CRC for
Water Sensitive Cities

Australian Government
Department of Industry, Innovation and Science

Business
Cooperative Research
Centres Programme

IRP2 - Comprehensive Economic Evaluation Framework (2017 – 2019)

An Overview

8 March 2018

watersensitivecities.org.au

IRP2 - Comprehensive Economic Evaluation Framework (2017 – 2019)

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CRC WSC IRP2 Integrated economic assessment and business case development

The University of Western Australia (UWA)

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Structure of the talk

- A background of Tranche 1 research
- A snap-shot of NMV studies
- An overview of IRP2

Tranche 1

Background: Project A.1 (2012 – 2016)

Provide tools and insights to industry partners and others, to assist with:

- decision making about investments in WSC
- design of policies to support WSC

Assist the CRC itself to:

- understand economic drivers
- make decisions about priorities for future research

The researchers

UWA and Monash

15 members;

- 7 academics
- 4 post-docs
- 4 research students

Themes

- Comparing and optimising water supply alternatives;
- Optimal actions to reduce nutrient emissions;
- Comparing potential projects and investments in water-sensitive cities;
- Cost effective water provision to public open space (POS)

Themes…. continued

- Valuing unpriced social and environmental outcomes for various services Stormwater management options:

  - Rain water tank
  - Urban drainage restoration (Living stream)
  - Land uses of buffer zones of wastewater treatment plants
  - Rain gardens
  - Constructed wetlands

Use of non-market valuation estimates

FOCUS: completed studies on non-market valuations

- STUDY 1: Local stormwater management
- STUDY 2: Buffer zone management

Study 1: Valuing environmental services associated with local stormwater management

Brent, D. A., et al. (2017). "Valuing environmental services provided by local stormwater management." Water Resources Research(53): 4907-4921.

Stormwater

- Stormwater management provides multiple benefits. Few of the secondary benefits associated with local stormwater management have been quantified in dollar-equivalent terms.
- Conducted choice experiments with nearly one thousand households from four metropolitan councils in Melbourne and Sydney.
- Respondents were asked to choose among different options for improving local stormwater management.

Stormwater

- There is significant economic support for stormwater projects. Marginal willingness to pay ($) per household per year (median)

Value	Melbourne	Sydney
Reduction of flash flood by half	22	22
Flood never	83	85
Stream health (medium)	84	117
Stream health (high)	234	229
Removal of level 3 & 4 water restrictions	5	90
Removal of complete water restrictions	155	242
Reduction of temperature by 2 degree	45	54

The values are estimated in comparison to the status Quo (or the current scenario).

Study 2: Non-market valuation of buffer zone management of wastewater treatment plants

Iftekhar, M., et al. (2018). "Understanding social preferences for land use in wastewater treatment plant buffer zones." Under Review

Buffer

- Buffer zones are commonly applied to wastewater treatment plants to identify the area impacted by odour. How that land is best used depends, in part, on community values.

- This study conducted a survey (n=709) to understand community preferences for different land uses within buffer zones in Perth and regional Western Australia.

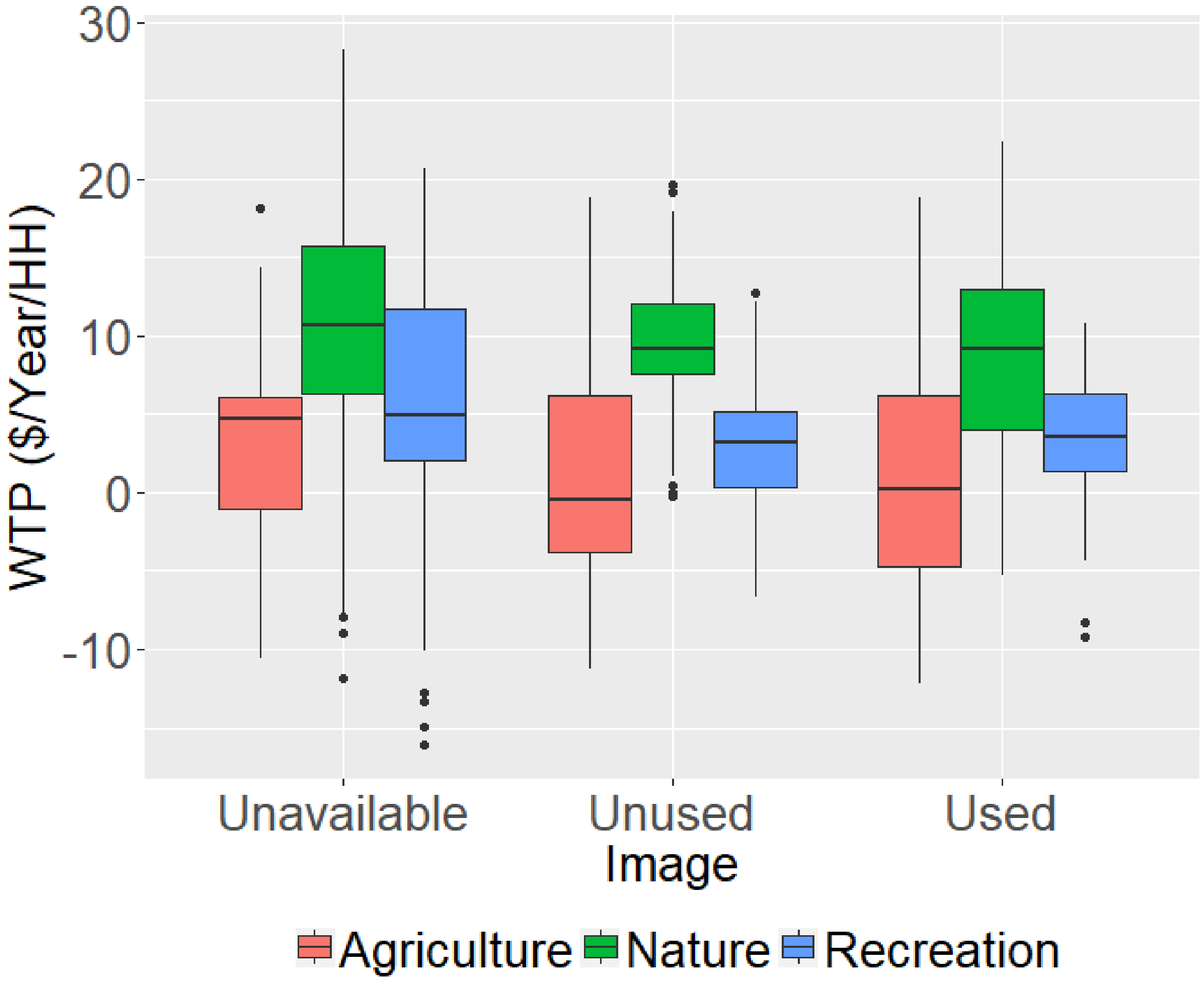
Buffer....

- 4 land use attributes: nature conservation, agriculture, sports & recreation and industry.

- The choice experiment involved two information conditions, one using text and tables only, the other had the option for respondent to view land use maps.

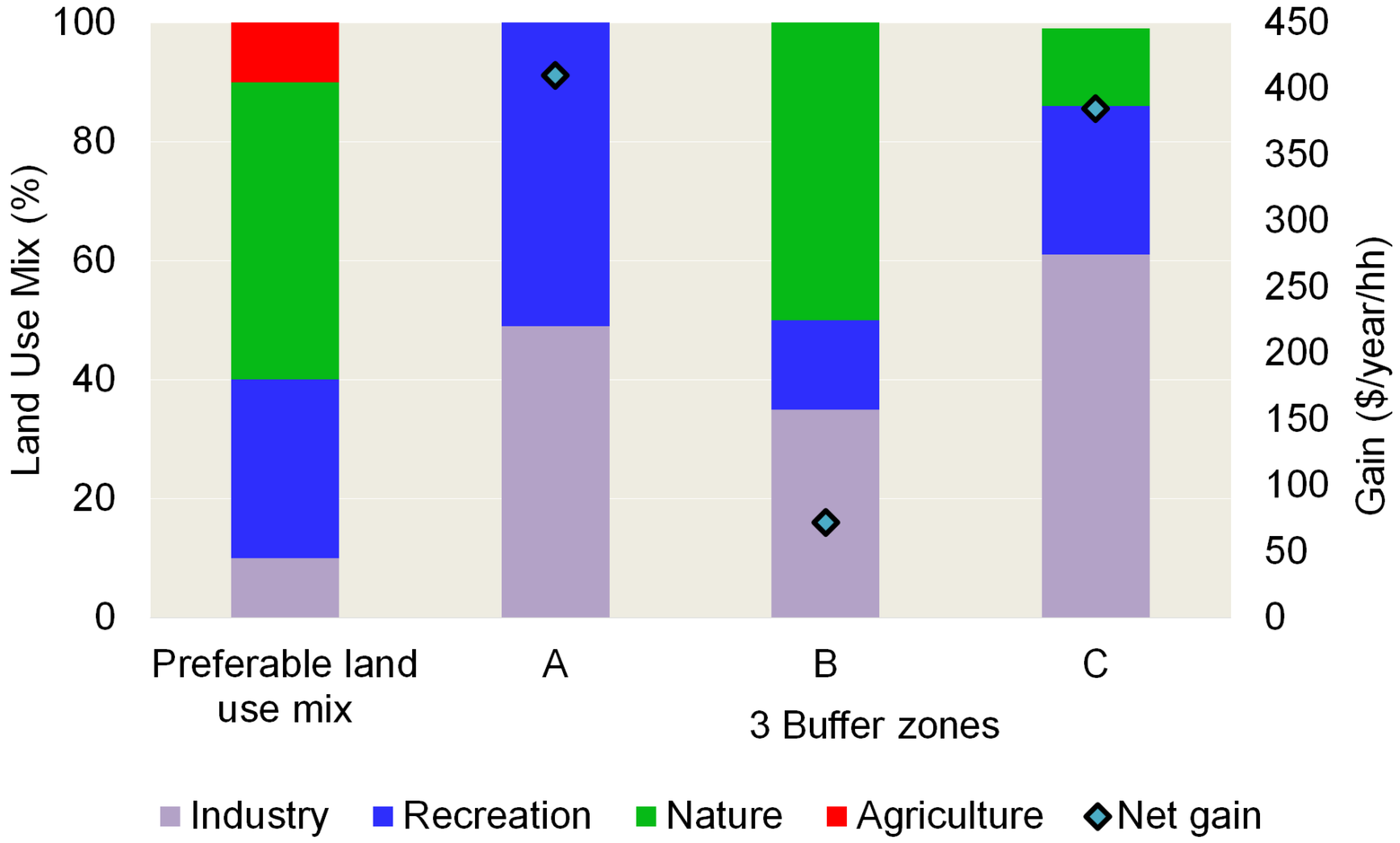
Buffer….

- There was a clear, consistent, preference ordering for land use within buffer zones
- The most preferred land use was nature conservation.



Buffer….

- Changing current land zoning at 3 treatment plants shows large increases in community welfare, although costs of provision are not considered here.



IRP2

Researchers

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UWA

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Dr Maksym Polyakov
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Project aim

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.

Key deliverables

1. A Benefit Transfer tool and guideline for using existing non-market values in new context

2. A Benefit-Cost Analysis tool, framework and guideline

3. Advice on financial regulation framework (especially, on benefit and cost sharing) for selected cases

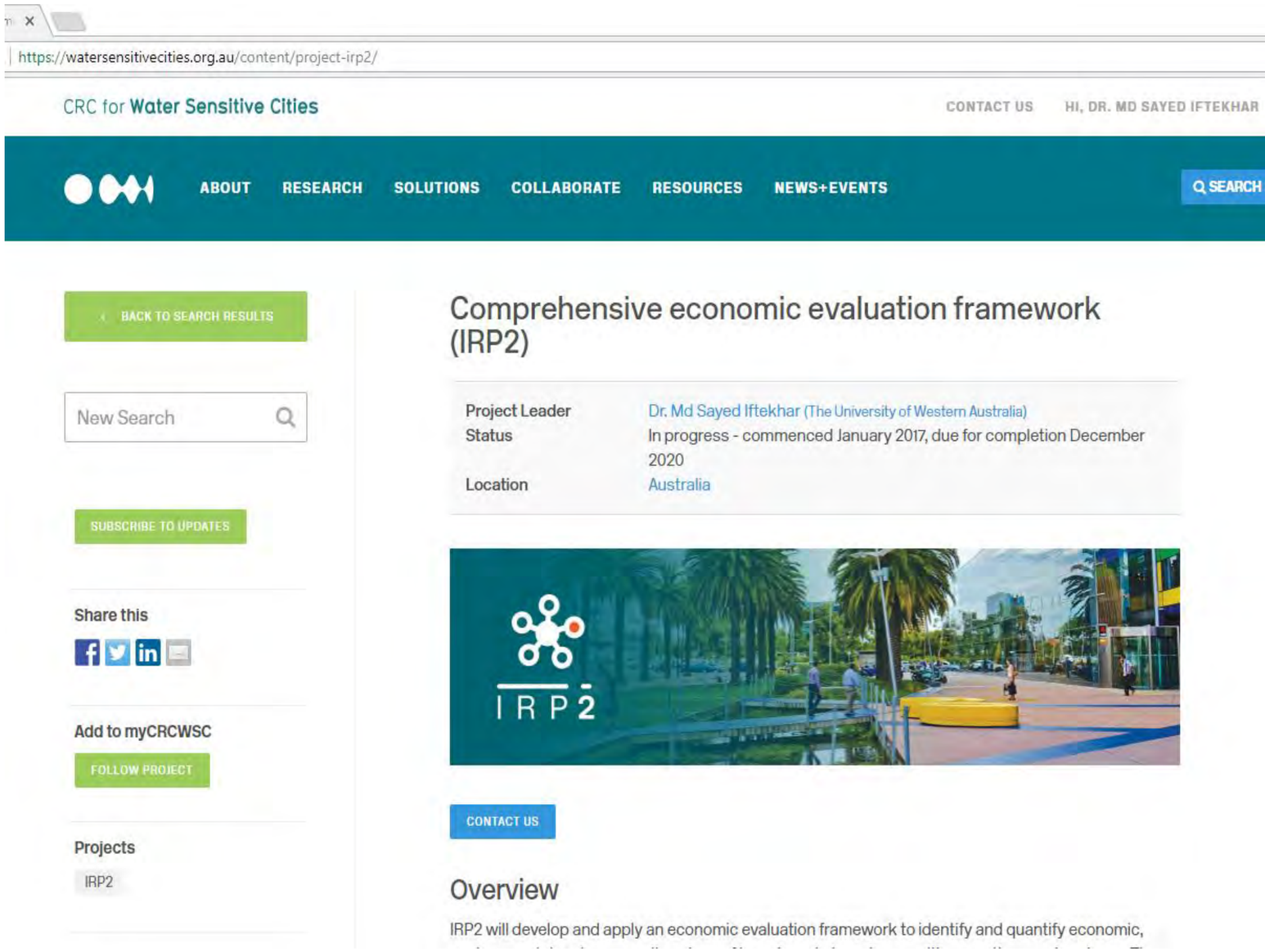
4. Economic evaluation of Urban Heat Island (UHI) mitigation scenarios

5. *Generate primary information for specific case studies*

WP1: Stakeholder engagement

- Stakeholder Engagement Strategy (SES) and Stakeholder Needs Assessment Reports have been developed

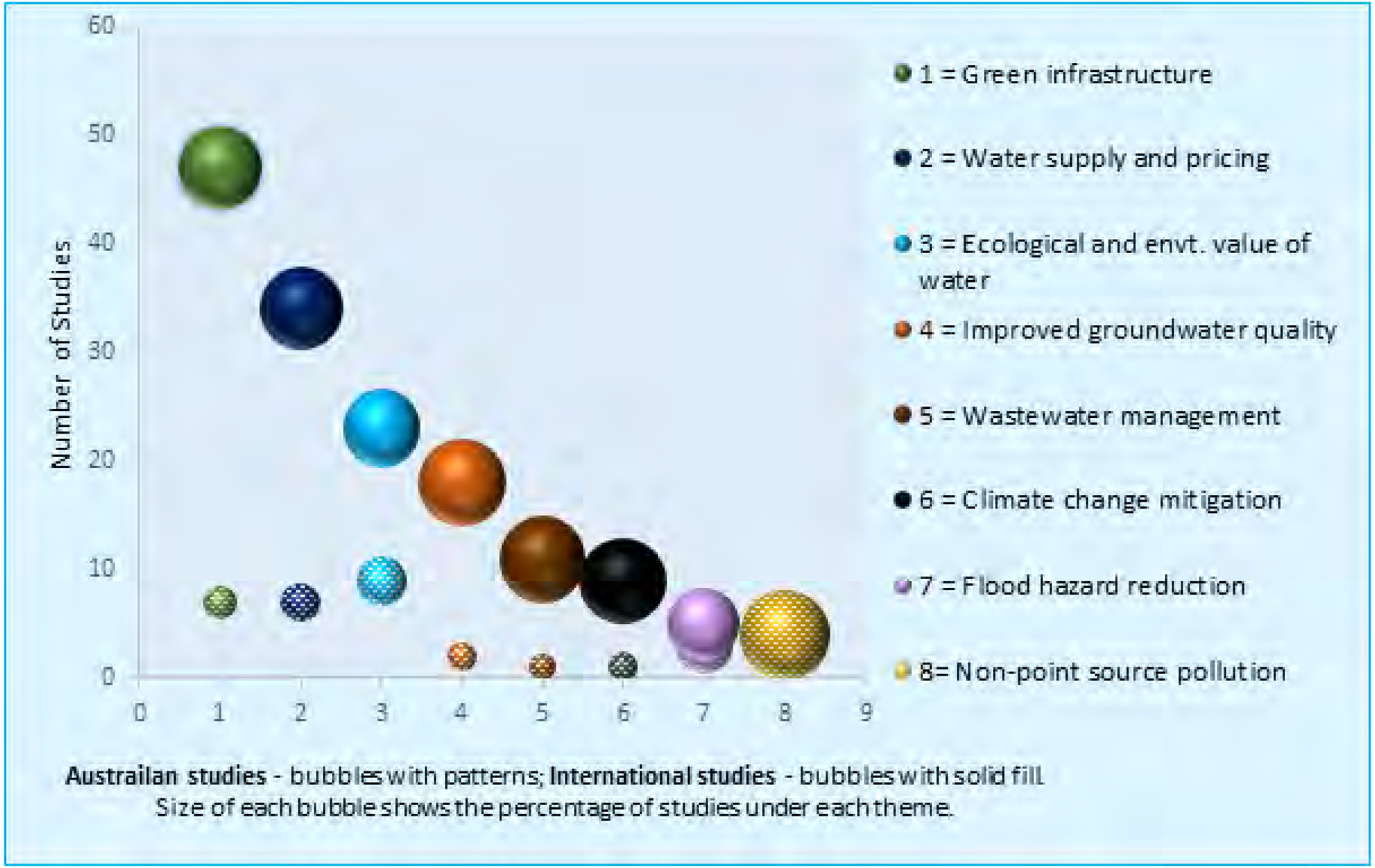
- Regular updating of the website with outputs, events and progress reports.



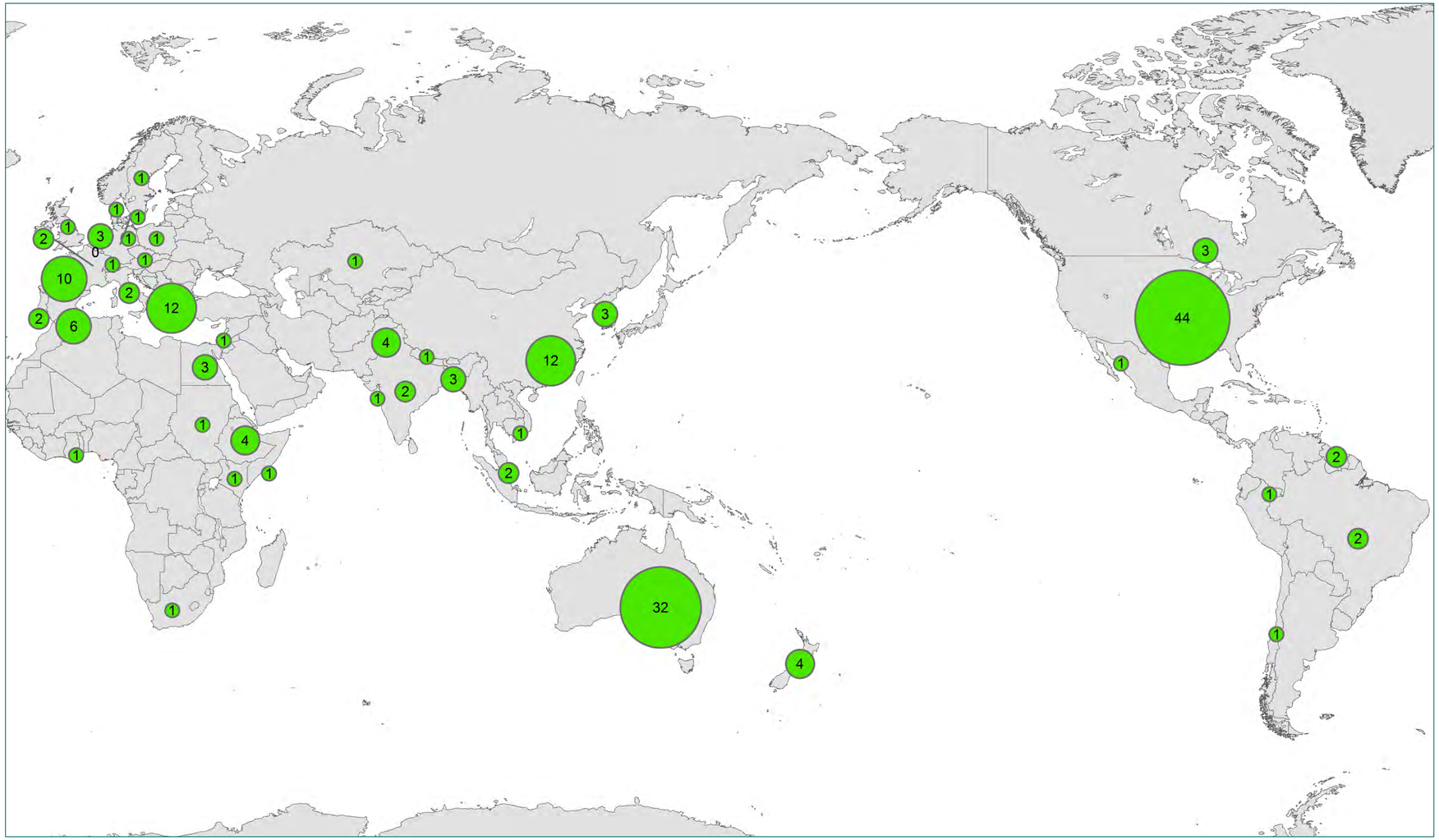
WP2: Benefit Transfer Tool

- An extensive review of non-market values of water sensitive systems and practices
- 181 studies; approximately 20% of them are Australian
- Major themes are – green infrastructure, ecological and environmental values of water and water supply and pricing
- Main methods: Survey and house price analysis

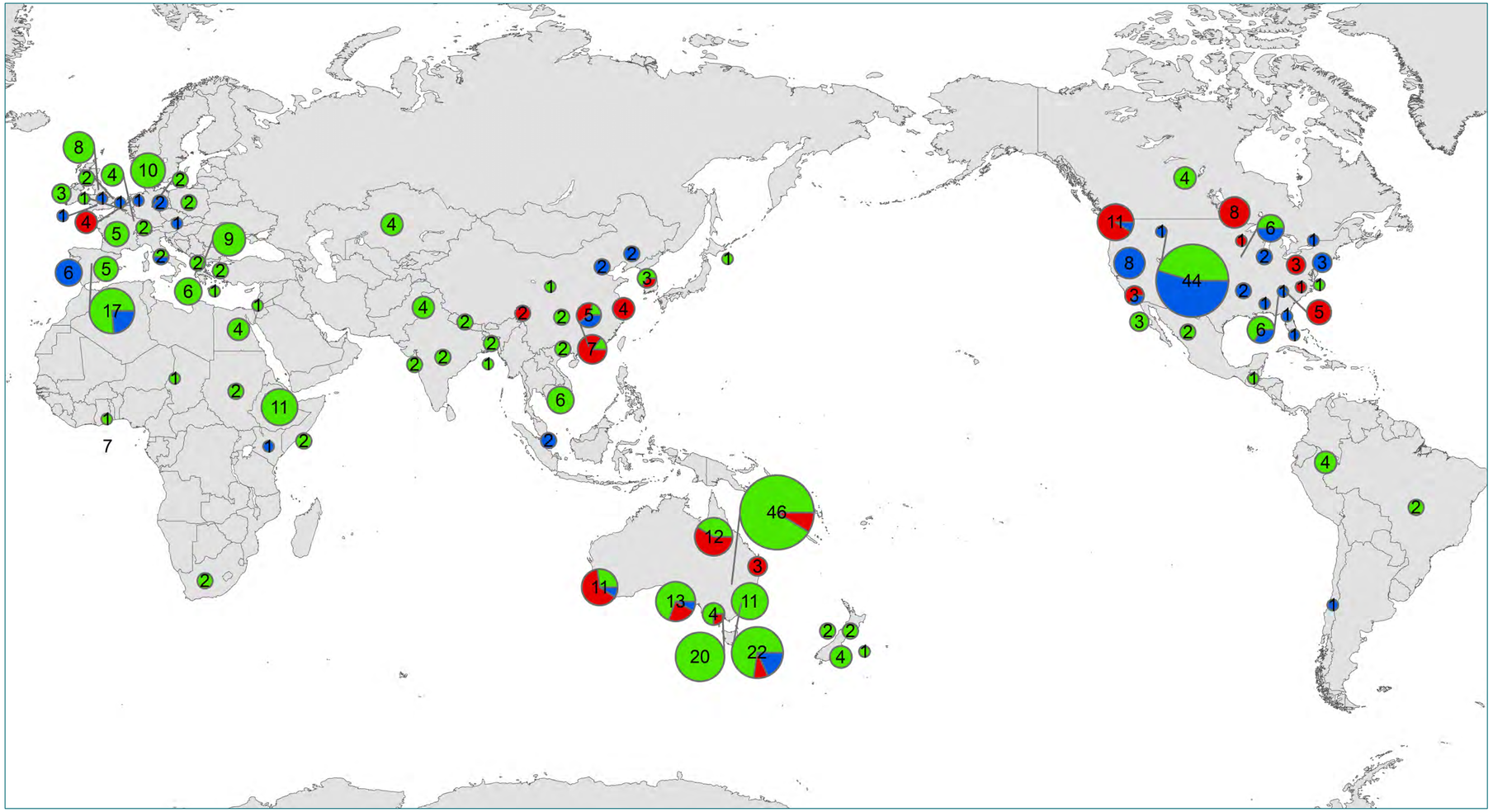
Distribution of studies by themes



Distribution of studies by location



Distribution of studies by method used



CRC for Water Sensitive Cities

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NMV database

- Started with the Australian studies
- Information from 52 studies (233 non-market values) have been included so far
- Information organized in an excel spreadsheet-based database

CRC for Water Sensitive Cities

THE UNIVERSITY OF WESTERN AUSTRALIA

Database of non-market values of water sensitive systems and practices

Asha Gunawardena, Sayed Iftekhar and James Fogarty
Centre for Environmental Economics and Policy, University of Western Australia
Date 1/02/2018

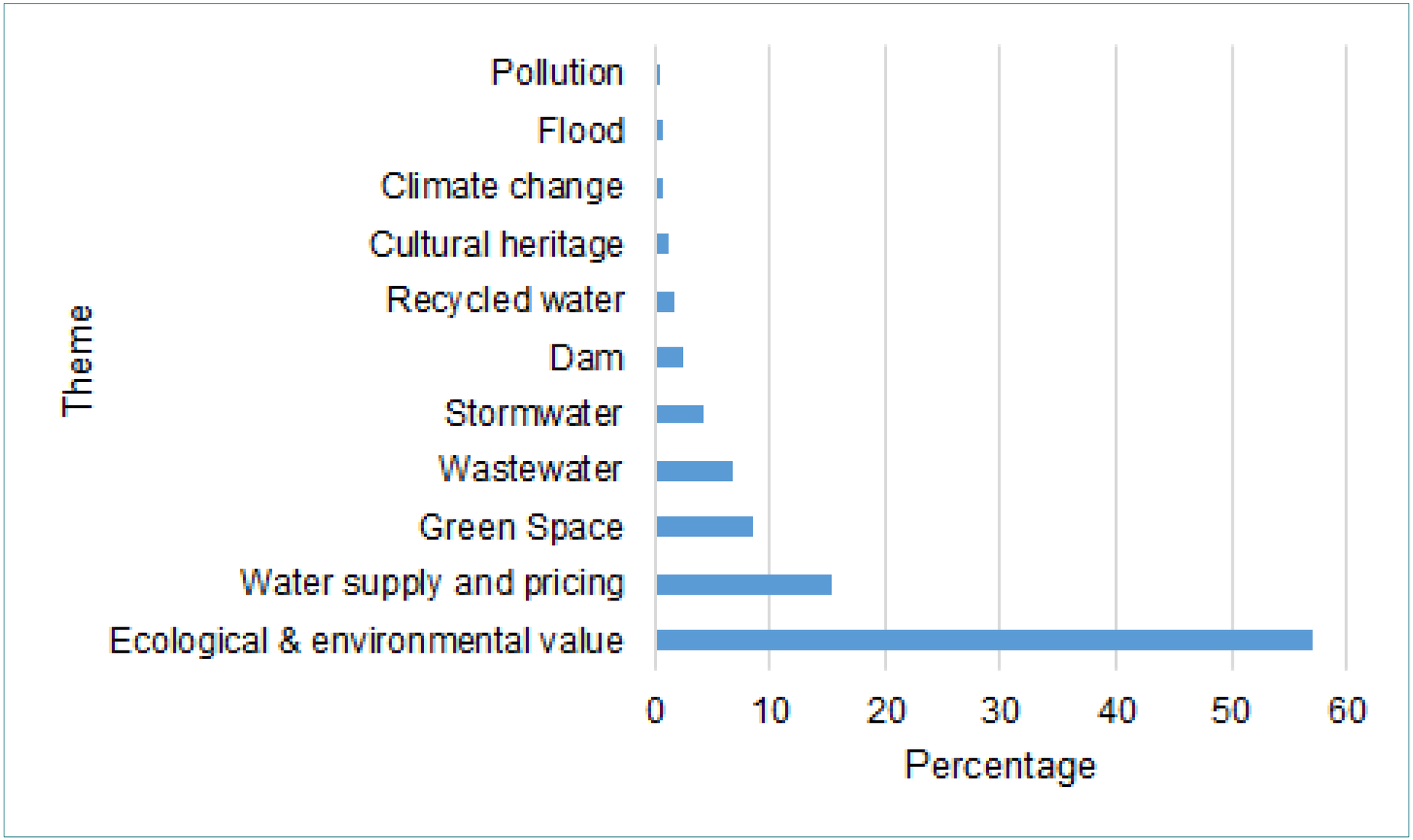
Introduction

This database was developed as part of CRC for Water Sensitive Cities IRP2 prject
It is supported by a set of guidelines: Gunawardena, A., Iftekhar, M. S., Fogarty, J., (2018). Non-market value database on water sensitive systems and practices: User Guideline. Melbourne, Australia: Cooperative Research Centre for Water Sensitive Cities
Contact: mdsayed.iftekhar@uwa.edu.au
This database is a collection of non-maket values of water sensitive systems and practices from primary studies from Australia from 2000 to December 2017.

NMV database

Study identification				WTP measure			
Obs. ID	Paper ID	Citation	Title	Value location	Theme	Value Type	System
1	1	Ambrey and Fleming (2014)	Public Greenspace and Life Satisfaction in Urban Australia	Entire Australia	Green Space	Amenity	Green Space
2	1	Ambrey and Fleming (2014)	Public Greenspace and Life Satisfaction in Urban Australia	Entire Australia	Green Space	Amenity	Green Space
3	2	Bennett et al (2008)	The economic value of improved environmental health in Victorian rivers.	Moorabool river (large pre-urban regualted river)	Ecological & environmental value	Native Fish	River
4	2	Bennett et al (2008)	The economic value of improved environmental health in Victorian rivers.	Moorabool river (large pre-urban regualted river)	Ecological & environmental value	Native vegetation	River
5	2	Bennett et al (2008)	The economic value of improved environmental health in Victorian rivers.	Moorabool river (large pre-urban regualted river)	Ecological & environmental value	Water Birds	River
6	2	Bennett et al (2008)	The economic value of improved environmental health in Victorian rivers.	Moorabool river (large pre-urban regualted river)	Ecological & environmental value	Native Fish	River

Distribution of values by themes



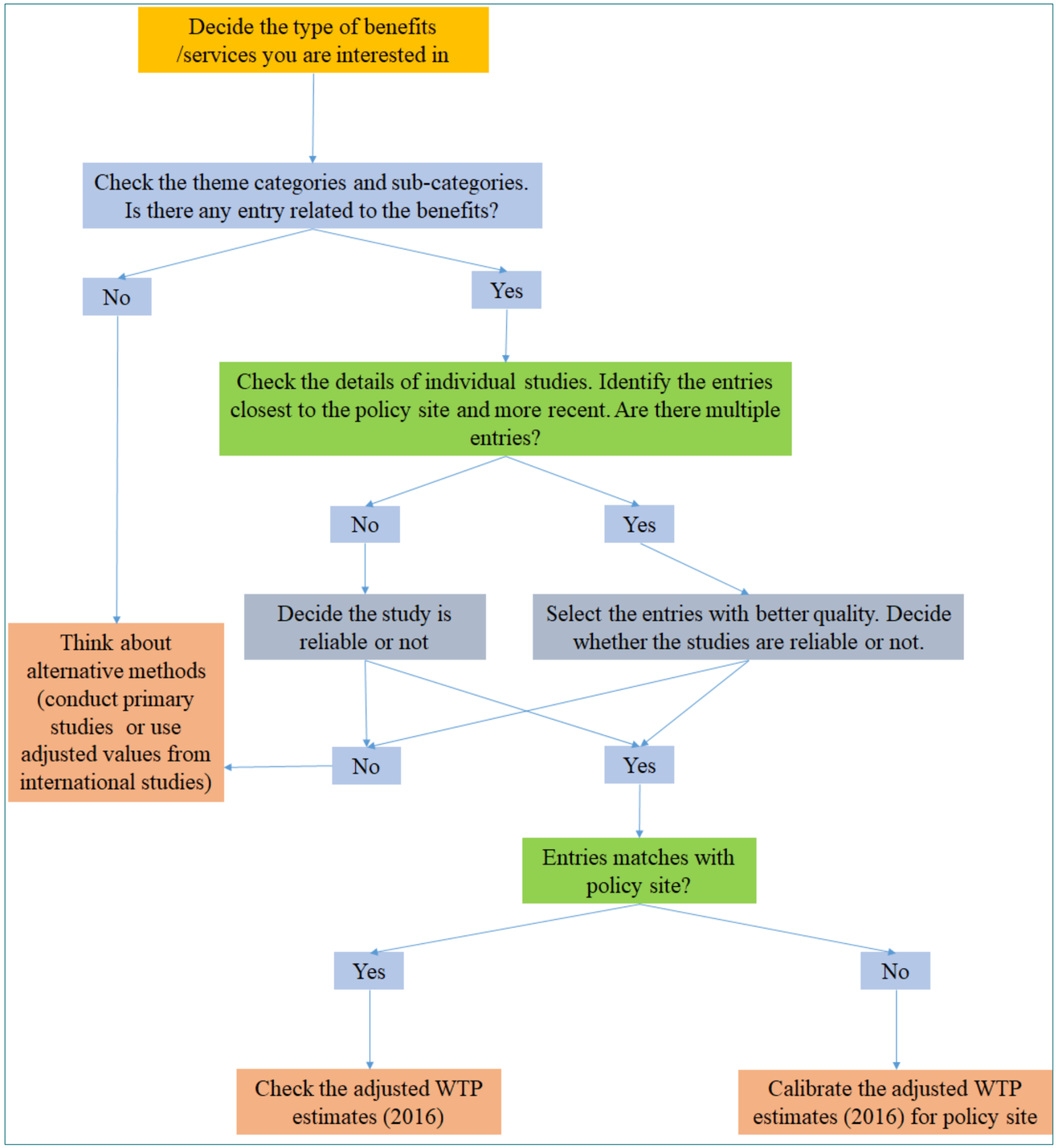
Distribution of values by themes and methods used

Theme	Method (% of total)			Total
	RP (house price)	SP (survey)	Other	
Climate change	0	0	100	2
Cultural heritage	0	100	0	3
Dam	50	50	0	6
Ecological & environmental value	23	77	0	133
Flood	0	100	0	2
Green Space	70	20	10	20
Pollution	0	0	100	1
Recycled water	0	100	0	4
Stormwater	0	100	0	10
Wastewater	0	100	0	16
Water supply and pricing	0	100	0	36
All themes	**21**	**77**	**2**	**233**

Distribution (%) of values by themes and states

Theme	ACT	NSW	NT	QLD	SA	TAS	VIC	WA
Climate change	1	0	0	0	0	0	0	0
Cultural heritage	0	0	0	1	0	0	0	0
Dam	0	0	0	2	0	0	0	0
Ecological & environmental value	2	14	1	15	7	1	10	6
Flood	0	0	0	1	0	0	0	0
Green Space	1	1	0	2	3	1	1	4
Pollution	0	0	0	0	0	0	0	0
Recycled water	0	0	0	0	1	0	0	0
Stormwater	0	2	0	2	0	0	2	0
Wastewater	4	2	0	0	1	0	0	0
Water supply and pricing	6	0	0	3	3	0	0	1
All themes	**13**	**18**	**2**	**26**	**15**	**2**	**14**	**10**

Use of the spreadsheet database



Use of the spreadsheet database – an example

- Residential development with WSUD in Perth
- Working with a private property developer
- 25 ha of residential area
- 15 ha of public open space
    - **4 Constructed wetlands**
    - **A living stream**

Case study : Bellevue Estate (WP5.3)

- Affected population
  - Potential increase of residential population – 800 people
  - Dwelling target – 348

- Socio-economic characteristics (Belllevue suburb)
  - Median age – 26, Average household size -2.3

- Information on substitutes
  - Neighbourhood parks (.5ha) and local park (0.25 ha)

Identifying relevant valuation studies

- Main features of the urban design
  - Wetlands
  - Living stream

- Different types of non-market values available

Case study : Bellevue Estate

Values identified in the stakeholder consultations

Private	Local
• Amenity • Recreation	• Amenity • Recreation • Connectivity (local access) • Water quality (nutrient, heavy metal) • Health (active living) • Reduced heat • Ecological/biodiversity/habitat • Access to nature/mental health • Industrial employment opportunities • Indigenous heritage

Urban design/practice and features

	Studies
A. Wetlands	7
B. Living streams	1

Closest matching studies

Pandit et al. (2014)	Valuing public and private urban tree canopy cover	WA	Wetlands	Amenity	% increase of property price having wetlands with in 300 m	2.3 (0.9 - 2.8)
Polyakov et al. (2017)	The value of restoring urban drains to living streams	WA	Living stream	Amenity	% increase of property value within 200m of the restoration site	6.1 (2.8 – 6.6)

Benefit transfer- amenity value of wetlands

	Study site	Policy site
Context	• Urban (established)	• Urban(new)
Nature of wetland	• Mix of natural, man-made or extensively modified	• Man-made or extensively modified
size	• 0.3-329 ha	• 15 ha
Average house price	• $ 795K (2006)	• $ 380K (2018)
Average distance to wetlands from properties	• 943 m	• 300m

Amenity value of wetlands

Percentage increase of property value	= 0.9 - 2.8 %
Number of properties	= 348
Average property price	= $380,000

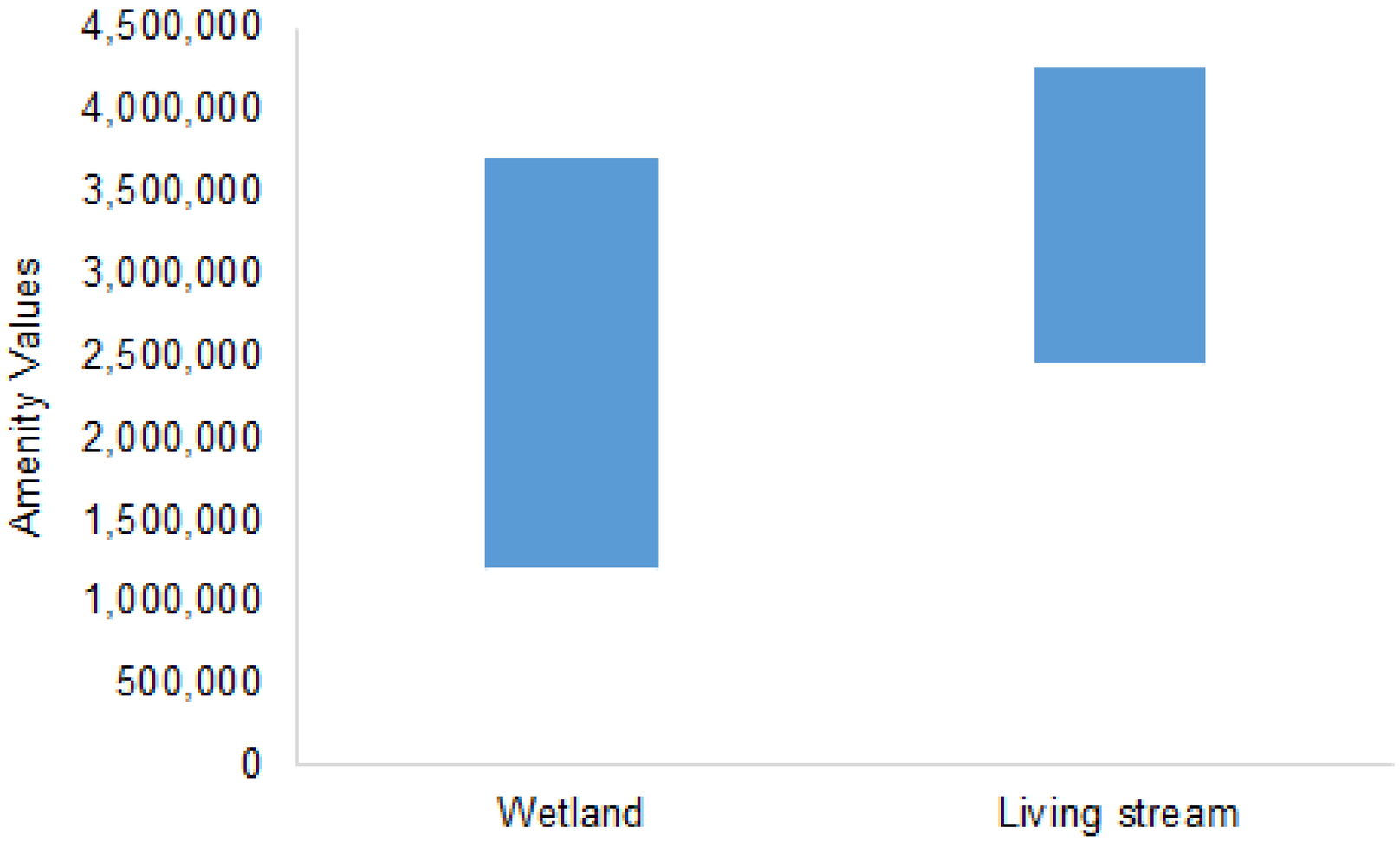
Total amenity value for residents due to wetlands	= $3,041,520 ($ 1,190,160 - 3,702,720)

Amenity values of living streams

Property price premium

Within 200m	= 2.8- 6.6 %
Number of properties with in 200m	= 170
Average property price	= $380,000
Amenity value of living stream	= $3,940,600 ($2,454,800 - 4,263,600)

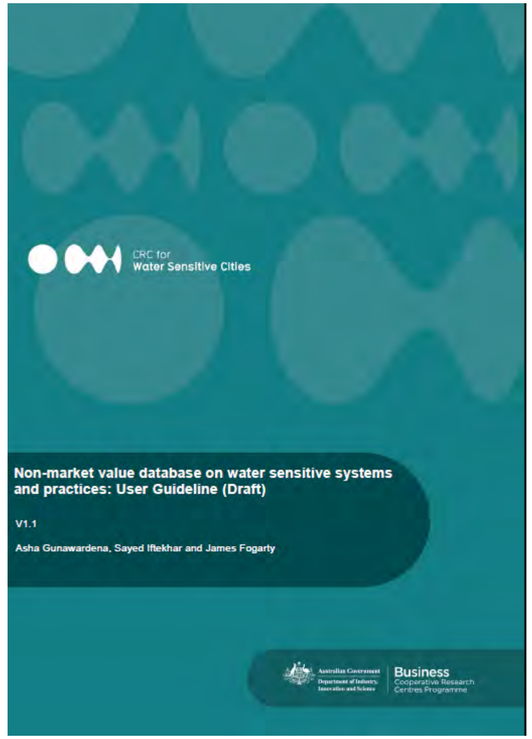
Amenity values



IRP2: Current work and future plan

NMV database – work in progress

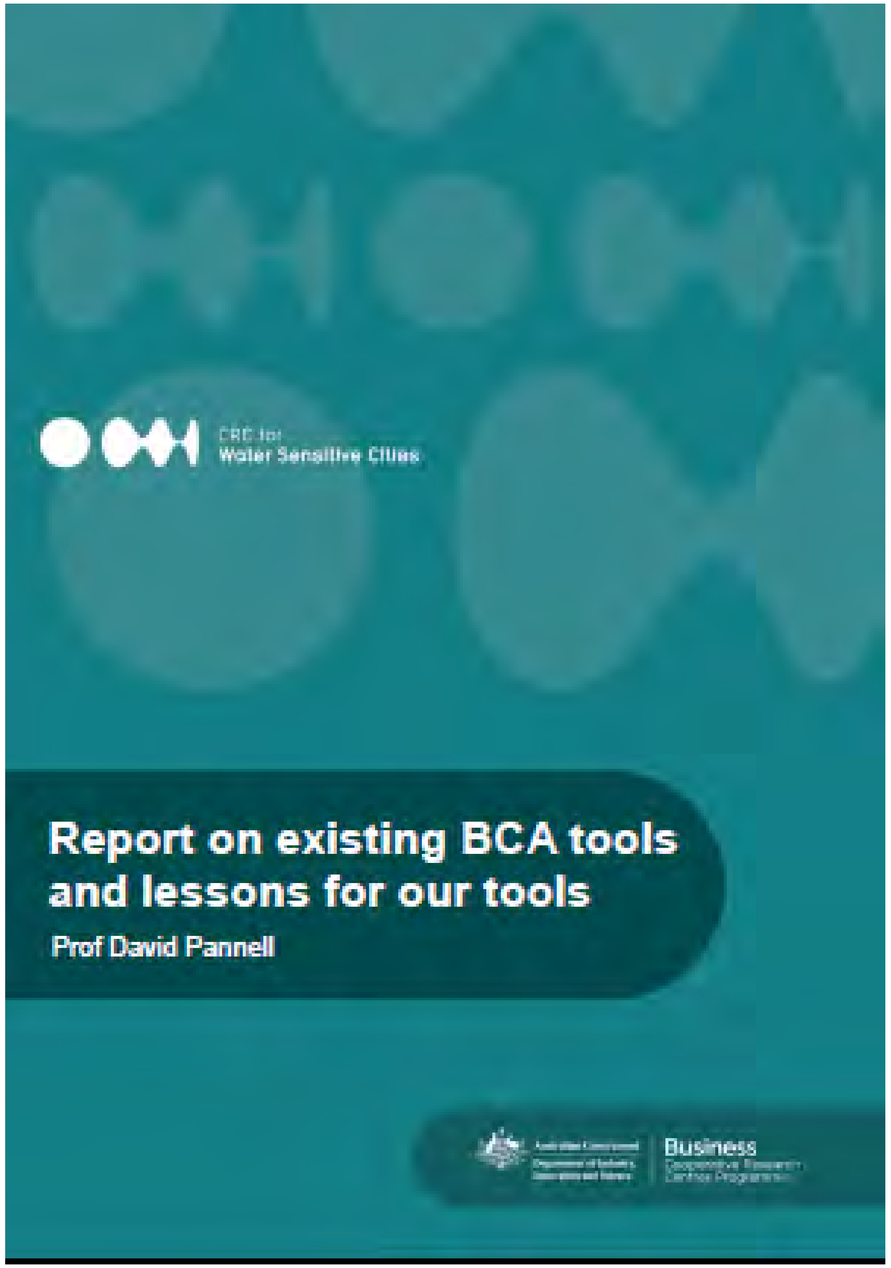
- Finalize the user guideline in collaboration with the Steering Committee members and case study partners
- Working on benefit transfer examples for selected case studies
- Add new information in the database as required



WP3: Benefit-Cost Analysis

Process

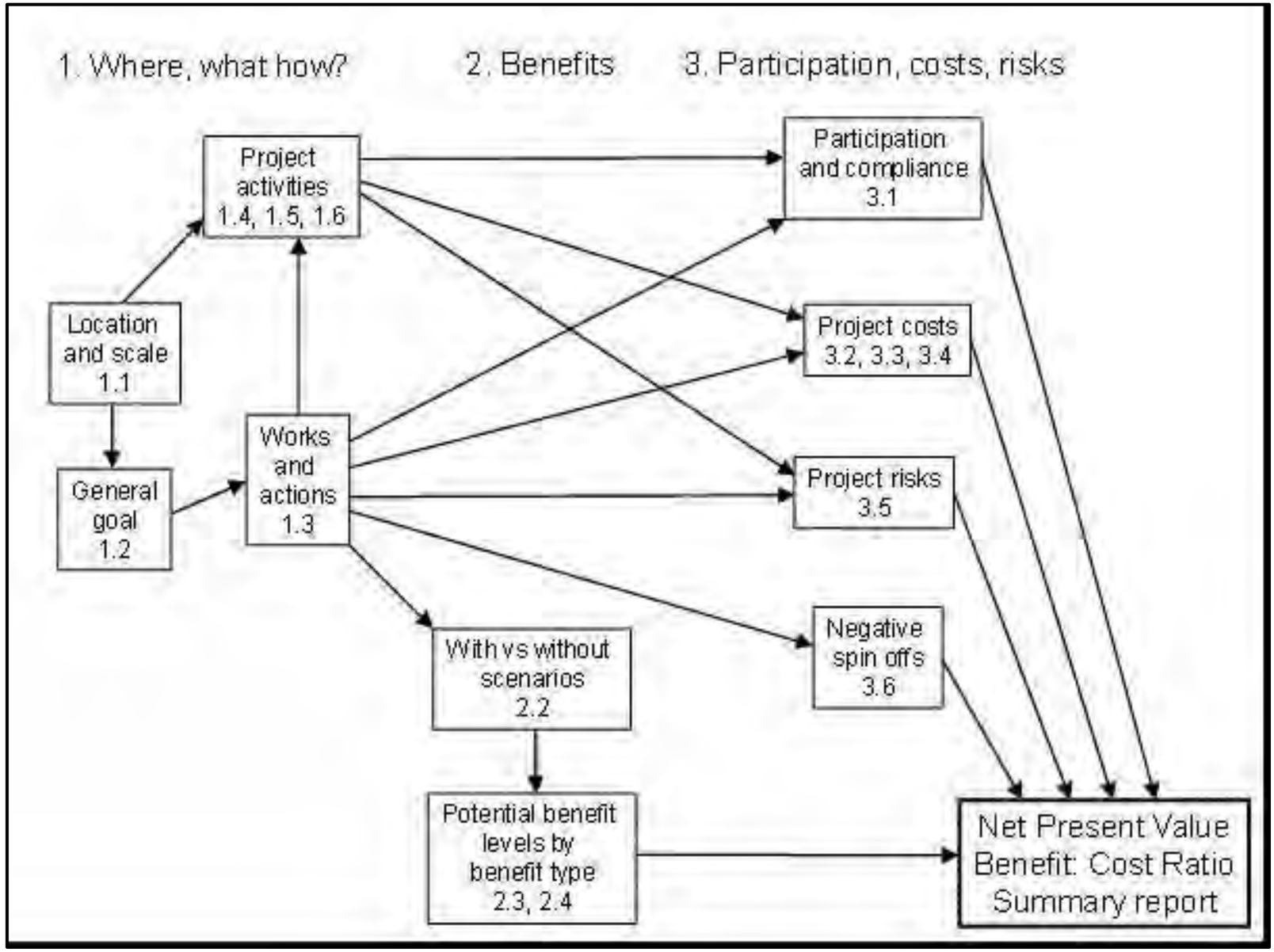
- Collate information about existing BCA tools
- One-to-one interviews; discussions with tool developers and economists
- All of the lessons encapsulated into a detailed spec for BCA tool (over 30 pages)



WP3: Benefit-Cost Analysis

Process

- The draft framework (specs) has been prepared and shared with the PSC and Case study partners

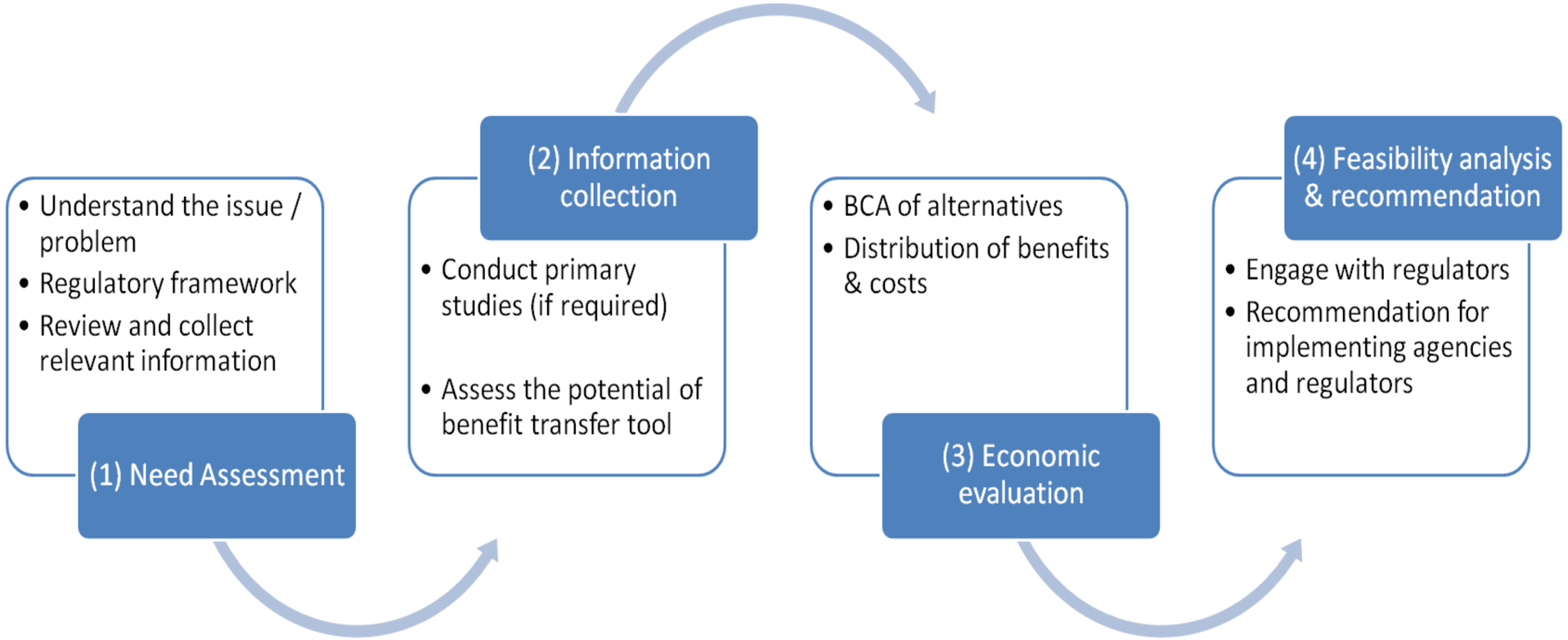


WP4: Financial models

Process

- Early stage
- Organized two sessions with WSAA
- Multiple meetings with Economic Regulation Authority (ERA), WA

WP5: Case studies



WP5: Case studies

- WP5.1: Greening the Pipeline, Melbourne
- WP5.2: Subiaco Wastewater Precinct, Perth
- WP5.3: Residential development with WSUD, Perth
- WP5.4: Urban renewal with flood management context, Melbourne
- WP5.5: Urban redevelopment (City of Salisbury) case study, Adelaide

WP5.1: Greening the Pipeline (GTP), Melbourne

- The Greening the Pipeline initiative aims to convert 27-km of the heritage listed Main Outfall Sewer pipeline into a parkland.

- A 100m section at Williams Landing has been transformed into a parkland for community use.

WP5.1: GTP, Melbourne

Information on the cost effectiveness of creating linear parklands in urban areas:

- Amenity (specifically facilities) – e.g. seats vs picnic tables vs bbqs and toilets; public art; educational signage?
- Recreation (i.e. playground equipment, gym equipment, dog park, etc.)
- Stormwater (i.e. bioretention system like the one at the Pilot Park)
- Vegetation – vegetation for people (ie large areas of grass) vs for habitat; manicured vegetation vs bushlike/wild vegetation
- Connectivity – connectivity across the pipeline
- Active transport - Federation Trail enhancement. Current poor condition vs upgrade to a high standard.

WP5.1: Greening the Pipeline, Melbourne

- The house price data procurement arrangement has been finalized with a commercial company. This data will be used to conduct hedonic analysis.

- The draft questionnaire for the Choice experiment has been prepared and shared with the case study partners.

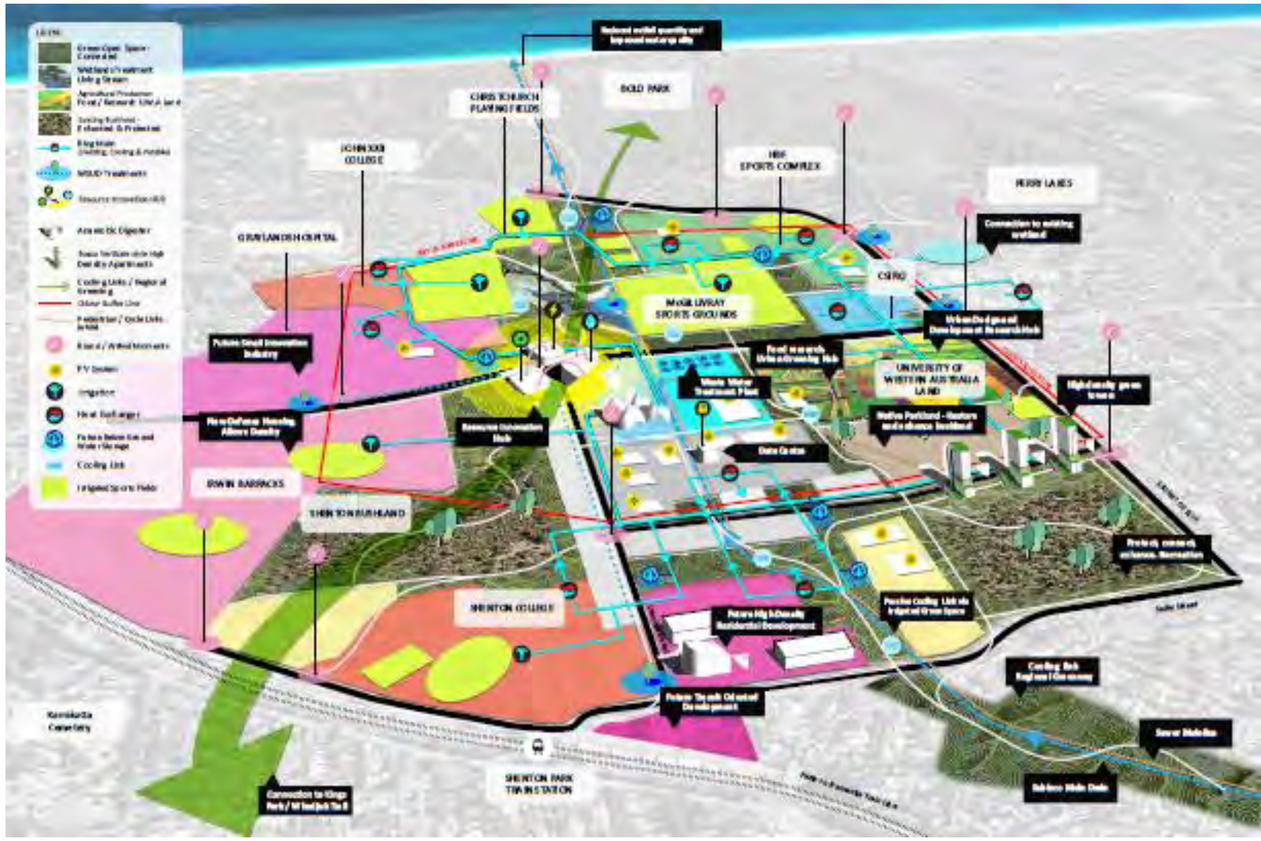
Further information on GTP Project: http://greeningthepipeline.com.au/

MW GTP video

WP5.2: Subiaco Wastewater Precinct, Perth

- The Subiaco plant is one of three that treat around 85% of the total sewage produced in the Perth-Peel region

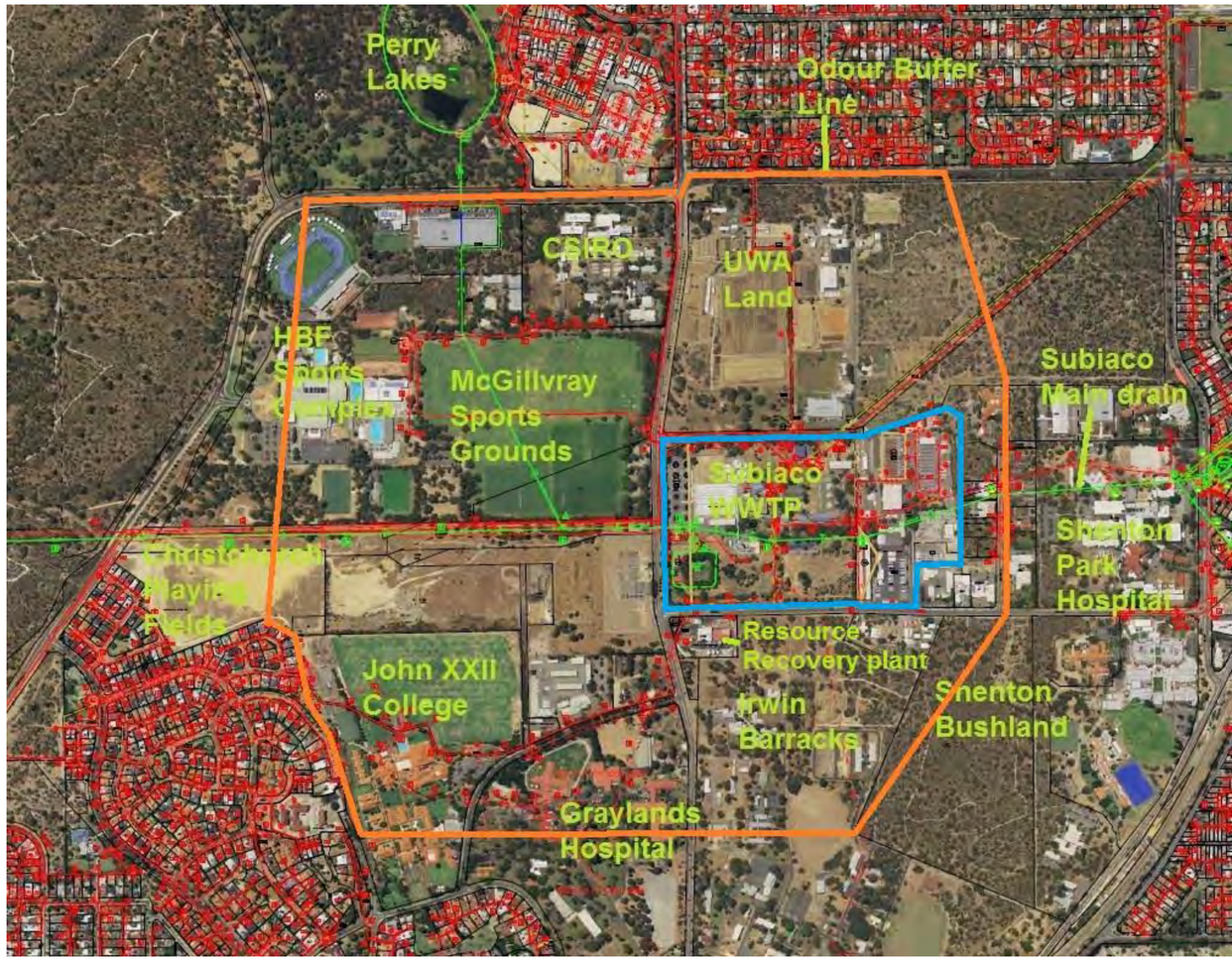
- Currently servicing 240K population => 290K (in 2030)



WP5.2: Subiaco Wastewater Precinct, Perth

- Economic evaluation of optimal use of the resource precinct with due consideration of intangible benefits and costs.

- Workshop on Ideas for Subiaco

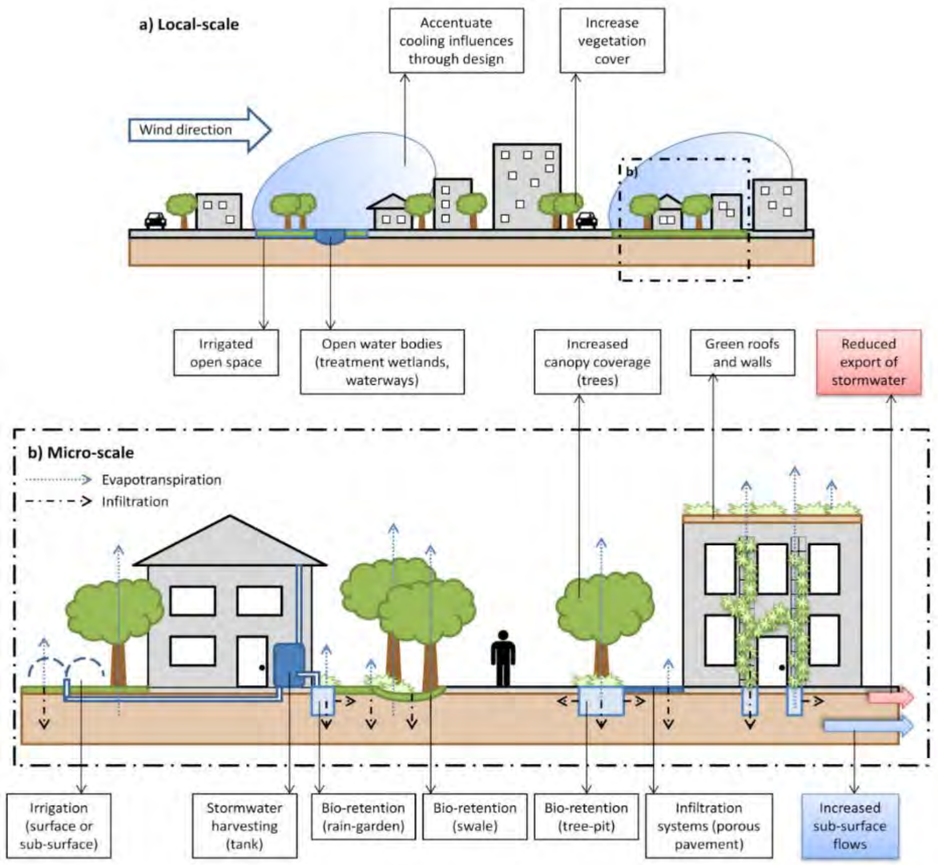


WP6: Urban Heat Island mitigation

Process/Progress

- Purpose - economic valuation of cooling from WSUD

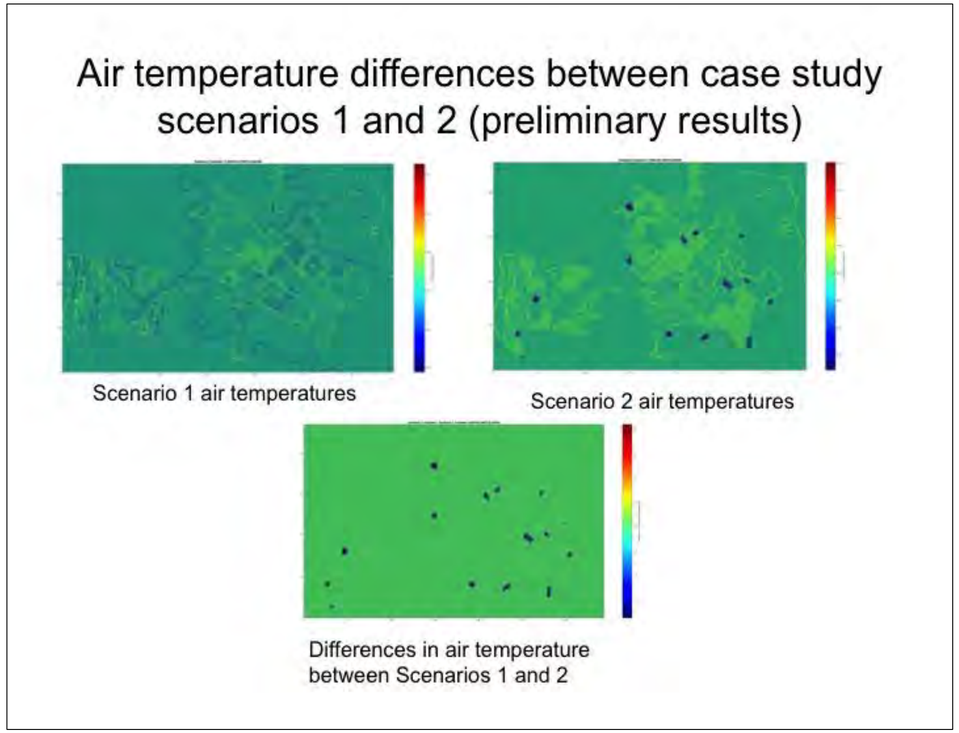
- Case study area is ~ 3,770 ha new growth area adjacent to an existing urban area in outer Melbourne



WP6: Urban Heat Island mitigation

Process/Progress

- 4 scenarios –
  - *Scenario 1 = no WSUD or whole of water cycle management*
  - *Scenario 2 = current regulatory settings for WSUD*
  - *Scenario 3 = proposed changes for WSUD*
  - *Scenario 4 = a targeted UHI mitigation scenario to achieve a desired cooling (e.g. 2 degrees on extreme heat days).*



- Scenarios 1-3 are complete and modelling has been successfully undertaken on the heat mitigation provided by those scenarios using the SURFEX and (our CRCWSC) TARGET climate models.

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Thank you.

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