystem value of two CRCWSC designed constructed wetlands (Melbourne and China)*		
Polyakov, M., Fogarty, J., Zhang, F., Pandit, R. and Pannell, D. J. (2016). The value of restoring urban drains to living streams. *Water Resources and Economics*. 'Online First' Published 18 March 2016. doi: 10.1016/j.wre.2016.03.002.	Publication	A1.2
CRCWSC Industry Note (2015). *The value of restoring urban drains to living streams.* Melbourne, Australia: Cooperative Research Centre for Water Sensitive Cities.	Factsheet	A1.2
***Cost-benefit analysis of nutrient emission case study in Western Australia's Southern River catchment**: Measurement of the rate at which emissions (nutrients) are changing - GIS analysis and database, hedonic analysis providing modelling results; Links between land use change and fertiliser use (and surface / groundwater interactions); Assessment of the cost and benefits of different policies for reducing emissions including behaviour change among households, local authorities' policies and restrictions on developers to identify: (a) least-cost solution/s for Canning (treatments for public and private land); and (b) a cost-effective nutrient management plan.*		
This output is currently being developed.	–	A1.3

Reference	Product type	Project no.
Salient method to improve non-market evaluations with choice experiments: *Method available to improve non-market valuation with choice experiments*		
Brent, D., Gangadharan, L., Leroux, A. and Raschky, P. (2014). *Putting One's Money Where One's Mouth is: Creating Saliency in the field*. Melbourne, Australia: Monash University Department of Economics Working Paper Series.	Publication; Guideline / Framework	A1.1
CRCWSC Industry Note (2016). *The real problem of hypothetical bias in the valuation of stormwater management projects*. Melbourne, Australia: Cooperative Research Centre for Water Sensitive Cities.	Factsheet	A1.1, A1.2
Guidelines for cost-benefit assessments of water sensitive city projects*: Practical guide on the process of cost benefit analysis. Report published as "Ranking projects for water-sensitive cities: A practical guide".*		
Pannell, D. J. (2015). *Ranking projects for water-sensitive cities: a practical guide*. Melbourne, Australia: Cooperative Research Centre for Water Sensitive Cities.	Guideline / Framework	A1.2
Case studies and guidelines for the management of the interaction between wastewater treatment plants and urban populations: *(1) Evidence from case studies: (a) Determination of the non-market values and preferences for beneficial land uses in the odour buffers of wastewater treatment plants and pumping stations; and (b) Identification and quantification of potential onsite and offsite impacts from cyanobacterial events for regional towns. (2) Specific guidelines on how water utilities should manage interactions between wastewater treatment plants and communities.*		
Wood, R. (2016). Acute animal and human poisonings from cyanotoxin exposure – A review of the literature. *Environment International*, 91, pp. 276-282.	Publication	A1.2

3. Socio-Political Capital

a. Science influence: The practices of science and its influence

Reference	Product type	Project no.
***Development and testing of capacity-building approaches for researchers to influence policy**: Design and testing of capacity-building approaches (e.g. interactive workshops, panels, etc.) for researchers to influence policy and engage with stakeholders (e.g. media, policy-makers, etc.); Development of a model for policy learning circles; Science-policy capacity building training.*		
Taylor, A., Lincklaen Arriëns, W. and Laing, M. (2015). Understanding Six Water Leadership Roles: A Framework to Help Build Leadership Capacity. *New Water Policy and Practice Journal*, 1(2), pp. 4-31.	Publication; Guideline / Framework	A3.3
Laing, M. and Wallis, P. (2016). Scientists versus policy-makers: Building capacity for productive interactions across boundaries in the urban water sector. *Environmental Science and Policy*, 66, pp. 23-30.	Publication	A3.3

b. Capacity: Knowledge, skills and experiences of practitioners

Reference	Product type	Project no.
***Australian and international skills and knowledge needs assessment report:** An assessment of the skills and knowledge needed to deliver water sensitive city outcomes across local and state governments, water utilities and the private sector in Australia, The Netherlands and a selected set of Asian cities.*		
McIntosh, B. S., Orams, P. and Patschke, S. (2015). *Delivering Water Sensitive Cities professional learning – Understanding the learning needs and preferences of the Australian urban water sector*. Melbourne, Australia: Cooperative Research Centre for Water Sensitive Cities.	Publication	D4.1
McIntosh, B. S., Pathirana, A., Veerbeek, W. and Wegener, P. (2015). *Water Sensitive Cities skills and knowledge needs – An Australian and international assessment*. Melbourne, Australia: Cooperative Research Centre for Water Sensitive Cities.	Publication	D4.1
***A structured professional learning vision and set of recommendations for delivering water sensitive city outcomes:** A report identifying and recommending opportunities for the CRCWSC to: (i) invest in the development of new structured professional learning programs and courses (education and training), where gaps and sufficient demand exists; and (ii) partner where existing provision or capacity exists to deliver on identified skills and knowledge needs.*		
McIntosh, B. S., Orams, P. and Patschke, S. (2015). *Delivering Water Sensitive Cities professional learning – Understanding the learning needs and preferences of the Australian urban water sector*. Melbourne, Australia: Cooperative Research Centre for Water Sensitive Cities.	Publication	D4.1

Reference	Product type	Project no.
McIntosh, B. S., Pathirana, A., Veerbeek, W. and Wegener, P. (2015). *Water Sensitive Cities skills and knowledge needs – An Australian and international assessment*. Melbourne, Australia: Cooperative Research Centre for Water Sensitive Cities.	Publication	D4.1
***Masters level module on delivering Water Sensitive Cities**: A professionally targeted high level module syllabus and teaching materials that introduce water sensitivity and how to deliver it through innovations in governance, technology and economics.*		
McIntosh, B. S. and Taylor, A. (2013). Developing T-shaped water professionals: reflections on a framework for building capacity for innovation through collaboration, learning and leadership. *Water Policy*, 15(S2), pp. 42-60.	Publication; Guideline / Framework	D4.1
McIntosh, B. S. and Taylor, A. (2013). Developing T-Shaped Water Professionals: Building Capacity in Collaboration, Learning, and Leadership to Drive Innovation. *Journal of Contemporary Water Research and Education*, 150(1), pp. 6-17.	Publication; Guideline / Framework	D4.1
McIntosh, B. S., Beckenham, T., Yule, M. and Pascoe, M. (2013). Transforming Our Cities Whilst Keeping the Taps and Toilets Working. *Water: Journal of the Australian Water Association*, 40(2), pp. 52-56.	Publication	D4.1
***Set of structured professional learning programs and courses with paying participants:** A set of structured professional learning programs and courses with paying participants, delivered by a mixture of CRCWSC participants and external partners to effectively build capacity in water sensitive city outcome delivery.*		
This output includes modules for the International WaterCentre and UNESCO-IHE Masters programs, such as 'Urban Futures: Delivering Water Sensitive Cities', and the development of a business case course using the 'Innovation Skills Series' learning model.	Learning Tool	D4.1
***Updated blueprint Chapter: Research Adoption and Implementation (Officer):** Revised and updated chapter describing the adoption, adaptation and implementation of research insights as part of Places Victoria's Officer development. This output is currently being developed.*		
Wong, T. H. F., Allen, R., Brown, R. R., Deletic, A., Gangadharan, L., Gernjak, W., Jakob, C., Johnstone, P., Reeder, M., Tapper, N., Vietz, G. and Walsh, C. J. (2013). *blueprint2013: Stormwater Management in a Water Sensitive City*. Melbourne, Australia: Cooperative Research Centre for Water Sensitive Cities.	Learning Tool	D1.1, D1.5
Wong T. H. F., Allen, R., Beringer, J., Brown, R. R., Chaudhri, V., Deletic, A., Fletcher, T. D., Gernjak, W., Hodyl, L., Jakob, C., Reeder, M., Tapper, N. and Walsh, C. J. (2012). *blueprint2012: Stormwater Management in a Water Sensitive City*. Melbourne, Australia: Cooperative	Learning Tool	D1.1, D1.5

Research Centre for Water Sensitive Cities.		
Reference	Product type	Project no.
***Case study applications of the Water Sensitive Cities Modelling Toolkit**: Documentation of application (testing and validation) of the Toolkit to specific locations.*		
Webster-Mannison, M., Boer, S., Breen, P. and Eadie, M. (2013). Urban water toolKit: Translating water engineering to urban design. In: *Water Sensitive Urban Design 2013: WSUD 2013*. Barton, ACT: Engineers Australia, pp. 184-191.	Learning Tool	D1.1, D1.5
CRCWSC (2016). *Water Sensitive Cities Toolkit*. Available at:https://watersensitivecities.org.au/solutions/water-sensitive-cities-toolkit/	Factsheet	D1.1, D1.5
***Seminars, reports, and site visits for demonstration projects:** Knowledge sharing seminars, presentations, reports and site visits focussed on CRCWSC research engagement, outcomes and insights for the Officer (Vic) and Marrickville (NSW) demonstration projects.*		
CRCWSC (2016). *Water Sensitive Cities Toolkit*. Available at:https://watersensitivecities.org.au/solutions/water-sensitive-cities-toolkit/	Factsheet	D1.1, D1.5
***Seminars and training on the application of the Water Sensitive Cities Modelling Toolkit**: Engagement with practitioners' interested/ involved in the application of the Toolkit, including the dissemination and discussion of research knowledge from research projects represented in the Toolkit.*		
Bach, P. (2015). Informing strategic planning through the application of water-sensitive modelling tools. Presented at: *2nd Water Sensitive Cities Conference*, 8-9 September, Brisbane, Australia.	Learning Tool	D1.1, D1.5
Allen, R. (2015). Water-sensitive cities modelling toolkit. Presented at: *CRCWSC Seminar: Novel decision-making tools for planners and designers engaged with creating water-sensitive cities*, 19 June, Brisbane, Australia.	Learning Tool	D1.1, D1.5
CRCWSC (2016). *Water Sensitive Cities Toolkit*. Available at:https://watersensitivecities.org.au/solutions/water-sensitive-cities-toolkit/	Factsheet	D1.1, D1.5

c. Community connection: Citizens' attitude and appreciation of water and its role in the place they live

Reference	Product type	Project no.
***Report on the history of water use in Australia:** (a) Historical analysis of water use in Australian households from 1788 – 2014 that identifies the social, physical, institutional, and cultural factors that have influenced water use during this period; (b) Description of cultures and contexts of water in three states.*		
Lindsay, J., Dean, A. J. and Supski, S. (2017). Responding to the Millennium drought: comparing domestic water cultures in three Australian cities. *Regional Environmental Change*, 17(2), pp. 1-13.	Publication	A2.1

Reference	Product type	Project no.
Gregory, J. (2017). "A Spirit of Bolshevism?" Perth's Water Crisis of the 1920s. *Journal of Urban History*. 'Online First' Published 1 January 2017. doi: 10.1177/0096144217692989.	Publication	A2.1
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