



Variation Agreement Project IRP2

THIS AGREEMENT is made on the 18th day of December 2017

THE CRC FOR WATER SENSITIVE CITIES, Building 74, Monash University, Clayton, Victoria, 3800 (CRC)

AND the parties named in Item 1 of the Schedule (Other Parties)

BACKGROUND:

- A. CRC and the Other Parties entered into the Document named in Item 2 of the Schedule (**Document**).
- B. CRC and the Other Parties wish to vary the Document in accordance with this Agreement.

IT IS AGREED AS FOLLOWS:

1. Definitions

1.1 Terms which are defined in the Document and used in this Agreement have the meaning given to them in the Document, unless stated otherwise.

2. Effective date of variation

2.1 The effective date of this Agreement is the date set out in Item 3 of the Schedule (**Effective Date**).

2.2 Clause 2.1 does not affect any right or obligation arising before the Effective Date.

3. Variation

3.1 The parties agree that from the Effective Date the Document will be varied in accordance with Item 4 of the Schedule.

3.2 Save for varying the Document as specified in this Agreement, all other provisions in the Document remain unchanged.

4. General

4.1 **Costs:** Each party remains responsible for its own costs and expenses in entering into this Agreement.

4.2 **Signatories:** The signatories to this Agreement warrant that they have the authority to enter into this Agreement on behalf of the party they are stated to represent.

4.3 **Counterparts:** This Agreement may be executed in any number of counterparts. All counterparts taken together will constitute the one Agreement.

4.4 **Electronic Signatures:** Each party may communicate its execution of this Agreement by successfully transmitting an executed copy of this Agreement by facsimile or email to each other party.

EXECUTED as an Agreement

SIGNED for and on behalf of [CRC]
by its authorised officer:

Signature: 

Name: BEN FORMAGE

Date: 18/12/17



SIGNED for and on behalf of **UNIVERSITY OF WESTERN AUSTRALIA**
by its authorised officer:

Signature:.....

Name:..... **Dr Campbell Thomson**

Date:..... **7 December 2017**

SIGNED for and on behalf of **MONASH UNIVERSITY**
by its authorised officer:

Signature:.....

Name:.....

Date:

SCHEDULE

| Item | Description |
|--------------------------|---|
| 1. Other Parties | THE UNIVERSITY OF WESTERN AUSTRALIA ABN 37 882 817 280 of Crawley in the state of Western Australia (UWA). MONASH UNIVERSITY ABN: 12 377 614 012 of Wellington Road, Clayton, Victoria (MU) |
| 2. Document | Project Agreement: Comprehensive economic evaluation framework (IRP2). Executed 08 Mar 2017. |
| 3. Effective Date | 01 July 2017 |
| 4. Variations | <ul style="list-style-type: none"> • The Agreement Variation provides additional funding of \$75,000 as per the Water Corporation Letter of Commitment to CRCWSC on 22 June 2017. Payments will be phased over 3 years (see budget table below). • In addition to general project deliverables, funding relates to outputs specifically from WP 5.2, as per Table 1 below. • Monash University funding is to be administered via the Faculty of Science, School of Earth, Atmosphere and Environment (formerly Faculty of Arts, School of Geography and Environmental Science) • Revised expenditure budget is provided in Table 2 below: |

SIGNED for and on behalf of **UNIVERSITY OF WESTERN AUSTRALIA**
by its authorised officer:

Signature:.....

Name:.....

Date:

SIGNED for and on behalf of **MONASH UNIVERSITY**
by its authorised officer:



Signature:.....

Name: Prof Pauline Nestor

Date: 14 December 2017

SCHEDULE

| Item | Description |
|-------------------|---|
| 1. Other Parties | <p>THE UNIVERSITY OF WESTERN AUSTRALIA ABN 37 882 817 280 of Crawley in the state of Western Australia (UWA).</p> <p>MONASH UNIVERSITY ABN: 12 377 614 012 of Wellington Road, Clayton, Victoria (MU)</p> |
| 2. Document | Project Agreement: Comprehensive economic evaluation framework (IRP2). Executed 08 Mar 2017. |
| 3. Effective Date | 01 July 2017 |
| 4. Variations | <ul style="list-style-type: none"> The Agreement Variation provides additional funding of \$75,000 as per the Water Corporation Letter of Commitment to CRCWSC on 22 June 2017. Payments will be phased over 3 years (see budget table below). In addition to general project deliverables, funding relates to outputs specifically from WP 5.2, as per Table 1 below. Monash University funding is to be administered via the Faculty of Science, School of Earth, Atmosphere and Environment (formerly Faculty of Arts, School of Geography and Environmental Science) Revised expenditure budget is provided in Table 2 below: |

Table 1. Project deliverables

| No. | Deliverables | Due date |
|--|--|-----------|
| General outputs | | |
| 1 | Comprehensive review of existing non-market values of water sensitive systems and practices | June 2017 |
| 2 | Benefit-transfer guidelines (draft version for testing) | June 2018 |
| 3 | Benefit: Cost Analysis tool (draft version for testing) | June 2018 |
| 4 | Finance models and policies for selected cases (draft version for testing) | June 2018 |
| 5 | Benefit-transfer guidelines (tested and finalised) | Dec 2019 |
| 6 | Benefit: Cost Analysis tool (tested and finalised) | Dec 2019 |
| 7 | Finance models and policies for selected cases (tested and finalised) | Dec 2019 |
| 8 | Training and capacity building | On-going |
| Outputs specific to Work Package 5.2 Case study on economic evaluation of land use scenarios and funding options for Strategic Water Resource Precincts (Subiaco Strategic Water Resource Precinct) | | |
| 9 | Initial scoping meeting | Mar 2018 |
| 10 | Presentation and workshop with Water Corporation on valuation methods used for case study and draft findings | Dec 2018 |
| 11 | Integrated economic valuation report: final report | June 2019 |



Budget Table

Information displayed here is private and confidential

Cooperative Research Centre for Water Sensitive Cities



Project Agreement

Project Number: IRP2

Project Title: Integrated economic assessment and
business case development for Water Sensitive Cities

Project Participants: University of Western Australia,
Monash University



Australian Government
Department of Industry,
Innovation and Science

Business
Cooperative Research
Centres Programme

THIS AGREEMENT IS MADE BETWEEN

CRC FOR WATER SENSITIVE CITIES LTD ABN 19 158 409 137 of Clayton in the state of Victoria (**Company**).

AND

The Project Participants set out in Schedule 1

Recitals

- A. The Company is responsible for the governance, management and co-ordination of the Centre.
- B. The Project Participants are participants in the Centre.
- C. The Centre's Activities include overseeing the Research Programs. The Research Programs are overseen by the CRO who is responsible for the coordination and conduct of the Research Programs.
- D. Within the Research Programs, the Centre determines the general nature of the research projects to be conducted and then in conjunction with the Project Participants, develops the detailed research project (**Project**). The Centre also manages the funding of the Project.
- E. The Project to which this Project Agreement relates has been approved by the Board as a Project to be carried out by the Project Participants with funding from the Company as part of the Activities of the Centre.
- F. By signing this Project Agreement, the Parties acknowledge their agreement to carry out the Project in accordance with the following terms.

PROJECT DETAILS

1 Dictionary

- 1.1 In this Project Agreement, unless the context otherwise requires, the following definitions apply:
 - (a) **BIP Participant** means the Party that has made the relevant Project BIP available to the Project.
 - (b) **Centre** means the Cooperative Research Centre for Water Sensitive Cities.
 - (c) **Centre IP** means the Centre IP arising from the Project.
 - (d) **Contributed Personnel** means the persons identified in Schedule 1 as the personnel who will conduct or be involved in the Project.
 - (e) **Participants Agreement** means either the Essential Participants Agreement or an Other Participant Agreement, entered into by the Company and a participant in the Centre.

- (f) **Parties** means the Project Participants and the Company and **Party** means any one of them.
- (g) **Project** means the project set out in Schedule 1.
- (h) **Project BIP** means the Background Intellectual Property of the Parties described in Schedule 1 or that is subsequently made available to the Project under the Participants Agreement.
- (i) **Research Project Proposal** means the proposal for the Project attached as Annexure C.

1.2 Words and phrases used in this Project Agreement that also appear in Schedule 1 [Definitions and Interpretation] of the Participants Agreement, and that are not specifically defined in this Project Agreement, will have the meaning given to those words and phrases in Schedule 1 of the Participants Agreement.

2 Paramountcy

If there is an inconsistency between this Project Agreement and a Participants Agreement, this Project Agreement will prevail to the extent of that inconsistency.

3 Application of Participants Agreement

The Project Participants acknowledge and agree that:

- (a) the conduct of the Project forms part of the Centre Activities;
- (b) all the provisions of the Participants Agreement that, expressly or by implication, apply to the conduct of Projects, will with any necessary amendment, be deemed to form part of this Project Agreement; and
- (c) this Project Agreement will be read with and deemed to form part of the Participants Agreement.

4 Project

In consideration of:

- (a) the payment of the Project Funds to the Project Participants by the Company; and
- (b) the making available of the Project Contributions to the Project by the Parties, the Parties will conduct the Project in accordance with this Project Agreement and the Participants Agreement.

5 Term

- 5.1 The Project will commence on the Project Commencement Date and will be completed on the Project Completion Date unless terminated earlier or otherwise agreed by the Parties.
- 5.2 A Project Participant may terminate this Project Agreement upon thirty days written notice to the other Parties, if another Project Participant:
 - (a) abandons the Project; or
 - (b) fails to achieve a Milestone or deliver a Deliverable within 60 days of the time specified in this Project Agreement,

and the Project Participant seeking to terminate has fully documented the work that it has completed and for which it has been funded before it gives notice of termination to the other Parties.

6 Payment and Project Contributions

- 6.1 Each Project Participant must make available to the Project, its Project Contributions in accordance with the Participants Agreement and Schedule 1.
- 6.2 The Company will:
- (a) pay to the Project Participants the Project Funds; and
 - (b) distribute the Project Contributions,
- in accordance with the Participants Agreement and Schedule 1.
- 6.3 In addition to its rights under the Participants Agreement, the Company may withhold some or all of the Project Funds and Project Contributions from a Project Participant that has not complied with the Project Agreement or the Participants Agreement in conducting the Project.

7 Performance

- 7.1 The Responsible Participant must ensure that the Project Leader fulfils the responsibilities and duties set out in Annexure A, in addition to any obligations set out in the Participants Agreement. The Responsible Participant must notify the Company upon becoming aware that the Project Leader is unable or is likely to become unable to fulfil the requirements in Annexure A for the duration of the Project.
- 7.2 In addition to any obligations under the Participants Agreement, each Project Participant must, and must ensure its Contributed Personnel, cooperate with the Project Leader, act in accordance with the Participants Agreement, and carry out its part of the Project to enable the Project to be conducted in accordance with this Project Agreement.

8 Meetings

- 8.1 The Project Leader must attend the following minimum number of meetings for the duration of the Project and for a period of up to [6] months following the Completion Date, either in person or using technology available to the meeting:
- (a) scheduled workshops (industry focus) as requested by the Centre each Financial Year;
 - (b) scheduled workshops (research focus) as requested by the Centre each Financial Year; and
 - (c) all program meetings relevant to the Research Program to which the Project relates, as scheduled by the relevant Program Leader,
- provided that the Project Leader has been provided with reasonable prior notice of the meeting.
- 8.2 The Project Leader may be excused from attending a meeting personally if:
- (a) he or she has notified the CRC Executive of the reasons why they cannot attend, and suggested a nominee to attend in his or her place; and
 - (b) the CRC Executive consents to the nominee attending in the Project Leader's place.

If consent is provided and the nominee attends the meeting, the Project Leader will be deemed to have attended the meeting for the purposes of clause 8.1.

- 8.3 The Centre may vary the number and timing of workshops specified under clause 8.1(a) or (b) by notice to the Project Leader.
- 8.4 Attendance by any one of the persons listed in Annexure B, Item 7 will be deemed to comply with Clause 8.1.

9 Reporting

- 9.1 In addition to its obligations under the Participants Agreement, the Responsible Participant must report, or ensure that the Project Leader reports:
- (a) as required by Item 10 of the Research Project Proposal;
 - (b) to the Company when requested, in the Approved Form notified by the Company from time to time;
 - (c) to the CRO, in relation to any issues adversely affecting or likely to adversely affect the Project (including any matter that the Project Leader considers will, or may, affect the ability of the Project to satisfy the Milestones or deliver the Deliverables, or to be completed within the Project Budget) as soon as practicable after that matter or issue comes to the attention of the Project Leader; and
 - (d) to the CRC Executive or Research Advisory Sub-Committee when requested.
- 9.2 The Quarterly reports required under Clause 21 of the Essential Participants Agreement must also contain a summary of the research progress made and expenditure of cash and in-kind contributions for the Project.
- 9.3 If requested by the CRC Executive or CRC Advisory Committee, the Project Participants must provide the CRC Executive or CRC Advisory Committee with any information reasonably requested in relation to the Project.

10 Milestones and Deliverables

- 10.1 Subject to this clause, the Milestones must be achieved, and the Deliverables must be delivered to the Company at the times specified in this Project Agreement.
- 10.2 A Project Participant is not required to achieve Milestones or deliver Deliverables to the extent that its failure to do so is attributable to the acts or omissions of other Project Participants or circumstances beyond its reasonable control.

11 Project Review

- 11.1 The Project will be reviewed by the CRC Executive and Research Advisory Sub-Committee in accordance with the Participants Agreement.
- 11.2 The Board may, on the recommendation of the CRC Executive or otherwise:
- (a) implement variations to the Project; or
 - (b) terminate the Project, if following a review, the Board reasonably forms the view that the Project will not achieve its objectives,
- provided the Board acts in accordance with the Participants Agreement.

12 Intellectual Property

- 12.1 Each BIP Participant makes available its Project BIP to the Project in accordance with the Participants Agreement.
- 12.2 All Centre IP will be owned by the Company. Each Project Participant will do all things reasonably necessary, including the signing of documentation, to vest the Centre IP in the Company.
- 12.3 Each Project Participant will on request from the Company provide the Company with information in relation to the Centre IP created by its personnel.

13 Contributed Personnel

- 13.1 Each Project Participant will make available its Contributed Personnel to conduct the Project in accordance with Schedule 1.
- 13.2 Subject to this clause, the Contributed Personnel of Project Participants remain subject to the terms and conditions of employment under which they are employed by Project Participants.
- 13.3 Each Project Participant will:
- (a) take all reasonably practicable steps to ensure that any working environment where:
 - (i) its Contributed Personnel work; or
 - (ii) the Project is conducted,is safe and without risk; and
 - (b) be responsible for the health and safety of:
 - (i) its Contributed Personnel at all times when they are at work; and
 - (ii) all other persons whose health or safety may be adversely affected by the conduct of the Contributed Personnel's actions.
- 13.4 Each Project Participant covenants and undertakes to procure that Centre IP created by any of its Contributed Personnel will be owned and dealt with according to this Project Agreement.

14 Commonwealth Obligations

The Parties acknowledge and agree that at any reasonable time any person designated by the Commonwealth Cooperative Research Centre Program may view the progress of the Project and that the Parties will give all assistance reasonably requested by such designated person.



Executed as an Agreement

EXECUTED by CRC FOR WATER
SENSITIVE CITIES LTD ABN 19 158
409 137 by its duly authorised
signatory

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[Handwritten signature]

CEO/COO

REW FURMAGE

Print full Name

[Handwritten signature]

Witness

EBONY HENDERSON

Print Full Name

9/03/2017

Date



EXECUTED by The University of Western Australia (ABN 37 882 817 280) by its authorised officer in the presence of)

[Handwritten signature]

Authorised Officer

Dr Campbell Thomson

Print full Name

[Handwritten signature: CJ Casey]

Witness

Christine Casey

Print Full Name

9 March 2017

Date

EXECUTED by Monash University (ABN 12 377 614 012) by its authorised officer in the presence of)

Authorised Officer

Print full Name

Witness

Print Full Name

Date



EXECUTED by **The University of
Western Australia (ABN 37 882 817
280)** by its authorised officer in the
presence of

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EXECUTED by **Monash University
(ABN 12 377 614 012)** by its
authorised officer in the presence of

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|) | <i>Pauline A Nestor</i> _____ Authorised Officer |
|) | Professor Pauline Nestor |
|) | _____ |
|) | Print full Name |
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|) | <i>Nicholas Edwards</i> _____ Witness |
|) | Nicholas Edwards |
|) | _____ |
|) | Print Full Name |
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|) | _____ |
|) | 09/03/2017 |
|) | Date |



SCHEDULE 1 PROJECT DETAILS

| | |
|--|--|
| Project Title | Item 1 of the Research Project Proposal. |
| Research Program (Recital B) | Tranche 2 Integrated Research Program. |
| Project Participants | <p>The Company</p> <p>Ben Furmage</p> <p>Chief Operating Officer, CRC for water Sensitive Cities Ltd PO Box 8000, Monash University LPO, Clayton Campus VIC 3800</p> <p>Tel. 61 (0) 3 9902 0542</p> <p>Email. Ben.furmage@crcwsc.org.au</p> <hr/> <p>The University of Western Australia</p> <p>Contact for notices: Dr Campbell Thomson</p> <p>Director, research Services</p> <p>Registrar’s Office, The University of Western Australia, 35 Stirling Highway, Crawley, Western Australia, 6009</p> <p>Tel +61 (0) 8 6488 3027</p> <p>Email: Campbell.thomson@uwa.edu.au</p> <hr/> <p>Monash University</p> <p>Name: Prof Pauline Nestor</p> <p>Position: Senior Vice-Provost & Vice-Provost (Research)</p> <p>Address: Office of the DVC (Research), Building 3A, Monash University, Wellington Road, Clayton 3800</p> <p>Telephone: +61 (0) 3 9902 0214</p> <p>Email: Pauline.Nestor@monash.edu</p> |
| Responsible Participant (clause 9) | The University of Western Australia |
| Contributed Personnel (clause 13) | Annexure B |
| Project Funds (clause 4 and 6) | Annexure B. Payment of actual project expenditure will be made quarterly in arrears following approval of the quarterly project progress report and the financial reports (cash utilised and in kind contributions made) by the CRCWSC’s Chief Research Officer. |
| Project Contributions (clause 4 and 6) | Annexure B. |



| | | |
|----------------------------------|---|---|
| Background IP (clause 12) | UWA: INFFER™, the Investment Framework for Environmental Resources (http://www.inffer.com.au/) MU: No IP | |
| Project Plan | <i>Project Leader</i> (clauses 8 and 9) | Item 3 of the Research Project Proposal. |
| | <i>Project Commencement Date</i> (clause 5) | 1Jan17 |
| | <i>Project Completion Date</i> (clause 5) | 31Dec20 |
| | <i>Project Objectives</i> | Items 6 of the Research Project Proposal |
| | <i>Proposed strategy</i> | Item 6 of the Research Project Proposal. |
| | <i>Milestones</i> (clause 10) | Item 15.3 of the Research Project Proposal. |
| | <i>Deliverables</i> (clause 10) | Item 15.3 of the Research Project Proposal. |
| | <i>Project Budget</i> | Annexure B |
| | <i>Third party contributions</i> | Item 16 of the Research Project Proposal and Annexure B |
| | <i>Resources</i> | Item 16 of the Research Project Proposal and Annexure B |
| | <i>Student requirements</i> | Item 16 of the Research Project Proposal and Annexure B |
| | <i>New Assets or Capital Items</i> | Item 16 of the Research Project Proposal and Annexure B |
| | <i>Analysis of Project Risk</i> | Item 17 of the Research Project Proposal. |
| | <i>Analysis of Utilisation of Project outcomes</i> | Items 15.1 C & D of the Research Project Proposal |

ANNEXURE A PROJECT LEADER RESPONSIBILITIES

Project Leaders have responsibility for and must fulfil the following duties in relation to the Project:

- (a) Supervision of Project Activities in accordance with the Research Project Proposal.
- (b) Managing the utilisation of Contributions provided by the Company and Project Participants and any other resources made available for the Project Activities.
- (c) Ensuring the quality and timely delivery of Project Deliverables according to Milestones.
- (d) Actively fostering and facilitating the research collaboration amongst Project Participants.
- (e) Fostering integration of research outputs and insights across the Research Program and supporting the relevant Program Leader(s) in integrating research outputs across the Research Programs in the Centre.
- (f) Identifying and effectively managing and mitigating Project risk and raising any risk or performance issues concerning the Project in a timely manner with the Program Leader.
- (g) Attendance and active participation in Centre industry partner and research workshops.
- (h) Preparation of timely quarterly reports to the CRC Executive (suitable to be shown to the Board) on Project progress and Project Budget expenditures.
- (i) Identifying any Centre IP developed within the Project, maintaining proper records of the Centre IP developed and its use within the Project and notifying the Program Leader of such Centre IP and any potential future use of Centre IP within the Centre.



ANNEXURE B PROJECT RESOURCES

Project Budget (ex GST)

Information displayed here is private and confidential

Additional Project Resources (ex GST) Anticipated

Information displayed here is private and confidential

Tied funding for the project has been agreed as follows:

Melbourne Water: \$250,000

Water-Sensitive SA & Partners: \$72,000

Further contributions of tied funding are anticipated and will be recorded via Variations to this Project Agreement.

ANNEXURE C RESEARCH PROJECT PROPOSAL

Project Proposal

1. **Project title:** IRP2 Integrated economic assessment and business case development for Water Sensitive Cities
2. **Summary:** IRP2 will develop and apply an economic evaluation framework to identify and quantify economic, environmental and community values of investments in water sensitive practices and systems. The ultimate output of the project would be an accepted and well-aligned evaluation framework that users will apply to business case development and decision making at multiple levels in public and private sector organisations. The framework will help in better decision making to achieve water sensitive, liveable and resilient cities. Building on existing CRC work on economic evaluation and, existing literature (such as studies on customer willingness to pay, water literacy, etc.), the framework will be developed in close engagement with key stakeholders¹ throughout the project. A Project Steering Committee will guide each stage of the project. Additionally, local government and industry practitioners will be directly involved in developing key inputs and testing of the proposed framework to support the acceptance and ongoing adoption from all key stakeholders across Australia.

The essentials

The key outputs of this project are as follows:

1. A tool to assist in the identification and monetisation of non-market or intangible benefits from various types of investment in water-sensitive cities. It will cover benefits related to ecology, water quality, recreation, aesthetics, and urban heat (affecting mortality, health, power costs, economic productivity and comfort). Generate new information on non-market benefits for selected cases.
2. A comprehensive tool specifically designed for conducting benefit-cost analysis of investments in water-sensitive cities, integrating non-market benefits, market benefits, bio-physical effects, behaviour change, risk and uncertainty, time delays, and costs (including up-front and maintenance costs). It will be developed to meet the needs and contexts of end users. It will be flexible and scalable.
3. Advice on finance models and policy approaches to foster investment in water-sensitive cities where benefits are not necessarily captured by those who bear the costs.
4. A diverse set of case studies where the tools are applied, tested and adapted.

The work will be underpinned by a strong strategy for stakeholder engagement, overseen by an end-user-driven steering committee, which has already been formed.

¹ We have used the term interchangeably with end users, industry partners and partners

Project leader & deputy:

Leader: Dr Sayed Iftekhar, The University of Western Australia (UWA)

Deputy: Dr James Fogarty, The University of Western Australia (UWA)

- 3. Project type and activity:** Integrated Research Project, Co-developed with CRC end users (directly through integrated testing and/or co-developed case studies)

4. Participating organisations & team structure:

| Name | Title | Affiliation | Contribution/role |
|----------------------|--------------|----------------------------|--|
| Sayed Iftekhar | Dr | CRCWSC / UWA | Project Leader / Project Steering Committee Member |
| James Fogarty | Dr | CRCWSC / UWA | Deputy Project leader |
| David Pannell | Professor | CRCWSC / UWA | Researcher / Project Steering Committee Member |
| Nigel Tapper | Professor | CRCWSC / Monash University | Researcher (valuation of urban climate benefits) / Project Steering Committee Member |
| Maksym Polyakov | Dr | CRCWSC / UWA | Researcher |
| Mark Siebentritt | Dr | Seed Consulting Services | Researcher (stakeholder engagement strategy) |
| Kym Whiteoak | Mr | RCMG | Researcher (valuation of urban climate benefits, depending on case study) |
| Sara Lloyd | Dr | E2Design | Researcher (valuation of urban climate benefits, depending on case study) |
| Grace Tjandraatmadja | Ms | Melbourne Water | Project Steering Committee Member |
| Greg Finlayson | Mr | GHD | Project Steering Committee Member |

| | | | |
|------------------|-----|---------------------------------------|-----------------------------------|
| Ursula Kretzer | Dr | Dept of Water, WA | Project Steering Committee Member |
| Naomi Rakela | Mrs | Eastern Metropolitan Regional Council | Project Steering Committee Member |
| Craig Miller | Mr | Healthy Waterways and Catchments | Project Steering Committee Member |
| Simon Leiva | Mr | Cooks River Alliance | Project Steering Committee Member |
| Mellissa Bradley | Ms | Water Sensitive SA | Project Steering Committee Member |
| Jill Fagan | Dr | WSAA | Project Steering Committee Member |
| Ben Fallowfield | Mr | Northern Beaches Council | Project Steering Committee Member |

5. *Project aim(s) and objectives:*

The overall aim of this project is to develop, test and apply a broadly applicable framework for conducting integrated economic assessment to support business case development for investing in water sensitive, liveable and resilient cities. The economic evaluation tools and framework developed under the project will help utilities, governments and private sector organisations to clearly articulate the benefits of transitioning towards water sensitive, liveable and resilient cities². Building on findings and lessons learned from economic assessment studies and more generally from a range of other research conducted under Tranche 1, we will do this by addressing the following **objectives**:

1. Build a common understanding amongst stakeholders on which elements of water sensitive cities provide the greatest benefits to the community (which includes benefits to the environment), clearly articulating market and non-market values, and contributing to transition towards liveable and resilient cities. This will also include identifying where there are gaps in assigning values to those key community values and developing appropriate solutions through research (synthesis of existing information, collection of primary information and development of manuals and guidelines).

² WSAA has suggested that “Liveability is all of those things that make a place somewhere people want to live, communities flourish and businesses choose to invest. ... A liveable city or region must consider the needs of future generations and use systems thinking to understand and respond to shocks and long-term change. (p5)” It has identified three key elements - amenity and community wellbeing, productivity and sustainability and future focus (WSAA, 2016, Liveability Indicators. A report prepared for the water industry).

2. Understand the requirements of stakeholders in government and industry in the design and delivery of economic evaluation tools and frameworks and monetisation of non-market values of key components of water sensitive and liveable cities, and ensure that the tools and frameworks can be readily integrated into stakeholders' processes for decision making and policy making.
3. Review the currently available benefit-cost analysis tools and integrate the key elements of existing tools and identify gaps and improvements needed to deliver comprehensive, flexible and broadly applicable tools for benefit-cost analysis and monetisation of non-market values for various elements of water sensitive cities.
4. Develop an economic evaluation framework which would allow inclusion of benefits and costs and will help users to identify who the beneficiaries are. This can form the basis of an understanding/negotiation of how projects should be funded.
5. Test, refine and apply the economic evaluation framework in selected case studies in collaboration with industry partners.
6. For selected cases, review the existing finance models and policies and recommend suitable approaches for investment in water sensitive systems and practices. This will include identification of innovative finance models incorporating market-based instruments and policy incentives.
7. Develop effective adoption pathways to promote and support the use of economic evaluation frameworks and tools.

6. Identified transition needs:

This project is one of the two 'High Priority' projects based on the combined ranking in the RAP priority matrix. In all the Needs and Opportunities workshops, the need for an economic evaluation framework was identified. The project will address the following needs that were identified during the CRC consultations: (a) to guide decision making about priorities for investment in water sensitive systems and practices; (b) To build compelling businesses cases for investment in water sensitive systems and practices; and (c) To develop innovative financing models and policy mechanisms for various contexts, including cases where there is a disparity between who benefits and who pays. Needs (a) & (b) were identified by all five RAPs, need (c) by several of them³. All RAPs were keen to see the application of the preferred outcome via a range of case studies that reflect the scale of investment (ranging from swales to major urban development), different jurisdictions and regulatory structures (water utilities, state

³ More specifically, the project provides for the following needs specified by each RAP: NSW1, WA1 and VIC1 (socio-econ advantages as part of vision and narrative), NSW3 (econ evaluation of making Parramatta River swimmable again), NSW4 (values, benefits, costs, incentives in regional towns), NSW5 (discussed at O&N workshop but not in documentation – economic evaluation and risk assessment of WSC for infill development), WA4 (benefits and costs to broader community, beyond project scale, in demo project), WA7 (full life-cycle benefit-cost analysis including non-monetary values), QLD3, QLD4, QLD5, VIC2, VIC5, SA3 (potential case-studies for BCA including non-market values), VIC3 (quantifying liveability), VIC4 (planning and evaluation incl. health). SA RAP is especially keen on RQ (iii), into which RQ (i) feeds. RQ (iv) addresses need (c) and links to NSW2 (appropriate funding model), WA2 (governance – mechanisms for incentives, risk sharing), WA7 (new financial models and incentives), and QLD2 (financing for sustainable water resource management).

governments and local governments), and different outcomes (investment in on-ground works to changes in public policy).

7. Knowledge base and research gaps:

The project will build on knowledge and outputs generated in Tranche 1. In the first phase, there was strong emphasis on generating non-market values for different elements of water sensitive cities to understand the scope of the opportunities and problems. Examples from Tranche 1 include:

- Valuing environmental services associated with local stormwater management in Melbourne and Sydney
- Valuing alternative land uses adjacent to traditional wastewater treatment facilities in Western Australia
- Valuing Australia's green infrastructure using hedonic pricing analysis for various parts of Australia
- Valuing restoring urban drains to living streams in Perth
- Estimating the capitalised value of rainwater tanks in property prices in Perth
- Valuing ecosystem services of raingardens in Sydney and Melbourne
- Valuing constructed wetlands in Australia and China
- Valuing water sensitive gardening styles in Perth

IRP2 will build on the results from these studies. In addition, we will draw in existing information on market and non-market values from broader (published and grey) literature set, CRC end users and industry practitioners, particularly for the costs of implementing water sensitive cities elements. In addition, relevant studies conducted under other CRC programs (such as, from Project B3.2 on the design of the public realm to enhance urban microclimates, statutory planning for water sensitive cities under Project B5.1, and Engaging communities with water sensitive cities under Project A2.3) will be consulted. Prof Nigel Tapper (Project B3.2) and his team is an important component of the project as the project's urban climate case study has been identified as one of the priority issues. Review of existing studies and stakeholder consultations reveal three main gaps, which will be addressed in this project.

The first gap addressed by the project is the need for economic tools to allow end users to effectively and easily apply the results from Tranche 1 in benefit-cost analysis to inform business cases.

The second gap is the need for new non-market valuation studies to address issues and contexts in relation to a broader range of liveability and resiliency criteria than were addressed in Tranche 1. There is also a need to understand how these concepts of liveability and resilience can effectively be applied, the risks in applying them and the transferability of findings from one circumstance to another. The state RAPs have identified a number of such cases.

The third gap is research on innovative financing models and policy mechanisms for various contexts, including cases where there is a disparity between who benefits and who pays.

8. Research questions and approach:

To fulfil the above mentioned objectives the following research questions will be addressed;

- RQ1: What are the current gaps in enabling implementation of integrated economic assessment of key elements of water sensitive, liveable cities?
- RQ2: What is the best way to capture existing evidence about non-market benefits (usually expressed as Willingness to Pay) of key elements of water sensitive cities and identifies how users can transfer or extrapolate values to new contexts needed for decisions or business cases?
- RQ3: How should economic tools (for benefit-cost analysis and non-market valuation) be designed to maximise their usefulness to end users for evaluating investments in water sensitive cities?
- RQ4: How should finance models and policies be designed to optimise public and private investment in water-sensitive cities in situations where benefits are not necessarily captured by those who bear the costs?
- RQ5: How can we best promote and support end-user adoption of the economic evaluation frameworks and tools for water sensitive cities?

Overall Approach: There are four major stages in the project: 1) needs assessment to understand the key gaps and barriers; 2) review existing frameworks and tools and prepare a framework and tools designed to best meet the needs of CRC end users; 3) conduct several case studies to test the framework and tools; 4) finalise the evaluation framework and resources for training & capacity building (Figure 1). End users will be engaged at every stage of the project to ensure wider uptake of the findings and capacity building. To organise the tasks, the following work packages (WP) have been defined.

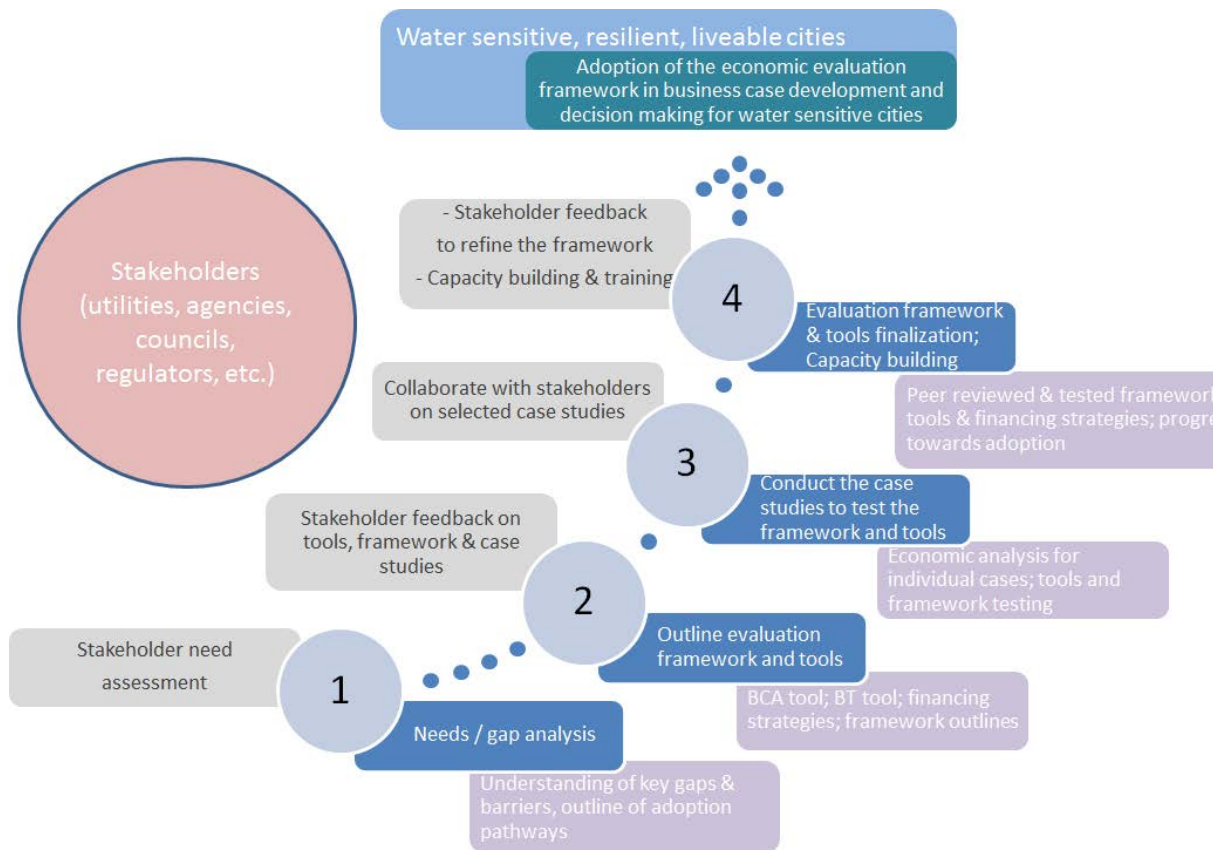


Figure 1: Key stages of IRP2

WP1: Stakeholder engagement (RQ1 and RQ5)

Approach: Based on the learnings from the stakeholder engagement activities in Tranche 1 (particularly, Program D) and information provided by the Project Steering Committee, we shall engage with the stakeholders to assess their needs and to ensure appropriate dissemination and adoption of the economic evaluation framework. This will be done in accordance with the needs of our partners and broader stakeholders. There are several steps in our stakeholder engagement method⁴: regularly **inform** stakeholders about the outcomes from various activities of the project; **consult** with the stakeholders to understand their needs and provide feedback on how the needs could be addressed; **involve** stakeholders in sharing data and information and capacity building, and; **collaborate** with them on particular case studies (Figure 2). While the first three steps will be carried out under this WP aiming at broader range of stakeholders the last one will be addressed under WP5 in close collaboration with selected stakeholders / partners.

WP1.1: Inform the stakeholders about the current knowledge on economics of water sensitive urban designs – A number of primary non-market valuations of water sensitive urban designs have been carried out in Tranche 1. Further, relevant literature on non-market values was captured and reviewed early in Tranche 1. We will expand

⁴ Following Bradley, M. (2015). Stakeholder engagement plan. Water Sensitive SA.
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and update the collection and update the review, adding new published studies (from CRC and others), grey literature and existing relevant economic tools. There is a wealth of knowledge, models and tools existing within industry and the consulting world that need to be identified, understood and analyzed. Input will be sought from industry partners to identify which gaps are more important. Synthesis and compilation of such information will help in assessing current gaps in knowledge.

WP1.2: Stakeholder engagement strategy – We will use our interstate network of stakeholders and the Steering Committee to develop a stakeholder engagement strategy, which will focus on the regular communication and information dissemination. The engagement strategy will include options to seek regular feedback from a wider range of stakeholders.

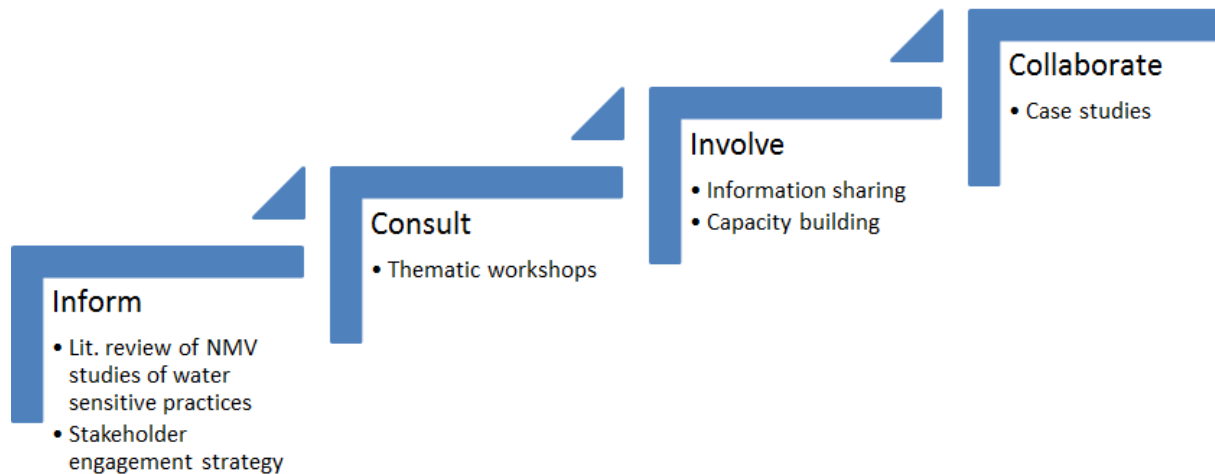


Figure 2: Steps in stakeholder engagement strategy

WP1.3: Stakeholder consultations for needs assessment – A thorough stakeholder needs assessment will be carried out to determine needs and agreed types of values/benefits and costs that need to be incorporated into the tools. This will build a common understanding on which type of elements of water sensitive cities are important to communities. The Water Sensitive Cities Index and WSAA’s work on Liveability Indicators will provide relevant reference tools for this work. To understand industry needs or gaps, there will be a selected number of issue-based or thematic workshops on:

1. The range of water sensitive cities elements to which the economic evaluation framework could be applied to assess their costs and/or benefits (lessons learned from the on-going IRP1 project will be integrated);
2. Desirable features or design aspects of cost-benefit analysis and benefit transfer tools. Understand industry requirements in terms of their needs for an economic valuation framework to support decision making, and their needs, abilities and decision making processes to develop business. (Multiple workshops will be organised to cater for diversified needs from different groups)



- such as developers, local government, catchment managers and/or water service providers);
3. Barriers faced in the implementation of water sensitive cities, addressing beneficiary pays, funding availability, etc. and assessment of the suitability of an economic evaluation framework to reduce these barriers by:
 - a. local governments,
 - b. developers, and
 - c. agencies and regulators (such as IPART, Essential Services Commission and the ERA).

The workshops will be held in several states to capture variation in local contexts in different parts of Australia. Where possible, some of these workshops will be organized in collaboration with IRP1 (and other CRC researchers) to incorporate a wider community view point.

WP1.4: Training and capacity building – Building on the outputs (such as manuals, tools and learnings) produced by other parts of the project, we will develop a training module and deliver training in the application of economic tools and framework. We will target practitioners from a range of sectors such as utilities, local councils, agencies, state governments, and peak bodies (such as WSAA). To deliver the training, the team will work closely with industry partners, of which many will be key members on our Steering Committee across Australia.

WP2: Updated collation of existing non-market valuation information and development of a benefit transfer tool (RQ2)

It is not always possible or appropriate to conduct original non-market valuation studies. Benefit transfer is the systematic extrapolation of existing non-market valuation results to new contexts. Its main attraction is that it saves on cost, relative to conducting original studies for every case where a decision is needed. Using benefit transfer methods, findings (values, functions) from the original study site are transferred to the site where benefits need to be calculated. If carefully conducted, benefit transfers have the potential to provide a reasonable approximation of the value for situations that lack an original non-market valuation study. There are different methods to conduct benefit transfer: meta-analysis, function transfer and unit value (means) transfer. Each of these methods have their strengths and weaknesses. The following two tasks will be carried out to develop an efficient and rigorous system for transferring or extrapolating values to new contexts...

WP2.1: Updated comprehensive database of existing non-market values of water sensitive practices – We will take the collation of studies and results from WP1.1 and include them in a database that allows them to be easily and efficiently accessed. We will add relevant studies to the database that have been conducted outside the CRC since we reviewed the literature in Tranche 1. The processed data will be used to underpin various benefit-transfer methods. The database will be designed in a way that is easy to update to allow the system to be maintained into the future (preferably as an online system), beyond the life of the CRC. Moreover, a number of original non-market valuation studies will be conducted as part of the case studies to test the tools

and framework (see WP5 for further details). The database will be continuously updated as new information is generated.

WP2.2: Development of benefit-transfer guidelines – There is growing literature on benefit transfer. The UWA team has existing close links and collaborations with some of the world experts in these methods: Prof Rob Johnston from Clark University, USA; Prof Peter Boxall from University of Alberta; and Prof John Rolfe from Central Queensland University (Johnston et al. 2015). We will work with these experts to develop accessible guidelines for end users on how to conduct benefit transfer for water sensitive practices, including choosing appropriate methods for the particular context. The guidelines will be tested with the stakeholders and adapted accordingly.

WP3: Development of a user-friendly Benefit-Cost Analysis (BCA) tool tailored to water sensitive cities investments (RQ3)

There are three major elements in a benefit-cost analysis; benefit assessment, cost assessment, and comparison of benefits and costs using an appropriate framework.

Benefits. Benefits need to include market and non-market values. Multiple methods exist to estimate the benefits of both types, and these will be employed as needed, depending on the types of benefits that are relevant, and on the availability of existing information about the benefits. Benefits are likely to include cost-savings from delaying or reduced investments in traditional infrastructure, as well as improved liveability and improved environmental conditions.

Costs. Information on the costs of implementing various features of water sensitive cities will be obtained from various relevant sources, particularly from end users with experience in implementation. They must include full lifecycle costs, not just the upfront costs. In some cases, it is not possible to obtain estimates of market and non-market benefits. In those cases, a cost-effectiveness approach could be applied, which uses cost estimates against physical performance.

Framework. A standard benefit-cost analysis framework will be used to combine and compare benefits and costs. This crucially involves use of a baseline (business as usual) so as to capture and include the cost of doing nothing. It also provides a rigorous approach to comparing benefits and costs that occur at different times to various parties, and allows easy sensitivity analysis to allow for uncertainty about benefits or costs.

WP3.1: Review of existing benefit-cost analysis tools relevant to water-sensitive cities – Existing literature and relevant stakeholders will be consulted to understand what tools are already being used (and by whom) and the extent of their use in decision making processes. Existing tools for benefit-cost analysis will be reviewed to determine their suitability for assessing water sensitive systems and practices at different scales and for users of varying capacity (including urban green space, water sensitive urban designs, and other features identified by the Steering Committee). Existing tools, both local and international, to be assessed may include: the i-Tree suite of tools; Social Environmental Tool (SET) developed by WA Water Corporation; CIRIA BeST (Benefits of Sustainable Drainage Systems Tool); Marsden Jacob –

AWRCoE Recycled Water Economic Assessment Tool; Natural Capital Coalition; MetroNet by Metropolitan Water Directorate; and INFFER (Investment Framework for Environmental Resources). Suitability of tools will be determined with respect to quantifying benefits for a range of possible factors e.g. ecosystem health, human health/well-being, economic prosperity, and climate change adaptation/mitigation, ease of use and data availability.

WP3.2 Provide standardised costing data to inform the BCA tool. WP2.1 and WP2.2 will provide data for non-market valuation. Here we will also collect and collate information to support judgements about the costs of implementing water sensitive cities in different contexts (e.g., lifecycle costs of new green infrastructures).

WP3.3: Develop a BCA tool – Based on the review and existing tools and approaches under WP3.1, we will make a decision about whether to adapt an existing tool or develop a new tool to meet the specific needs of Australian end users. Answering the following questions will help in selecting an appropriate approach: (i) what outcomes the tool / framework should deliver, (ii) how/where it will be used (which decision framework that the economic framework would support, scalability), (iii) which categories of value/benefits need to be included, (iv) what input data (e.g., technical inputs, scale, time frames, units etc.) are available from stakeholders, (v) analysis of trade-offs between elements (such as costs and benefits, benefits to agreed level of service) and different discount rates (benefit time scales), and (vi) what standards for data collection, management and maintenance should be used? The tool will be implemented in Microsoft Excel initially, but after a period of testing and further adaptation, it may be implemented in a web-based system (depending on the preferences of users).

WP3.4: Guidelines for benefit-cost analysis tool - Develop a guideline document to support the application of the BCA tool. This will provide guidance on critical concepts and approaches that underpin the tool, step-by-step guidance on how to apply it, and information about its assumptions and limitations. It will also provide several examples based on the case studies under WP5 on how to apply the framework in practice. This would include a discussion on alternatives for assisting decision-making when some elements (such as monetized benefits) are not available.

WP4: Finance models and policies to foster investment in water sensitive cities (RQ4)

WP4.1: Review existing finance models and policies. We will work with end users to identify existing finance model, policies and mechanisms (such as financial incentives) used to foster public and private investment in water sensitive cities⁵. We will also

⁵ Lessons from CRC Program B5.1 will be considered. The Project team will be conscious of the continuously changing landscape of the regulatory environment. For example, the Victorian Essential Services Commission has released their Water Pricing Framework and Approach on the 27 October 2016, which puts the customer at the centre of decision making. There are potentially clear implications to finding a suitable integrated economic evaluation process and decision making framework when we start thinking about ecosystem services/ liveability/community value considerations.

review policies and models for investments in other sectors that aim to foster investments that generate public goods. A set of different funding approaches will be presented, with examples/case studies on where these approaches have been used, factors will be identified that help/hinder project funding, and principles from the economic evaluation framework will be highlighted that could be used to support, direct or negotiate a funding approach suited to the circumstance. Often, larger water utilities may not be well equipped to do things that are a bit different / decentralised and private sector (such as developers) may be more suitable to deliver. We will evaluate the effectiveness of existing models and policies, and identify successful approaches and the requirements for success.

WP4.2: Engage with regulators and agencies to design new approaches. Building on findings from WP4.1 and WP1.2, design a small number of alternative approaches to investment financing and policy that appear likely to be effective in the context of water sensitive cities. These approaches could include beneficiary identification methods, risk sharing, cost-sharing principles as well as payment mechanisms such as value capture. We will workshop these approaches with CRC end users, policy makers and experts in financing projects to evaluate their likely success. If we are able to identify approaches that are judged to be likely to succeed, then we can work with policy agencies to explore the legal, practical, political and financial feasibility of implementing the approach. This procedure would help in understanding how to engage and negotiate with policy makers to facilitate investment.

WP5: Testing the integrated economic evaluation framework in selected case studies (RQ3, RQ4, RQ5)

Approach: In each of the case studies, the following steps will be carried out (Figure 3): 1) understand the issue or problem and knowledge gap analysis by collecting and reviewing relevant information (such as benefits, costs, timeframe, major stakeholders, regulatory framework, current business model, etc.); 2) Assess the potential of benefit transfer to use existing data. If required, conduct original studies to estimate non-market values. Collect cost data from agencies. Workshop economic analysis methods and data requirement with relevant stakeholders; 3) Conduct economic evaluation (benefit-cost analysis) of several alternatives or options, and; 4) Engage with end users to understand the feasibility of implementing various options and generate a set of recommendations for the implementing organisations. The case studies will be conducted in such a way that the intermediate results are continually disseminated to allow for transferability and quick uptake.

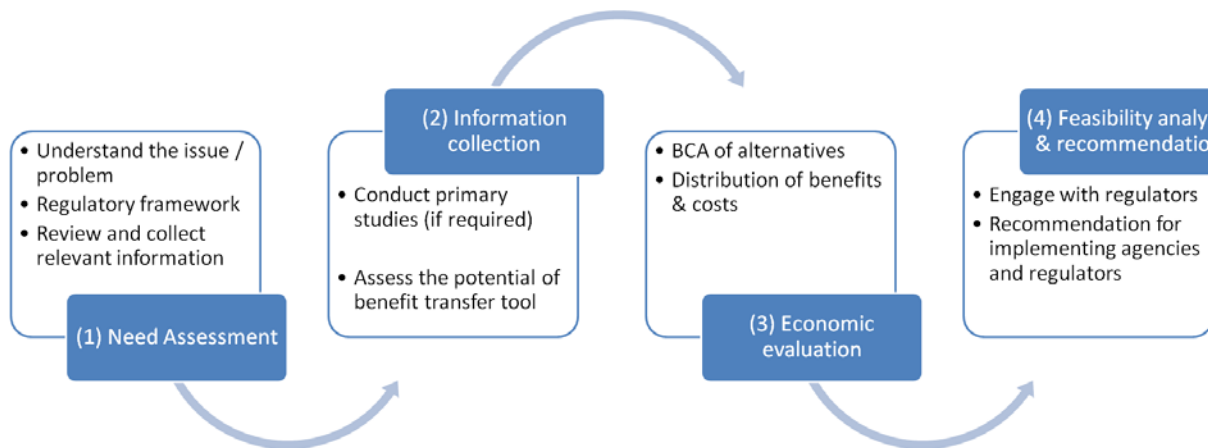


Figure 3: Steps in conducting a case study

Selection of case studies: The case studies are important tools to test the economic valuation framework. They should reflect diversity in scale, jurisdiction, complexity and types of issues. The key criteria for selection of a case study are to ensure that:

- (a) the economic valuation tool and framework could be tested in various contexts;
- (b) they address the needs of stakeholders;
- (c) there are sufficient resources available to undertake them, and;
- (d) they address the priority needs of the CRC.

Consultations with the Project Steering Committee and key stakeholders have been carried out. Based on their feedback, the following case studies have been selected for inclusion in the current work plan (which are feasible to implement within existing resources). The key features of the case studies in terms of their capacity to test various elements of the economic evaluation framework and key social and environmental benefits are presented in the following table.

Table 1: Key features of the selected case studies.

| | WP5.1: Greening the Pipeline | WP5.2: Strategic Water Resource Precincts (Subiaco Strategic Water Resource Precinct) | WP5.3: Converting an open drain into a living stream | WP5.4: Arden Macaulay Urban Redevelopment | WP6: Urban climate improvement** |
|--|------------------------------|---|--|---|----------------------------------|
| Potential to implement various elements of the economic evaluation framework | | | | | |
| Scale | Sub-city | Local government | Local government | Sub-city / Local government | Sub-city / City |
| Primary non-market valuations (survey and / or hedonic) | X | X | | X | |
| Other methods (e.g., damage costs) | X | | | | X |
| Benefit transfer tool | X | | X | X | X |
| Cost-benefit analysis tool | X | X | X | X | X |

| | | | | | |
|--|---|---|---|---|---|
| Finance models / Regulatory framework analysis | X | X | | X | |
| Key social and environmental benefits addressed | | | | | |
| Ecological conditions* | | | X | | |
| Quality of water in waterways* | X | | X | X | |
| Amenity / Public open space / Recreation / Sense of place* | X | X | X | X | X |
| Groundwater management | | X | | | |
| Reducing pressure on drainage system / wastewater and stormwater recycling | | X | | X | |
| Reduced mortality and morbidity* | X | | | X | X |
| Cost and emission reductions* | X | | | X | X |

* Key elements of liveability

** Urban climate improvement study is large and complex enough to present as a separate work package

Brief descriptions of the proposed case studies are presented below. A list of potential additional case studies has been presented under WP5.5 with elaboration of selected ideas in Appendix A. In recent days, a significant number of new case studies have been proposed. Rather than rushing to make decisions about all of these, we propose to engage our steering committee in a process (including broader consultation) that leads to balanced decisions about how many more case studies we can manage to do (considering trade-offs with our other project goals), and which of them are the highest priorities considering the above criteria. These decisions can be finalized once the project has commenced.

WP5.1: Case study on greening the pipeline in Melbourne

Key stakeholders: Melbourne Water, Wyndham City Council, VicRoads, City West Water

Key issues / Research or Management questions:

- How to best improve liveability and environmental outcomes through restoration activity and parkland construction works along a 27km linear section of the heritage listed Main Outfall Sewer.
- Assess the economic, environmental, and social benefits of an on-ground liveability improvement pilot project – Williams Landing.
- Provide quantifiable economic justification for investment spending that targets activities that improve liveability.

Importance / significance of the case study: Greening the Pipeline is a flagship liveability improvement project for Melbourne Water in partnership with Wyndham City Council, City West Water, and VicRoads.

Why and how an integrated economic evaluation framework would be useful in addressing the key issues?: There are multiple beneficiaries from the creation of parkland and active space: nearby residents receive benefits in the form of higher house prices due to the proximity to an amenity asset; non-local residents receive benefits in the form of access to a new amenity area; all members of society benefit from environmental improvements (i.e. additional revegetation and stormwater capture and reuse); local governments receive higher revenue due to higher property tax revenue; and the State and Commonwealth governments receive benefits in terms of lower public health care costs. An integrated economic evaluation framework is needed to capture this diverse range of benefits.

Expected outcomes from the case study (how it will be useful for the stakeholders): The project is a pilot project that will be developed in stages. As such, the economic evaluation involves an ex ante assessments of costs and benefits. The case study will provide a detailed guide for how benefit transfer methods can be used to develop the ex ante business case for investment in liveability projects.

The benefit transfer method will draw on both hedonic price studies and travel cost studies. This type of evidence is currently seen as the strongest by economic regulation agencies.

The core final output will be a case study demonstrating how the benefit transfer method can be used to develop a business case that satisfies the requirements of economic regulation agencies for future investment in liveability projects. Please note that prior to the completion of the case study it is impossible to say for any given specific project or project variant that costs are less than benefits.

Available In-Kind support (could include data, information, experts, etc.): Asset data (eg maps, construction drawings, cost information), access to project sponsors/stakeholders, Melbourne Water liveability team in-kind support, access to Melbourne Water liveability research materials, Melbourne Water liveability/multiple land use related policies and procedures

Available Cash (co-investment) support: Melbourne Water's confirmed contribution to the overall project (\$250k).

WP5.2: Case study on economic evaluation of land use scenarios and funding options for Strategic Water Resource Precincts (Subiaco Strategic Water Resource Precinct)

Key stakeholders: Water Corporation, City of Nedlands, WESROC group of local governments (Municipalities of Nedlands, Subiaco, Cottesloe, Peppermint Grove, Claremont, Mosman Park), Department of Water, WA Planning Commission/Department of Planning

Key issues / Research or Management questions:

- What are the costs: benefits (market and non-market) of land use options (major land use options are nature conservation (including rehabilitation), sporting and recreation, horticulture and agriculture, commercial and industry).
- What are the available tools for evaluating land use options / scenarios and what is their level of utility for users.
- What are the available funding and policy tools (e.g. development / infrastructure contribution schemes, differential rating) to support equitable implementation.

Importance / significance of the case study: The WA Planning Commission's State Planning Strategy states "wastewater treatment plants are increasingly being recognised as secure sources of alternative water (treated wastewater and stormwater). Facilitating beneficial and synergistic land use in and around the odour buffers of treatment plants will improve the efficient use of land and infrastructure and reduce the risk of land use conflicts." There are 100+ WWTPs across Western Australia and 1,200+ across Australia which are becoming increasingly important to water security and helping to ensure the climate resilience, liveability and sustainability of cities and towns.

The Subiaco Wastewater Treatment Plant (WWTP) is a State significant asset which currently services a catchment of about 230,000 people (including the Perth CBD) and growing. The WWTP already provides treated wastewater (TWW) to irrigate nearby playing fields and there is increasing demand by surrounding local governments and others to use TWW for irrigation of green spaces and environmental purposes. The WWTP has also been identified as a potential source of TWW for groundwater replenishment (indirect potable reuse).

The area also contains significant sub-regional drainage infrastructure which may also provide a source of alternative water, while the existing compensating basin and corridors could be retrofitted to provide community benefits e.g. living stream.

The WWTP odour buffer, which is about 250 hectares in area and in a combination of private and public ownership, is unsecured and considered to be at high risk of encroachment by odour sensitive land uses e.g. residential.

This case study will identify approaches to collaborative planning, evaluating and implementing (including funding) beneficial land uses in the odour buffer of the Subiaco WWTP, also known as the Subiaco Strategic Water Resource Precinct (SWRP). It will provide a model, tools, information and data which can be applied by planners and communities state-wide and nationally.

How an economic evaluation framework would be useful?: Following on from the non-market values study, it is proposed that a "Synthesis workshop" (additional to current project scope) be undertaken for the precinct to identify the range of land use and infrastructure options and issues. The economic evaluation framework will enable the costs and benefits (including non-market values) to be evaluated for the range of land uses and help determine the distribution of costs associated with implementation. This will also inform which funding and policy tools to use to support implementation.

Expected outcomes from the case study (how it will be useful for the stakeholders):

1. An understanding of the costs and benefits (economic, social and environmental) and values for implementing beneficial land uses.
2. An understanding of the available mechanisms to support implementation of the plan.
3. Development of a tool(s)/framework for evaluating and distributing economic costs and benefits associated with alternative land uses.
4. Inform a collaborative process, methodology, tools and data for planning beneficial land uses in the odour buffers of wastewater treatment and water resource recovery plants.
5. Assist with developing collaborative arrangements for planning and implementing Strategic Water Resource Precincts across WA and nationally.
6. A structure / master plan for the Subiaco Strategic Resource Precinct.
7. This case study will inform the potential "Synthesis workshop" for Subiaco Water Resource Precinct project, Western Suburbs groundwater restoration and Reuse project and potential structure planning.

Available In-Kind support: The Water Corporation will commit involvement by the following:

- Land Planning Section, including a Senior Town Planner;
- Liveable Communities program, including a Senior Infrastructure Planner and a Financial Analyst;
- Support in use and evaluation of the Water Corporation's Socio-Economic Tool (SET) and provision of associated values / data.

Available cash (co-investment) support: \$75K from WA Water Corporation

WP5.3: Case study on converting an open drain into a living stream (Lot 800 Katharine Street Belleview)

Key stakeholders: Shire of Mundaring, Developer – Taliska Securities Pty Ltd (TBC), City of Swan (TBC), Department of Water (TBC), Water Corporation (TBC), Department of Parks and Wildlife (Rivers and Estuaries Division) (TBC)

Key issues / Research or Management questions:

- How can a main drain conversion to Public Open Space via a living stream be incorporated into a future residential development.
- How best to allocate the cost and liabilities associated with construction where issues of drainage and flood mitigation are a priority, and legacy issues related to nutrient load need to be considered.
- What governance arrangements best facilitate the delivery of water sensitive urban design, where there are multiple stakeholders with varying responsibilities -- water utility, water regulator, developer, and local government - and where there is the potential to deliver non market benefits through waterway pollution load reductions.

Importance / significance of the case study: Demonstration of how water sensitive urban design can be implemented in practice, in a location with complex drainage interactions, flooding issues, and complex multi stakeholder agency arrangements.

Why and how an integrated economic evaluation framework would be useful in addressing the key issues?: An integrated economic evaluation framework would help identify and quantify:

- The costs and benefits associated with converting an open drain into a living stream, where the area is flood prone.
- The ongoing benefits, liabilities, and responsibilities of different stakeholders and the revenue needed for the project to be viable from the perspective of each individual stakeholder, and as a whole.

Expected outcomes from the case study (how it will be useful for the stakeholders): Demonstrating the application of the benefit transfer method to support the implementation of water sensitive urban design.

Developers, the water utility, the water regulator, and local government to understand the costs and benefits of converting a drain to a living stream.

Available in-Kind support: In-kind time from Shire of Mundaring staff, the developer and EMRC. In-kind time from Department of Water, Water Corporation and Department of Parks and Wildlife – Rivers and Estuaries Division, WAPC, City of Swan (all TBC)

Available cash (co-investment) support: Nil

WP5.4: Case study on Arden Macaulay Urban Redevelopment

Key stakeholders:

Direct Stakeholders - City West Water, Melbourne Water, City of Melbourne City of Moonee Valley, Victorian Government (via Victorian Planning Authority)

Indirect Stakeholders - South East Water Yarra Valley Water, Department of Environment, Land and Water Planning, Melbourne Metro Rail Authority and all other authorities undertaking in fill redevelopment

Key issues / Research or Management questions:

When water authorities are faced with developing the servicing strategies for major urban infill / redevelopments the opportunity exists to assess options outside of business as usual. These options are principally related to exploring new ideas that enable an integrated solution to creating liveable / water sensitive outcomes. For authorities like CWW, their approach for developments like Arden Macaulay, has been to develop the costs of business as usual, assess a range of plausible water sensitive / liveability options with stakeholders, undertake an economic assessment to identify the best community outcome and then make decisions.

In many cases there is a considerable gap between the financial and economic costs of “water sensitive solutions”, because the latter includes broader environment, amenity and health outcomes. In general, there are multiple beneficiaries for the broader outcomes, but beneficiaries may or may not be aware of benefits. In addition, water authorities and often beneficiaries lack knowledge to value these broader outcomes. All these issues lead to not being able to develop justifiable business cases to implement “water sensitive solutions”, which results in providing “business-as-usual” urban water services to infill developments.

The key research questions relates to ensuring the best data is available to identify all benefits (and values) and all costs for the options such that a thorough evaluation can be taken in order to allow for the appropriate trade-offs to be considered. For example, alternatives considered would include considering recycled wastewater against recycled stormwater. Arden Macaulay will allow each of the proposed research

questions be considered in the context of an integrated solution taking into account the whole of the water cycle.

Importance / significance of the case study:

Infill redevelop impacts both water authorities and local government across all of Australia. Across Melbourne the majority of new lots are from redevelopments. Each of these developments are a unique opportunity to create a sustainable future and having clarity of understanding of the economic values – across the whole water cycle - are critical. Without a robust economic framework – with a clear understanding of values, benefits transfer and willingness to pay, opportunities may be lost.

Arden-Macaulay case study provides an opportunity to explore benefits associated with infill development, which can be transferable to other infill developments. It is located some 1.5 km north west of Melbourne CBD, in lower reaches of Monee Ponds creek catchment, with a potential to become an integral part of the CBD, and in an area subject to flooding. Hence there will be benefits associated with improved productivity as well as improved flood resilience, in addition to usual liveability benefits (e.g. increased canopy cover, healthy waterways, micro climate, etc.). Therefore, this case study can be used learn benefits that are not fully understood (e.g. improved productivity) as well as for applying existing knowledge on benefits (e.g. increased greenspace).

In terms of the expected growth, Arden Macaulay will be home to some 25,000 residents and support 43,500 jobs, by 2051. The expected increase in water demand by 2051 is 2.3 GL

Why and how an integrated economic evaluation framework would be useful in addressing the key issues?: The benefits of this project will allow all stakeholders to identify the options, identify the benefits, have clarity about their values and be informed to make rational decisions on servicing the area, including funding for service provision.

Expected outcomes from the case study (how it will be useful for the stakeholders): The expected outcomes of this case study include an improved understanding of benefits, beneficiaries and approaches for valuing of benefits related to an infill redevelopment. This requires an evaluation framework that must overlay multiple agencies with multiple objectives and different financing arrangements.

Available in-Kind support:

Melbourne Water, City West Water, City of Melbourne, Victorian Government (via Victorian Planning Authority and DELWP) and South East Water are currently involved in identifying a water servicing strategy that has the potential to provide multiple

benefits. All of these organisations may be contacted, as required to obtain data and information.

In addition, City West Water can provide \$10,000 worth of in-kind support, which may include provision of data and information, and a contribution to developing research concepts.

Available cash support: TBA

WP5.5: Potential additional case studies (not part of current project scope)

A wider set of project ideas presented or mentioned during the project planning workshop and through follow-up discussions are presented below. This list could be used to identify potential additional case studies for inclusion in the project, subject to co-investments available from local/regional partners.

| Case study Idea | | Potential Location |
|-----------------|--|---|
| 1. | Value of urban trees (mental health) | |
| 2. | Value of irrigation of public open space (social cohesion) - Irrigated versus non-irrigated parks - Cost of alternative water sources for irrigation of public and private spaces | City of Wyndam, Shire of Kalamunda, White Gum Valley (City of Fremantle), Brabham (City of Swan) or South Pinjar (City of Wanneroo) |
| 3. | Restoration of degraded waterways (actual improvement of water quality) | |
| 4. | Analysis of decision making process (post-hoc analysis) | |
| 5. | Flood protection (stormwater harvesting, risk aversion, risk transfer) | |
| 6. | Cost of maintaining vegetated WSUD assets across a local government – work with a local government to assess the costs and benefits of its vegetated assets (tree pits, biofilters, living streams, swales, detention basins) | City of Subiaco or City of Armadale |
| 7. | Assessment of different land use strategies for reduction in nutrient loads | |
| 8. | Conversion of drainage infrastructure (including basins) into functional open space and opportunities for water quality, flood protection and potentially water harvesting in addition to amenity and liveability gains, including an assessment of maintenance (operational) costs. | |
| 9. | Legislative requirement of putting rain water tank in new developments (design stormwater capture option) | Brisbane |
| 10. | Different land-use or landscape designs (green space) | WA / SA |

| | | |
|-----|---|-----------|
| 11. | Urban infill - Test strategy against the 30 Year Plan for Greater Adelaide | Adelaide |
| 12. | Transition / restoration of Sunshine employment centre (infill/greenfill) - 2100 hectares, waterways challenges | Melbourne |
| 13. | Restoration of Cooks River (Cooks River alliance) | NSW |
| 14. | Restoration of Breakout creek in SA* | SA |
| 15. | Benefit-cost analysis of South Creek Living Waterway Corridor in Sydney* | Sydney |
| 16. | WESROC Recycled Water Managed Aquifer Recharge for Public Open Space and Other Social Benefits* | WA |
| 17. | Site 1 - North Stoneville and/or Site 2 - North Parkerville (2 separate developments – potentially 2 different projects)* | WA |
| 18. | City-wide costs and benefits of rainwater harvesting* | Brisbane |
| 19. | Economic value of urban climate improvement: Sub-tropical case study* | Brisbane |

* These last six case study ideas are presented in more detail in Appendix A. These have been developed with potential co-investors in this project, but are subject to additional funding being provided to undertake them as part of the current project.

WP6: Economic value of urban climate improvement: Urban Heat Island (UHI) mitigation

This work package will explore the UHI mitigation produced from different scales of investment in urban greening, and quantify in dollar terms the value of this benefit, for example by reduced mortality/morbidity, reduced energy demand and increased productivity. The list of possible areas for benefit-transfer will be fully developed in WP3 and WP4.

Increasing levels of investment in green public open space, and associated investments in passive and active irrigation of those spaces, produce increasing benefits in UHI mitigation. In Tranche 1 CRCWSC research was able to show the clear physical urban cooling benefits of different levels and types of urban greening, but there is currently no credible estimate of the economic value of the cooling produced under different scenarios of WSUD adoption. Therefore there is currently no way to use UHI mitigation in any policy position or business case for greening cities and integrated water management policy changes. This work package will seek to overcome this critical barrier in policy knowledge, combining expertise in economic assessment (UWA and RMCG), UHI modelling (Monash University) and urban design response (E2DESIGNLAB)⁶. Outputs will be dollar value estimates of the UHI mitigation value produced under different greening and integrated water management settings.

The first phase of this work will involve development of the modelling and scenario-building approach for Study Site 1, the Sunbury growth area in Melbourne. This location is preferred because of a considerable amount of pre-existing material assembled by the researchers that can be used in scenario development, therefore saving time and money for the project. The general approach is shown in the Figure below.

⁶ Relevant experts on public health, such as Professor Fiona Bull (Centre for the Built Environment and Health), Dr Paula Hooper (School of Sport Science, Exercise and Health, The University of Western Australia) and/or Dr Helen Brown (School of Public Health, Curtin University) will be consulted and / or their research findings will be used.

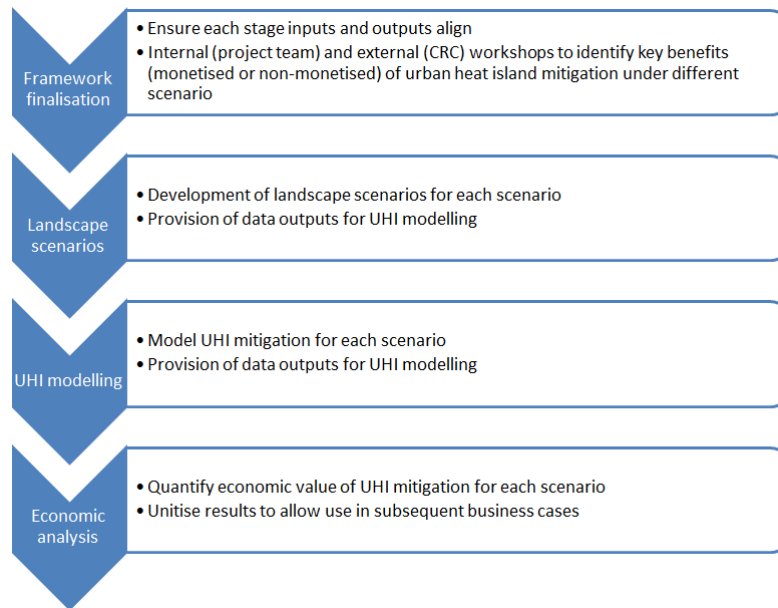


Figure 4: Steps in conducting WP6

UHI mitigation value will be regionally specific. i.e. the benefits in Western Melbourne may be very different from Brisbane. Therefore, once developed, tested and evaluated for Study Site 1, the approach and resulting economic evaluations may be applied in three other Study Sites in Perth, Sydney and Brisbane (subject to availability of funding). This will allow testing of the approach in a range of climatic and landscape development scenarios, across greenfield, brownfield and infill developments. After finalisation of the framework (see Figure above), development of landscape scenarios will involve derivation of a range of physical variables critical for modelling (e.g. plan area fraction of paved area, buildings, trees, grass, open water bodies, etc.) for four different scenarios, 1. No WSUD or whole of water cycle management (WWCM), 2. Current regulatory settings for WSUD/WWCM, 3. Proposed changes for WSUD/WWCM, and 4. A targeted UHI mitigation scenario to achieve a desired cooling (e.g. 2 degrees on extreme heat days). UHI modelling will compare the heat mitigation performance of each development scenario against the base case for typical summer conditions, as well as extreme heat summertime conditions.

In subsequent economic analyses results can then be translated to quantify in dollar terms the UHI mitigation benefit produced by each scenario. Economic values associated with different settings for urban greening at the precinct level generated under this work package would be relevant for urban planning in both greenfield developments and established suburbs. This could be used for business cases for urban greening in future. Following the successful application of the approach to Case Study 1 in Melbourne, the work will be extended to Brisbane, Sydney and Perth case studies (subject to additional funding availability).

9. *Intended project outcomes and expected project impact:*

The project outputs will include:

1. A widely tested and supported **economic evaluation framework to support business case development** for decision making for investment in water sensitive cities designs and practices;
2. A peer reviewed and tested **benefit-cost analysis (spreadsheet/database) tool** with user friendly interface and a comprehensive set of peer reviewed input metrics for the tool based upon practitioner data and best available research;
3. A peer reviewed and tested **benefit transfer tool and guideline** to allow users to transfer non-market values of different elements of water sensitive cities;
4. **Valuation of certain (non-market) benefits** of water sensitive cities (such as urban heat island mitigation), filling important and relevant gaps in the existing body of evidence;
5. **Supporting guideline/user manual** to support application of economic evaluation framework and tool (which would include examples of application of the framework in different case studies);
6. **Cross-state network of stakeholders and practitioners** which will provide a vehicle for continued engagement regarding delivery of economic evaluation framework and tool

The outputs generated under the project will help to standardise the economic evaluation of water sensitive cities systems and practices. The non-market values of various elements of water sensitive liveable cities generated under the project will help end users in estimating the multi-functional benefits of such practices. Further, application of the economic evaluation framework will help the end users to justify (or not) investment in water sensitive cities tools and practices, which will help the decision makers to make more economic sound investment decisions on water sensitive cities and gain approval from regulators. This will help the cities transition towards more water sensitive cities.

10. *Targeted end-user group(s):*

Stakeholders from various industry / end user groups (such as utilities, agencies, councils, regulators and consultants) will be engaged in the project. Stakeholders will benefit by being part of the project directly (such as through participation in the case studies or workshops) or indirectly (such as through our communication and adoption activities). The stakeholders directly engaged will gain first-hand experience from the development and testing of the economic evaluation framework. Further, participants of the case studies will benefit from the case specific economic evaluation which will help them to devise appropriate water management strategies for their particular problem / issue. We will engage with other end users through our wider communication and adoption activities to help them to adopt the standardised economic evaluation framework and improve their decision making.

11. Commercialisation and Intellectual Property (IP):

The CRCWSC has recently established a Commercialisation Committee and is implementing a commercialisation framework for opportunities which arise from current projects. IP will be actively identified and managed within this framework to ensure long-term benefits can be achieved from this project. We do not expect significant commercialisation outcomes, in the sense of income generated for the CRC, because the objective will be to have the tool and guidelines adopted as widely as possible.

12. Industry/end-user participation:

The Steering Committee of the project consists of at least one representative from each Regional Advisory Panel and representatives of key sectors and industries. The Committee members have extensive experience in water management issues and knowledge of the specific regional context. They have already contributed substantially in the development of this proposal. They will be actively involved in the subsequent stages from design and delivery of the project activities to communication and adoption of the project outputs. The Committee members will also facilitate wider connections with other end users and industry groups.

Beyond the Steering Committee members, there will be participation of many other Officers from end user organisations and other relevant organisations. People will be involved in providing data, input on the design of the framework, advice about the context for tool usage, testing tools and workshops of various types. There will be some significant, and highly valuable, input required from end user (industry) participants and that those entities who want to have their case studies addressed will need to ensure that this engagement and collaboration capacity (and relevant data etc.) is made available to the project.

To ensure regular communication a bi-monthly tele-conference and six monthly in-person meetings will be organised. These meetings will keep the full project team updated on the overall progress all the project and sharing new lessons from individual activities. Further, they will meet (as required) during the workshops organised under individual work packages and communicate through telephone and emails. To ensure communication with other CRCWSC projects (such as IRP1), in association with the CRC HQ a communication plan will be developed for wider engagement and learning from other activities.

13. Translation/adoption pathways:

Effective industry engagement for adoption and utilisation of outputs will be an integral aim from inception and throughout the project with on-going involvement of the Project Steering Committee. The development of a stakeholder dissemination strategy and adoption pathway will be the focus of WP1 of the project. The target audience for adoption will be informed by the Project Steering Committee and will include:

- Service providers and Regulators;
- Local Governments and State Government planning departments;
- Developers;
- UDIA and consultants;
- Peak industry bodies, including WSAA, Nursery and Garden Industry Australia; and
- Green infrastructure and WSUD design and implementation practitioners.

The intention is that the tools will be trialled with a subset of stakeholders in major capital cities in Australia, but that the adoption phase will reach all metropolitan and major regional stakeholders.

14. Work plan, project timelines and milestones:

14.1 Work plan

The research work plan including methods and outputs have been described under individual work packages above.

15.2 Timeline of tasks/activities and milestones

| Project Milestone / Deliverables | Accountable team members | Timeline of Tasks | | | | | | | | | | | |
|---|--|-------------------|------------------|--------------------|---------------|---------------|-------------------------------------|----------|------------------|------------------|--------|--------|------------------|
| | | Mar-17 | Jun-17 | Sep-17 | Dec-17 | Mar-18 | Jun-18 | Sep-18 | Dec-18 | Mar-19 | Jun-19 | Sep-19 | Dec-19 |
| WP1: Working paper on existing non-market values of water sensitive systems and practices | Sayed Iftekhar & James Fogarty | | Report | | | | | | | | | | |
| WP1: Stakeholder engagement strategy | Mark Siebentritt, Sayed Iftekhar & David Pannell | | Strategy | | | | | | | | | | |
| WP1: Stakeholder needs assessment report | Sayed Iftekhar & James Fogarty | | | Report | | | | | | | | | |
| WP1: Training sessions | Sayed Iftekhar & James Fogarty | | | | | | | Sessions | | | | | Sessions |
| WP2: Database on existing non-market values of water sensitive systems and practices | Sayed Iftekhar & James Fogarty | | | | Database | | | | Revised Database | | | | Revised Database |
| WP2: Benefit-transfer guidelines | Sayed Iftekhar & David Pannell | | | | | | Guideline | | | | | | |
| WP3: Report on existing BCA tools and lessons for our tool | Sayed Iftekhar & David Pannell | | Report | | | | | | | | | | |
| WP3: Benefit: Cost Analysis tool (draft version for testing) | Sayed Iftekhar & David Pannell | | | Tool | | | | | | | | | |
| WP3: Benefit: Cost Analysis tool (revised version) | Sayed Iftekhar & David Pannell | | | | | | | | Updated tool | | | | |
| WP3: Guidelines for Benefit: Cost Analysis tool | Sayed Iftekhar & David Pannell | | | | | | | | | | | | Guideline |
| WP4: Review of existing finance models and policies for selected cases | James Fogarty & Sayed Iftekhar | | | | | | | | | Report | | | |
| WP4: Finance models and policies for selected cases (tested and finalised) | James Fogarty & Sayed Iftekhar | | | | | | | | | | | Report | |
| WP5: Integrated economic valuation report: Final report (WP 5.1) Greening pipeline | Sayed Iftekhar & James Fogarty | | Scoping workshop | | | | Presentation of preliminary results | | | | | Report | |
| WP5: Integrated economic valuation report: Final report (WP 5.2) Wastewater Precinct | Sayed Iftekhar & James Fogarty | | | Synthesis workshop | | | | Report | | | | | |
| WP5: Integrated economic valuation report: Final report (WP 5.3) Living stream | Sayed Iftekhar & James Fogarty | | | | | | | | | Report | | | |
| WP5: Integrated economic valuation report: Final report (WP 5.4) Arden Macaulay | Sayed Iftekhar & James Fogarty | | | | | | Scoping workshop | | Report | | | | |
| WP5: Integrated economic valuation report: Final report (WP 5.5) Unspecified | Sayed Iftekhar & James Fogarty | | | | | | | | | Scoping workshop | | Report | |
| WP6: Landscape scenarios development for Study Site 1 (Sunbury, Melbourne) and report | Kym Whiteoak & Sara Lloyd | | Tool & Report | | | | | | | | | | |
| WP6: UHI modelling and heat mitigation for Study Site 1 (Sunbury, Melbourne) scenarios and report | Nigel Tapper, Ashley Broadbent & Kym Whiteoak | | | | Tool & Report | | | | | | | | |
| WP6: Integrated economic valuation of Study Site 1 (Sunbury, Melbourne). Report | Kym Whiteoak & Nigel Tapper | | | | | Tool & Report | | | | | | | |
| WP6: UHI modelling and heat mitigation for Study Sites 2-4 (Sydney, Brisbane and Perth) and report (subject to funding) | Nigel Tapper & Ashley Broadbent | | | | | | Tools & Report | | | | | | |

* The dates assume Year 1 begins Jan 2017 and the project receives active support from stakeholders.

15. Resources: Provide a yearly budget estimate including anticipated annual cash and in-kind budget over the duration of the project

| IRP2 budget | | Year 1 2016-17 Six months | Year 2 2017-18 | Year 3 2018-19 | Year 4 2019-20 Six months | Total |
|--|---|---------------------------------|-------------------|-------------------|---------------------------------|--------------------|
| Tied funding committed by partners | | | | | | |
| Melbourne Water | | \$150,000 | \$50,000 | \$50,000 | \$0 | \$250,000 |
| WA Water Corp | | \$25,000 | \$25,000 | \$25,000 | \$0 | \$75,000 |
| Water-Sensitive SA | | \$0 | \$30,000 | \$0 | \$0 | \$30,000 |
| Total tied funding | | \$175,000 | \$105,000 | \$75,000 | \$0 | \$355,000 |
| Expenditure | Detail | | | | | |
| Salaries | | | | | | |
| Sayed Iftekhhar (UWA) | 0.90 FTE | \$72,990 | \$150,146 | \$158,854 | \$81,697 | \$463,687 |
| Maksym Polyakov (UWA) | 0.8 FTE months 13-36 | \$0 | \$61,400 | \$123,800 | \$62,400 | \$247,600 |
| UWA Postdoc to be appointed (TBA) | 0.75 FTE first 12 months | \$39,375 | \$39,375 | | | \$78,750 |
| UWA research assistant | 0.40 FTE | \$13,000 | \$26,400 | \$27,200 | \$13,800 | \$80,400 |
| Ashley Broadbent (Postdoc, Monash with Nigel Tapper) | 0.75 FTE months 1-12 0.5FTE months 13-24, WP6 | \$57,547 | \$99,397 | \$41,850 | | \$198,794 |
| Kym Whiteoak (RMCG) -TBC (case-study dependent) | WP6 - economics of urban climate | | \$30,000 | \$20,000 | | \$50,000 |
| Sarah Lloyd (E2Design) -TBC (case-study dependent) | WP6 - biophysical modelling | | \$40,000 | \$10,000 | | \$50,000 |
| Mark Siebentritt | WP1.3 Stakeholder engagement strategy | \$5,000 | \$10,000 | \$10,000 | | \$25,000 |
| Mark Morrison (Southern Cross Uni) - Postdoc | 0.5 FTE year 1, Sydney Case study dependent | | | | | \$0 |
| Sub-total - salaries | | \$187,912 | \$456,719 | \$391,704 | \$157,897 | \$1,194,232 |
| Operating costs | | | | | | |
| Workshops | | \$0 | \$18,000 | \$26,000 | \$8,000 | \$52,000 |
| Case studies | | \$0 | \$30,000 | \$65,000 | \$0 | \$95,000 |
| Other general operating costs | | \$7,500 | \$31,000 | \$28,500 | \$31,000 | \$98,000 |
| Sub-total - operating costs | | \$7,500 | \$79,000 | \$119,500 | \$39,000 | \$245,000 |
| Total expenditure | | \$195,412 | \$535,719 | \$511,204 | \$196,897 | \$1,439,232 |
| Cash funding from CRC | Total expenditure – Total tied funding | \$20,412 | \$430,719 | \$436,204 | \$196,897 | \$1,084,232 |
| Potential additional tied funding | (prospective only, will increase number of case studies and overall budget accordingly) | | | | | |
| Sydney Water | | \$50,000 | \$100,000 | \$100,000 | \$50,000 | \$300,000 |
| WA Water Corp (additional) | | \$25,000 | \$25,000 | \$25,000 | | \$75,000 |
| SEQ participants & partners | | | | | | \$0 |
| Water-Sensitive SA & Partners (additional) | | | \$42,000 | | | \$42,000 |
| Other partners | | | | | | \$0 |
| Total potential | | \$75,000 | \$167,000 | \$125,000 | \$50,000 | \$417,000 |
| WSAA (running separate project through WRA) | Value yet to be determined based on industry contributions | | | | | \$0 |
| In-Kind contributions (indicative only, to be finalised after review) | | | | | | |
| David Pannell (UWA) | Researcher/Steering committee | 0.1 | 0.2 | 0.2 | 0.1 | |
| James Fogarty (UWA) | Researcher | 0.1 | 0.2 | 0.2 | 0.1 | |
| Nigel Tapper (Monash) | Researcher/Steering committee | 0.05 | 0.1 | 0.1 | 0.05 | |
| Grace Tjandraatmadja | Steering committee | 0.025 | 0.05 | 0.05 | 0.025 | |
| Greg Finlayson | Steering committee | 0.025 | 0.05 | 0.05 | 0.025 | |
| Ursula Kretzer | Steering committee | 0.025 | 0.05 | 0.05 | 0.025 | |
| Naomi Rakela | Steering committee | 0.025 | 0.05 | 0.05 | 0.025 | |
| Craig Miller | Steering committee | 0.025 | 0.05 | 0.05 | 0.025 | |
| Simon Leiva | Steering committee | 0.025 | 0.05 | 0.05 | 0.025 | |
| Mellissa Bradley | Steering committee | 0.025 | 0.05 | 0.05 | 0.025 | |
| Jill Fagan | Steering committee | 0.025 | 0.05 | 0.05 | 0.025 | |
| Ben Fallowfield | Steering committee | 0.025 | 0.05 | 0.05 | 0.025 | |

Please see Appendix B for explanations of the specific budget items.

16. Risk assessment and management: *Identify key risks that may impact on project progress or deliverables/outcomes, including barriers to adoption, and how they will be proactively managed. Identify financing implications if there are co-contributors.*

| Risk | Impact | Management action |
|--|--|---|
| Lack of support from local end users | Failure to conduct appropriate number of case studies and reduced ability to fulfil project objectives | Building on the successes of industry engagement in Tranche 1 in getting broad support and buy-in. Secure commitments of support during project development and negotiation. To achieve those commitments, ensure that the project is well designed to meet end user needs. |
| Lack of data | Failure to test the tools and framework comprehensively | Develop an adaptive approach to identify potential roadblocks very early in the process and define project scope appropriately |
| Reluctance to use estimates based on non-market valuation studies (such as willingness to pay based on survey) | Limiting the scope to consider wide range of evidence for economic evaluation | Build confidence on the method and estimates through engagement with both industry and experts |
| Reluctance to use an economic evaluation framework for decision making by the end users | The adoption of the outputs from the project will be limited and the impact of the project will be reduced | Engage with the regulators and policy makers from the beginning of the project and clearly communicate the benefits of using an evaluation framework |
| Expectations beyond the scope of the project from end users | Frustration at failure to meet expectations. | Convey the scope and outputs of the project through interactive engagement and clear communication Invite end users to invest additional resources to generate additional outputs (if required) |
| Lack of integration with the other CRC projects and failure to learn from each other | Full potential of the project is not realised | Establish a well-designed plan for engagement with other projects to ensure smooth information exchange |
| Loss of key research personnel | Delay in the delivery of the project | Employed researchers will be part of productive and well-respected research groups. Mentor and support early-career researchers. Create opportunities for professional development and career progression. |

17. References:

- Johnston, R.J., J. Rolfe, R.S. Rosenberger and R. Brouwer, eds. 2015. *Benefit Transfer of Environmental and Resource Values: A Guide for Researchers and Practitioners*. Dordrecht, the Netherlands: Springer.
- WSAA, 2016. *Liveability Indicators: A report prepared for the water industry*. Occasional Paper No 31, Water Services Association of Australia Ltd, 40pp.

Appendix A: Details of selected potential case studies (subject to funding availability)

| Case study A1 | | Benefit-cost analysis of South Creek Living Waterway Corridor in Sydney |
|--|---|---|
| Key stakeholders: | Sydney Water, Greater Sydney Commission Department of Planning and Environment, IPART, Camden, Liverpool, Fairfield, Blacktown + Penrith Councils, Office of Environment and Heritage, NSW EPA, Metropolitan Water Directorate | |
| Key issues / Research or Management questions: | <p>The scale of population growth in Western Sydney presents a significant problem in wastewater management (sewage and stormwater). In summary, it will result in a water surplus that far exceeds the capacity of existing waterways. There is significant risk that business as usual approaches to water, wastewater and stormwater services will not deliver the desired community and customer outcomes.</p> <p>Further to this, the shift toward a hotter drier climate on top of increased population density will present significant challenges to liveability in the region. Managing thermal comfort, and access to recreation and natural amenities will become critical factors in community health and economic prosperity. There is a shortage of high grade recreation areas in the west. There is significant potential investment in stormwater management across Council areas but initiatives are poorly integrated. The limited remaining areas of high ecological value will deteriorate without active intervention.</p> <p>The Living Corridor presents an integrated approach to water management within the South creek corridor and establishing highly valuable and accessible recreation areas within the corridor as well as providing a framework for innovative, decentralised water servicing, open space irrigation and ecological preservation.</p> | |
| Importance / significance of the case study: | By valuing the outcomes of the South Creek Living Corridor an argument can be made of significant alternative land planning, water servicing and environmental regulation of this major region of Sydney's growth. To elevate regulation conversations above the existing paradigms to a city outcome conversation these benefits must be valued. | |
| Why and how an integrated economic evaluation framework would be useful in addressing the key issues?: | <p>Water management across Sydney is managed by potentially inconsistent and often competing interests and organisations with little agreement on greater city wide goals. Water utility assets are capitalised and regulated on a "least cost" site by site basis as a protection for customer affordability. As a result services for water, sewerage and recycled water are not only viewed in isolation from one another, but also from other water cycle elements such as stormwater, flooding, waterway health, city aesthetic and green space outcomes. These other elements are coordinated by a collection of local government and other agencies. Overall, this can create inefficiencies in water and financial resources whilst also potentially failing to capture significant benefits that are available. The living corridor proposal is an attempt to integrate such management in to a greater landscape outcome for the west.</p> <p>An integrated economic framework is required to present and articulate for alternate (WSC) servicing scenario of the Corridor and how it will provide city wide benefits.</p> | |



| | |
|---|---|
| Expected outcomes from the case study (how it will be useful for the stakeholders): | This will provide a regional case study that sums up multiple threads of the tranche 1 research into one real example. |
| Available support: In-Kind (could include data, information, experts, etc.) | Sydney Water is looking to partner on the case study to articulate the scenario with real data from the Western Sydney Regional Masterplan process. |
| Available support: Cash (co-investment) | Sydney Water expects to financially contribute. |

| Case study A2 WESROC Recycled Water Managed Aquifer Recharge for Public Open Space and Other Social Benefits | |
|--|--|
| Key stakeholders: | WESROC – Western Regional Organisation of Councils (Town of Mosman Park, Shire of Peppermint Grove, Town of Cottesloe, Town of Claremont, City of Nedlands, and City of Subiaco); Department of Water; Water Corporation |
| Key issues / Research or Management questions: | <p>The WESROC region covers 64 km² in the western suburbs of Perth. The councils rely heavily on the superficial aquifer to water public open spaces (POS). Declining groundwater levels and quality are affecting their ability to maintain POS, street trees, vegetation.</p> <p>Department of Water (DoW), WESROC and Water Corporation are working together to evaluate different water management strategies including recycling treated wastewater for irrigating POS, to:</p> <p>Secure a future water supply for POS in a drying climate; Maintain groundwater quality, dependent wetlands and existing users in the area under drying climate.</p> <p>Phase 1: Pre-feasibility investigations. Funded by DoW, completed in July 2016. Subproject 1-1: Western suburbs hydrogeological study (DoW, 2016) Subproject 1-2: Pre-feasibility study of western suburbs MAR of treated wastewater (GHD, 2016)</p> <p>Phase 2: Feasibility, groundwater investigations and numerical model development. The current focus of the project is:</p> <p>Evaluate water recycling options and determine preferred options, using Marsden Jacob's 'Economic viability of recycled water schemes' cost benefit framework. Scoping MAR supply options. Groundwater investigation and model conceptualisation. Develop a groundwater numerical model to simulate the impact of public and private abstraction on water levels and quality. Phase 3: Detail design and approvals. Use groundwater model to evaluate engineering designs and assess risks of MAR options.</p> |
| Importance / significance of the case study: | <p>Key drivers of the project include:</p> <p>Ability to meet demand for watering POS in a drying climate, without adversely impacting on groundwater quality, groundwater dependent ecosystems and existing users. High demand for groundwater for POS where allocation limits are constrained, with little scope for accommodating future growth. Possible saline intrusion (extent and source). Evaluation of management response options and fit-for-purpose supply options; e.g. MAR using treated wastewater and stormwater. High social and environmental values associated with groundwater dependent environments (e.g. lakes, trees, vegetation).</p> |
| Why and how an integrated economic evaluation framework would be useful in addressing the key issues?: | <p>The framework would help identify and quantify:</p> <p>costs and benefits associated with recycled water MAR schemes – particularly the wider public and environmental benefits as part of developing business cases; beneficiaries to inform future funding models for regional schemes.</p> |



| | |
|---|--|
| Expected outcomes from the case study (how it will be useful for the stakeholders): | Assist councils to identify the scale of benefits (and who benefits) from different water management strategies to maintain POS and environmental assets, in order to develop: business cases; funding models (e.g. sharing across regional councils, Government grants, Water Corporation, industry). Assist DoW and Water Corporation to better understand the wider benefits of recycled water MAR schemes. |
| Available support: In-Kind (could include data, information, experts, etc.) | Phase 1 of the study was funded by DoW, approximately \$150k operating costs plus in-house staff salary costs. Phase 2 is jointly funded by DoW and WESROC, approximately \$700k for operating costs plus staff salary costs. Costs and funding arrangements for Phase 3 will be determined at the conclusion of Phase 2. DoW would be able to provide most of the estimated costs for recycled water MAR schemes, so the focus of the framework would be in assessing the associated benefits of maintaining groundwater quality, dependent wetlands and existing users in the Western suburbs area under drying climate. |
| Available support: Cash (co-investment) | Existing contribution to the overall project |




| | |
|--|---|
| Case study A3 | |
| Site 1 - North Stoneville and/or Site 2 - North Parkerville (2 separate developments – potentially 2 different projects) | |
| Key stakeholders: | Shire of Mundaring Site 1 – Developer - Satterley (TBC) Site 2 - Developer - Parkerville Residential Pty Ltd (TBC) Independent Water Utility (TBC) |
| Key issues / Research or Management questions: | Two future townsites to the north of Stoneville, Parkerville & Hovea are proposed They are zoned 'Urban Deferred' until wastewater treatment issues are resolved North Parkerville investigating scheme water management by strata Use of non-Water Corporation sewage system, possible third pipe systems in a new residential development Development currently cannot go ahead until above is resolved |
| Importance / significance of the case study: | Development of this area is currently inhibited due to no waste water treatment system. Solutions could be applied to developing or extending townsites in regional areas with water and/or wastewater limitations. Shire information sheets available - North Stoneville & North Parkerville |
| Why and how an integrated economic evaluation framework would be useful in addressing the key issues?: | Provide information on decentralised waste water systems - costs and benefits, business case for future developers, local governments – particularly of interest to regional and peri-urban local governments. Resolution of the wastewater treatment issue will likely involve minimising water use in other areas, so developers have an incentive to reduce, reuse and recycle water wherever possible. |
| Expected outcomes from the case study (how it will be useful for the stakeholders): | The developer is looking at development of a stand-alone, decentralised waste water system (not connected to Water Corporation infrastructure). Development cannot proceed without resolving water and wastewater issues. |



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| Available support: In-Kind (could include data, information, experts, etc.) | In-kind support from the Shire of Mundaring, Developer, private waste water provider, EMRC, possibly Department of Water and Department of Parks and Wildlife (all TBC). |
| Available support: Cash (co-investment) | Nil at this stage However it would be expected the developer would implement project findings |

| Case study A4 | Breakout Creek Wetlands |
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| Key stakeholders: | Adelaide and Mt Lofty Ranges NRM Board as project driver. Community – whole community benefiting from improvements to Breakout Creek and Gulf St Vincent. SA Water as watercourse capacity manager. City of West Torrens as a land manager. City of Charles Sturt as a land manager. |
| Key issues / Research or Management questions: | Creating a linear wetland environment at Breakout Creek has well-quantified capital works costs and ongoing management costs. The substantial ongoing benefits to people, ecosystems and the economy can be described qualitatively but aren't readily quantified. With works completed in two reaches of Breakout Creek, how can we articulate a robust business case for the creation of a linear wetland in the third and final reach to the sea, valuing the currently unmonetised benefits to justify the appropriate investment? |
| Importance / significance of the case study: | Breakout Creek is the last few kilometres of Adelaide's iconic River Torrens – an artificial channel dug in the 1930s to connect the Torrens directly to Gulf St Vincent. It's part of Adelaide's landmark Torrens Linear Park, established in the 1980s, but as a weedy, grassed open channel leased for agistment by a local horse club, it offered little value as an ecosystem or to the community beyond the horse club. In the late 1990s the Torrens Catchment Water Management Board reconstructed 500m of Breakout Creek, relocating horses, creating permanent deepwater pools, improving community access, and planting thousands of native aquatic and terrestrial plants. In the late 2000s the AMLR NRM Board reconstructed the next 700m of river downstream, further improving and extending habitat and accessibility. In the 2010s the AMLR NRM Board is engaging with the community about potential outcomes for the final reach of Breakout Creek to the sea. The importance of this case study encompasses: One stage of reconstructed river nearly 20 years old. One stage of reconstructed river over 5 years old. One stage of river with the potential for reconstruction actively under consideration with engagement with the community already commenced. Adelaide's most well-known river. |



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| | <p>Breakout Creek, February 2009:</p>  <p>Breakout Creek, October 2013:</p>  <p>Breakout Creek, September 2016:</p>  |
| <p>Why and how an integrated economic evaluation framework would be useful in addressing the key issues?:</p> | <p>The first two stages of works at Breakout Creek were enabled by socio-political environments at those times supportive of public-good ecological improvement works without the imprimatur for hard-nosed financially-based business cases. People were comfortable with weighing qualitative benefit descriptions against quantitative costs. However, the socio-political landscape for this type of project has changed since the second stage of works was considered and its social licence to progress was confirmed in the early to mid-2000s. Now, a business case expressed in hard financial terms, clearly articulating the economic, social and ecological benefits and costs, is necessary to progress the next stage of works from engagement and feasibility to hard, cash action.</p> |
| <p>Expected outcomes from the case study (how it will be useful for the stakeholders):</p> | <p>A case study resulting in a real evaluation of market and non-market benefits will be an invaluable tool for the stakeholders to build the business case for the next stage of Breakout Creek watercourse reconstruction. It could be the key to continuing the amazing social and ecological outcomes of the first stages all the way to Gulf St Vincent.</p> |
| <p>Available support: In-Kind</p> | <p>Significant support from DEWNR Natural Resources AMLR staff.</p> |
| <p>Available support: Cash (co-investment)</p> | <p>\$42,000 from Water Sensitive SA, Adelaide and Mt Lofty Ranges NRM Board, SA Department of Environment, Water and Natural Resources.</p> |

| <p>Case study A5 City-wide costs and benefits of rainwater harvesting</p> | |
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| <p>Key stakeholders:</p> | <p>Brisbane City Council, Ipswich City Council, Logan City Council, Redland City Council, Gold Coast City Council, SEQWater, Queensland Urban Utilities</p> |
| <p>Key issues / Research or Management questions:</p> | <p>Stormwater management is an increasingly expensive issue for city Councils and their ratepayers. Largely impervious urban catchments rapidly direct rainfall into stormwater systems for discharge into waterways. This increases the volume and rate of peak flows, requiring large capacity drainage systems for short term events, causing localised flooding, increasing erosion and sediment run off from construction sites, and changing the hydrology of urban waterways with consequent impacts on local biodiversity.</p> <p>Capturing rainfall in domestic rain water tanks offers a potential cost-effective solution if it occurs at the right scale across the urban environment, with the water being used to supplement domestic supply, watering domestic gardens or public green spaces, or being discharged into the stormwater system once the peak has passed.</p> |



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| | <p>Can domestic rainwater tanks make a cost-effective system-wide contribution to stormwater management in south east Queensland?</p> <p>What are the relative cost: benefits for all agents and stakeholders in the urban water cycle?</p> <p>What cost:benefit sharing models are available to create an incentive for domestic uptake at the scale required?</p> <p>What innovative options are available for rainwater harvesting, storage, and use within suburbs and neighbourhoods?</p> |
| Importance / significance of the case study: | <p>Rainwater tanks have been a political football in south east Queensland over the last two decades, being seen as a water conservation solution during drought conditions, through to an unnecessary cost for developers and landholders at other times. For example, the State Government required rainwater tank installation during the drought and removed that requirement after the drought ended.</p> |
| Why and how an integrated economic evaluation framework would be useful in addressing the key issues? | <p>This problem requires a system-wide stock-and-flow with feedback analysis of the relative costs and benefits to different but interrelated agents in the urban ecosystem. It requires consideration of, and the testing of, different funding models and an examination of the intended and potential unintended consequences of changes to the funding model on the different agents relative to the benefits of stormwater harvesting.</p> |
| Expected outcomes from the case study (how it will be useful for the stakeholders): | <p>Evidence-based policy regarding domestic rainwater capture, storage and use; equitable and effective cost: benefit allocation across stakeholders and beneficiaries; improved waterway condition</p> |
| Available support: In-Kind (could include data, information, experts, etc.) | <p>Brisbane City Council</p> <p>Healthy Waterways and Catchments - Delivering Queensland stormwater, erosion and sediment control strategy for Department of Environment and Heritage Protection in 2016/17.</p> |
| Available support: Cash (co-investment) | <p>TBC</p> |

| Case study A6 | | Economic value of urban climate improvement: Sub-tropical case study |
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| Key stakeholders: | Brisbane City Council, Ipswich City Council, Gold Coast City Council, Logan City Council, Healthy Waterways and Catchments | |
| Key issues / Research or Management questions: | Add to existing research questions: Does the Living Waterways framework provide a cost-effective means for urban climate improvement in sub-tropical cities? | |
| Importance / significance of the case study: | The cities of south east Queensland are rapidly growing, with both greenfield development, and infilling brownfield development. Sustainable development requires consideration and mitigation of climate impacts on human health and amenity. Understanding the economic value of cooling through Greening in these environments is critical to the establishment of policy and business cases for ongoing and future urban development. | |
| Why and how an integrated economic evaluation framework would be useful in addressing the key issues? | SEQ is planning for significant growth through urban development; urban heat islands may be an unintended consequence of business as usual if not explicitly addressed through policy and planning. It will be important to identify the relative costs and benefits of new approaches to development that mitigate the heat island effect, deliver liveable and sustainable communities, and equitably allocate the costs. | |
| Expected outcomes from the case study (how it will be useful for the stakeholders): | This information will inform the business case for Greening in urban development and support SEQ city strategic plans for sustainable urban development. | |
| Available support: In-Kind (could include data, information, experts, etc.) | Brisbane City Council Healthy Waterways and Catchments - Proprietary analytic methods and thermal mapping of urban, peri urban and rural areas in Queensland at 30m resolution. Living Waterways framework | |
| Available support: Cash (co-investment) | TBC | |

Estimated level of effort required to complete each case study

| Serial Number | Case study Idea | Level of effort (tentative) |
|---------------|--|-----------------------------|
| WP5.1 | Greening the pipeline | 6 |
| WP5.2 | Strategic Water Resource Precincts | 4 |
| WP5.3 | Converting an open drain into a living stream | 2 |
| WP5.4 | Arden Macaulay Urban Redevelopment | 3 |
| A1 | Benefit-cost analysis of South Creek Living Waterway Corridor in Sydney | 6 |
| A2 | WESROC Recycled Water Managed Aquifer Recharge for Public Open Space and Other Social Benefits | 2 |
| A3 | Site 1 - North Stoneville and/or Site 2 - North Parkerville (2 separate developments – potentially 2 different projects) | 2 |
| A4 | Breakout Creek Wetlands | 3 |
| A5 | City-wide costs and benefits of rainwater harvesting | 3 |
| A6 | Economic value of urban climate improvement: Sub-tropical case study | 3 |

Appendix B: Explanations of budget items

Employed staff

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| Sayed Iftexhar (UWA) | <p>Project leader, overall coordination and reporting.</p> <p>Broad expertise in economic analysis.</p> <p>Will contribute to all work packages and all case studies.</p> <p>Needed for a high FTE percentage throughout the project. (Would prefer 100% but current budget is for 90%.)</p> |
| Maksym Polyakov (UWA) | <p>Expert on aspects of non-market valuation (hedonic pricing analysis), cost-benefit analysis and economic modelling broadly.</p> <p>Will particularly contribute to WP1.4 (training), WP2.2 (non-market values), WP3.3 (BCA tool), WP3.4 (BCA tool guidelines), and WP5 (all case studies).</p> <p>Needed for a high FTE percentage (80%, preferably 100%) for the last two years of the project.</p> |
| Postdoc to be appointed (UWA) (TBA) | <p>A non-market valuation specialist, but with general economics expertise.</p> <p>Needed for WP2, particularly in the absence of Maksym Polyakov in the first 12 months of the project. Will contribute to WP1.3 (consultation), WP1.4 (training), WP2.1 and WP2.2 (non-market values), WP3.2 (costing), WP5 (case study 2).</p> <p>Needed 75% FTE for one year. Will create a full-time position by combining funds from a different (non-CRC) project that deal with non-market values.</p> |
| Research assistant (UWA) (TBA) | <p>Skills in stakeholder and community engagement, and in organisation of workshops and stakeholder engagement activities.</p> <p>Will contribute to stakeholder engagement (WP1.3 and WP1.4), non-market valuation guidelines (WP2.2), BCA tool guidelines (WP3.4), organisation of workshops, and project reporting. Will contribute to other work packages as required.</p> <p>Budgeted at 0.4 FTE for the duration of the project.</p> |
| Postdoc (with Nigel Tapper) | <p>Climate modelling and health benefits.</p> <p>Will contribute to WP6.1 (heat island).</p> <p>0.75 FTE in first 12 months of project, 0.5 FTE in second 12 months.</p> |
| Kym Whiteoak (consultant) | <p>Skills in economic evaluation. Has worked with Nigel Tapper previously.</p> <p>Could be engaged to conduct the economic analysis in WP6.1 (heat island)</p> |
| Sarah Lloyd (consultant) | <p>Skills in biophysical modelling. Could be engaged in WP6.1 (heat island)</p> |
| Mark Siebentritt (consultant) | <p>Expert on community engagement. Will assist with WP1, including advising on strategy to ensure that the tools are widely adopted.</p> |



Operating costs

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| Workshops | The project includes six workshops for engagement and consultation. The budget of \$5000 per workshop allows for interstate travel and accommodation for 2-3 project team members and 1-2 key end users who lack access to travel funds, plus funds for venue and catering. |
| Training | Four training workshops at \$8000 each, covering interstate travel and accommodation for 2 project team members and up to 8 end-user trainees, plus funds for venue and catering. |
| Dissemination strategy | Costs cover design, assistance with document preparation, printing and dissemination, plus costs of a variety of complementary dissemination and engagement activities. |
| Online implementation of BCA tool. | Once the tool design is completed and well tested, online implementation has a number of advantages and, based on experience, is likely to be more attractive to users than a spreadsheet version. We will use our own expertise in web development to limit the cost to around \$10,000. |
| Case studies | The case studies involve a number of surveys (at \$15,000 to \$20,000 each for cost of access to a suitable sample of respondents and implementation of the survey), travel and meeting costs. |
| Urban heat island work package | Consumables, travel and computing \$2K, \$2K, \$5K in each of 2017 and 2018. |
| Equipment | Replacement and maintenance of computers and software. |
| Conferences | Two team members attending one national research conference per year. Registration, accommodation and travel estimated at \$3500 each. |
| General travel | To CRC meetings not connected with case studies or workshops that are part of work packages. |

In-kind staff

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| David Pannell (UWA) | Broad expertise in economics, policy and end-user engagement. Will contribute to WP1.2 (dissemination), WP2.2 (non-market valuation guidelines), WP3.3 (BCA tool), WP3.4 (BCA tool guideline), and case studies. |
| James Fogarty (UWA) | Broad expertise in economics and policy. Will contribute to WP1.4 (training), WP3.2 (costing), WP3.3 (BCA tool), WP4.1 and 4.2 (finance models and policies), and WP5 (case studies 2 and 3). |
| Nigel Tapper (Monash) | Will lead WP6.1 (urban heat island). |



Steering Committee

| Members: | Role of the steering committee: |
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| Grace Tjandraatmadja Greg Finlayson Ursula Kretzer Naomi Rakela Craig Miller Simon Leiva Mellissa Bradley Jill Fagan Ben Fallowfield | Provide overall guidance for the project, including assistance with prioritisation of case studies. Advise on and assist with collection of data required for the project, particularly for the case studies. Facilitate networking and connections between the project team and various organizations and key people to successfully implement various tasks. Advise on and assist with dissemination and sharing of information, knowledge and tools generated from the project. Actively seek opportunities in their respective organizations to implement lessons and tools from the project. |
| Nigel Tapper David Pannell Sayed Iftekhar | |