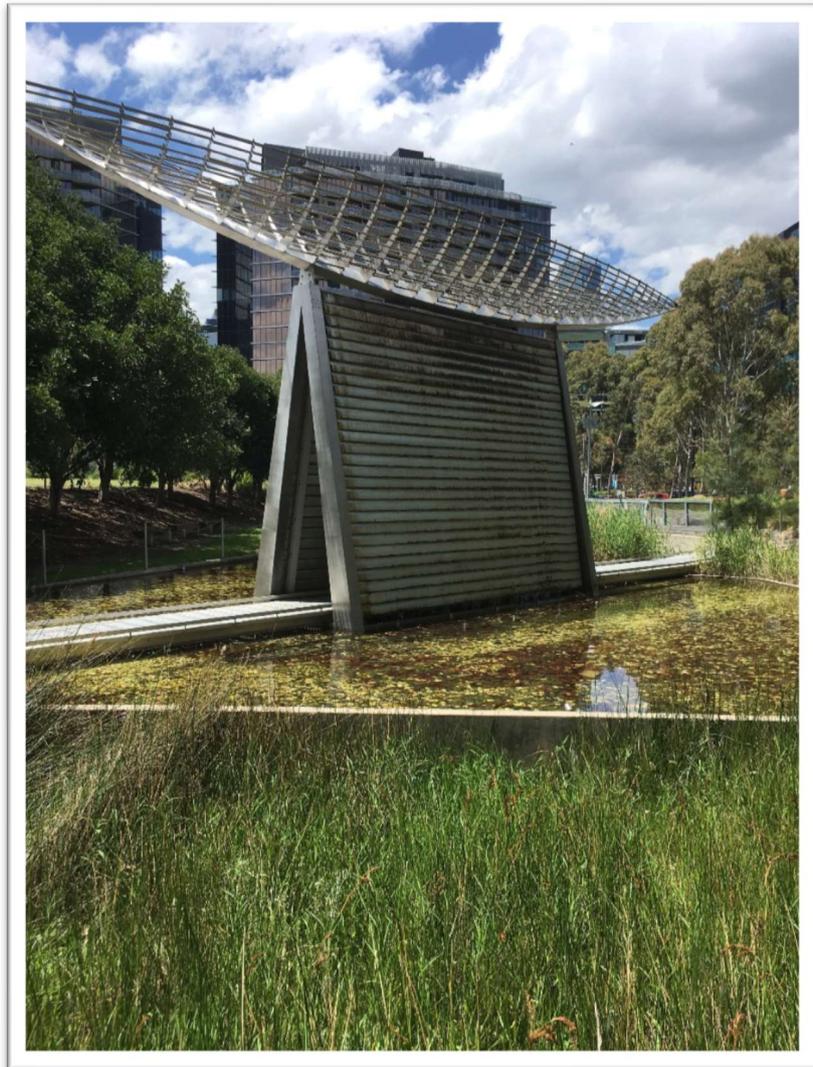


Activating WSUD for Healthy, Resilient Communities

Study trip to Melbourne, November 2018

Findings



National
Science
Challenges

BUILDING BETTER
HOMES, TOWNS
AND CITIES

Ko ngā wā kāinga hei
whakamahorahora

1 Introduction

Current research conducted as part of New Zealand’s “Building Better Homes Towns and Cities” National Science Challenge is investigating ways of activating the adoption of Water Sensitive Urban Design (WSUD) in Aotearoa New Zealand.

The “Activating WSUD” research project began in late 2017 with a “discovery phase”: workshops and surveys to explore barriers to the adoption of WSUD in New Zealand. A wide range of barriers were identified, leading to recommendations for a programme of research¹. Recognising the relatively limited duration of the project (approx. 18 months in total), the programme focuses on the delivery of ‘quick wins’ while also building a longer-term research plan.

The project is currently implementing that programme, which includes three Core Research (CR) activities that aim to:

- Provide a better understanding of the life cycle costs of WSUD;
- Better characterize and evaluate the full benefits of WSUD;
- Provide guidance on maintenance-led design practices.

A related activity is to disseminate information on options for incentivizing the uptake of WSUD.

A key complementary component of the programme is the continuation of the discovery activities initiated in the first phase of the project. The research team identified Melbourne as a target location for advancing the project’s knowledge base, being home to Australia’s Co-operative Research Centre for Water Sensitive Cities (CRCWSC) as well as agencies that have world-leading experience in the implementation of WSUD.

Recognizing the significant value to the project to be gained by learning and reflecting on insights generated by the substantial Australian experience in WSUD, a team of three researchers (Jonathan Moores, Sue Ira and Chris Batstone) visited Melbourne over the three-day period 19-21 November 2018. As well as meeting researchers and practitioners from a wide range of disciplines, the team also visited a major WSUD field study and many examples of the practical application of WSUD through the city.

2 Objectives and Scope

The learning objective of the study trip was to:

“Learn from WSUD success stories: to hear about WSUD characteristics (what), activating factors (why) and implementation approaches (how) that have delivered successful WSUD projects in Australian cities.”

While the team was interested to hear about experiences on any aspect of WSUD, engagement with Australian peers was considered to be especially relevant to informing the following research activities¹:

¹ Moores, J., Batstone, C., Simcock, R. and Ira, S. (2018). Activating WSUD for Healthy Resilient Communities – Discovery Phase: Results and Recommendations. Research report to the Building Better Homes, Towns and Cities National Science Challenge.

- Developing and providing guidance on methods for cost-benefit analysis (CBA)/cost-effectiveness analysis (CEA);
- Reviewing and providing guidance on potential options for incentivising uptake of WSUD and potential alternative funding mechanisms for WSUD implementation;
- Developing and applying models and assessment tools to demonstrate the contrast in outcomes between WSUD and conventional approaches across multiple indicators;
- Investigating and implementing ways of promoting change toward more water sensitive practice among professionals and in and between organisations; and
- Investigating and implementing ways of promoting stronger support for water sensitive practice amongst decision-makers and broader society.

Findings from the study trip are to be used in reporting on the three Core Research Activities and other research outputs where relevant. This may include specific sections on NZ/Australian synergies, similarities and differences, and highlighting lessons learnt from the transition process and implementation of WSUD in Australian cities. Annex 1 contains a copy of the scoping statement for the study tour, as given in the project's Discovery Phase report¹.

3 Programme

The first day of the study visit was hosted by the CRCWSC at Monash University's Clayton Campus. The CRCWSC is a collaboration between multiple Australian research organisations and water management agencies that "research[es] interdisciplinary responses to water problems, synthesise[s] diverse research outputs into practical solutions, and influence[s] policy, regulation, and practice to promote adoption" of WSUD². Meetings held at Monash University involved discussing research and projects in the following topic areas:

- The development and performance of green infrastructure;
- The development of benefit-cost assessment methods and tools;
- Strategies for transitioning to water sensitive cities;
- Melbourne Integrated Water Management (IWM) project; and
- Understanding social influences on community engagement and uptake of water sensitive behaviours.

The second day of the visit commenced with a tour of the Little Stringybark Creek catchment, the location of a long-established research project led by Melbourne University researchers to investigate stream response to the retrofitting of WSUD devices³. After a follow-up discussion at the University of Melbourne (Burnley campus), the team took a series of self-guided walking tours around stormwater harvesting projects located on the eastern edge of Melbourne's CBD⁴.

The first half of the final day of the visit was hosted by Melbourne Water at their head office in the Docklands area of central Melbourne. Melbourne Water is not only responsible for bulk water supply, wastewater treatment and large-scale stormwater management but also provides a regulatory and leadership role in relation to the multiple councils and water supply companies that

² <https://watersensitivecities.org.au/>

³ <https://urbanstreams.net/lsc/>

⁴ <http://urbanwater.melbourne.vic.gov.au/tours-videos/take-a-self-guided-tour/>

operate at the local scale across Melbourne⁵. Thanks to arrangements made by the CRCWSC, meetings were held on the following Melbourne Water activities:

- The Living Rivers programme, an incentives scheme for promoting WSUD uptake by local councils;
- Stormwater strategic planning and regulatory activities, including ongoing challenges facing WSUD implementation across Melbourne; and
- Clearwater training activities to build capacity in Melbourne's water management sector.

Following these meetings, the Activating WSUD team visited further examples of WSUD infrastructure in Melbourne's CBD and Docklands area.

Annex 2 gives a full record of the meetings held and locations visited, including links to relevant websites for further information on projects and activities of the teams involved. Annex 3 shows photos from examples of the sites visited.

4 Findings

4.1 The Melbourne experience of WSUD

Before describing learnings from the study trip, it is worth broadly summarizing the Melbourne experience of WSUD, based on a synthesis of comments made by Australian researchers and practitioners involved in the various meetings. This provides context for considering the relevance, and potential limitations, of learnings for informing approaches to activating WSUD uptake in New Zealand.

The primary motivating factor for a change in water management in Melbourne was the Millennium Drought of the early 2000s. A step-change in the rainfall regime led to a need for alternative water supply sources. This crisis prompted both a large-scale structural response in the construction of a desalination plant and the identification of the need for a widespread, decentralized transformation in water management involving the capture and re-use of wastewater and harvested stormwater for non-potable uses. Another important driver was poor water quality, especially elevated nutrients levels, in the Lower Yarra River. As well as providing a supplementary water source, distributed interventions to capture and treat stormwater also provided a means of attempting to improve water quality in the City's streams and rivers.

Strong collective leadership played a key role in initiating (and continuing) the change in water management in Melbourne. Leaders at state government and local government levels and in water agencies and the research sector have been influential in driving change. Melbourne is seen as having a prior record of strong environmental leadership and this legacy provided an enabling environment for change.

The multiple agencies involved in strategic planning and urban water management continue to develop and implement effective ways of collaborating to meet shared objectives. This collaboration takes the form of, for instance: strategic visioning exercises⁶; incentive schemes to seed WSUD practices at the local level⁷; and extensive capacity building programmes⁸.

⁵ <https://www.melbournewater.com.au/>

⁶ <https://watersensitivecities.org.au/content/project-irp1/>

⁷ <https://www.melbournewater.com.au/community-and-education/apply-funding/living-rivers-funding>

⁸ <https://www.clearwatervic.com.au/>

Reflecting the importance of water supply needs, the practical application of WSUD in Melbourne places a strong emphasis on water capture and re-use. In the context of stormwater, this involves the use of private rainwater tanks and large public stormwater harvesting schemes. Harvested stormwater is used for purposes such as irrigation of recreational areas and landscaping. In the former case, stormwater is treated prior to use to avoid potential public health issues. As well as providing a supplementary water supply, harvesting has obvious benefits for stormwater quantity control and this is complemented by the use of bioretention systems. Similar to WSUD in New Zealand, bioretention systems are also used to provide stormwater quality treatment and range in size from relatively large-scale installations to individual tree pits. During summer, these systems may also be irrigated in order to sustain vegetation through the dry months.

State and local government and the water management sectors recognize that the implementation of WSUD in Melbourne continues to face challenges. The rapid pace of greenfield development and a process-based approach to regulation are cited as issues that have constrained uptake of WSUD by the development community. Some local councils remain averse to WSUD, reflecting concerns about maintenance costs and a lack of budget. A stormwater offset system applies, whereby developers can avoid site-scale WSUD by making a financial contribution towards the construction of larger-scale interventions. There are difficulties in the implementation of this system, for instance in linking an offset contribution for a given development site to an intervention that directly manages the effects of that development.

Recognising that WSUD implementation in Melbourne continues to face these sorts of challenges, along with others such as climate change and changing community expectations, the city is again looking to 'up its game' through the development of an Integrated Water Management (IWM)⁹ strategy. At the same time, a State-level review has recently made a series of recommendations specific to improving stormwater management¹⁰. Despite the perception that Melbourne is well-progressed on the transition to becoming a water sensitive city, these sorts of current initiatives clearly indicate a continuing recognition by WSUD champions of the need to reflect on the City's progress and to strategize new ways of driving change.

4.2 Learnings for implementation of WSUD in New Zealand

Three groups of learnings from the study trip are described below.

Firstly, consistent with the aim of the study trip, there are a series of learnings on success factors which offer some potential to make a positive difference to WSUD uptake in New Zealand.

Secondly, there are number of findings relating to research and implementation activities that constitute a work in progress. These activities have yet to contribute to successful WSUD outcomes in Australia but are worth watching for their potential application in NZ.

Finally, the remaining findings reflect the fact that the Australian experience of WSUD has faced, and continues to face, a range of challenges. Often, these appear to be similar to issues experienced by

⁹ <https://www.melbournewater.com.au/community-and-education/about-our-water/liveability-and-environment/integrated-water-management>

¹⁰

https://www.water.vic.gov.au/_data/assets/pdf_file/0035/394685/Improving_Stormwater_Management_Report_PUBLIC_V4.pdf

NZ practitioners. Although these ‘continuing challenge’ learnings do not provide an immediate source of inspiration for WSUD uptake in New Zealand, they are described here in order to provide a reality check on the perception that NZ’s implementation of WSUD lags behind Australia across the board. In addition, this identification of shared challenges provides a focus for continued engagement with the Australian WSUD research sector, providing an opportunity for future collaborate on areas of mutual interest.

Where relevant, the list below notes which of the current Activating WSUD research areas each finding is most closely linked to, allowing the subsequent capturing of these findings in the outputs of each of those research activities.

WSUD success factors

1. Leadership at the highest levels and across multiple agencies (government, water industry and research sectors) has been key to a coordinated response to Melbourne’s water supply crisis and a continuing strategic approach to improving water management. In the current phase of strategizing, the business case for progressing an IWM approach is being discussed at the highest state and local government decision-making levels. Linked to this, many researchers stressed the importance of local champions within government and water industry agencies as vital to creating buy-in within agencies, driving on-going change, capacity building, and facilitating good on-the-ground demonstration projects and implementation.
2. Establishing effective governance structures has been crucial for establishing clearly defined institutional roles and mandates, breaking down silos and facilitating collaboration, and providing an enabling environment for WSUD implementation.
3. Collaborative approaches to strategy development, currently through benchmarking and visioning exercises provides a transparent approach to developing a collective understanding of how cities are performing and the development of transition strategies. Facilitated by CRCWSC researchers, these exercises allow a diverse range of stakeholders to aim for a consensus approach. They have been found to benefit from the involvement of leading thinkers and decision-makers, often from outside the traditional sectors involved in water management, but who become invested in the process. Through these exercises, stakeholders are able to collectively focus on priorities, for instance areas where performance is currently poorest.
4. The Living Rivers incentives programme allows Melbourne Water to support WSUD projects in local councils, financing activities and employees that councils would otherwise not take on. By embedding WSUD practice (and champions) in councils the Living Rivers programme aims to motivate continuing WSUD implementation, not only by supporting progressive councils involved in the scheme but also via a snowball effect on other councils. As a result, the programme aims to deliver WSUD implementation across Melbourne at a scale that Melbourne Water are unable to achieve in isolation of local council buy-in. [*Relevant for Activating WSUD “Incentives and Funding” activity*].
5. Industry engagement and capacity building, for instance through Clearwater’s activities, occur on a significant scale. Delivery focuses on practical training by independent technical

experts, including translation of relevant research findings. Similarly to the delivery of Living Rivers programme, the role of WSUD champions in local councils is important in identifying training needs. The programme makes widespread use of demonstration studies to illustrate both successes and failures. For maintenance activities, this involves field-based training. For construction activities, the programme recognizes the challenges of hosting training on active construction sites and instead uses instructional videos recorded at critical points though the construction process. *[Relevant for Activating WSUD “Guidance for maintenance-led design” activity].*

6. In the current strategic environment of IWM, Melbourne Water has adopted a more broadly-based set of objectives than those traditionally associated with the water sector. The twin objectives of public health (wastewater management) and public safety (flood control) have been replaced by a set of ‘liveability’ objectives, with buy-in across state and local government stakeholders. This not only allows the business-case for WSUD to be expressed across a wider set of benefits but also establishes the significance of WSUD in contributing to city liveability *[Relevant for Activating WSUD “Characterising, evaluating and demonstrating the full benefits of WSUD” activity].*
7. IWM planning and implementation involves a diversity of interventions, including: centralized/de-centralised approaches (both large projects and small-scale widely distributed projects) and structural/non-structural approaches (both infrastructural solutions and other approaches, for instance education to change behaviours).
8. As part of the University of Melbourne’s Little Stringybark Creek project, adoption of WSUD at the private property scale (e.g. rainwater tanks) was most successful where enabled by simple administrative and funding processes. From the point of view of agencies promoting uptake, a strategic approach to push uptake in priority areas is more effective for achieving objectives than a ‘hands-off’ approach. Rates of uptake can also be assisted by taking proactive community engagement steps to normalize WSUD. *[Relevant for Activating WSUD “Incentives and Funding” activity].*
9. Community acceptance of street scale WSUD devices can be enhanced by allowing locals to have a say in the plant species used. A successful approach is to combine functional plant species within the device itself and allow communities to specify the species mix of aesthetic (non-functional) marginal planting *[Relevant for Activating WSUD “Guidance for maintenance-led design” activity].*
10. Widespread use of treepits and the importance of trees as part of a wider ‘urban forest’ strategy that considers the multi-faceted benefits of green infrastructure, especially in relation to urban cooling¹¹. *[Relevant for Activating WSUD “Guidance for maintenance-led design” activity]*

¹¹ <https://www.melbourne.vic.gov.au/community/parks-open-spaces/urban-forest/pages/urban-forest-strategy.aspx>

Items to keep a watching brief on

11. In response to a high demand for 'business case' methods, the University of Western Australia (part of the CRCWSC) has developed a benefit-cost-analysis (BCA) tool¹². The tool provides a framework for capturing and aggregating estimates of a diverse range of benefits. It relies on established methods for monetizing benefits which are not new to NZ and are consistent with contemporary economics research in the area of non-market valuation (NMV) methods, but which have had more widespread application and acceptance in Australia. The tool conducts sensitivity analyses of benefit estimates, expressing the outcomes of assessments in terms of likelihood. Potential limitations on the use of the tool in NZ are: the availability and applicability of data for benefit transfer; methodologies for addressing the reliability of NMV assessments reliance on monetization; and approaches to discounting. A suggested way forward is to collaborate with the developers of the tool on an NZ implementation, once Australian testing of the current beta version is completed. *[Relevant for Activating WSUD "Characterising, evaluating and demonstrating the full benefits of WSUD" activity].*
12. A current trend to minimize costs of bioretention is the use of washed sand as a default media. This is generally the cheapest media that meets bioretention specifications, which are driven by infiltration rate. Nutrient inputs delivered in stormwater may be sufficient to meet plant requirements while the use of a raised outlet maintains a saturated zone at the base of the device. However, it is important to note that Australian bioretention systems are often irrigated (for instance, by harvested stormwater) during dry months, without which plants in washed sand systems may struggle to survive *[Relevant for Activating WSUD "Understanding the full lifecycle costs" and "Guidance for maintenance-led design" activities].*
13. Monash University's Living Water Laboratory is hosting a wide range of novel research to investigate the performance of green infrastructure (GI). Provision for monitoring has been designed into GI research areas such as living walls and green roofs. Current research of particular interest includes investigating the uptake of stormwater contaminants by edible plant species and the effect of leaf litter from plants with antibacterial properties on the removal of microbial contaminants in stormwater *[Relevant for Activating WSUD "Guidance for maintenance-led design"; "Characterising, evaluating and demonstrating the full benefits of WSUD activities" and the "WSUD and Te Ao Maori" workstream].*
14. The University of Melbourne's Little Stringybark Catchment study has investigated the catchment-scale response to WSUD retrofitting. The results are reported to contain more evidence of an improvement in stream hydrology than in water quality or biology. This may indicate that the scale of intervention to disconnect impervious surfaces from the stream has been insufficient in some places (although levels of imperviousness are very low compared to most urban areas in New Zealand). Publication of detailed results is expected over next 12 months or so and these are likely to contain further insights. A key learning to date has been importance of tracking changes in the catchment (infill, uptake of rainwater tanks) as the study has progressed, as the research team has found it challenging to

¹² <https://watersensitivecities.org.au/research/our-research-focus-2016-2021/integrated-research/irp2-wp3/>

retrospectively assemble these data [*Relevant for Activating WSUD “Characterising, evaluating and demonstrating the full benefits of WSUD” activity*].

15. The Little Stringybark Creek study is noteworthy for its local scale approach to price discovery in the form of a multi-stage auction process that sought co-funding from residents to locate WSUD devices on their properties. This approach may be important for WSUD retrofit projects in NZ, with potential motivations for WSUD likely to vary between properties in relation to the distribution of private and public benefits and costs, and the capacity of individual properties to contribute to the quantum of environmental mitigation at the catchment scale. [*Relevant for Activating WSUD “Incentives and Funding” activity*].
16. The Living Rivers programme is adopting the Australian government’s Monitoring, Evaluation, Reporting and Improvement (MERI) framework to measure success, both at the programme and project scale. They are also using transitioning tools developed by the CRCWSC, for instance to monitor progress in building council capacity [*Relevant for Activating WSUD “Characterising, evaluating and demonstrating the full benefits of WSUD” activity*].
17. The stormwater offset approach, whereby developers contribute to the construction of publicly-owned devices, has benefits for developers and local councils by avoiding issues associated with the construction and maintenance of WSUD devices on private land. However, it can be challenging to monitor how contributions are spent and ensure that effects generated by a given development are managed in the same catchment. The scope of the current review of stormwater management in Victoria includes recommendations to improve the offset system, as well as a range of other matters of relevance for stormwater management in New Zealand. [*Relevant for Activating WSUD “Incentives and Funding” activity*].

Continuing challenges for WSUD implementation

18. Much of Melbourne’s development community remains averse to the adoption of WSUD. This is especially the case in greenfield settings, which are under considerable development pressure due to Melbourne’s rate of population growth. There are, however, some examples of more progressive developers adopting WSUD because they see its potential appeal to the higher-end of the residential housing market [*Relevant for all Activating WSUD research activities*].
19. The consenting of development proposals has been viewed as being process-based rather than outcome-based, with applicants resistant to the regulator conducting technical reviews of proposals. This technical review role is typically supplied by consultants acting for the applicant. The scope of the current review of stormwater management in Victoria includes recommendations which may see some changes to regulatory processes. [*Relevant for Activating WSUD “Incentives and Funding” activity*].
20. Some local councils remain averse to WSUD due to bad experiences with design and construction and the ongoing maintenance burden, especially in greenfield locations. Maintenance costs can be a problem for councils because there is no specific mechanism in

the rating system for assigning budget to deal with WSUD maintenance. Without ongoing support, such as through the Living Rivers programme, it is likely that some councils which have had some exposure to WSUD would revert to conventional water management approaches [*Relevant for Activating WSUD “Understanding the full lifecycle costs” and “Incentives and Funding” activity*].

21. There are questions around the social equity of WSUD. Research at the CRCWSC has found that social advantage/disadvantage plays a role in influencing the uptake of ‘water sensitive’ behaviours. WSUD is attractive proposition for the educated middle classes and, as noted above, some developers are picking up on this. A potential outcome is one in which an uneven implementation of WSUD fails to deliver benefits across different socio-economic sectors of the community. The same danger applies to the implementation of WSUD in New Zealand, where it also has the potential to take on a cultural dimension. There are some logical downstream questions around this in terms of differential financial and incentive schemes to avoid this uneven uptake, especially relevant given the need to motivate effective mitigation in retrofit situations. [*Relevant for Activating WSUD “Characterising, evaluating and demonstrating the full benefits of WSUD” and “Incentives and Funding” activities*].

5 Limitation

This document is based on discussions with the Australian WSUD researchers and practitioners listed in Annex 2. While we have endeavoured to record comments and views accurately, we recognize that we may have misunderstood or misinterpreted information provided to us. That being the case, the content of this document therefore represents the understanding of the Activating WSUD research team and may not accurately represent the views, policies or findings of individuals and organisations involved in meetings with the NZ team.

As part of, and subsequent to, those meetings the Activating WSUD team has been provided with copies of and/or access to a range of documents on relevant research, practice and strategy in Melbourne. While this document refers to some of that material, the Activating WSUD team have yet to subject it to full review. Accordingly, it may be the case that the findings described above may be modified or added to when considered in the light of the additional material available.

6 Acknowledgements

The Activating WSUD team extends its thanks to:

- the Cooperative Research Centre for Water Sensitive Cities, including Monash University staff Katie Hammer, Jamie Ewert, Euan Hind, Dr Briony Rogers, Dr Brandon Winfrey, Prof Rob Skinner, Dr Paul Satur and Dr Sarah Kneebone, and University of Western Australia’s Dr David Pannell.
- A/Prof Chris Walsh and Dr Darren Bos of the University of Melbourne.
- Melbourne Water staff: Bronwen Hutchinson, Micah Pendergast, Birgit Jordan, Katrina Hawkins and Petra??

Annex 1 – Scoping Statement

| | |
|------------------------------|--|
| Activity | Knowledge transfer: learning from the Australian experience |
| Relevance / potential impact | The Australian CRC for Water Sensitive Cities has an approximate \$100M budget to deliver research that cuts across many of the themes identified in Phase 1. While recognising the need for NZ/Aotearoa-specific guidance, there is likely to be significant value to be gained by learning and reflecting on insights generated by our Australian peers and importing relevant international best practice to NZ. This is especially the case in relation to: the characterisation and assessment of WSUD benefits; planning a longer-term monitoring and evaluation programme; incentives; activating organisational change; and progressing the social licence for WSUD. |
| Methods | Take part in study visit to Monash University, Melbourne (host of CRC for Water Sensitive Cities). Workshop NZ areas of interest with leading researchers in relevant fields and learn from current implementation practices by Melbourne Water and relevant local authorities. Scope methods (new research and/or knowledge transfer from Australia) for the development and dissemination of NZ-relevance guidance. Take opportunities to host key CRC investigators in New Zealand, for instance providing support to extend planned visits (e.g. conference attendance) to hold workshops and research meetings. |
| Research team | Activating WSUD core research team |
| Anticipated outputs | Use of findings in reporting on the three Core Research Activities and other Discovery activities where relevant. Include specific sections on NZ/ Australian synergies, similarities and differences, and highlighting Australian lessons learnt from the transformation process and implementation of WSUD in Melbourne, Perth, Sydney and Adelaide. |
| Potential end-users | Potential funders of future research; research team; central, regional and local government, politicians, developers, planners. |

Annex 2 – Record of Activities

Monday 19 November – Meetings with Monash University researchers

| Time | Activity |
|-----------|--|
| 0930-1100 | Dr Brandon Winfrey: Tour of Living Laboratory for Water and greenhouse in Jock Marshall Reserve. https://www.monash.edu/engineering/departments/civil/research/our-facilities/living-laboratory |
| 1100-1200 | Dr David Pannell, University Western Australia: - video conference on CRC IRP2 Comprehensive economic evaluation framework and Benefit Cost Analysis Tool. https://watersensitivecities.org.au/research/our-research-focus-2016-2021/integrated-research/irp2-wp3/ |
| 1300-1400 | Dr. Briony Rogers and Katie Hammer: CRCWSC IRP1 Water Sensitive City Visions and Transition Strategies. https://watersensitivecities.org.au/content/project-irp1/ |
| 1400-1530 | Prof Rob Skinner: Monash Sustainable Development Institute activities and IWM project. https://resilientmelbourne.com.au/integrated-water-management-information-hub/ Dr Paul Satur: Community engagement insights from CRCWSC tranche 1 research https://watersensitivecities.org.au/content/social-inequality-and-water-sensitive-cities/ Dr Sarah Kneebone: Behaviourworks research into water sensitive behaviours https://www.behaviourworksaustralia.org/ |
| 1530- | Self-guided walking tour of Monash University WSUD features. |

Tuesday 20 November – Field visit, meetings with Melbourne University researchers and city WSUD walking tours

| Time | Activity |
|-----------|--|
| 0930-1130 | Tour of the Little Stringybark Creek (LSC) research catchment with Darren Bos of University of Melbourne. https://urbanstreams.net/lsc/ |
| 1230-1400 | Meeting with A/Prof Chris Walsh, University of Melbourne (Burnley Campus) on LSC research project and Melbourne’s WSUD drivers and journey. https://thewerg.org/ |
| 1400- | Self-guided walking tours of WSUD features in areas east and south of Melbourne’s CBD. Queen Victoria and Alexandra Gdns http://urbanwater.melbourne.vic.gov.au/tours-videos/take-a-self-guided-tour/self-guided-tour-stormwater-harvesting-at-queen-victoria-and-alexandra-gardens/ Birrarung Marr http://urbanwater.melbourne.vic.gov.au/tours-videos/take-a-self-guided-tour/walking-tour-birrarung-marr-stormwater-harvesting/ East Melbourne http://urbanwater.melbourne.vic.gov.au/tours-videos/take-a-self-guided-tour/east-melbourne-walking-tour/ |

Wednesday 21 November – Meetings with Melbourne Water and walking tours

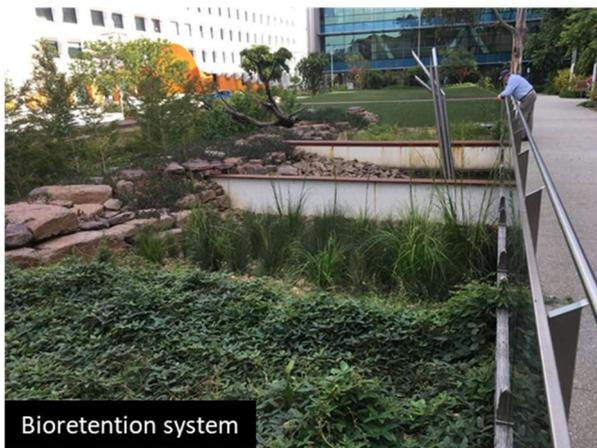
Meetings facilitated by Euan Hind (CRC Water Sensitive Cities)

| Time | Activity |
|-----------|---|
| 0900-1000 | Bronwen Hutchinson and Micah Pendergast: Living Rivers program – incentives for WSUD https://www.melbournewater.com.au/community-and-education/apply-funding/living-rivers-funding |
| 1000-1100 | Birgit Jordan: Stormwater team – technical stormwater insights and strategic planning for stormwater https://www.melbournewater.com.au/planning-and-building/stormwater-management |
| 1100-1200 | Katrina Hawkins and Petra Katona - Clearwater - capacity building for WSUD and stormwater management. https://www.clearwatervic.com.au/ |
| 1300- | Self-guided walking tours of WSUD features in docklands and Melbourne’s CBD. http://urbanwater.melbourne.vic.gov.au/wp-content/uploads/2015/07/Urban-Water_Central-city-WSUD-tours.pdf |

Annex 3 – Photographs



19 November:
Monash University





Capture of stormwater in rain tanks for irrigation of sports fields



House rain tanks adjacent to Little Stringybark Creek

20 November: Little Stringybark Creek catchment and Melbourne University (Burnley) green roof



Retrofit bioretention system



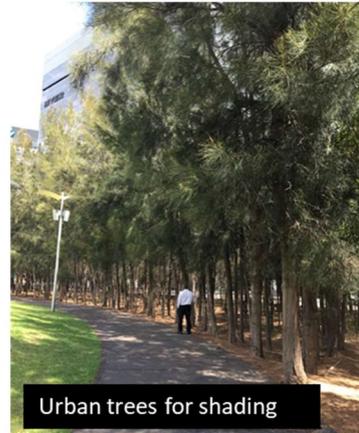
Retrofit bioretention system



Retrofit bioretention system



Melbourne University green roof



**21 November:
Melbourne CBD and
Docklands WSUD**

