CRC for Water Sensitive Cities

Regional Advisory Panel Meeting
Western Region

Meeting No. 37	Meeting Minutes	9.00am - 11:00am
20/08/2019		UWA Trustees Level 2

Attendees (entire meeting)			
Mike Mouritz (Chair)	CRCWSC Board	Emma Yuen	CRCWSC, Regional Manager
Max Hipkins	Mayor of Nedlands	Loretta van Gasselt	Dept. of Planning, Lands & Heritage
Greg Ryan	LandCorp	Emma Monk	Dept. of Biodiversity, Conservation & Attractions
Ryan Hunter	Peet	Antonietta Torre	Water Corporation
Attended (part of meeting)			
Barry Ball	CRCWSC	Scott Wills	Water Technology
Shelley Shepherd	New Water Ways Inc.	John Savell	Dept. of Communities /CRCWSC EPRG
Apologies			
Sue Martins	Communities	Tao Bourton	Yolk Property Group
		Nick Deeks	GHD
Ajay Shah	KBR	Winsome MacLaurin	Dept. of Water & Environmental Regulation
Neil Burbridge	City of Armadale		

Item No.	Agenda Topic
1.	**Welcome and apologies** Tao and Winsome were apologies New members Scott Wills and Damien Pericles were welcomed
3.	**Acceptance of previous minutes** The minutes from the last RAP meeting were accepted.
4.	**Actions from November minutes** • Deferred/Ongoing items and those on the agenda were noted. • Outstanding action was # 10 but Ryan Hunter informed the group that a typical estate spends $350-700k a year on advertising with ends up being $4,000 per property over the full life (or 2% of gross) ACTION: Action 6 “look at case study for LGA to frame city scale health benefits” will be taken forward by Shelley Shepherd.

Item No.	Agenda Topic
5.	**Correspondence** Received the following correspondences: • Request for submission to the Climate and Health Inquiry • Resignation of LGAs including Joondalup, Nedlands, and EMRC • Discussed the challenges for LGAs to obtain support of both CEO and Mayor • EY to add LGA follow up with MM and JS in September • The Councils in the EMRC are increasingly interested in WSC and they want to be more involved. There should be a strategy for engaging more. ACTION: EY and WRAP to follow up with EMRC councils following resignation of EMRC particularly Bassendeen, Bayswater and Swan. ACTION: EY to add strategy for LGA follow up with MM and JS on September 10
	CRCWSC Updates
2.	**Executive Update** Barry Ball presented on behalf of the executive: 1. List of missing T1 outputs has been incorporated 2. All IRP outputs to be on website 3. Agreed to circulate the rules of expenditure 4. Discussed the role of the WSC Institute. ACTION: EY to circulate the expenditure rules for Capacity Building and WRAP budgets. ACTION: WRAP to do health check on T1/T2
8.	**Capacity Building** Discussed the capacity building program and WRAP agreed that Shelley Shepherd will do a transport, health and tourism fact sheet. ACTION: WRAP to comment on the factsheets for IRP5 provided in the attachments
4.	**IRP1** • Perth Transition Strategy Implementation/ Action plan approved and soon to go on website. ACTION: SS/ EY to circulate link for Perth Transition Strategy Implementation/ Action plan at next WRAP.
4.	**IRP3** • Workshop planned for 17 September around broader planning mechanisms • There is always the challenge to find people willing to change approach and move outside of BAU • DPLH questioned the focus of IRP3 but believe that positive learnings will come out of it. There needs to be a process to collect these learnings possibly when Chris Chesterfield is over next in September. • Could run a learning session with IRP3 team and individual industry groups to discuss the problems with approvals in a confidential space. Timing could be around the time of the September 17th workshop. • Mike Mouritz session with UDIA could lead onto better approval processes through either UDIA or IRP3.

Item No.	Agenda Topic
	ACTION: EY to discuss evaluation with IRP3 team.
6.	**Transformative Cities update** • JS provided an update from the EPRG provided in attachment 1 • Discussed whether the mainstreaming workshops should start with the national level first. • Roadshow mainstreaming workshop planned for 25 September but timelines are tight and the agenda needs to be clear. • Discussed whether winding up the CRCWSC 12 months (not 6 months) earlier to ensure a smooth transition to CRCTC. Participants were concerned about how the CRCWSC would deliver on existing Tranche2 commitments.

6.	**Regional Manager Report**
	• 10 new case study projects for the website should consider the NWW case studies found https://www.newwaterways.org.au/resources/case-studies-fact-sheets/wsud-case-studies/
	• Other case studies to consider are
	  ○ Hartfield Park MAR,
	  ○ City of Mandurah have a treated wastewater for POS irrigation MAR system
	  ○ Greenwall at the Workzone Pier street green roof.
	  ○ Beenyup MAR of treated wastewater for injection into aquifer used for potable supply
	•
	ACTION: Damien Pericles provide a few sentences on the Workzone Pier street green roof.
	ACTION: Scott Wills to provide the project title of MAR projects WaterTech have been involved with.
	ACTION: All to look at the list circulated at the meeting (and in attachments) to identify case studies that could be put forward that were either not complete when the list was last revised and or didn't have enough knowledge.
	ACTION: EY to circulate the priority topics from Kim last time that included greenwalls, WSC index, Synthesis process, Transition Dynamics Framework.

6.	**IRP5** • Members of the IRP5 PSC have been agreed and were discussed. ACTION: EY to circulate the IRP5 PSC and ToR to WRAP.
6.	**IRP2** • We received two excellent nominations for the IRP2 PSC and EY will put forward to both for inclusion to the IRP2 team leader. • Decided that the best people for the superusers/champions group are the existing case studies (Ursula Kretzner (DWER), Damien Slack (Mandurah), Stewart Dallas (Murdoch)) and the economists (Synergies, Marsden Jacobs). • Concerns were raised that INFEWS is only good for the skilled economists and not the lay user

Item No.	Agenda Topic
	ACTION: EY to inform IRP2 that we would like to put forward both nominees for the PSC.
9.	**UDIA workshop on Exemplar project** • Mike provided an update on the workshop and noted it focussed around barriers particularly approvals ACTION: MM to contact Chris Green to take forward the Exemplar projects through UDIA. ACTION: EY to discuss with Chris Chesterfield how to include the findings from the UDIA workshop with IRP3 including in the evaluation of the process.
9.	**IRP4** • Need to explore the DPLH Draft Precinct Design State Planning Policy and Guidelines, which has strong links to WSUD • Note the Water mass balance will not be a CRC output • Will not have urban heat assessment in Knutsford • Geoffrey London and Nigel Bertram presented at LandCorp on the infill typologies on 14 August ACTION: GR to lobby through PSC to get Knutsford to consider urban heat. ACTION: MM to contact the CRO and IRP4 project lead to lobby to get Knutsford to consider urban heat. ACTION: WRAP to provide feedback on the evaluation framework circulated with the attachments.
9.	**Ideas for synthesis projects** Ocean Reef Marina will be occurring on 27 and 28 August Opportunity for Ideas for Queens Park at the end of the year ACTION: EY to coordinate proposal with Jamie Ewert and Rob Thomson for Ideas for Queens Park.
	Items for discussion
10.	**Transition Network** Not discussed
11.	**Upcoming Events** Additional dates not in the Agenda 27 September – Brabham workshop 25 September – Mainstreaming workshop

Item No.	Agenda Topic
12.	**Other Business** No longer possible to have coffee delivered ACTION: All will send Emma Yuen coffee orders via emma.yuen@uwa.edu.au or text 0448889318 one hour before the RAP
	Other business
18.	**Close:** The meeting closed at 10.30am and the Chair thanked everyone for their attendance. **Next meeting:** 9-11 Tuesday 15 October 2019 @ LANDCORP

CRC for Water Sensitive Cities

WESTERN Regional Advisory Panel

ACTIONS

Legend
Done
Not Done
Deferred
On Agenda

Actions	Description	Who	When
	Actions from Meeting No. 37		
1	EY and WRAP to follow up with EMRC councils following resignation of EMRC particularly Bassendeen, Bayswater and Swan.	EY	
2	EY to add strategy for LGA follow up with MM and JS on September 10	EY	
3	EY to circulate the expenditure rules for Capacity Building and WRAP budgets.	EY	
4	WRAP to do health check on T1/T2	WRAP	
5	WRAP to comment on the factsheet for IRP5	WRAP	
6	SS/ EY to circulate link for Perth Transition Strategy Implementation/ Action plan at next WRAP.	EY	
7	EY to discuss evaluation with IRP3 team.	EY	
8	Damien Pericles provide a few sentences on the Workzone Pier street green roof.	DP	
9	Scott Wills to provide the project title of MAR projects WaterTech have been involved with.	SW	
10	WRAP to look at the list circulated at the meeting (and in attachments) to identify case studies that could be put forward that were either not complete when the list	WRAP	

Actions	Description	Who	When
	was last revised and or didn't have enough knowledge.		
11	EY to circulate the priority topics from Kim last time. (ie greenwalls, WSC index, Synthesis process, Transition Dynamics Framework.)	EY	
12	EY to circulate the IRP5 PSC and ToR to WRAP.	EY	
13	EY to inform IRP2 that we would like to put forward both nominees for the PSC.	EY	
14	MM to contact Chris Green to take forward the Exemplar projects through UDIA.	MM	
15	EY to discuss with Chris Chesterfield how to include the findings from the UDIA workshop with IRP3 including in the evaluation of the process.	EY	
16	GR to lobby through PSC to get Knutsford to consider urban heat.	GR	
17	MM to contact the CRO and IRP4 project lead to lobby to get Knutsford to consider urban heat.	MM	
18	WRAP to provide feedback on the evaluation framework circulated with the attachments.	WRAP	
19	EY to coordinate proposal with Jamie for Ideas for Queens Park.	EY	
20	All will send Emma Yuen coffee orders via emma.yuen@uwa.edu.au or text 0448889318 one hour before the next RAP	WRAP	
	Outstanding actions from previous meetings		
A	TAPs Project Steering Committee to continue to interface with the WRAP via Antonietta Torre and Nick Deeks and ensure ongoing discussions with Dan Paraska.	AT, ND	Ongoing
B	WRAP members to advise EY if other Ideas for workshops not discussed come up as higher priority.	ALL	Ongoing
C	Emma Yuen will pursue seminar/ conference opportunities where possible given constraints.	EY	Ongoing

Actions	Description	Who	When
D	Emma Yuen to Identify if we can use the Ideas subsidy from last FY for the Ideas for Soccer stadium	EY	
E	Lorena to confirm status of uncompleted Trance 1 activities	LT	
F	Barry to confirm how CB and WRAP funding can be spent.	BB	
G	New PSC member to organise meeting time with IRP2 team and invite John, Antonietta, Shelley, Ryan, Mike, Emma and Greg Ryan (or relevant LandCorp representative) to ensure that the business case methodology is addressed in addition to economic evaluation.	tba	
H	Shelley to look at case study for LGA to frame city scale health benefits. Consider Swan, Canning, Stirling or LGs commencing and Urban forest Strategy or strategic plan.	SS	
I	Maksym Polyakov will explore a greenfield development such as Wungong (those who put in living streams and those who didn't) with support of a master's student.	M Polyakov	
J	Emma Yuen will coordinate printing of 100 copies of Part A	E Yuen	
K	EY to coordinate UWA rep once leadership of IRP 5 decided	E Yuen	

Western Region Manager Update

WRAP 15th October 2019

Activity title	Outcomes achieved	Items for RAP to note
CRCWSC executive	The CRCWSC has said goodbye to some old staff and welcomed some new. Kristy Good and Euan Hind have left CRCWSC while Georgie Wettenhall has joined as the Vic regional manager and Lorena Ikic has expanded her role to act as the NSW regional manager, Mel Ling has expanded her role to include communications and Verity McDonald is the new Governance Manager (Board EO).	
CRCWSC Board	The CRCWSC Board meet 6 September and approved IRP5.	
CRCWSC AC		
EPRG	Notes from last EPRG meeting were circulated with the August WRAP minutes.	
Research including Tranche 1 and Tranche 3	Round 21 Transformative cities was unfortunately unsuccessful. Comments included the range of issues was too ambitious and they were unsure how CRC-TC would drive such large scale change. We were also told the bid should have rested on our laurels of the successful CRCWSC more. The executive is reviewing feedback and planning another bid for Round 22. The successful CRCs into stage 2 of Round 21 are: • Building 4.0 CRC • Future Cities CRC • Future Energy Exports CRC • Reliable Affordable Clean Energy (RACE) for 2030 CRC • SmartCrete CRC • CRC for Transitions in Mining Economies (TIME) WSTN Research subcommittee is exploring future governance post 2021	
General operations and Regional Manager	Emma Yuen has been working on the 19/20 RAP Business Plan based on a simplified layout and focused on CRCWSC tools and research programs.	
Transition Network	Didn't hold the WSTN meeting because it was replaced with the Mainstreaming workshop. This explored: • Develop a list of potential and priority objectives, activities, projects and resources that could facilitate mainstreaming in the region by building on WSTN implementation plan (Part B) • What would an innovation hub look like for WA • Discuss options for a post-CRCWSC entity to drive or support for mainstreaming activities (e.g. TC CRC, WSC-institute, other)	
Adoption - IRP1	Transition Strategy Implementation Plan (Part B) is on the website. Water Wise Action Plan is to be released soon. Stay tuned!	See the Implementation Plan here https://watersensitivecities.org.au/content/implementation-plan-released-for-a-water-sensitive-greater-perth/
IRP2	Both Corey Dykstra (Water Corporation) and Luke Oliver (Peet) were invited to join the PSC The fullday INFEWS value tool training session will be held 25 October at UWA. The non-market valuation tool provides an understanding of how to adjust available information (values) to a particular context, known as benefit transfer. The INFFEWS Value Tool has approximately 1500 non market and market values related to benefits of urban water and environmental management investments. Presentation on Greening the pipeline on 13 September. 75 people attended the Nigel Tapper on 22 and 23 August seminar at WaterCorp. IRP2 case studies, are finalised and attached The IRP2 team have developed a simple video describing non-market values. You might recognise the voices and background music (by Dave Pannell)	Register for value tool training here https://www.stickytickets.com.au/92382/perth_training_session__inffews_value_tool.aspx Read the WP5.3 Belleview case study report here Read the WP6 Economic Value of UHI mitigation – biophysical aspects (Nigel Tapper) Read the WP6 Economic Value of UHI mitigation – economic analysis (Kym Whiteoak)
IRP3	3rd Brabham IRP3 workshop held 27 September Evaluation surveys have been circulated and there will be a limited number of face to face interviews.	undertake the evaluation survey fro Brabham here https://monash.az1.qualtrics.com/jfe/form/SV_7QYg1K3L2NqutAp and it should take around 5 minutes to complete
IRP4	The Performance Evaluation Framework (Draft for Consultation) and Infill Typology Catalogue (Draft for Consultation) were released on the website Book chapter on integrated urban water systems in the book decarbonising the built environment. The team are planning an information session around the Framework and the Typology Catalogue.	Read here https://watersensitivecities.org.au/content/infill-performance-evaluation-framework-draft-for-consultation/ And here https://watersensitivecities.org.au/content/infill-typologies-catalogue-draft-for-consultation/
IRP5	IRP5 PSC has been formed and held a meeting 18 October. Expert panel will include: Assoc. Prof. Sally Thompson (University of Western Australia - UWA); Dr Margaret Shanafield (National Centre for Groundwater Research and Training - NCGRT); and Mr. Greg Claydon (Chair). Currently inviting industry to meet with the Expert Panel for 90-120 minutes during Tuesday 12 to Friday 15 November, 2019.	
Opportunities – policy	UWA public Policy Institute has identified water as a big (policy) Issue for Western Australia .	Read the big issues document here https://gallery.mailchimp.com/7aee4c845f45c2d11b5544723/files/b7e769cc-7626-4176-8953-f4af141e7629/158786_Big_Issues_for_WA_WEB_.pdf
Opportunities - Projects	Held Workshop for Ocean Reef Marina 27 and 28 August and delivered draft report to Landcorp and Joondalup. Also looking to develop Ideas for the new Football stadium Queens park but need to make sure we can provide opportunities for innovation.	
Grants and Funding		

Activity title	Outcomes achieved	Items for RAP to note
TAP1 - WSC index		
TAP2 – scenario tool at planning scale	no update	
Adoption - WA Research and Adoption Plan	The mainstreaming workshop will feed into this.	
KAT – capacity building and community engagement		
Analysis: Evaluation		
Conferences	upcoming conferences: • 1-5 December Small water and wastewater systems conference to be held at Murdoch (IWA) • 3-5 December State of Australian Cities Conference to be held in Perth CBD • March 2020 IPWEA State Conference on Vision 2020: Opportunity 2030 –How are you/your organisation planning to reduce your carbon footprint and to lessen environmental and climate change impacts? • Sustainability Research and Innovation (SRI) 2020 will be held in Brisbane, Australia from 14-17 June 2020 and has a call for sessions	
Media	Great video on the economic values by the UWA team I heard there was a hypothetical on urban heat and poor urban design. Did anyone attend this?	See the videos on basics of non market values here also a version on youtube here
Stakeholder engagement by Regional Manager	Various meetings and sessions including: • Andrew Trosic Steven Harding and Helen Sarcich at Shire of Serpentine Jarrahdale • City of Cannings Sustainability Reporting Platform	Discussion: Opportunities to engage with the UWA master plan.
Development sector engagement	UDIA water committee meeting held 20 September and was attended by Greg Claydon to discuss IRP5 Aquarevo developed by SE Water/ Villawood was presented at UDIA breakfast and separate sessions with Water Corporation, Landcorp and Department of Communities. This was videoed by Urbaqua	
Local Government sector engagement	EY, JS and MM met to discuss the strategy for LGAS and agreed • LGAs probably do not get best value from attending every WRAP meeting and we need to be more strategic in how we engage them. However any interested council is welcome to come to WRAP. • Make sure LGAs are involved into WSTN and this is covered by the WSC Index workshop follow-up. • Engage with key participant councils – Melville, Canning, Mandurah etc to understand what they want. • Invite LGAs to sessions that are relevant to them and reduce their costs so that they are at least in the room. Vulnerability mapping is available via link https://sites.google.com/site/mappingvulnerabilityindex/ Then use the “select your city” tab to go into Perth. The summary of these maps is in found https://www.nccarf.edu.au/sites/default/files/attached_files_publications/Loughnan_2013_Spatial_vulnerability_analysis.pdf. Past LGA events • Nigel Tappers WALGA and Urban Tree Canopy group meeting discussed the LGA vulnerability mapping and slides were shared out of session. Key LGA events (in addition to conferences) coming up are: • WALGA Urban Forest Canopy group meets regularly and is conducting a Urban Forest Research gap analysis. • Waterwise Councils Forum planned for October 23	
Water utility engagement	WaterWise Councils and WaterWise Devemopments will hold a 23 October Water Wise Forum at WaterCorporation Water Corporation will provide a showcase on 15 November following the WSTN meeting	

Urban Heat – a Critical Issue for Local Government in Times of Climate Change

Professor Nigel Tapper, *Monash University, Australia*

Key Researcher, CRC for Water Sensitive Cities

President, International Association for Urban Climate

Lead Author, Working Group II, Adaptation, Mitigation and Vulnerability, IPCC 6th Assessment Report

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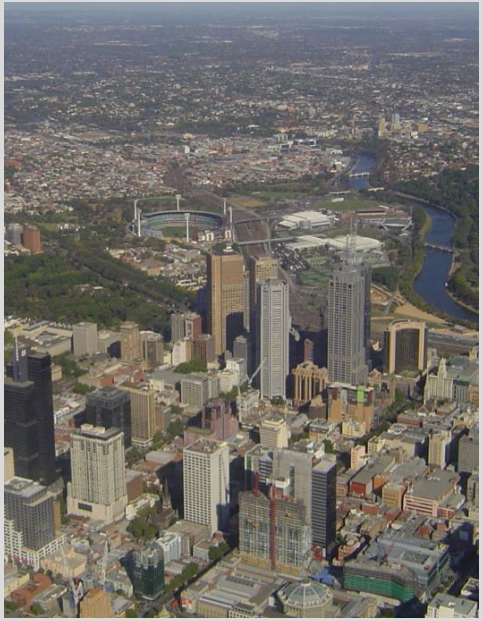
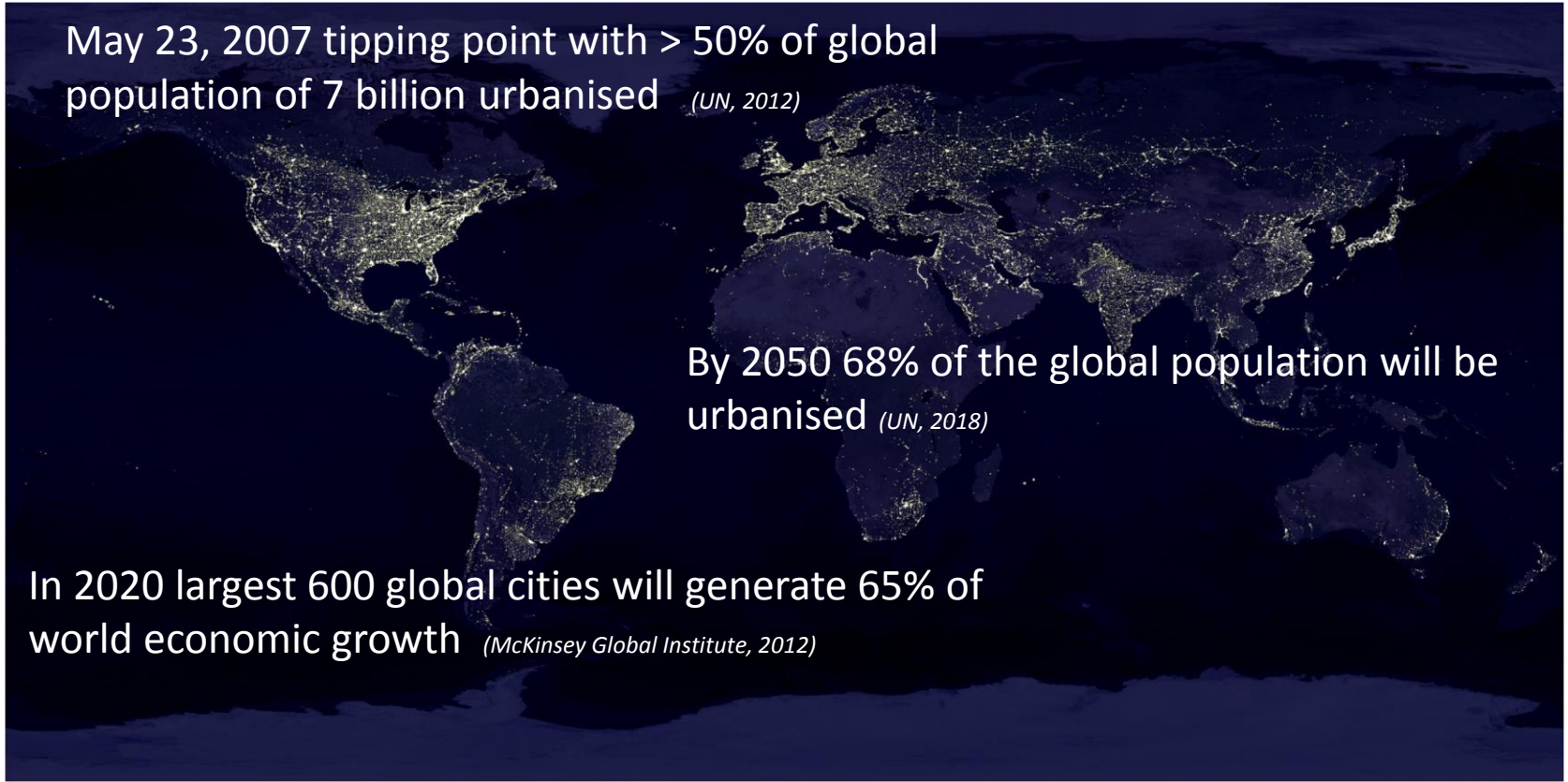
Five Key Messages in Relation to Cities and Adaptation to Climate Change



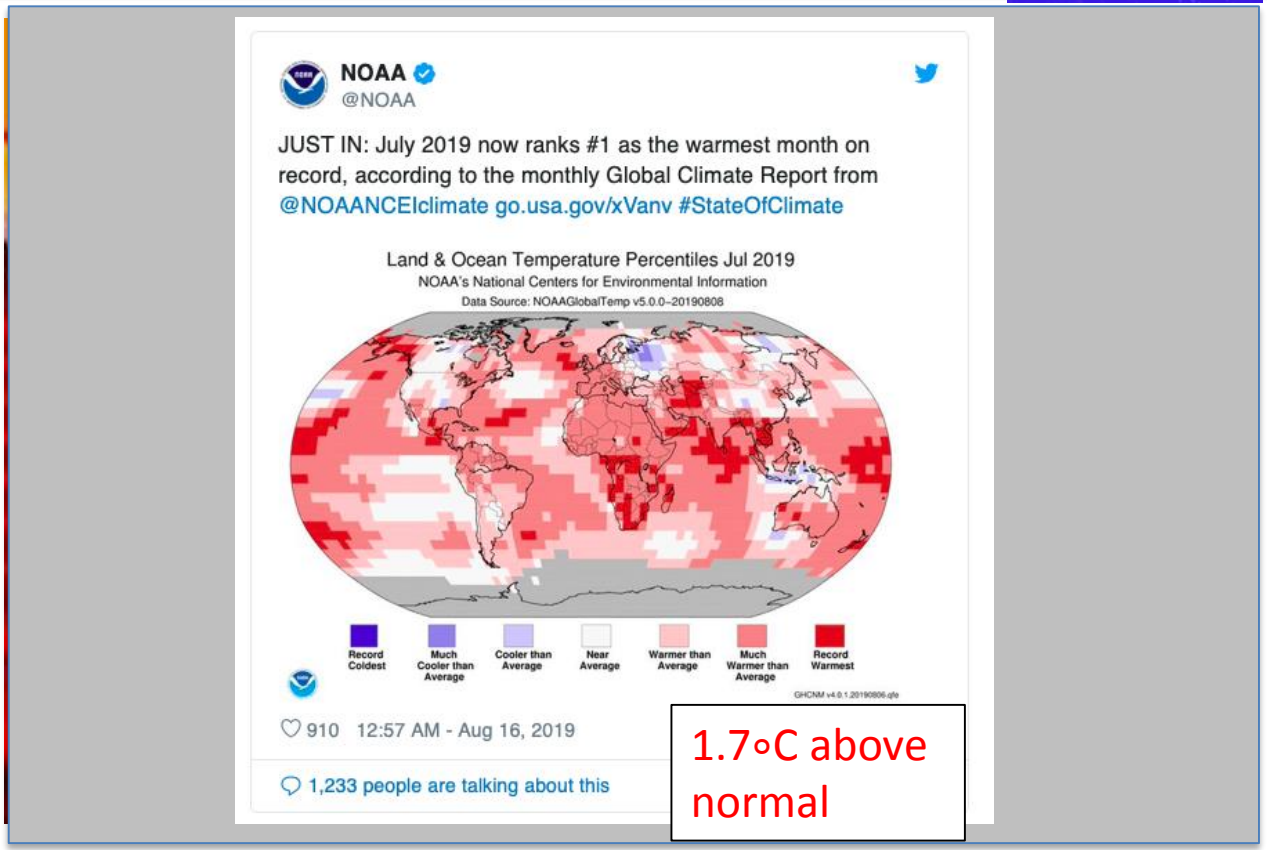
1. Globally the process of urbanisation continues at an extraordinary rate



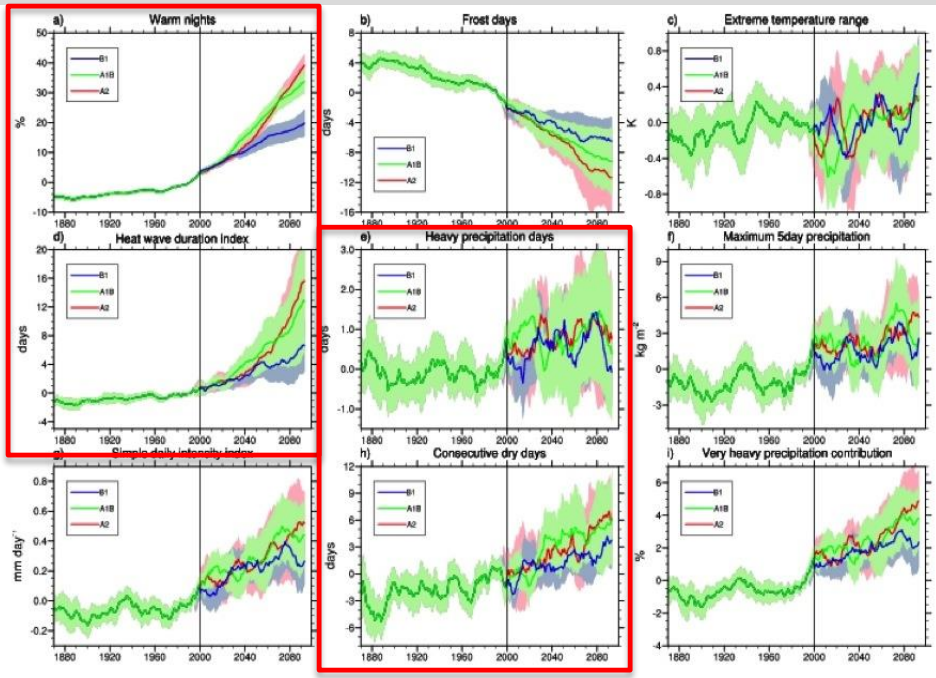
2. Urbanisation coincides with a broadening acceptance of climate change

- Clear evidence in the observational record
- On track for warming of 1.5°C by 2040
- 2016 and 2018 both tracked >1.0 °C long-term average.
- Now July 2019!

(IPCC, 2018; WMO, 2018)

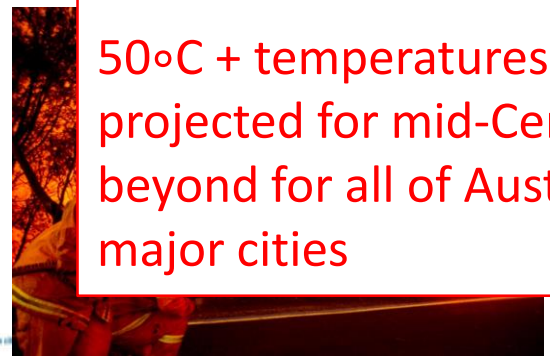


Australian Climate Stressors



Time Series of Extremes for the Australian Region 1870-2099

Alexander and Arblaster, 2009

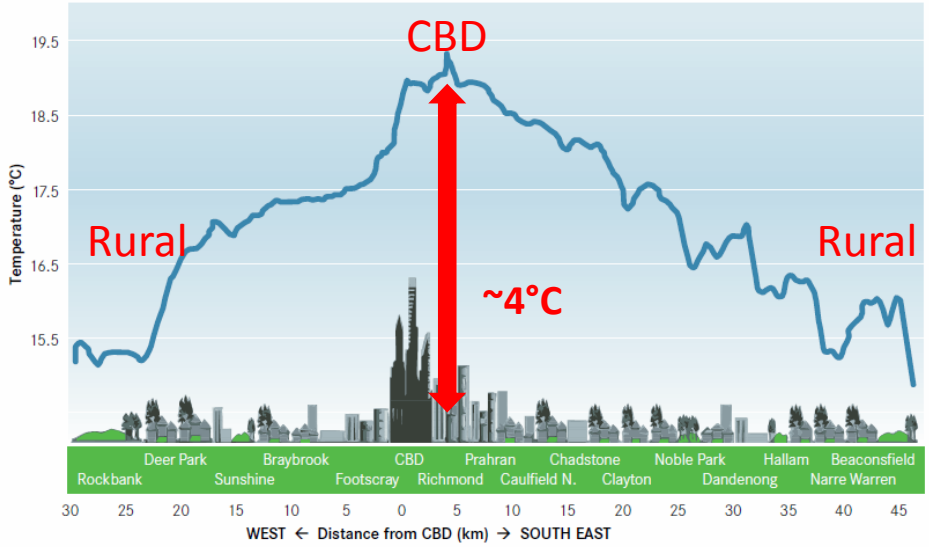


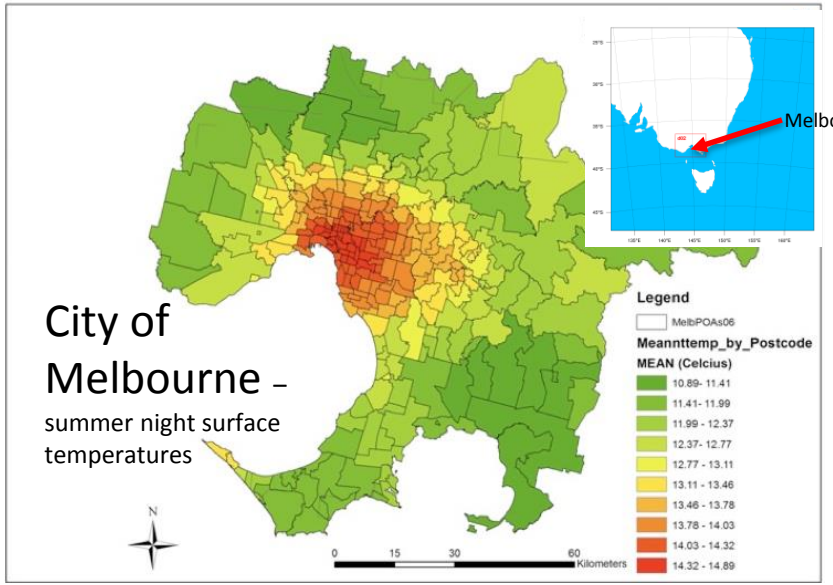
Both Melbourne and Sydney, cities with 5 million+ populations, have recently recorded official temperatures > 47◦C. Adelaide in 2019.

50◦C + temperatures are projected for mid-Century and beyond for all of Australia's major cities

3. Cities are hotter than their rural surroundings

Graph 1: Spatial variability of the Melbourne urban heat island (1:00 am, 23 March 2006)[5]



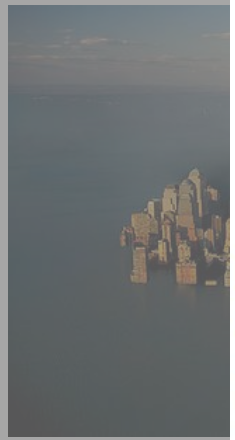


(Coutts, Beringer and Tapper, 2010)

This heat is superimposed upon greenhouse-gas (GHG) induced climate change

4. Cities and urban areas are highly vulnerable in the face of climate change

especially in
to *heat*, *wat*
scarcity and
rise



UN-Habitat, 2011

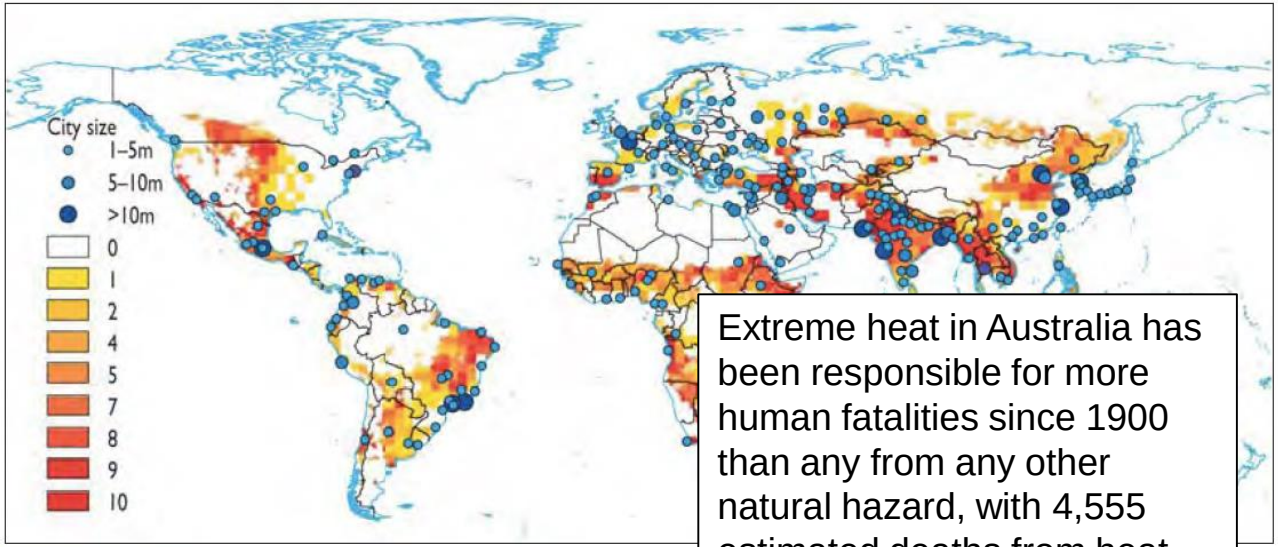


Figure 1

Cities in relation to current climate-related hazards

Note: The urban areas included in this figure have populations greater than 1 million. The hazard risk represents a cumulative score based on risk of cyclones, flooding, landslides and drought. A score of '0' denotes 'low risk' and '10' denotes 'high risk'.

Source: Based on de Sherbinin et al, 2007, Figure 1

Extreme heat in Australia has been responsible for more human fatalities since 1900 than any from any other natural hazard, with 4,555 estimated deaths from heat exposure (55% of the total) (Coates et al., 2014). By far the largest proportion of these deaths occur in cities.

Ageing – a key urban population vulnerability in the developed world

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Chart 1: An ageing and growing population

Chart 1.1: Population growth and combined dependency ratio

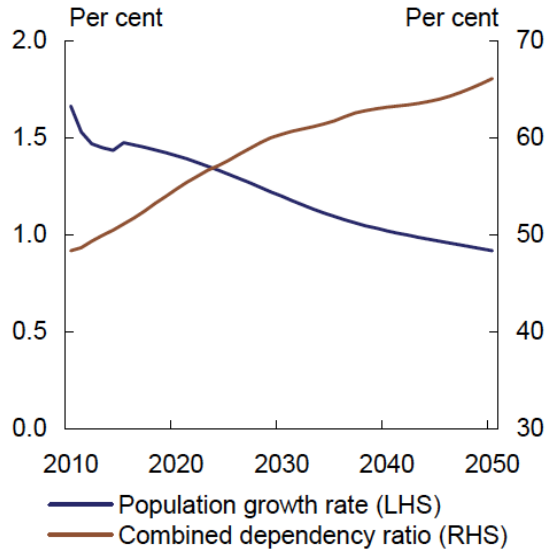
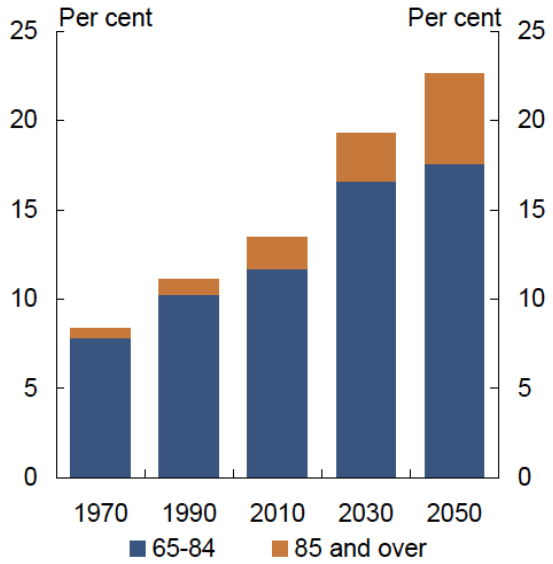


Chart 1.2: Proportion of the Australian population aged 65+



Source: ABS cat. no. 3105.0.65.001 (2008) and Treasury projections.

Australia is similar to most developed countries around the world

Why should this be an issue?

An older population is a population much more susceptible to heat

5. Although highly vulnerable, cities globally *do provide unique opportunities* for climate adaptation

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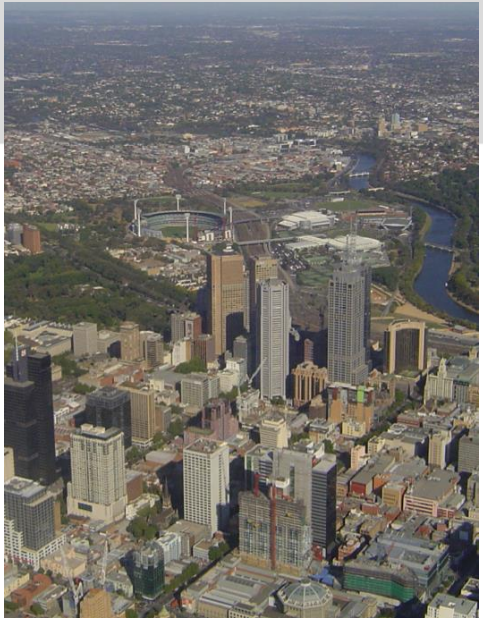
However, strategies are required immediately

- *Concentration of people in one place maximises opportunities for climate mitigation and adaptation (e.g. providing cooler cities)*
- *Cities have lower per capita GHG emissions*
- *There are co-benefits for many urban approaches to climate mitigation and adaptation,*
- *These well-established measures to reduce urban warmth can provide 'head room' against now unavoidable climate change*

CRCWSC-funded Work on City Adaptation to Climate Change



What can we do to increase the resilience of our cities in the face of climate change?

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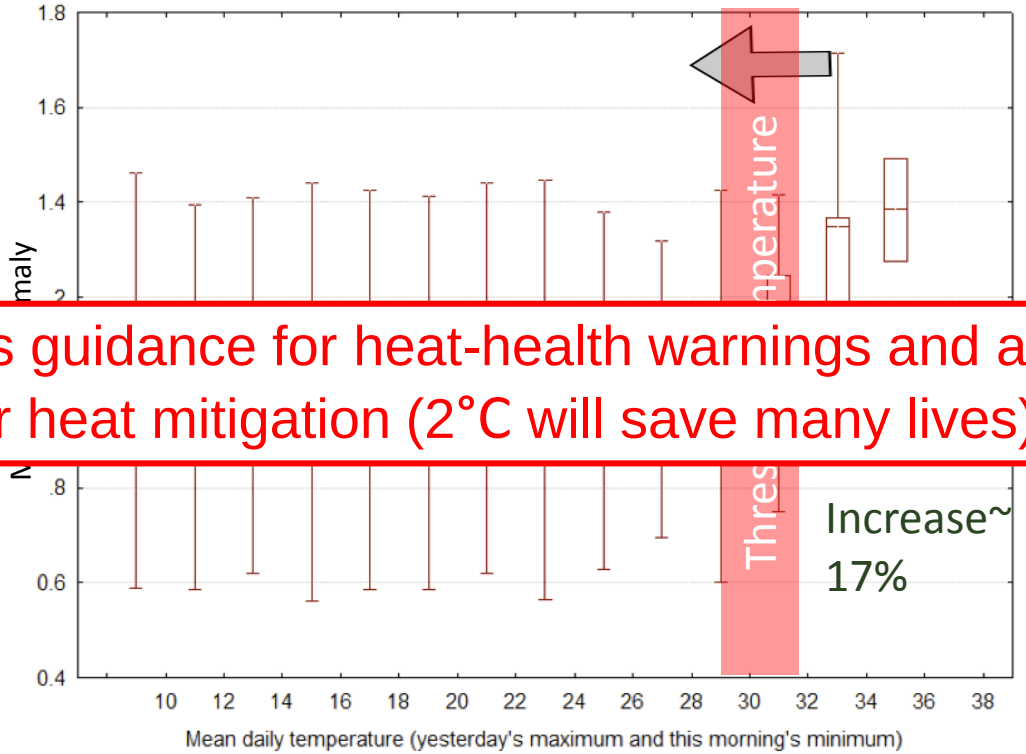
Our work in Australia has focused on two areas in order to address this concern

1. Improved public heat warnings and emergency services preparedness to save lives
2. Finding solutions to make our cities cooler to save lives and protect city infrastructure from extreme heat

Improved public heat warnings and emergency services preparedness to save lives

Melbourne – Heat Threshold for Excess Deaths in >64 year olds

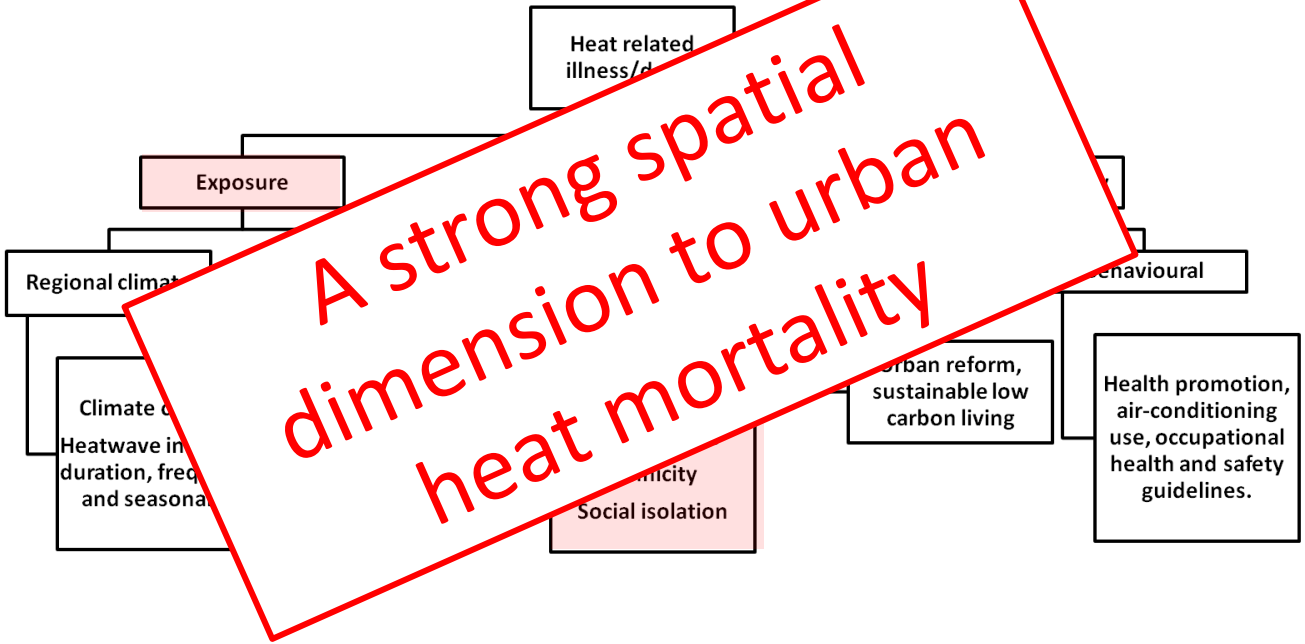
MDT of 30°C = (40°C+20°C)/2



Provides guidance for heat-health warnings and a target for heat mitigation (2°C will save many lives)

Nicholls, Skinner, Loughnan and Tapper, 2008

Exposure, Vulnerability, Adaptive Capacity Determine Heat-Health Outcomes



Tapper, Coutts, Loughnan & Pankhania, 2014

Mapping the Vulnerability Index in Australian Cities

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NCCARF National Climate Change Adaptation

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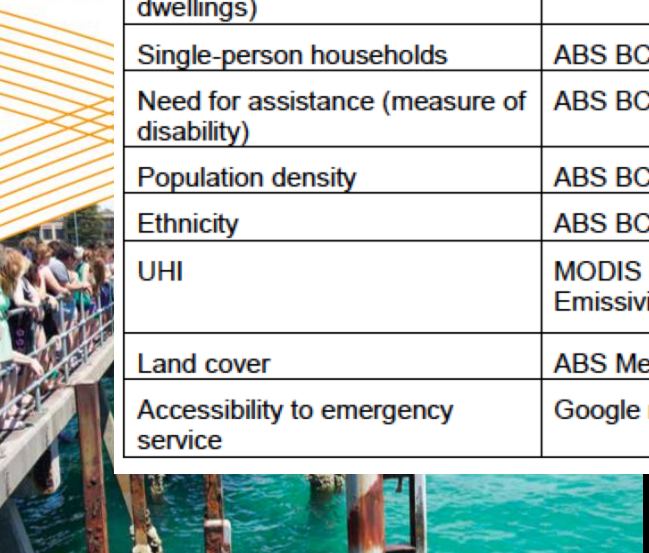
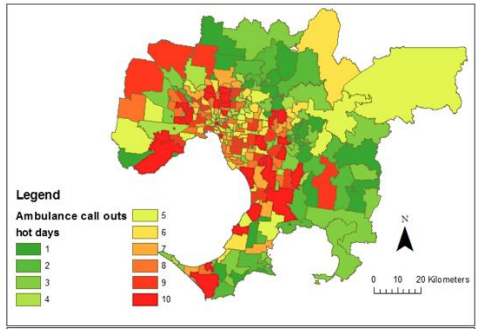
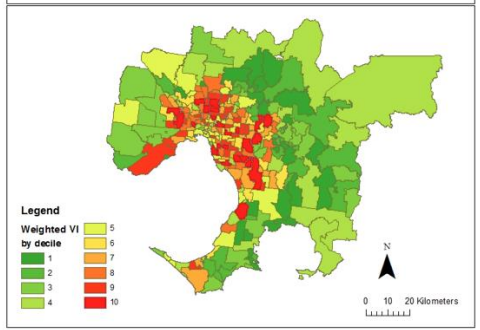
Risk factor	Data sources
Age (0–4, 65+)	ABS BCP Table 1
Aged care facilities (ACF)	Department of Health and Ageing
SES	ABS SEIFA Table 3
Urban design (non-single dwellings)	ABS BCP Table 31
Single-person households	ABS BCP Table 22
Need for assistance (measure of disability)	ABS BCP Table 17
Population density	ABS BCP Table 1
Ethnicity	ABS BCP Table 12
UHI	MODIS (Terra) Land surface Temperature & Emissivity Monthly L3 Global 0.05° CMG
Land cover	ABS Meshblock
Accessibility to emergency service	Google maps

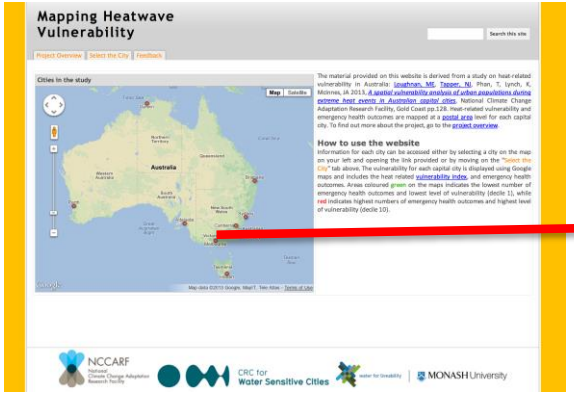


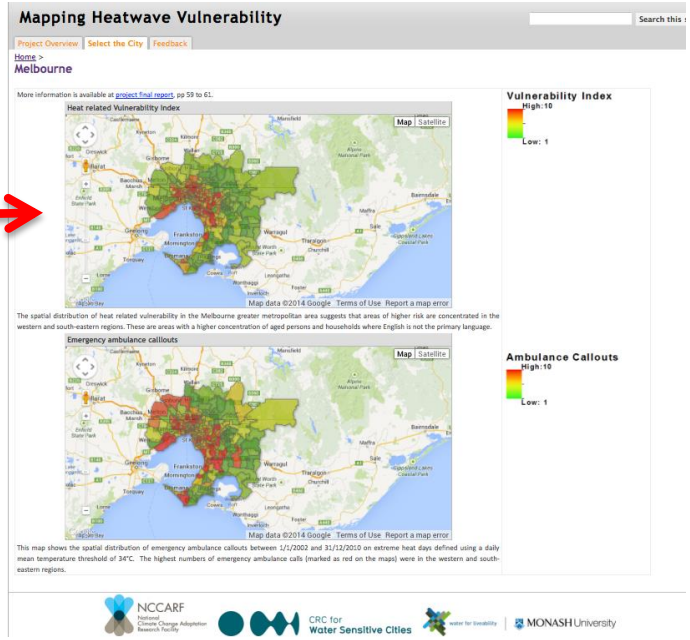


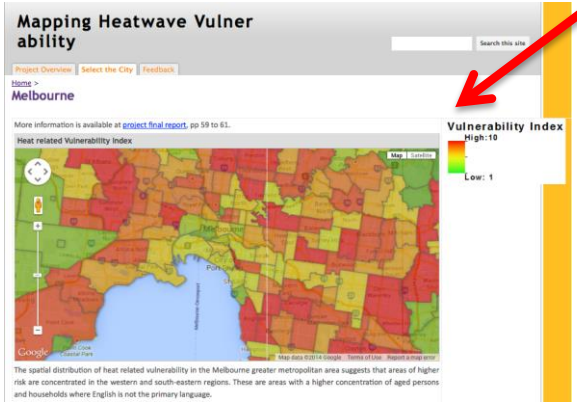


Vulnerability Maps Online

Google Map Overlay

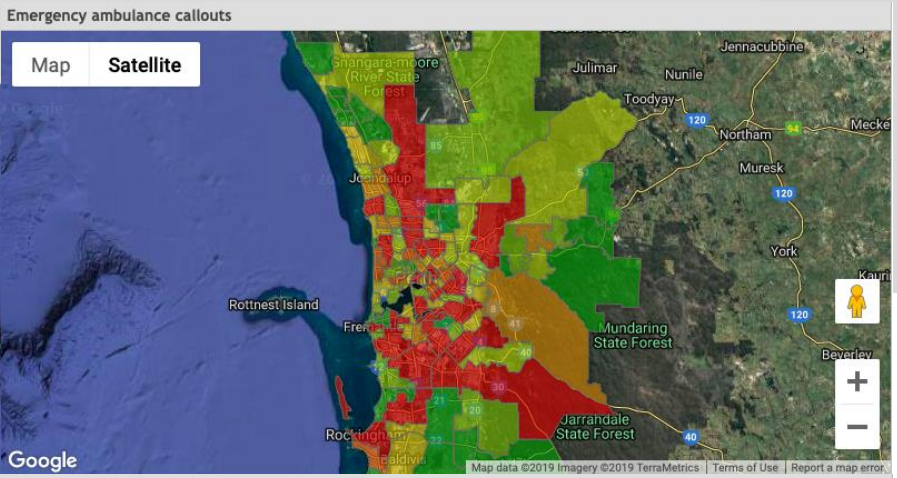


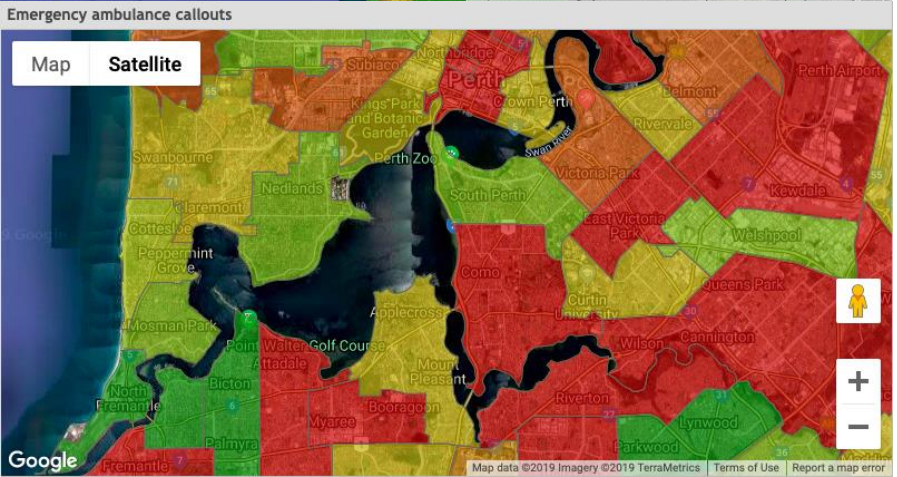




Final report *Loughnan, Tapper et al., 2013* **SPATIAL VULNERABILITY TO EXTREME HEAT EVENTS IN AUSTRALIAN CAPITAL CITIES.**
National Climate Change Adaptation Research Facility, Gold Coast, pp146
(https://sites.google.com/site/mappingvulnerabilityindex/home)

Perth - Heat Vulnerability Indices and Ambulance Call-Outs





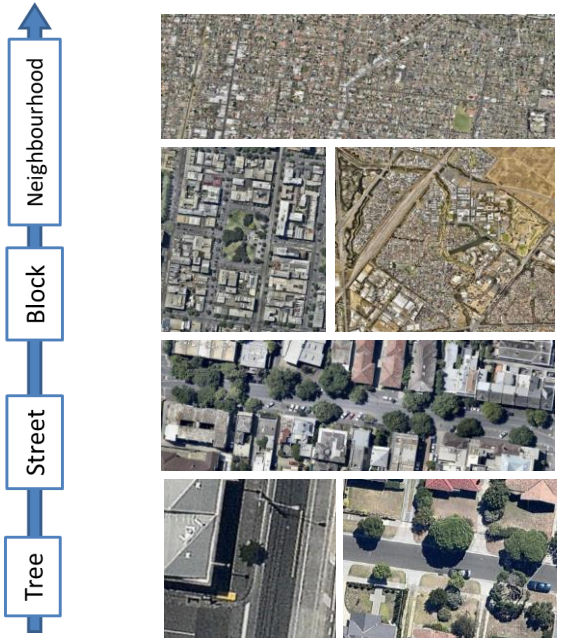
Highly relevant for LGAs prioritizing implementation of urban design features that can cool the urban landscape as well as mobilizing emergency services

Cooling Cities: The key research question and approach

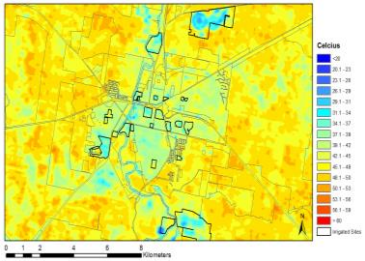
MONASH University

CRC for Water Sensitive Cities

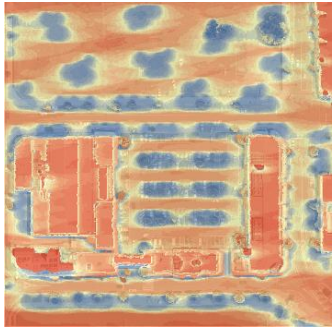
"What are the key technologies and approaches required to cool Australian (and many global cities) to adapt to climate change and save lives in extreme heat?"



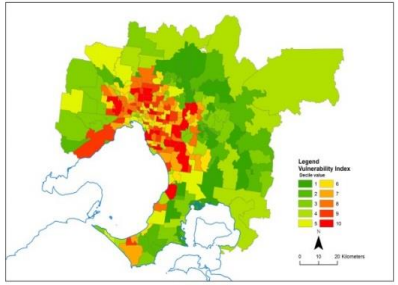
Observations



Remote sensing



Modelling



Database mapping

Summertime Landscape Cooling

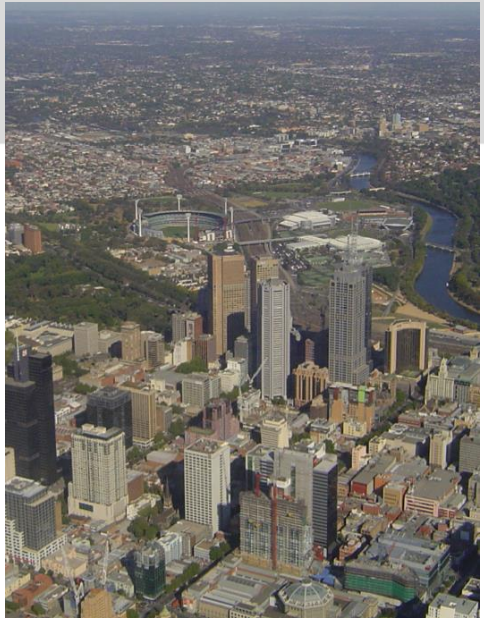
Across a range of scales we can achieve air temperature cooling of 1-2°C, and "feels like" cooling of 7-10°C

Tapper 2019

Table 1. Nature of micro and local scale urban cooling treatment examined by CRCWSC urban climate researchers and the level of summer cooling achieved in each case.

	Nature of Treatment	Summer Cooling Provided
Microscale	**Precinct tree cover** ***(modelling study)*** Thom J, Coutts A, Broadbent A, Tapper N (2016)	Doubling tree cover (from 20 to 40%) reduces mean radiant temperature by 4° C in summer and by up to 7° C during EHE.
	Street trees - inner city E-W oriented streets ***(observational study)*** Coutts A, White E, Tapper N, Beringer J, Livesley S (2016)	1° C air temperature cooling in treed v's un-treed streets; UTCI ("feels like") cooling of up to 4° C.
	Individual tree ***(observational study)*** Coutts A, Moore C, Thom J, Tapper N, White E, (2019)	Up to 1.0° C air temperature cooling within and below canopy during EHE, along with up to 6° C UTCI temperature reduction.
	Green roof ***(observational study)*** Coutts A, Daly E, Beringer J, Tapper N (2013b)	Up to 20° C surface temperature reduction, but little impact away from the roof.
	Rain garden ***(observational study)*** Miao S, Tapper N (2017)	Up to 1.5° C air temperature reduction for up to 1x raingarden diameter downwind of raingarden; up to 25° C reduction in surface temperature
Local scale	**Inner city park – lightly irrigated** ***(observational study)*** Motazedian A, Coutts A, Tapper N (2019)	1° C average air temperature cooling (more in EHE); UTCI cooling of up to 10° C in shade.
	City botanical gardens – irrigated ***(observational study)*** Lam C, Loughnan M, Tapper N (2018)	Up to 3.5° C air temperature cooling in irrigated areas during EHE.
	Large suburban lake ***(observational study)*** Broadbent A, Coutts A, Tapper N, Demuzere M, Beringer J (2017)	~1° C air cooling above and up to 1x lake diameter downwind of a 1 km^2 lake.
	Suburban-scale irrigation ***(modelling study)*** Broadbent A, Coutts A, Tapper N, Demuzere M (2018)	~0.5° C air temperature cooling during EHE with light irrigation and up to 2.5° C cooling with heavy irrigation; up to 20° C surface temperature reduction.
	City-scale tree canopy, irrigation and albedo increase ***(modelling study)*** Jacobs S, Gallant A, Tapper N, Li D (2018); Jacobs S, Gallant A, Tapper N (2019)	0.6 - 1° C air temperature reduction for tree cover increase from 20 to 40%; up to 1.5° C cooling with combined canopy, irrigation and albedo increase.
	City-scale vegetation fraction increase ***(remote sensing study)*** Nury S (2016)	6° C cooling in summertime average surface temperatures with an increased vegetation fraction from 0.2 to 0.8.

A Response to Some Key Questions of Interest for Local Government



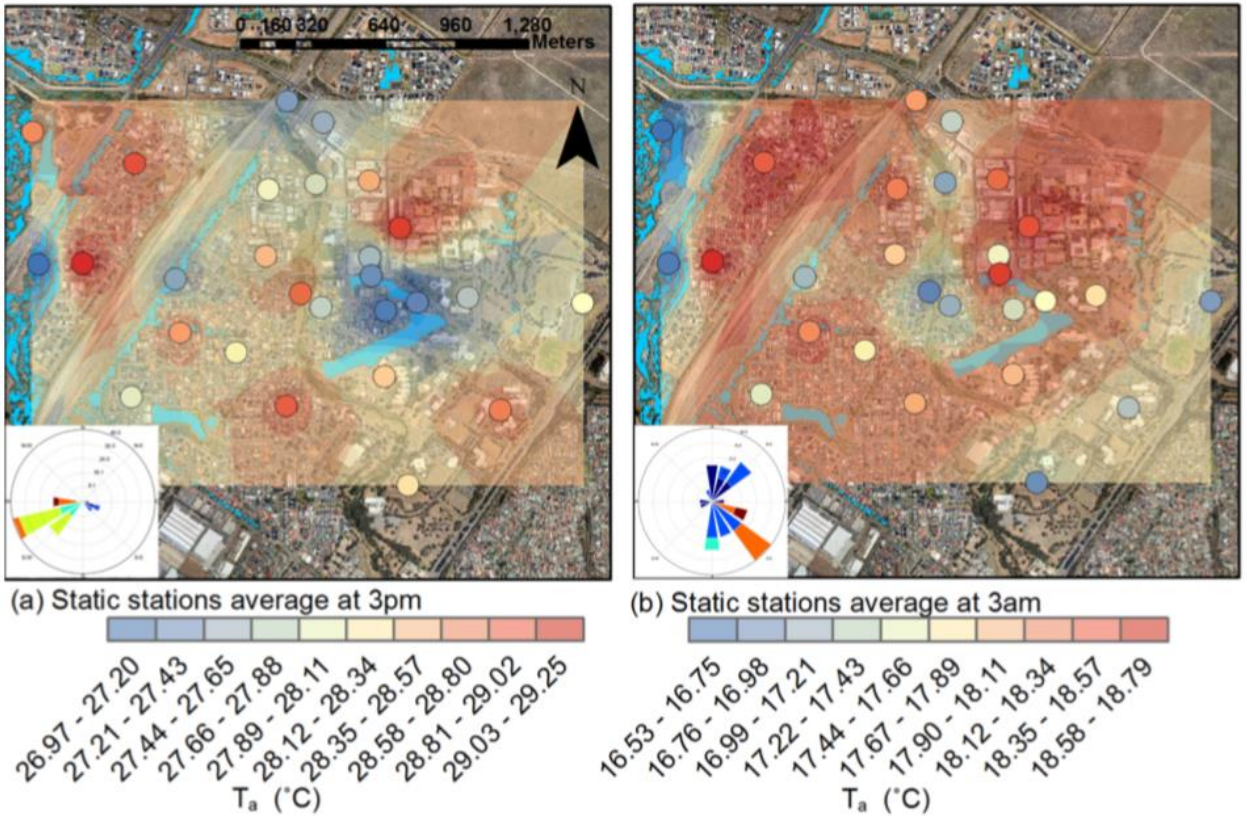
How Can We Measure Urban Heat? Observations

- The most direct approach (i.e. measures the sensible heat content of the air, but
  - Requires large numbers of measurements for even modest spatial coverage to represent different microclimates, etc
  - Expensive in terms of instrumentation and servicing of equipment
  - Time consuming to develop a longer term (seasonal) data base and to analyse data
  - Significant protocols; exposure, height of exposure, etc
- With correct instrumentation can obtain accurate measurements of human thermal comfort e.g. UTCI

How Can We Measure Urban Heat?

Observations

e.g. ~30 fixed weather stations from a study at Mawson Lakes, Adelaide



How Can We Measure Urban Heat?

Remote Sensing (Satellite/Aircraft/Drone

- The preferred approach of LGAs and consultants
- Can quite rapidly provide large areal coverage of large areas, but
  - Aircraft (usual approach) is astronomically expensive
  - limited resolution of microscale variation (satellite/aircraft)
  - plan view only
  - Surface temperature is **not** necessarily a direct reflection of air temperature
  - To get accurate surface temperatures, emissivity **must** be correctly specified for each surface – this is generally **not** done

How Can We Measure Urban Heat?

Remote Sensing (Satellite/Aircraft/Drone

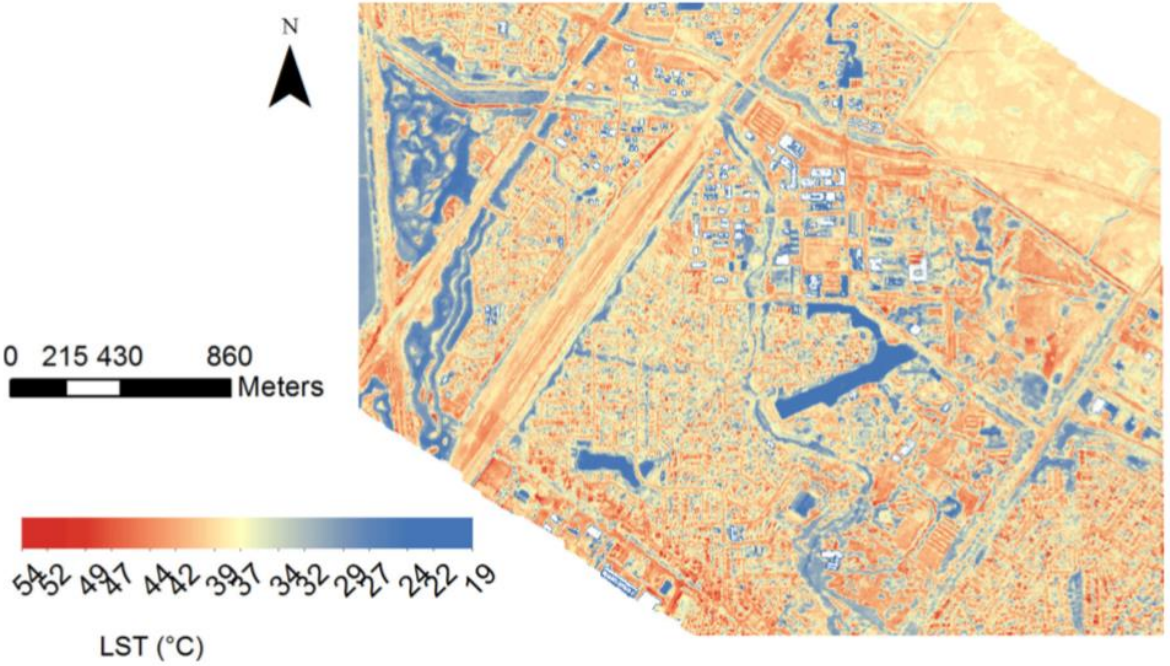


Figure A.1: The airborne thermography for Mawson Lakes captured at 2:00–4:30 pm on the 16th February.

Monash UAV Platform

How Can We Measure Urban Heat?

Modelling

- Not used much for showing temperature patterns, but worth considering
- Relatively accurate when validated, cheap and very high resolution
- Once set up, can be used to assess the benefits of treatment, e.g. irrigation, green infrastructure, etc., but
  - They can be complicated, requiring expertise and computing power
  - We recognise that and are developing much more industry-friendly models (e.g. TARGET)

How can We Measure Urban Heat?

e.g. SURFEX and TARGET

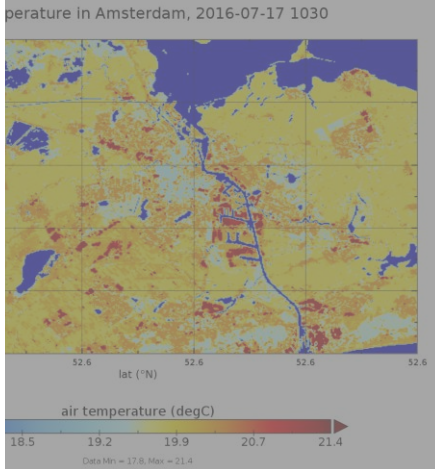
Mawson Lakes, Adelaide, irrigation study SURFEX

The Air-temperature Response to Green/blue-infrastructure Evaluation Tool (TARGET)[1].

- Is a microclimate model developed specifically within my group for use in the CRC-WSC to evaluate the thermal benefits of WSUD.
- It is a simplified but accurate and scientifically defensible model, ultimately designed to be used by our industry partners. The accessibility allows modelling scenarios to be created from simple land cover class fractions and a few basic parameters.
- TARGET's efficiency means that modelling domains of tens of thousands of grid points can calculate weeks of simulation in seconds to minutes.
- TARGET was our model-of-choice for use in WP6. Being incorporated into the CRCWSC Scenario Modelling Tool

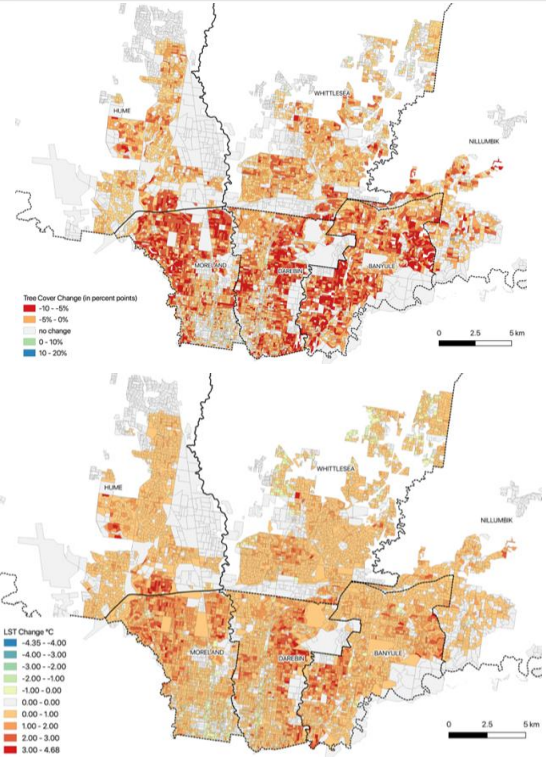
, [1.]Broadbent, A., Coutts, A., Nice, K., Demuzere, M., Krayenhoff, E., Tapper, N., Wouters, H., 2019. The Air-temperature Response to Green/blue- infrastructure Evaluation Tool (TARGET v1.0): an efficient and user-friendly model of city cooling. Geosci. Model Dev., 12, 785–803.

Amsterdam, Netherlands air temperatures, TARGET

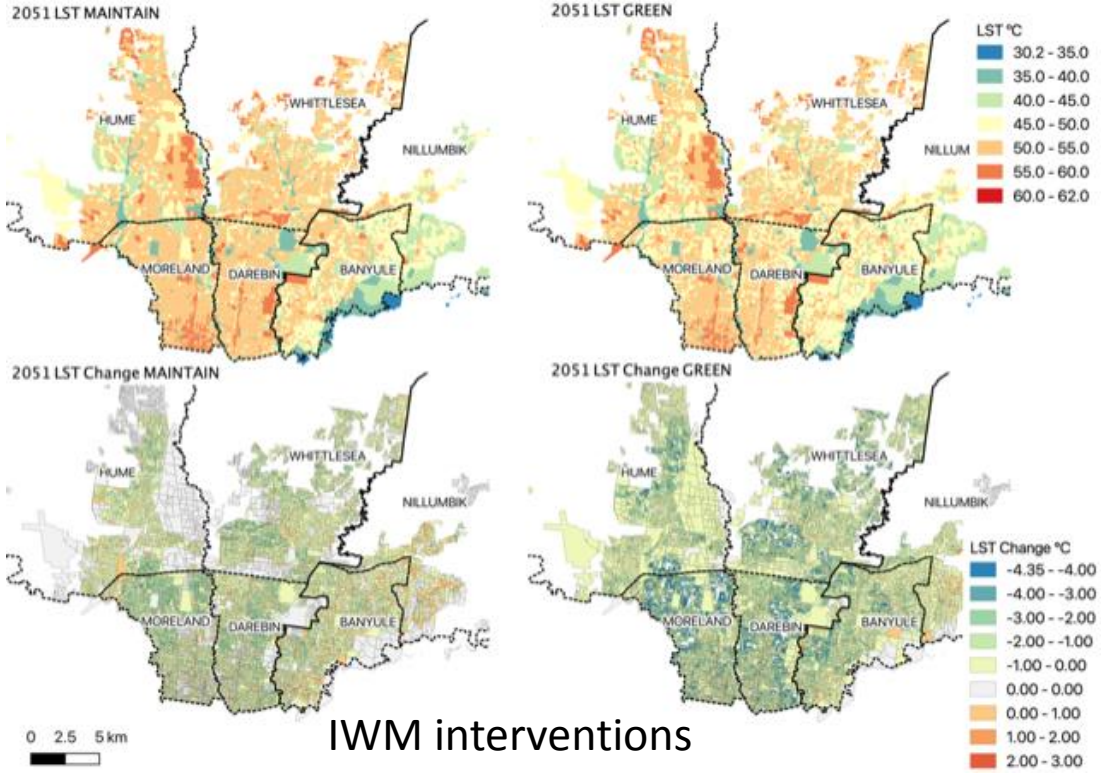


How can We Measure Urban Heat?

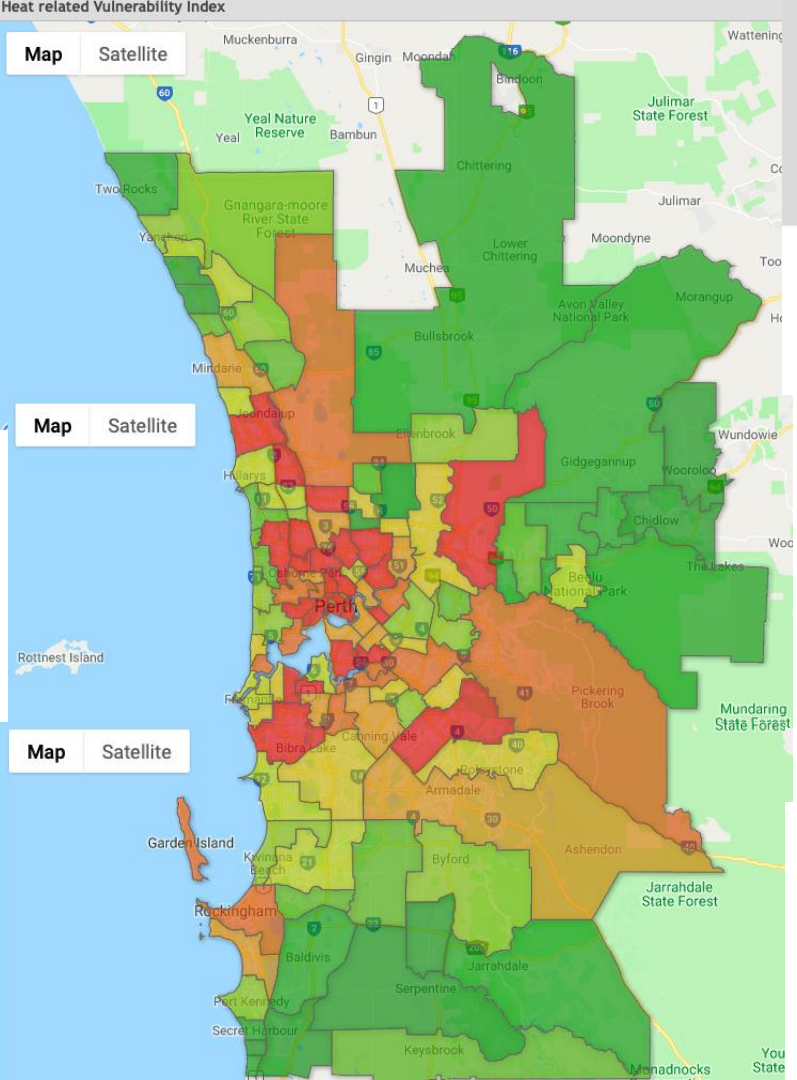
e.g. Heat Module in CRCWSC Toolkit



Tree cover change



IWM interventions



Where Are Perth's Most Heat Vulnerable Suburbs?

MONASH University

CRC for Water Sensitive Cities

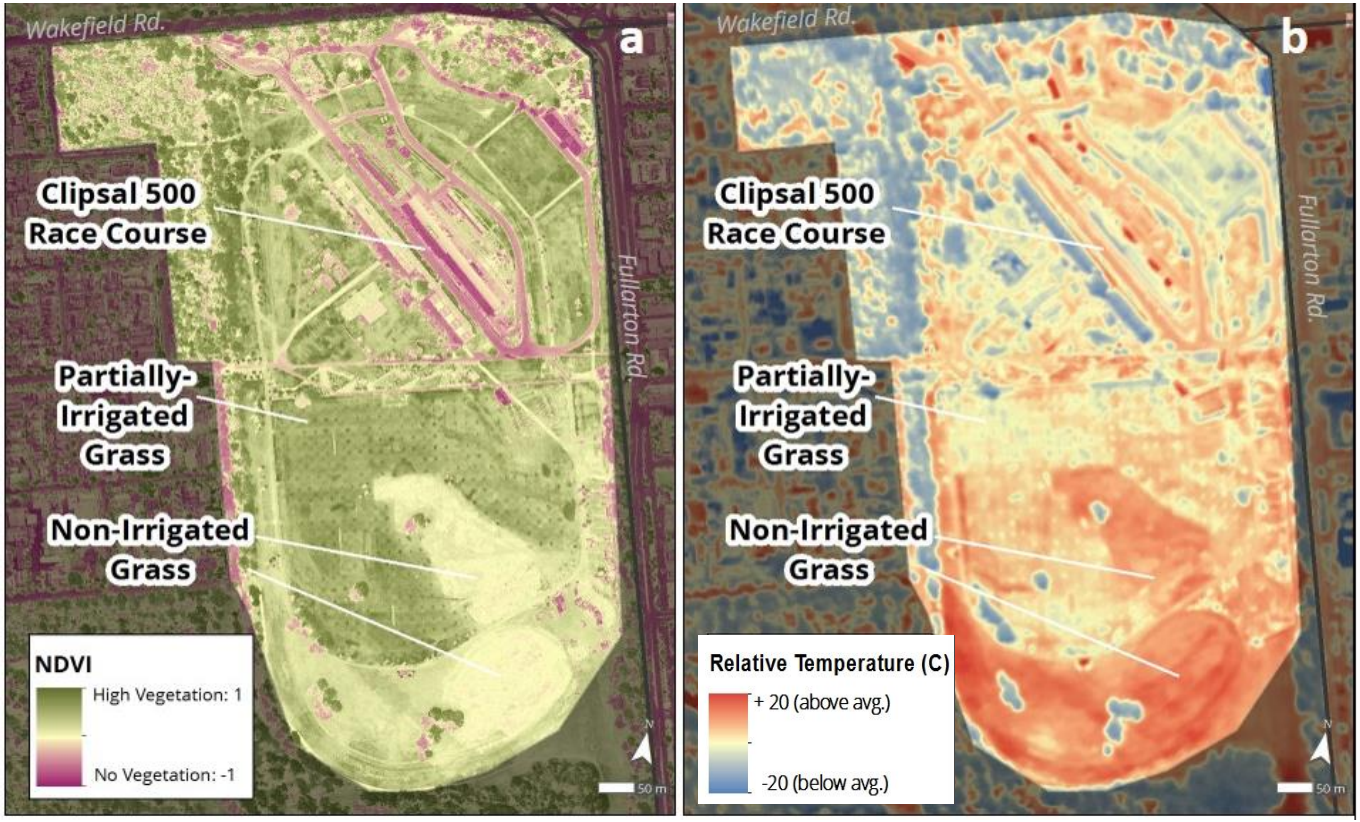
- Highest vulnerability inner city suburbs, north of the city and south along the Swan River
- Lowest vulnerability semi-rural areas to the northeast and east, and to the far south.
- (Not shown here) some of the outer northern suburbs show the greatest difference in emergency service call-out between hot and non-hot days.
- All variables except daytime UHI were significantly correlated with adverse heat-health outcomes; number aged care facilities and ethnicity particularly strong.

Growing cool cities – The role of irrigated green cover

Dr Mark Siebentritt
Seed Consulting Services
18 June 2019

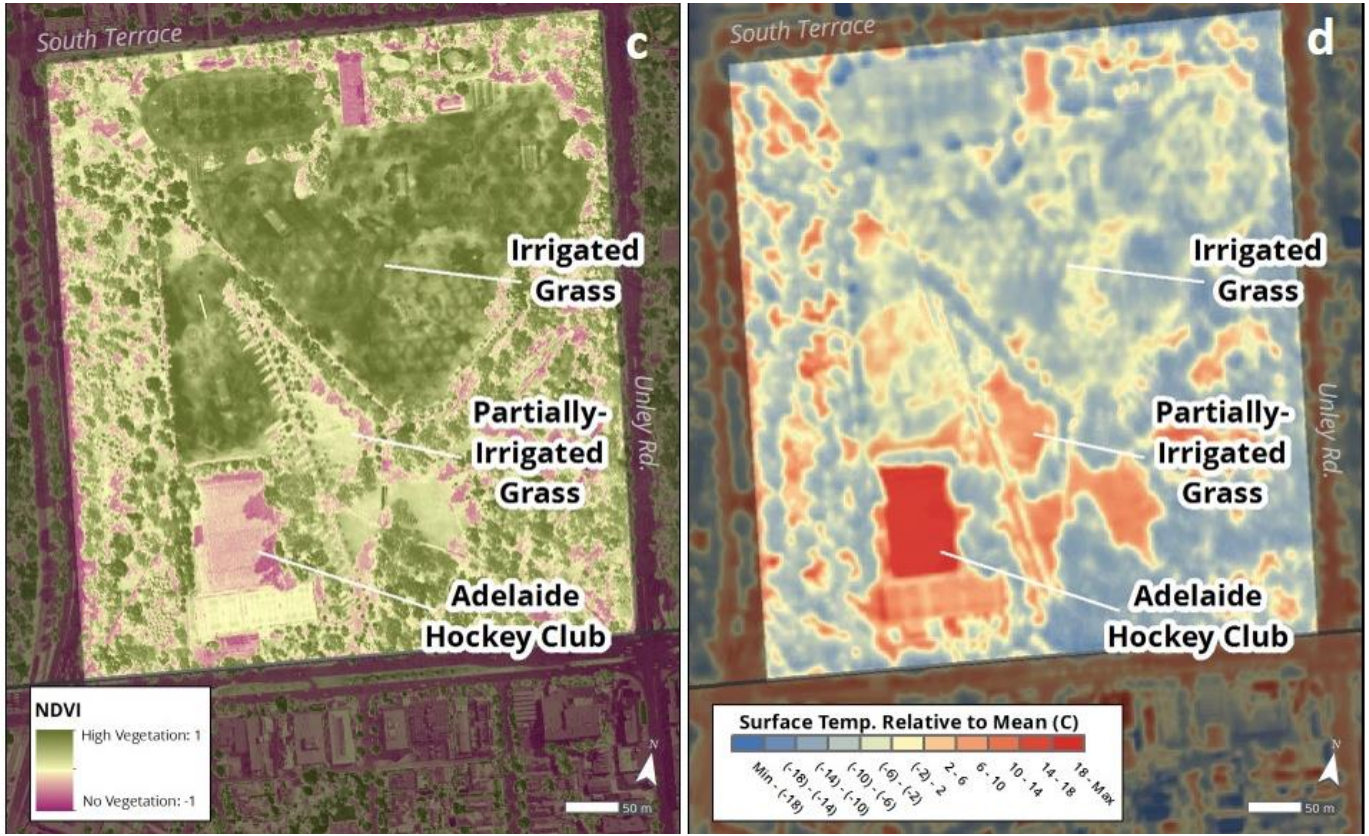
Irrigated grass versus non-irrigated grass (Adelaide Parklands)

Victoria Park

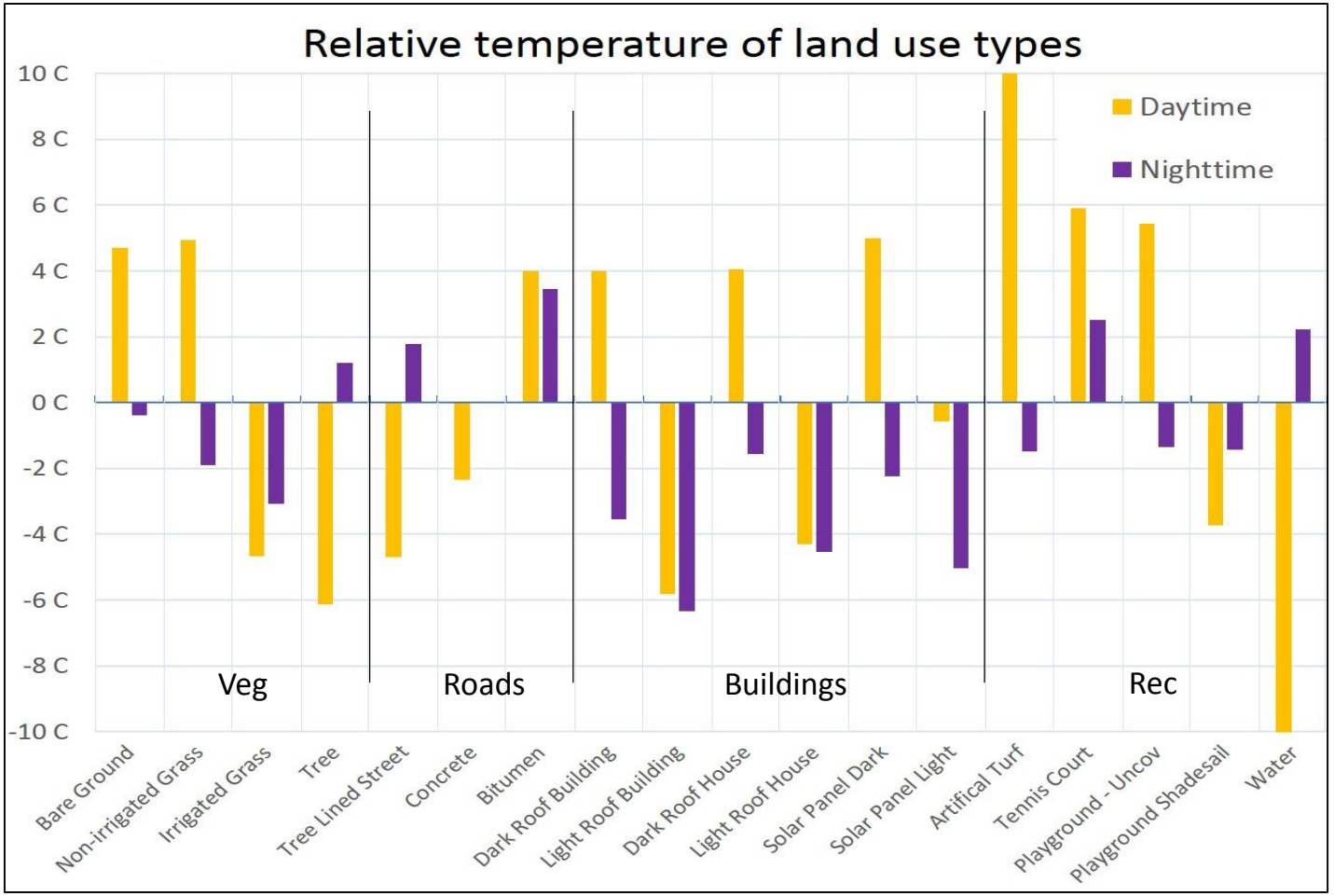


Source: Eastern and Northern Adelaide Heat Mapping Study (Seed et al. 2018)

Irrigated grass versus non-irrigated grass (Adelaide Parklands)



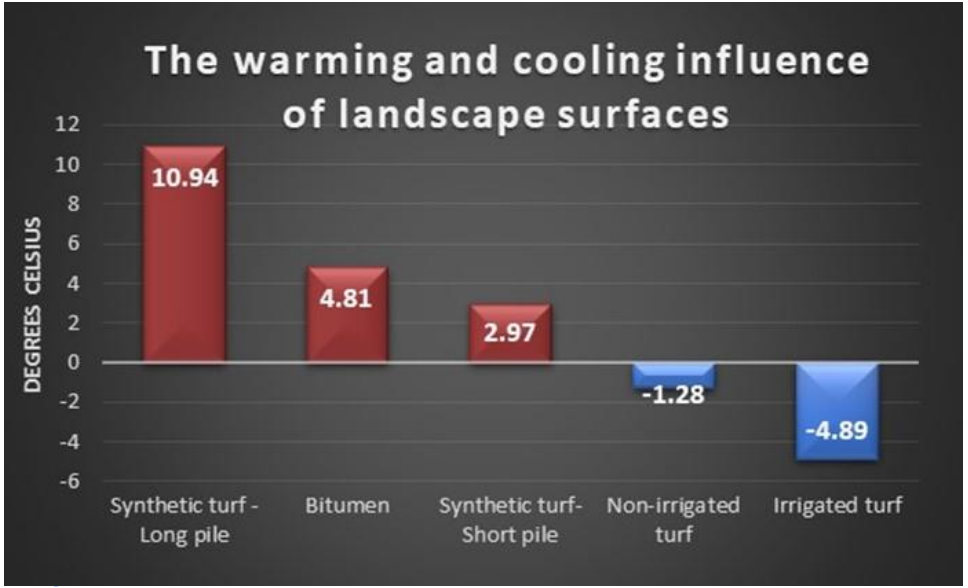
Source: Eastern and Northern Adelaide Heat Mapping Study (Seed et al. 2018)



Source: Eastern and Northern Adelaide Heat Mapping Study (Seed et al. 2018)

Hort Innovation
Strategic levy investment

TURF FUND



seed
consulting services

WRAP Business Plan 19/20 - What does success look like?

IRP5: Incorporate the interim guidance on high groundwater into relevant policy and practices

- **Embed guidance in DWER groundwater monitoring guidance.**
- **Present the findings to the Land Development in Groundwater Constrained Environments Working Group (IPWEA/WALGA).**

IRP4: Apply the 'Infill Performance Evaluation Framework' and 'Infill Typology Catalogue' across Perth

- **Landcorp has been encouraged and supported to use the infill development framework and catalogue in other developments.**
- **Department of Communities has been encouraged and supported to apply the framework and catalogue in one of their new infill developments.**

IRP4: Apply the Water Mass Balance tool in Perth

- **CRCWSC partners trial the water mass balance module within the Scenario planning tool.**
- **The water mass balance tool is accessible for use by practitioners.**

IRP3: Embed the learnings from the Brabham case study report in the planning system

- **Department of Communities and Peet have a greater understanding around efficient approval processes for innovative developments.**
- **The barriers to approval are communicated in a way that facilitates buy-in for shared solutions.**

IRP2: facilitate awareness and use of the Investment Framework for Economics in CRCWSC participant processes:

- **WA treasury, ERA, Infrastructure WA and public infrastructure assessment experts are pitched the value of including non-market values in business case guidelines and are told arguments why they should endorse INFEWS as a suitable tool for the calculation of non-market values.**
- **CRCWSC participants who deliver infrastructure (eg state developers, utilities, LGAs) consider non-market values and trial the INFEWS tool on key projects**
- **Developers are able to use the INFEWS tools in negotiations for a fair distribution of costs where future public water sensitive benefits are unable to be recouped through housing sales.**

IRP1: Deliver the Perth Transition Strategy and roll out the process across WA

- **The Perth Transition strategy (lead by the WSTN), is funded and implemented by relevant stakeholders.**
- **City of Perth's (CoP) Transition Strategy is incorporated into strategic water and land planning.**
- **WA Regional towns understand the benefits of undertaking a transition strategy process.**
- **WaterWise Councils (WWC) support LGAs to undertake not just WSC Index workshops but other transition components including visioning, TDF, actions, implementation support and TAP1.**

All IRPs: Development of appropriate research outputs and tools, readily adopted across Industry

- **Key stakeholders have been engaged via Project Steering committees to ensure research and products are locally and industry relevant.**
- **Key stakeholders understand the research outputs and are able to adopt the knowledge in their spheres of influence.**

Sustainable and widely used Capacity Building program

- **WRAP, IRP PSC and NWW work together to prioritise high impact capacity building activities related to CRCWSC outputs and case studies.**
- **The CRCWSC website is user friendly and on a platform that endures beyond 2021.**

TAP2: Support the trial of the Scenario Planning Tool with CRCWSC partners

- **The Scenario tool has been trialed by participant organisations using relevant case studies.**

Wide range of sponsors undertake Synthesis Projects across diverse issues and in diverse locations in WA

- **New "Ideas for …" workshops are undertaken in Perth and across WA.**
- **Other synthesis processes (ie excluding Ideas for workshops) have been trialed in WA.**
- **Stakeholders value, participate in and sponsor synthesis processes delivered by the CRCWSC and or the WSC-Institute.**

Diverse range of Case studies are accessed by practitioners and provide the knowledge and confidence to undertake water sensitive projects.

- **CRCWSC and other capacity building websites illustrating case studies are linked and complement each other.**
- **Case studies are easy to search for via the internet.**
- **WA relevant case studies support participants to undertake Water Sensitive Projects**

Test the RESTORE Tool and RESTORE design guidelines in WA

- **the RESTORE tool has been trialed in one case studies in WA.**
- **WA consultants interested in trialing the tool have been provided access.**

Sustainable funding for coordination post 2021

- **Sustainable funding or in-kind support for administration of the WSTN.**
- **Sustainable funding for a Regional Manager/Coordinator for Water Sensitive activities including WSTN.**
- **NWW and other stakeholder organisations have sustainable funding for capacity building activities.**

CRC for
Water Sensitive Cities

Vision and Transition Strategy for a Water Sensitive Greater Perth

Implementation Plan 2019–2021

Australian Government
Department of Industry, Innovation and Science

Business Cooperative Research Centres Programme

Vision and Transition Strategy for a Water Sensitive Greater Perth – Implementation Plan 2019–2021

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Table of Contents

Foreword from the Water Sensitive Transition Network Chair

Perth stakeholders have formed a shared vision of Perth as a leading water sensitive city. The people of Perth expect that those responsible for managing our water make the most of all opportunities across the urban water cycle to deliver greater community benefit and protect our water environments.

We are facing complex challenges that traditional thinking and a siloed approach cannot solve. A water sensitive city requires many stakeholders, including an empowered community, working together towards this common goal.

Leaders from 26 stakeholder organisations spanning state and local government, research, private industry and community sectors have formed a strategic network aimed at guiding the transition of Perth towards a water sensitive city. This network – the Water Sensitive Transition Network – was formed in 2016 and has gained momentum and grown as a cross-sector community of practice. Partners are united through their commitment, goodwill and shared vision for a sustainable, highly liveable city.

The Water Sensitive Transition Network has worked with the Cooperative Research Centre for Water Sensitive Cities to develop our *Vision and Transition Strategy for a Water Sensitive Greater Perth: Implementation Plan 2019–2021*. This plan outlines strategic, coordinated actions by key stakeholders to progress Perth's transition to a leading water sensitive city.

Perth is one of the world's cities most impacted by climate induced water scarcity. We have seen average streamflow into our dams reduce by around 80% since the mid-1970s. Our climate is continuing to become hotter and drier. At the same time, urban development and the demand for water are continuing to grow. Planning is under way to accommodate an anticipated 3.5 million people by 2050, requiring urban expansion and intensification. A key challenge for Perth is how to create and maintain highly liveable communities when natural water sources continue to decline.

Of the 800,000 new homes expected to be needed in Perth by 2050, State Government planners aim for 47% to be located within the existing urban footprint, requiring urban intensification and infill development. This poses significant challenges and opportunities for how water services and other infrastructure are provided into the future to create a more sustainable city. Clever planning and design can create higher density living while enhancing green spaces and urban forests.

Other key challenges include rebalancing our precious groundwater aquifers through sustainable use and replenishment, and improving the health of our iconic Swan Canning river system and wetlands. Innovative approaches to urban form and water servicing are required because urban development has moved into constrained areas, including areas with shallow, nutrient-rich groundwater and areas without available groundwater to irrigate parks and ovals. New approaches to urban development are required that prevent pollutants from entering our waterways, wetlands, ocean and groundwater.

We need to create public spaces that are appropriate to our climate and develop affordable, sustainable water supplies to maintain the parks and green spaces that make Perth highly liveable. Approaches to integrate water and vegetation throughout the urban landscape are required to reduce urban heat, provide human health and wellbeing benefits, and protect our receiving waterbodies.

By continuing to work with our diverse stakeholders, the Transition Network will find clever solutions to our water challenges. A multi-disciplinary approach to city planning will enable our city to evolve as being resilient to climate change, highly liveable, economically productive and sustainable over the long term.

It is the Transition Network's aim to create a city that manages water in the urban landscape in ways that create healthy environments and great places to live, now and in the future.

John Savell

Chair, Water Sensitive Transition Network

1. Introduction

Water makes Perth a great place to live. We understand and value our beautiful, healthy water environments, treat them with care and use water wisely.

This Implementation Plan has been developed by the Perth Water Sensitive Transition Network with assistance from the Cooperative Research Centre for Water Sensitive Cities (CRCWSC). It outlines the actions and ideas the Water Sensitive Transition Network believe are important to implement the strategies in the *Vision and Transition Strategy for a Water Sensitive Greater Perth* (Hammer et al., 2018) to achieve Perth's water sensitive vision. It provides a framework for delivery, monitoring and review of Perth's transition progress.

This report is a companion to the *Vision and Transition Strategy for a Water Sensitive Greater Perth* (Hammer et al., 2018), which built on *Shaping Perth as a Water Sensitive City: Outcomes and perspectives from a participatory process to develop a vision and strategic transition framework* (Rogers et al., 2015).

This Implementation Plan is intended to provide guidance for future policy and planning, to be used by many different stakeholders as a sector-wide strategic framework to inform the development of intra- and cross-organisational policies, strategies and programs that facilitate the delivery of a water sensitive Greater Perth (the Perth metropolitan area defined in *Perth and Peel @3.5 million* land use planning and infrastructure frameworks).

The content in this document reflects the priorities identified collaboratively by the Water Sensitive Transition Network on the basis of their collective knowledge, supported by research led by the CRCWSC, particularly Integrated Research Project 1: Water Sensitive City Visions and Transition Strategies[1] and Project A4.2 Mapping Water Sensitive City Scenarios[2]. This document and the actions it describes have no formal organisational commitment or status in government policy. It is not intended to be a substitute for a state-led water or water wise strategy.

The Water Sensitive Transition Network would sincerely like to thank Dr Briony Rogers, Chris Chesterfield and Katie Hammer from the CRCWSC for sharing their knowledge and insights and their unswerving commitment to helping us understand the importance of our Vision and Transition Strategy.

[1] https://watersensitivecities.org.au/content/project-irp1/
[2] https://watersensitivecities.org.au/content/project-a4-2/

2. Vision and Perth's Progress

The CRCWSC notes that 'Developing a shared perspective of water today, a compelling vision for the future and a framework to guide coherent strategic action is critical for establishing the understanding, motivation and capacity amongst stakeholders to drive their WSC transition' (Hammer et al., 2018).

In Australia, the vision of a water sensitive city (WSC) is now widely used to represent an aspiration in which water has a central role in shaping a city. In a WSC, ecosystems are healthy, people are not disrupted by flooding and can enjoy reliable water supplies, effective sanitation, cool green landscapes, efficient use of resources, and beautiful urban spaces that bring the community together. In Western Australia, the term 'Waterwise city' is being used to describe the same concept. This concept represents the highest level of performance and achievement in urban water management.

The *Vision and Transition Strategy for a Water Sensitive Greater Perth* (Hammer et al., 2018) describes how WSC concepts are to apply specifically to the Perth and the Peel metropolitan region. The report presents the 2065 vision of Greater Perth as a water sensitive city that was developed by project participants. Their aspirations are expressed as a suite of outcome statements with accompanying rich descriptions, organised into four interconnected themes to orient and align the actions of stakeholders over the long term (Figure 1).

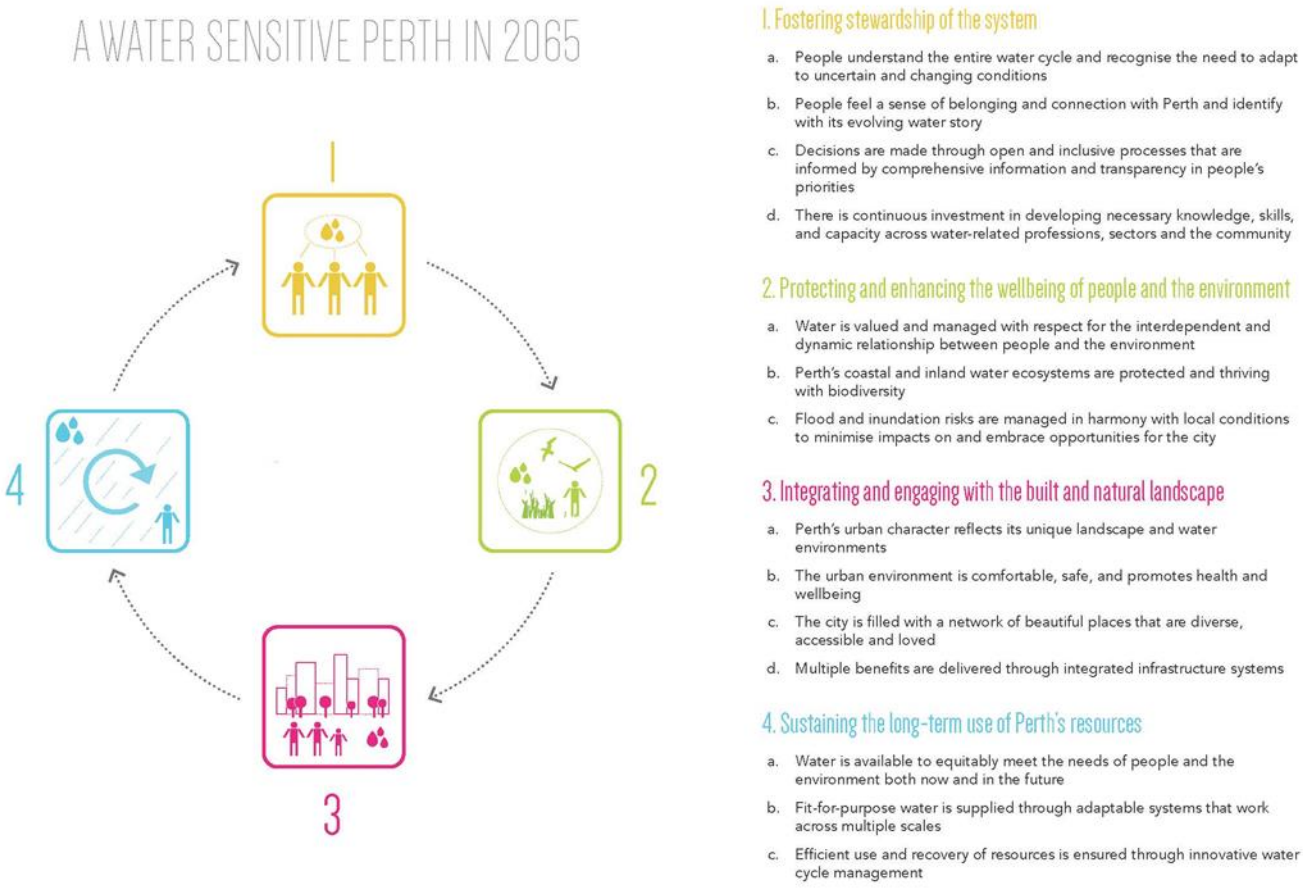


Figure 1: The vision for a water sensitive Perth in 2065

2.1 Benchmarking with the Water Sensitive Cities Index

To assist Perth to transition to its water sensitive city vision, a group of key water champions worked with the CRCWSC to apply the Water Sensitive Cities (WSC) Index benchmarking tool in 2016. The WSC Index articulates seven WSC goals, which organise 34 indicators representing the major attributes of a WSC. The results for each of the seven goals are shown in Figure 2 and Table 1. The CRCWSC has mapped the indicators to the idealised city-states in the Urban Water Transitions Framework (Hammer et al., 2018) and these are also shown in Figure 2.

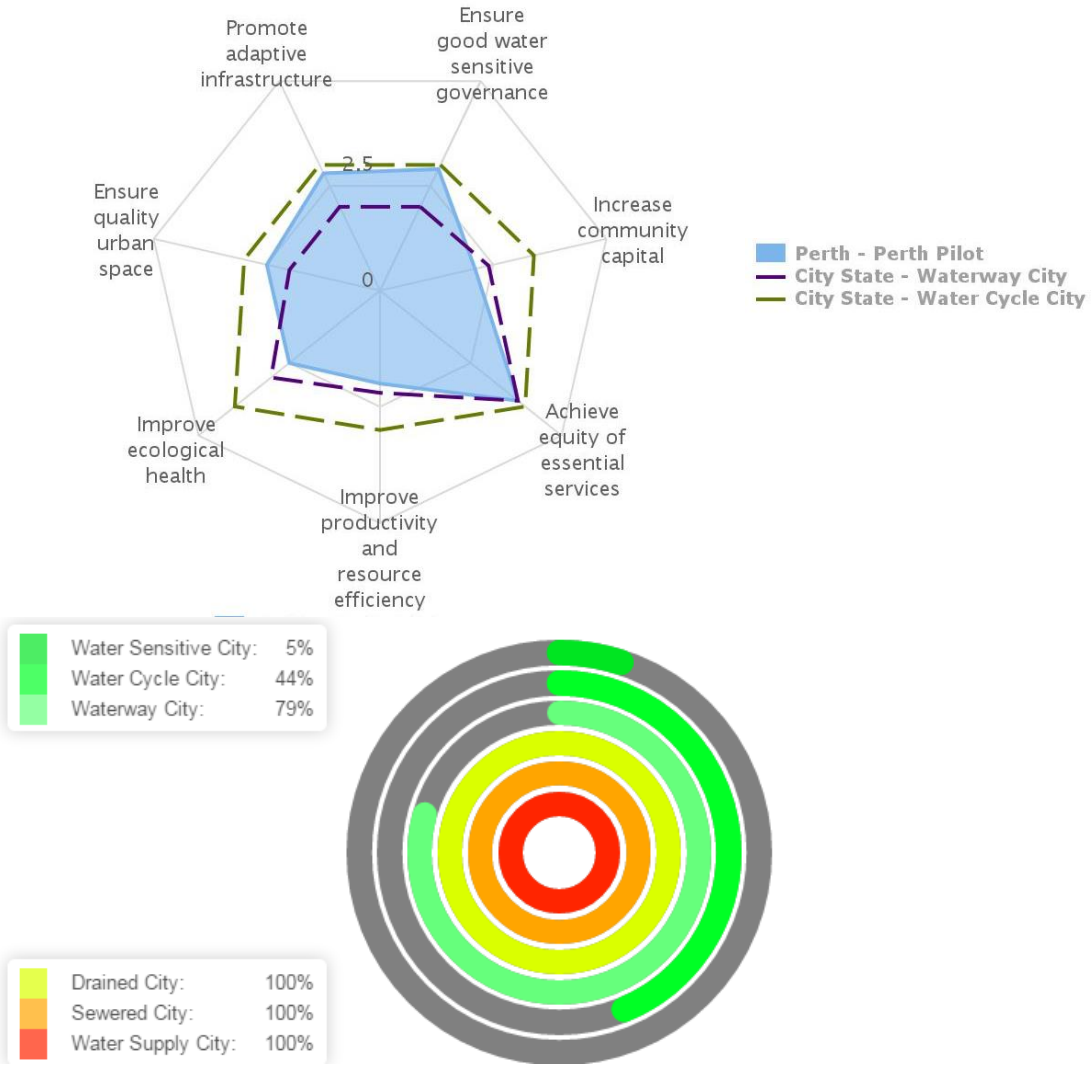


Figure 2: Results of Perth's benchmarking using the WSC Index in 2016

Perth is well-advanced at moving beyond the essential services of water supply, wastewater and drainage services, which are provided to a very high standard (100% achievement of a 'Water Supply', 'Sewered' and 'Drained' city in Figure 2). We are a city that has made good progress in managing water to achieve social,

amenity and environmental health outcomes (a ‘Waterway City’), as well as developing diverse, fit-for-purpose supplies (a ‘Water Cycle City’). The results suggest a need to focus on the goal areas of increasing community capital, improving ecological health and improving productivity and resource efficiency to progress Perth towards a water sensitive city.

While a score of ‘5’ for each goal is considered to represent achievement of the water sensitive city state, the CRCWSC recognises that a city’s local WSC vision may not emphasise all indicators of the WSC Index to the same degree. Perth’s vision scores were mapped by the CRCWSC and are shown in brackets in each indicator box in Table 1. Mapping of the indicators against the vision themes is shown in Table 1, represented by the colour of each vision theme. Some indicators may be relevant to multiple vision themes, but the mapping in Table 1 shows where each indicator is most relevant.

Table 1: WSC Index indicator scores for Perth benchmarked in 2016 and Perth's Vision in 2065 (vision scores in brackets)

Goal 1. Ensure good water sensitive governance 2.9 (4.1)	Goal 2. Increase community capital 2.1 (4.7)	Goal 3. Achieve equity of essential services 3.8 (4.8)	Goal 4. Improve productivity and resource efficiency 2.0 (4.0)	Goal 5. Improve ecological health 2.5 (4.5)	Goal 6. Ensure quality urban space 2.5 (4.3)	Goal 7. Promote adaptive infrastructure 2.8 (4.0)
1.1 Knowledge, skills and organisational capacity 3.0 (4.0)	2.1 Water literacy 2.0 (5.0)	3.1 Equitable access to safe and secure potable water supply 5.0 (5.0)	4.1 Benefits across other sectors because of water-related services 3.0 (5.0)	5.1 Healthy and biodiverse habitat 2.0 (5.0)	6.1 Activating connected pleasant urban green and blue space 3.0 (5.0)	7.1 Diverse fit-for-purpose water supply system 3.0 (4.0)
1.2 Water is key element in city planning and design 3.0 (5.0)	2.2 Connection with water 2.0 (5.0)	3.2 Equitable access to safe and reliable sanitation 4.0 (5.0)	4.2 Low GHG emission in water sector 1.0 (4.0)	5.2 Surface water quality and flows 3.0 (4.0)	6.2 Urban elements functioning as part of the urban water system 2.0 (4.0)	7.2 Multi-functional water system infrastructure 3.0 (4.0)
1.3 Cross-sector institutional arrangements and processes 3.0 (4.0)	2.3 Shared ownership, management and responsibility of water assets 2.0 (4.5)	3.3 Equitable access to flood protection 4.0 (4.0)	4.3 Low end-user potable water demand 2.0 (4.0)	5.3 Groundwater quality and replenishment 2.0 (4.0)	6.3 Vegetation coverage 2.5 (4.0)	7.3 Integration and intelligent control 3.0 (4.0)
1.4 Public engagement, participation and transparency 2.5 (4.0)	2.4 Community preparedness and response to extreme events 2.0 (5.0)	3.4 Equitable and affordable access to amenity values of water-related assets 2.0 (5.0)	4.4 Water-related economic and commercial opportunities 2.0 (3.0)	5.4 Protect existing areas of high ecological value 3.0 (5.0)		7.4 Robust infrastructures 3.0 (4.0)
1.5 Leadership, long-term vision and commitment 4.0 (4.0)	2.5 Indigenous involvement in water planning 2.5 (4.0)		4.5 Maximised resource recovery 2.0 (4.0)			7.5 Infrastructure and ownership at multiple scales 2.5 (4.0)
1.6 Water resourcing and funding to deliver broad societal value 3.0 (4.0)						7.6 Adequate maintenance 2.5 (4.0)
1.7 Equitable representation of perspectives 2.0 (4.0)						

Fostering stewardship of the system

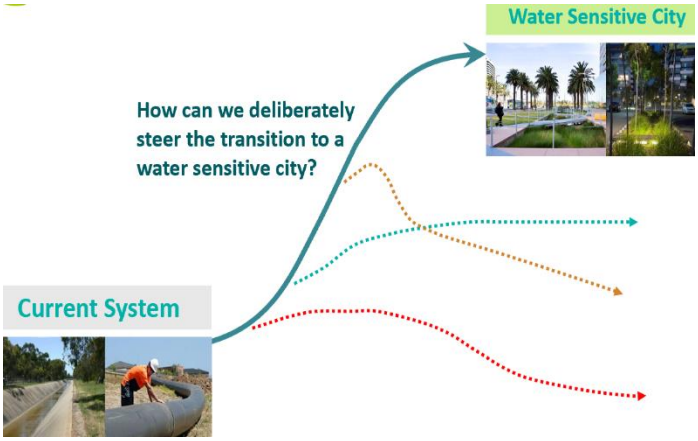
Protecting and enhancing the wellbeing of people and the environment

Integrating and engaging with the built and natural landscape

Sustaining the long-term use of Perth's resources

2.2 Advancing Perth's water sensitive transition

Lasting change is difficult to achieve. The conventional way of achieving an outcome is to develop a series of strategies or actions which support a defined objective or goal. It is generally assumed that by implementing the strategies, the desired outcomes are achieved. However, CRCWSC research has suggested that the nature of water sensitive cities is so complex that this simple approach is unlikely to be effective, and changes made are likely to only be effective in the short term. The research has demonstrated the importance of understanding the social processes that link the multiple complex, interconnected systems that comprise a WSC, and the need to deliberately guide a transition process to achieve lasting change.



Projects don't lead to transition – processes do

As described in the *Vision and Transition Strategy for a Water Sensitive Greater Perth* (Hammer et al., 2018), WSC transitions unfold over six phases: (1) an issue with old practice emerges and (2) becomes more defined; (3) people develop a shared understanding and agreement about the issue; (4) knowledge about solutions is disseminated; and (5) new solutions are diffused through policy and practice, and eventually (6) embedded as new mainstream practice (**Error! Reference source not found.**).

Figure 3: Phases of change

The CRCWSC recognises the importance of the need to move through these phases to create lasting change.

The CRCWSC's Transition Dynamics Framework builds on this idea and proposes five types of enabling factors that are needed to help to drive progress through the six phases of change: **champions, platforms for connecting, science and knowledge, projects and applications**, and **practical and administrative tools and instruments**. These five types of enabling factors are considered critical to create an enabling environment for accelerating water sensitive transitions.

2.3 Where is Perth at in its water sensitive city transition?

The CRCWSC research team, with the assistance of some participants in Perth, applied the Transition Dynamics Framework to Perth in 2015 and then again in 2017 (**Error! Reference source not found.**). The CRCWSC n oted:

> *The overall transition progress assessment for Perth suggests that significant advancements have been made towards its water sensitive vision. However, it is at risk of stagnation if critical enabling conditions are not established to shore up Phase 3 (shared understanding and issue agreement) and Phase 4 (knowledge dissemination) and continue pushing into Phase 5 (policy and practice diffusion).*

Based on this analysis, the *Vision and Transition Strategy for a Water Sensitive Greater Perth* (Hammer et al., 2018) recommended four high-level strategies to progress Perth's WSC transition:

I. Develop a broad community mandate for pursuing the vision for a water sensitive Perth

II. Embed Perth's water sensitive vision in organisational policies, plans and strategies

III. Increase knowledge about potential solutions for aspects of Perth's WSC vision that are less progressed

IV. Implement large-scale demonstrations and develop practical guidance for a broad range of water sensitive solutions.

These strategies have assisted development of the actions in this Plan.

Transition phase	Champions	Platforms for connecting	Knowledge	Projects and applications	Tools and instruments
1. Issue emergence	Issue activists	N/A	Issue highlighted	Issue examined	N/A
2. Issue definition	Individual champions	Sharing concerns and ideas	Causes and impacts examined	Solutions explored	N/A
3. Shared understanding & issue agreement	Connected champions	Developing a collective voice	Solutions developed	Solutions experimented with	Preliminary practical guidance
4. Knowledge dissemination	Aligned and influential champions	Building broad support	Solutions advanced	Significant solution demonstrations	Refined guidance and early policy
5. Policy & practice diffusion	Government agency champions	Expanding the community of practice	Capacity building	Widespread implementation and learning	Early regulation and targets
6. Embedding new practice	Multi-stakeholder networks	Guiding consistent application	Monitoring and evaluation	Standardisation and refinement	Comprehensive policy and regulation

Notes: Green boxes indicate the enabling factor is fully present and regression into the previous phase is unlikely. Yellow boxes indicate some presence, however they are vulnerable to regressing to the previous phase. Red boxes indicate a complete absence of the enabling factor, and that progression is unlikely.

Figure 4: Results of the application of the Transition Dynamics Framework to Perth in 2017

3. Achieving the vision through strategy and actions

The following action plan has a short-term focus, based on the long-term goal of achieving Perth's vision for a water sensitive city. It is intended to be a 'live' document that is annually reviewed and updated by the Water Sensitive Transition Network.

3.1 Achievements to date

Since the establishment of the Water Sensitive Transition Network (WSTN) in 2016 and its supporting subcommittees in 2017, the network has achieved a number of outcomes. These include:

- meetings with the Minister for Water to scope priority actions for the delivery of a Water wise Perth
- market research that explored the community's knowledge and perceptions of what it means to be part of a water sensitive community in Western Australia. The objective of the research was to guide messaging and communications that can be used across the different partner agencies to ultimately facilitate attitude and behaviour change within the community.
- development of a common list of messages and phrases to be used by all agencies on the WSTN to educate the community on water sensitive cities
- application of the Transition Dynamics Framework to Perth to identify the enabling conditions required to achieve WSC Index goals
- finalisation of the *Vision and Transition Strategy for a Water Sensitive Greater Perth* (Hammer et al., 2018) in partnership with the CRCWSC
- development of collective 'Policy Pitch' projects that were road tested by a panel of experts facilitated by Prof. John Thwaites
- input into the revision of *State Planning Policy 2.9: Water Resources* and *Modernising Western Australia's Planning System: Green paper for planning reform*
- an Open Space workshop to identify what research is needed to help deliver healthy, liveable cities that are resilient to a changing climate.

3.2 Actions for 2019–2021

The WSTN has identified a number of actions that its members will work on collectively to support and deliver between 2019 and 2021. The actions in the following sections were prioritised based on:

- the findings outlined in the *Vision and Transition Strategy for a Water Sensitive Greater Perth* (Hammer et al., 2018) including the recommended strategies

- Perth's WSC Index score and areas where there is the greatest opportunity for improvement to achieve the vision score (largest gaps)
- enabling factors that are emerging and therefore need a concerted effort to embed the practice change
- the knowledge of WSTN members, particularly to identify local opportunities for delivering outcomes.

3.3 Vision theme 1: Fostering stewardship of the system

	Action	Short-term target (by 2020)
1.1	Undertake social research to understand community values, benefits and people's connection to local water assets, and use this research in community engagement activities	Project plan prepared, funding for delivery obtained and research commenced Outcomes communicated to all parties on WSTN
1.2	Develop a number of simple messages targeting the public/community to increase water awareness; to be used by all organisations.	Messages developed, agreed and used by each agency on WSTN Marketing tool kit developed for use by developers and housing industry
1.3	Review existing community engagement programs (including those that do not have a water focus) and seek opportunities to include common messages	Messages are tested (and evaluated) e.g. in a METRONET community workshop or through a display at the Royal Show
1.4	Engage Whadjuk Noongar people to collect and use Noongar water knowledge and stories to inform water management planning and urban design, and to enhance community connection and cultural outcomes	Five water stories published Prepare project plan for Noongar involvement in water planning and decision making Seek comments and support from DPLH and SWALSC Seek funding for delivery
1.5	Provide a common WSTN portal to share information and facilitate collaboration between members	Portal established and being used by WSTN members
1.6	Develop partnerships around projects (on-ground projects and policies development) to connect a diverse range of stakeholders (including non-water sector)	Recognise Brabham and Knutsford as WSC exemplar projects which receive cross-agency support for delivery Share learnings of projects and collaboration processes on WSTN information portal and across state and local government agencies, including industry forums etc.
1.7	Build interest and support for water sensitive cities in local governments	Develop a coherent strategic engagement package targeting senior executives and elected officials in local government, which includes understanding linkages to local government roles and decisions

3.4 Vision theme 2: Protecting and enhancing the wellbeing of people and the environment

	Action	Short-term target (by 2020)
2.1	Partner with researchers to provide evidence which strengthens relationships between water system services and mental and physical health (e.g. urban heat, WSC business case)	Prepare project plan and seek funding for delivery Use big data to identify where the priority community health issues are/will be located
2.2	Undertake a coordinated education program to increase the community's understanding of how urban activities impact the health of wildlife and people	Education program scoped and funding for delivery secured
2.3	Reduce contaminants, including nutrients, organic material and sediment, entering the Swan and Canning rivers and maintain or improve environmental flows	Implement the River Protection Strategy
2.4	Implement trials and demonstrations of both technical and governance solutions that aim to improve environmental health, including an explicit learning agenda (link to actions 3.5 and 4.3)	Recognise Brabham, Hamilton Hill and Knutsford as WSC exemplar projects which receive cross-agency support for delivery Clarify objectives (e.g. to address specific governance or regulatory barrier) and focus on priority issues in both greenfield and infill, e.g. minimise importation of sand fill; improve water quality; mitigate urban heat
2.5	Continue the Drainage for Liveability program	Five (5) Drainage for Liveability projects completed
2.6	Translate policy goals for the wellbeing of people and the environment into system-wide standards and programs of implementation	Clearly articulate the desired outcomes (what needs to be done where and when) and support with targets (e.g. potentially related to urban heat mitigation, tree canopy coverage, water quality and quantity management) Develop water quality targets for protection of receiving environments and for use in UNDO (Urban Nutrient Decision Outcomes) tool Government to adequately resource the preparation of strategic guidance and water management report assessment officers

3.5 Vision theme 3: Integrating and engaging with the built and natural landscape

	Action	Short-term target (by 2020)
3.1	Document and quantify benefits of public and private open space and green infrastructure, including maintenance costs, to support ongoing maintenance commitments by local governments (link to action 4.5)	Gather financial information on lifecycle benefits and costs of WSUD vs conventional drainage/POS, focusing on maintenance, and share comparison via a database of information
3.2	Continue to undertake and support applied research to deliver outcomes (including secure funding) Research findings to inform the development of policies and guidance	Measure performance of a range of WSUD assets in various site conditions and share learnings on performance, design and maintenance Develop guidance that emphasises the need to identify and address the critical water issues within a site and development (place) context
3.3	Strengthen and expand university curriculum for urban planning and design courses to give multi-disciplinary focus to water	WSUD principles are a component of first year planning degrees at UWA, Curtin and Edith Cowan universities
3.4	Support professional and individual development of water professionals and champions to deliver WSC solutions	New WAter Ways to collaborate with the International Water Centre to develop and deliver training session Work with industry peak bodies to develop training programs for urban professionals and provide mentors – at least one collaborative event with each agency each year
3.5	Lead and demonstrate best practice urban form through State government development agencies (LandCorp, MRA and the Department of Communities) Developments at Hamilton Hill, Knutsford, Brabham, Bentley and the METRONET infill precincts, to apply water sensitive design at different urban forms and scales (link with actions 2.4 and 4.3)	Recognise Brabham, Hamilton Hill and Knutsford as WSC exemplar projects, which receive cross-agency support for delivery
3.6	Participate in Government policy development initiatives, which include Water Resource Management Bill, State Planning Policies (SPP) review, Waterwise Perth Strategy, Environmental Protection Policies, Better Water Urban Management review, Design WA, Climate Change Adaptation	Revised Water Resources State Planning Policy and guidelines supported by every agency in the WSTN Updated IPWEA Subdivisional Guidelines adequately address WSC/total water cycle outcomes and are supported by WSTN agencies WSTN to assist in preparing Precinct Design Policy (Design WA)
3.7	Develop a policy or approach for allocation of groundwater and alternative non-potable sources of water that incorporates values/prioritisation (e.g. public benefit, POS) and considers scale, use and feasibility	Action supported by Government, program scoped and funding for delivery secured
3.8	Integrate relevant water issues into regional and district water planning to support implementation of *Perth & Peel @ 3.5million*	Priority areas identified and scopes prepared for integrated water plans that address key water issues, which may include identification of sources for irrigation of POS, strategies for management of stormwater and groundwater, protection of high value environments, and land/infrastructure required for flood protection

	Action	Short-term target (by 2020)
3.9	Hold an annual symposium or conference that brings academics and professionals together to explore emerging knowledge and solutions	Demonstrate how WSC outcomes can be delivered through built form including building scale application of green infrastructure
3.10	Improve public access to water bodies within the Greater Perth area	Maintain and improve the level of public access to and along foreshore areas of the Swan and Canning rivers Implement Swan Canning Riverpark Trail, including walking, cycling and kayaking trails

3.6 Vision theme 4: Sustaining the long-term use of Perth's resources

	Action	Short-term target (by 2020)
4.1	Support local governments to undertake visioning / benchmarking workshops and progress towards achievement of Waterwise Gold status and eligibility for Platinum status	50% of metropolitan local governments have achieved Waterwise Gold status and 30% of local governments are eligible for Platinum status
4.2	Integrate WSC principles into WA's climate change policy to address the water energy nexus	WSC principles and water-energy nexus explicitly recognised in State Climate Change Policy
4.3	Continue to build organisational and industry capacity through adequately resourced capacity building programs (e.g. New WAter Ways)	Ongoing funding secured for New WAter Ways (at least $100k pa).
4.4	Implement trials and demonstrations of innovative adaptive, multi-functional and resource recovery solutions, including an explicit learning agenda	Support the Water Corporation's Water Research and Innovation Precinct to pilot new wastewater treatment and water resource recovery technologies based on sustainability principles
4.5	Share knowledge and data through strengthened collaboration platforms focused on delivering adaptive infrastructure and resource efficiency solutions across organisations and sectors (link to action 3.1)	Develop data sharing platform for water monitoring data (similar to the Index of Biodiversity Surveys for Assessments)
4.6	Strengthen policy and regulation to encourage and enable adaptive infrastructure and resource recovery solutions to be adopted	Incentivise reuse and recycling schemes that are appropriate at scale and fit for purpose
4.7	Share economic valuation methods to support business cases for different scales and beneficiaries (including maintenance of water sensitive systems)	Life cycle cost/benefit information for a range of treatments at various scales is readily accessible Develop a business case for maintenance that is used by local governments to obtain support for appropriate levels of resourcing
4.8	Quantify non-market values (benefits/risks) and share effective tools, supported by industry training	CRCWSC benefit cost analysis tool and benefit transfer tool used by WSTN agencies and the broader industry One training course held

4. Implementation

One of the most significant learnings from the CRCWSC research is that creating a liveable, productive, sustainable and resilient city cannot be achieved through the actions of one agency, one industry or one project – it requires the collaborative effort of government at all levels, working with industry and the community to bring about lasting change.

This Plan is intended to provide guidance for future policy and planning, to be used by many different stakeholders as a sector-wide strategic framework to inform the development of intra- and cross-organisational policies, strategies and programs.

As stated previously, this document and the actions it describes have no status in government policy. The key driver for implementation of this Plan is the WSTN.

4.1 Water Sensitive Transition Network

The WSTN is a community of practice – a group of people who share a concern or a passion for something they do and learn how to do it better as they interact regularly.

The WSTN is informal and self-organising, with a mutual desire to work collaboratively in partnership towards beneficial outcomes, but with no formal obligations imposed on individuals or organisations with respect to funding/resourcing.

The WSTN members respect the Charter which outlines the following attributes and behaviours of the network and its members:

- We are a leadership group of champions in the urban water sector.
- Individually and collectively we have the ability (be it knowledge, networks, authority, legitimacy) to influence decision making in relation to urban water management to progress a water sensitive Perth.
- We are supported by our respective organisations' mandates, and can represent our agencies, to contribute towards a water sensitive Perth.
- We strive to work individually and collectively towards our common aim of a water sensitive Perth.
- We proactively focus on strategic activities to progress Perth's transition to a water sensitive city.
- We provide a forum for new information, learning and projects to be shared.
- As a group, we are informal and flexible in nature.
- Our collective role will evolve over time, responding to opportunities and adapting to challenges.

We will:

- act as water sensitive city champions and advocate for a WSC approach within our professional networks and within our organisations
- represent our respective organisations as we provide advice and support as appropriate on the WSC approach within and external to the group
- provide eyes and ears into the Perth community on opportunities to advance a WSC
- share information on successes and 'not so good' outcomes
- promote coordinated, common messages (both verbally and written) around water sensitive cities
- act in good faith and in the spirit of collaboration.

Due to the scope, scale and complex nature of work required to transition Perth to a water sensitive city, the WSTN established four subcommittees to enhance opportunities for collaboration and delivery:

- Community Engagement and Communication
- Policy and Governance
- Technical Capacity and Partnerships
- Research.

These subcommittees meet regularly and have developed their own work programs to support new ideas, seek opportunities, work constructively through challenges, share lessons and influence others.

4.2 Monitoring progress

Perth's transition towards its WSC vision will require significant changes across the structures, cultures and practices of urban and water system planning, design, management, engagement and decision making. These changes are likely to occur over a long timeframe, which makes monitoring and review of progress difficult. It will be possible to monitor implementation of actions identified in this Plan at an individual level; however, it is critical that monitoring of progress is also undertaken at a higher, macro level.

4.2.1. Macro-level progress

The WSTN will review progress towards achieving the vision by applying the WSC Index benchmarking tool and Transition Dynamics Framework every three years. This will assist in identifying new areas of focus (new strategies and actions), on the basis of progress measured by these tools.

Consideration will then be given to the relationships between the vision themes, Index goals (and indicators), enabling conditions and strategies in the *Vision and Transition Strategy for a Water Sensitive Greater Perth* (Hammer, et al., 2018) that will optimise outcomes.

4.2.2. Actions

Due to the short-term focus of this action plan, it will be reviewed annually, with completed actions recognised in the next version.

The WSTN will prioritise new actions for inclusion by applying the criteria described in section 3.

5. References

Hammer, K., Rogers, B.C., Chesterfield, C., (2018). *Vision and Transition Strategy for a Water Sensitive Greater Perth*. Melbourne, Australia: Cooperative Research Centre for Water Sensitive Cities.

Rogers, B.C., Hammer, K., Werbeloff, L., Chesterfield, C., (2015). *Shaping Perth as a Water Sensitive city: Outcomes of a participatory process to develop a vision and strategic transition framework*. Melbourne, Australia: Cooperative Research Centre for Water Sensitive Cities.

Attachment 1 – Perth Water Sensitive Transition Network Participants 2019

Name	Organisation
Giles Pickard (WSTN Deputy Chair)	City of Canning and Australian Institute of Landscape Architects
Rachel Williams	City of Canning
Claire Braithwaite	City of Cockburn
Natalie Lees	City of Mandurah
Max Hipkins	City of Nedlands
Shelley Smith	City of Perth
Anita Marriott	City of Vincent
Sara Orsi	City of Vincent
Mike Mouritz (Chair, Research Subcommittee)	CRCWSC Board Director
Katie Hammer	CRC for Water Sensitive Cities
Emma Yuen	CRC for Water Sensitive Cities
John Savell (WSTN Chair)	Department of Communities (Housing)
Sue Martins	Department of Communities (Housing)
Emma Monk (Chair, Technical Capacity & Partnerships Subcommittee)	Department of Biodiversity, Conservation and Attractions
Richard Theobald	Department of Health
May Carter	Department of Local Government, Sport and Cultural Industries
Rob Thomson	Department of Local Government, Sport and Cultural Industries
Loretta Van Gasselt	Department of Planning, Lands and Heritage

Name	Organisation
Winsome MacLaurin (Chair, Community Engagement & Communication Subcommittee) (WSTN Executive Support)	Department of Water and Environmental Regulation
Susan Worley	Department of Water and Environmental Regulation
David Horn	GHD
Josh Byrne	Josh Byrne and Associates
Greg Ryan	LandCorp
Nadja Kampfhenkel	Lendlease
Jason Pitman	Perth NRM
Tanya Steinbeck	UDIA
Samantha Thompson	UDIA
Shelley Shepherd	Urbaqua
Carolyn Oldham	UWA
Mark Batty	WALGA
Natasha Ogonowski	Water Corporation
Nadine Riethmuller	Water Corporation
Mel Roosendaal	Water Corporation
Antonietta Torre	Water Corporation
Sergey Volotovskiy (Chair, Policy & Governance Subcommittee)	Water Corporation
Giles Pickard (WSTN Deputy Chair)	City of Canning and Australian Institute of Landscape Architects

Attachment 2 – Transition Dynamics Framework matrices for Perth

Transition Dynamics Framework was applied to Perth in 2015 and 2017. The framework is provided below.

		Enabling factors				
Phases of change	Transition phase	Champions	Platforms for connecting	Knowledge	Projects and applications	Tools and instruments
	1. Issue emergence	Issue activists		Issue highlighted	Issue examined	
	2. Issue definition	Individual champions	Sharing concerns and ideas	Causes and impacts examined	Solutions explored	
	3. Shared understanding & issue agreement	Connected champions	Developing a collective voice	Solutions developed	Solutions experimented with	Preliminary practical guidance
	4. Knowledge dissemination	Influential champions	Building broad support	Solutions advanced	Solutions demonstrated at scale	Refined guidance and early policy
	5. Policy and practice diffusion	Government agency champions	Expanding the community of practice	Capacity building	Widespread implementation and learning	Early regulation and targets
	6. Embedding new practice	Multi-stakeholder networks	Guiding consistent application	Monitoring and evaluation	Standardisation and refinement	Comprehensive policy and regulation

When applying the Transition Dynamics Framework, it is important to have a clear understanding of the practice change you are applying it to. Participants noted that it was sometimes necessary to 'split' or redefine an outcome if there was a wide range of possible enabling factors, because it was difficult to define the appropriate phase of change. Accordingly, 12 separate assessments were undertaken to obtain a comprehensive picture of where Perth was in relation to the WSC Index goals and indicators.

The process usually commences with the consideration of champions, and works left to right across the enabling factors, determining whether:

- the enabling factor is fully present and regression into the previous phase is unlikely – coloured green
- some presence of the enabling factor, however they are vulnerable to regressing to the previous phase – coloured yellow
- a complete absence of the enabling factor, and that progression is unlikely – coloured red.

Although there are no points on the process which are considered to have more impact than others, it has been suggested that a transition is more likely to be effective where more progress is made on the left-hand side of the matrix, because this drives progress towards the right.

The outcomes of the assessments in 2015 and 2017 are provided below to assist in the ongoing review of Perth's progress.

Perth 2015

Transition phase	Champions	Platforms for connecting	Knowledge	Projects and applications	Tools and instruments
1. Issue emergence	Issue activists	N/A	Issue highlighted	Issue examined	N/A
2. Issue definition	Individual champions	Sharing concerns and ideas	Causes and impacts examined	Solutions explored	N/A
3. Shared understanding & issue agreement	Connected champions	Developing a collective voice	Solutions developed	Solutions experimented with	Preliminary practical guidance
4. Knowledge dissemination	Influential champions	Building broad support	Solutions advanced	Solutions demonstrated at scale	Refined guidance and early policy
5. Policy & practice diffusion	Government agency champions	Expanding the community of practice	Capacity building	Widespread implementation and learning	Early regulation and targets
6. Embedding new practice	Multi-stakeholder networks	Guiding consistent application	Monitoring and evaluation	Standardisation and refinement	Comprehensive policy and regulation

Perth 2017

Transition phase	Champions	Platforms for connecting	Knowledge	Projects and applications	Tools and instruments
1. Issue emergence	Issue activists	N/A	Issue highlighted	Issue examined	N/A
2. Issue definition	Individual champions	Sharing concerns and ideas	Causes and impacts examined	Solutions explored	N/A
3. Shared understanding & issue agreement	Connected champions	Developing a collective voice	Solutions developed	Solutions experimented with	Preliminary practical guidance
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6. Embedding new practice	Multi-stakeholder networks	Guiding consistent application	Monitoring and evaluation	Standardisation and refinement	Comprehensive policy and regulation

The detailed assessments undertaken in 2017 are provided below. Evidence and justification for the assessments can be found in the *Vision and Transition Strategy for a Water Sensitive Greater Perth* (Hammer et al., 2018).

Goal 1: Ensure good water sensitive governance

Transition phase	Champions	Platforms for connecting	Knowledge	Projects and applications	Tools and instruments
1. Issue emergence	Issue activists	N/A	Issue highlighted	Issue examined	N/A
2. Issue definition	Individual champions	Sharing concerns and ideas	Causes and impacts examined	Solutions explored	N/A
3. Shared understanding & issue agreement	Connected champions	Developing a collective voice	Solutions developed	Solutions experimented with	Preliminary practical guidance
4. Knowledge dissemination	Influential champions	Building broad support	Solutions advanced	Solutions demonstrated at scale	Refined guidance and early policy
5. Policy & practice diffusion	Government agency champions	Expanding the community of practice	Capacity building	Widespread implementation and learning	Early regulation and targets
6. Embedding new practice	Multi-stakeholder networks	Guiding consistent application	Monitoring and evaluation	Standardisation and refinement	Comprehensive policy and regulation

Goal 2: Increase community capital

Transition phase	Champions	Platforms for connecting	Knowledge	Projects and applications	Tools and instruments
1. Issue emergence	Issue activists	N/A	Issue highlighted	Issue examined	N/A
2. Issue definition	Individual champions	Sharing concerns and ideas	Causes and impacts examined	Solutions explored	N/A
3. Shared understanding & issue agreement	Connected champions	Developing a collective voice	Solutions developed	Solutions experimented with	Preliminary practical guidance
4. Knowledge dissemination	Influential champions	Building broad support	Solutions advanced	Solutions demonstrated at scale	Refined guidance and early policy
5. Policy & practice diffusion	Government agency champions	Expanding the community of practice	Capacity building	Widespread implementation and learning	Early regulation and targets
6. Embedding new practice	Multi-stakeholder networks	Guiding consistent application	Monitoring and evaluation	Standardisation and refinement	Comprehensive policy and regulation

Indicator 2.5 Indigenous involvement in water planning

Transition phase	Champions	Platforms for connecting	Knowledge	Projects and applications	Tools and instruments
1. Issue emergence	Issue activists	N/A	Issue highlighted	Issue examined	N/A
2. Issue definition	Individual champions	Sharing concerns and ideas	Causes and impacts examined	Solutions explored	N/A
3. Shared understanding & issue agreement	Connected champions	Developing a collective voice	Solutions developed	Solutions experimented with	Preliminary practical guidance
4. Knowledge dissemination	Influential champions	Building broad support	Solutions advanced	Solutions demonstrated at scale	Refined guidance and early policy
5. Policy & practice diffusion	Government agency champions	Expanding the community of practice	Capacity building	Widespread implementation and learning	Early regulation and targets
6. Embedding new practice	Multi-stakeholder networks	Guiding consistent application	Monitoring and evaluation	Standardisation and refinement	Comprehensive policy and regulation

Indicator 3.4 Equitable access to amenity values of water-related assets

Transition phase	Champions	Platforms for connecting	Knowledge	Projects and applications	Tools and instruments
1. Issue emergence	Issue activists	N/A	Issue highlighted	Issue examined	N/A
2. Issue definition	Individual champions	Sharing concerns and ideas	Causes and impacts examined	Solutions explored	N/A
3. Shared understanding & issue agreement	Connected champions	Developing a collective voice	Solutions developed	Solutions experimented with	Preliminary practical guidance
4. Knowledge dissemination	Influential champions	Building broad support	Solutions advanced	Solutions demonstrated at scale	Refined guidance and early policy
5. Policy & practice diffusion	Government agency champions	Expanding the community of practice	Capacity building	Widespread implementation and learning	Early regulation and targets
6. Embedding new practice	Multi-stakeholder networks	Guiding consistent application	Monitoring and evaluation	Standardisation and refinement	Comprehensive policy and regulation

Indicators 4.1 Benefits across other sectors and 4.4 Water-related economic & commercial opportunities

Transition phase	Champions	Platforms for connecting	Knowledge	Projects and applications	Tools and instruments
1. Issue emergence	Issue activists	N/A	Issue highlighted	Issue examined	N/A
2. Issue definition	Individual champions	Sharing concerns and ideas	Causes and impacts examined	Solutions explored	N/A
3. Shared understanding & issue agreement	Connected champions	Developing a collective voice	Solutions developed	Solutions experimented with	Preliminary practical guidance
4. Knowledge dissemination	Influential champions	Building broad support	Solutions advanced	Solutions demonstrated at scale	Refined guidance and early policy
5. Policy & practice diffusion	Government agency champions	Expanding the community of practice	Capacity building	Widespread implementation and learning	Early regulation and targets
6. Embedding new practice	Multi-stakeholder networks	Guiding consistent application	Monitoring and evaluation	Standardisation and refinement	Comprehensive policy and regulation

Indicators 4.2 Low GHG emissions and 4.5 Maximised resource recovery

Transition phase	Champions	Platforms for connecting	Knowledge	Projects and applications	Tools and instruments
1. Issue emergence	Issue activists	N/A	Issue highlighted	Issue examined	N/A
2. Issue definition	Individual champions	Sharing concerns and ideas	Causes and impacts examined	Solutions explored	N/A
3. Shared understanding & issue agreement	Connected champions	Developing a collective voice	Solutions developed	Solutions experimented with	Preliminary practical guidance
4. Knowledge dissemination	Influential champions	Building broad support	Solutions advanced	Solutions demonstrated at scale	Refined guidance and early policy
5. Policy & practice diffusion	Government agency champions	Expanding the community of practice	Capacity building	Widespread implementation and learning	Early regulation and targets
6. Embedding new practice	Multi-stakeholder networks	Guiding consistent application	Monitoring and evaluation	Standardisation and refinement	Comprehensive policy and regulation

Indicator 4.3 Low end-user potable water demand

Transition phase	Champions	Platforms for connecting	Knowledge	Projects and applications	Tools and instruments
1. Issue emergence	Issue activists	N/A	Issue highlighted	Issue examined	N/A
2. Issue definition	Individual champions	Sharing concerns and ideas	Causes and impacts examined	Solutions explored	N/A
3. Shared understanding & issue agreement	Connected champions	Developing a collective voice	Solutions developed	Solutions experimented with	Preliminary practical guidance
4. Knowledge dissemination	Influential champions	Building broad support	Solutions advanced	Solutions demonstrated at scale	Refined guidance and early policy
5. Policy & practice diffusion	Government agency champions	Expanding the community of practice	Capacity building	Widespread implementation and learning	Early regulation and targets
6. Embedding new practice	Multi-stakeholder networks	Guiding consistent application	Monitoring and evaluation	Standardisation and refinement	Comprehensive policy and regulation

Goal 5: Ecological health

Transition phase	Champions	Platforms for connecting	Knowledge	Projects and applications	Tools and instruments
1. Issue emergence	Issue activists	N/A	Issue highlighted	Issue examined	N/A
2. Issue definition	Individual champions	Sharing concerns and ideas	Causes and impacts examined	Solutions explored	N/A
3. Shared understanding & issue agreement	Connected champions	Developing a collective voice	Solutions developed	Solutions experimented with	Preliminary practical guidance
4. Knowledge dissemination	Influential champions	Building broad support	Solutions advanced	Solutions demonstrated at scale	Refined guidance and early policy
5. Policy & practice diffusion	Government agency champions	Expanding the community of practice	Capacity building	Widespread implementation and learning	Early regulation and targets
6. Embedding new practice	Multi-stakeholder networks	Guiding consistent application	Monitoring and evaluation	Standardisation and refinement	Comprehensive policy and regulation

Indicator 5.2: Surface water quality and flows

Transition phase	Champions	Platforms for connecting	Knowledge	Projects and applications	Tools and instruments
1. Issue emergence	Issue activists	N/A	Issue highlighted	Issue examined	N/A
2. Issue definition	Individual champions	Sharing concerns and ideas	Causes and impacts examined	Solutions explored	N/A
3. Shared understanding & issue agreement	Connected champions	Developing a collective voice	Solutions developed	Solutions experimented with	Preliminary practical guidance
4. Knowledge dissemination	Influential champions	Building broad support	Solutions advanced	Solutions demonstrated at scale	Refined guidance and early policy
5. Policy & practice diffusion	Government agency champions	Expanding the community of practice	Capacity building	Widespread implementation and learning	Early regulation and targets
6. Embedding new practice	Multi-stakeholder networks	Guiding consistent application	Monitoring and evaluation	Standardisation and refinement	Comprehensive policy and regulation

Indicators 6.1 Activating connected pleasant urban green and blue space and 6.3 Vegetation coverage

Transition phase	Champions	Platforms for connecting	Knowledge	Projects and applications	Tools and instruments
1. Issue emergence	Issue activists	N/A	Issue highlighted	Issue examined	N/A
2. Issue definition	Individual champions	Sharing concerns and ideas	Causes and impacts examined	Solutions explored	N/A
3. Shared understanding & issue agreement	Connected champions	Developing a collective voice	Solutions developed	Solutions experimented with	Preliminary practical guidance
4. Knowledge dissemination	Influential champions	Building broad support	Solutions advanced	Solutions demonstrated at scale	Refined guidance and early policy
5. Policy & practice diffusion	Government agency champions	Expanding the community of practice	Capacity building	Widespread implementation and learning	Early regulation and targets
6. Embedding new practice	Multi-stakeholder networks	Guiding consistent application	Monitoring and evaluation	Standardisation and refinement	Comprehensive policy and regulation

Indicator 6.2 Urban elements functioning as part of the urban water system

Transition phase	Champions	Platforms for connecting	Knowledge	Projects and applications	Tools and instruments
1. Issue emergence	Issue activists	N/A	Issue highlighted	Issue examined	N/A
2. Issue definition	Individual champions	Sharing concerns and ideas	Causes and impacts examined	Solutions explored	N/A
3. Shared understanding & issue agreement	Connected champions	Developing a collective voice	Solutions developed	Solutions experimented with	Preliminary practical guidance
4. Knowledge dissemination	Influential champions	Building broad support	Solutions advanced	Solutions demonstrated at scale	Refined guidance and early policy
5. Policy & practice diffusion	Government agency champions	Expanding the community of practice	Capacity building	Widespread implementation and learning	Early regulation and targets
6. Embedding new practice	Multi-stakeholder networks	Guiding consistent application	Monitoring and evaluation	Standardisation and refinement	Comprehensive policy and regulation

Goal 7. Promote adaptive infrastructure

Transition phase	Champions	Platforms for connecting	Knowledge	Projects and applications	Tools and instruments
1. Issue emergence	Issue activists	N/A	Issue highlighted	Issue examined	N/A
2. Issue definition	Individual champions	Sharing concerns and ideas	Causes and impacts examined	Solutions explored	N/A
3. Shared understanding & issue agreement	Connected champions	Developing a collective voice	Solutions developed	Solutions experimented with	Preliminary practical guidance
4. Knowledge dissemination	Influential champions	Building broad support	Solutions advanced	Solutions demonstrated at scale	Refined guidance and early policy
5. Policy & practice diffusion	Government agency champions	Expanding the community of practice	Capacity building	Widespread implementation and learning	Early regulation and targets
6. Embedding new practice	Multi-stakeholder networks	Guiding consistent application	Monitoring and evaluation	Standardisation and refinement	Comprehensive policy and regulation

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04 October, 2019

Dear Member of the UDIA Water Committee

Thank you to those members of the UDIA Water Committee who were able to meet with me at the UDIA WA offices on Friday, 20 September, 2020 to discuss a proposed project by an *Expert Panel on Urban Developments Impacted by High Groundwater*, convened by the Cooperative Research Centre for Water Sensitive Cities (CRCWSC), administered by the University of Western Australia (UWA) and chaired by me.

Thanks especially for the positive responses and suggestions about how the Expert Panel might best go about preparing its proposed two main products:-

1. Guidance for planning and designing urban developments in high groundwater areas, building on practitioners' experience and knowledge of the Swan Coastal Plain; and
2. Recommendations for further research, data and information collection and/or methods that may improve the guidance over time.

The Expert Panel is now seeking participation in the project from practitioners who are willing to volunteer relevant data and information and discuss particular "case study" projects to inform and assist the Expert Panel's considerations. We recognise the time impositions and constraints on busy people through projects such as this one, and consequently the Expert Panel suggests that using already documented material may be helpful, where it can be made available.

Some further details about the suggested way for participation in the project are contained in the attached Participant Information Form (which is also part of the ethics approval process under the UWA's administrative requirements for projects of this nature).

As I outlined at the meeting, the Expert Panel fully respects participation in the project to be completely voluntary and confidential and this is underpinned through the attached Participant Consent Form (which again is part of the ethics approval process under the UWA's administrative requirements for projects of this nature).

I encourage you to support the proposed work of the Expert Panel and cordially invite you to participate in the project, which I believe can bring benefits to the urban development industry, to consultants, to planning and regulatory decision makers, and to the general community.

If you and/or your organisation wishes to participate in the project, could you please:

1. Inform me of same in principle, preferably by Friday 25 October, 2019, so that I can schedule a discussion with you and/or your nominee/s; and
2. Suggest a day/s and a time/s that would be suitable for you/your organisation to meet with the Expert Panel for 90-120 minutes during Tuesday 12 to Friday 15 November, 2019.

Following your advice, I will be in contact to confirm arrangements for participation in the project.

In addition, I will keep the UDIA Water Committee informed about progress with the project.

If you wish to discuss any of this further or require more information or clarifications, please contact me on email greg.k.claydon@gmail.com or mobile 0417009385.

I look forward to hearing from you.

Best regards

Greg Claydon