

Development of an integrated software tool for strategic planning and conceptual design of water sensitive cities

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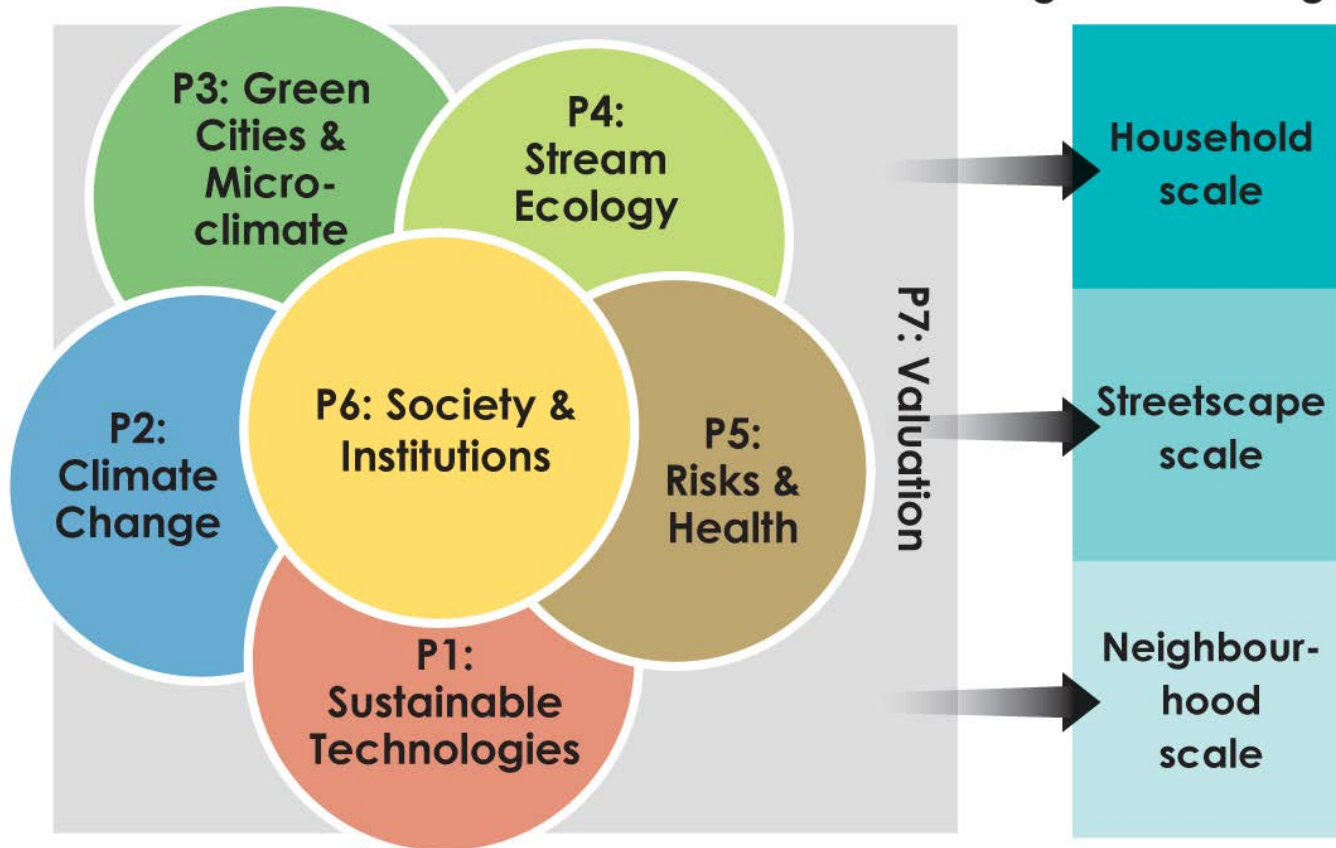
Cities as Water Supply Catchments

The image features a blue header with a white silhouette of a city skyline. Below the header is a large aerial photograph of a city, showing a highway with a curved overpass and various urban buildings and green spaces. The background of the header has a pattern of white lines and circles, suggesting a network or data flow.

A research program that aims to harness the potential of storm water to overcome water shortages, reduce urban temperatures, and improve the landscape and livability of Australian cities

Research Framework

P8: Integration
& Demonstration
Through Urban Design

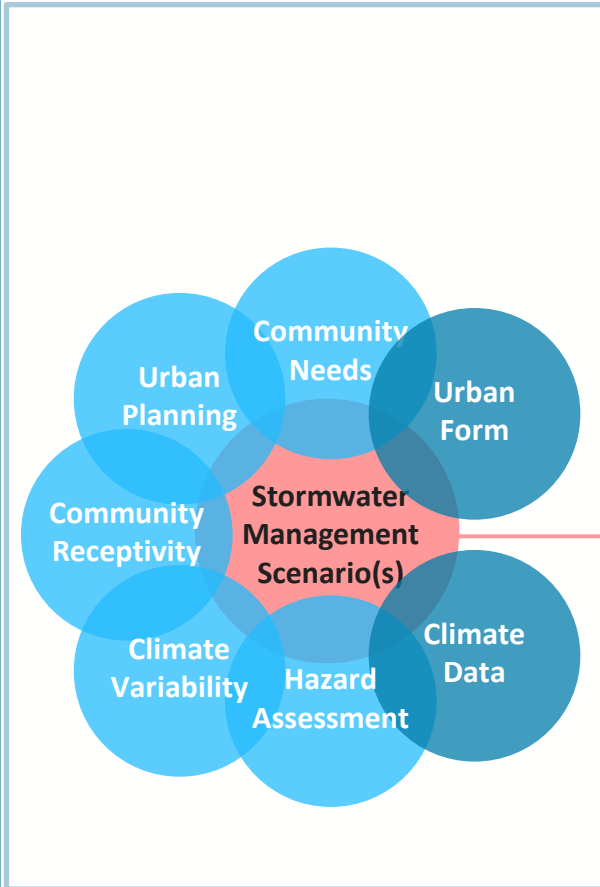


- \$14 million and 5 year long project
- We are ½ way there!

Schematic diagram

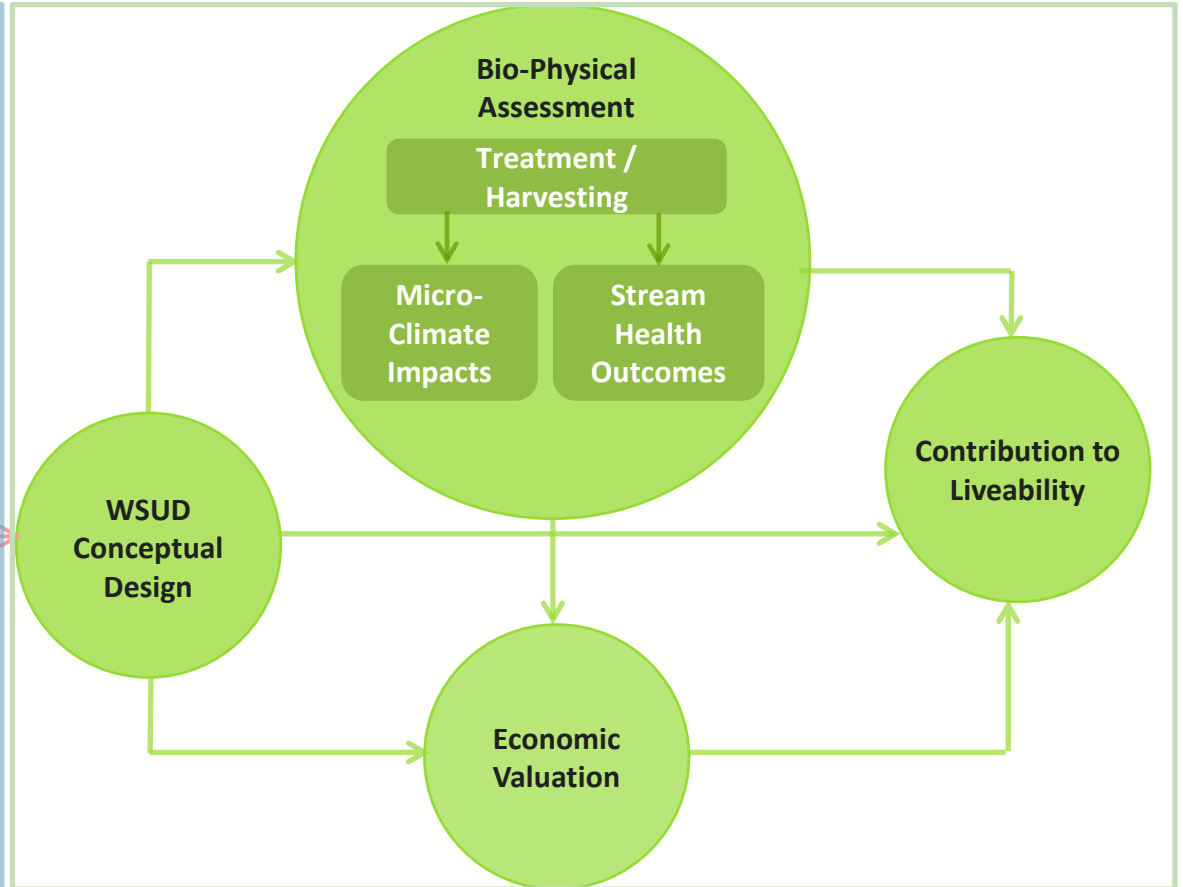
Scenario Generation

Participatory Process



Scenario Assessment

Simulation process



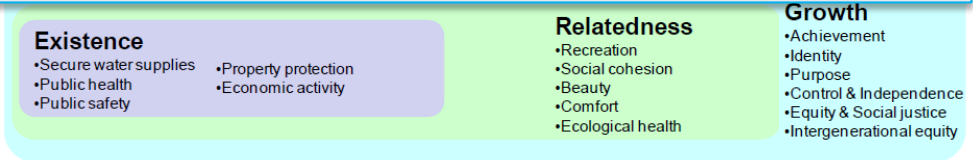
Community Needs



- identify urban water needs of local communities that can be influenced by stormwater management

Water Supply City	Sewered City	Drained City	Waterways City	Water Cycle City	Water Sensitive City
Water – potable use	Wastewater management	Stormwater disposal	Stormwater hydrology & quality	Total water cycle management	Thermal comfort
Water – non-potable use		Pluvial flood risk reduction	Improved habitat	Integrated water systems	Identity & Vision

- *inform the evaluation of scenario contributions to liveability within the scenario assessment component of the model*



Urban Planning



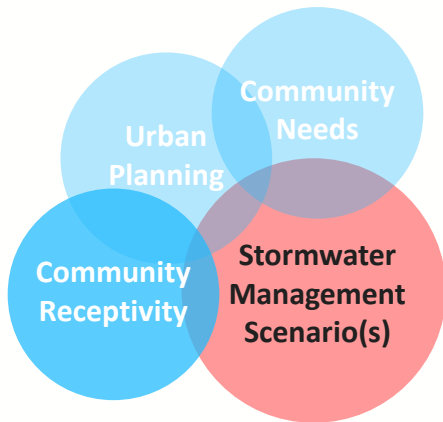
- relevant high level urban planning guidance and regulations
- participatory input from stakeholders

A collage of images including a building rendering, a site plan with a lake, an existing zoning map, and a transect-based regulation plan. Below the collage is a grey box containing two bullet points.

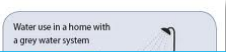
- *identify current local strategic and statutory planning considerations &*
- *determine additional contribution*

Existing Zoning Map Transect Based Regulation Plan Site Plan North Singletree Estates Huntley, Illinois

Community Receptivity

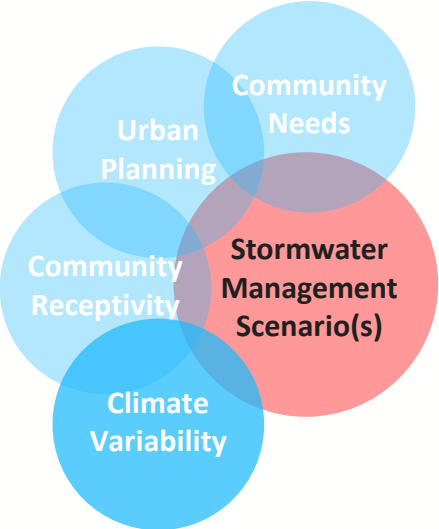


- results and observations from studies focused on community norms and community engagement

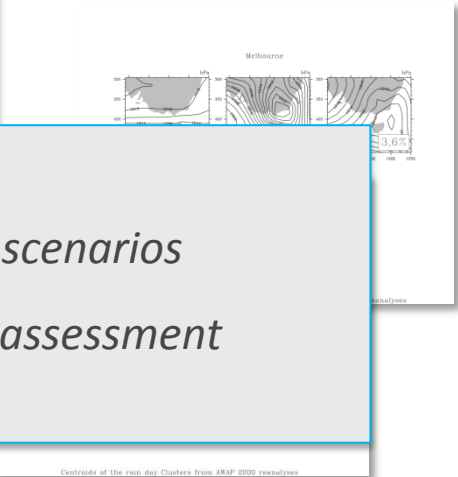


- *guide on identifying policy tools and capacity building strategies to accelerate the implementation of WSUD technologies and practices and to increase industry/community receptivity*

Climate Variability

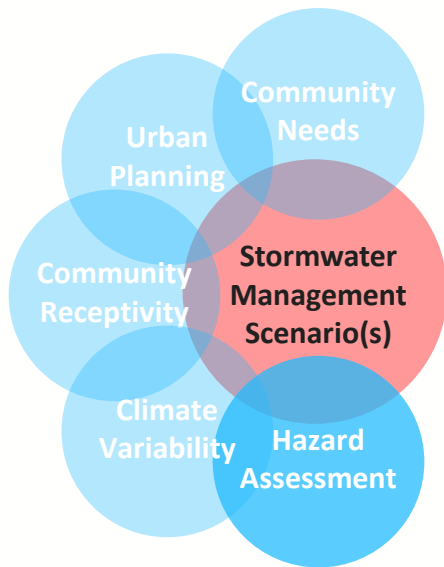


- urban climate predictions (e.g. rainfall, evapotranspiration, temperatures and humidity) and the uncertainty associated with these predictions (100, 1000s of scenarios)



- *analysis of future climate scenarios*
- *inputs to the bio-physical assessment*

Hazard Assessment



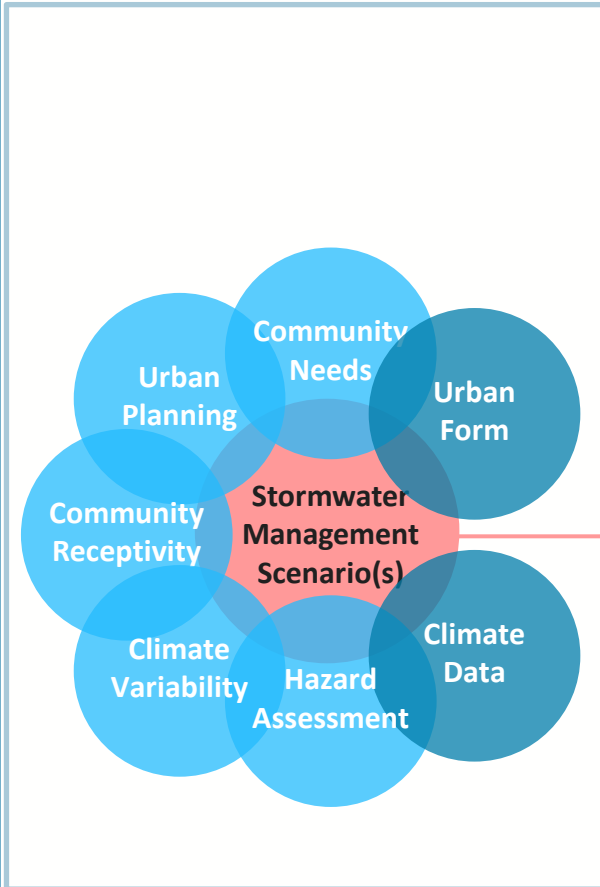
- public health hazard and risk assessments of WSUD systems
- links to relevant national and state regulations and guidance on water recycling and pollution control

- *guidance on how to implement and operate stormwater harvesting and use systems to meet the required health and safety standards for potable and non-potable water use*

Schematic diagram

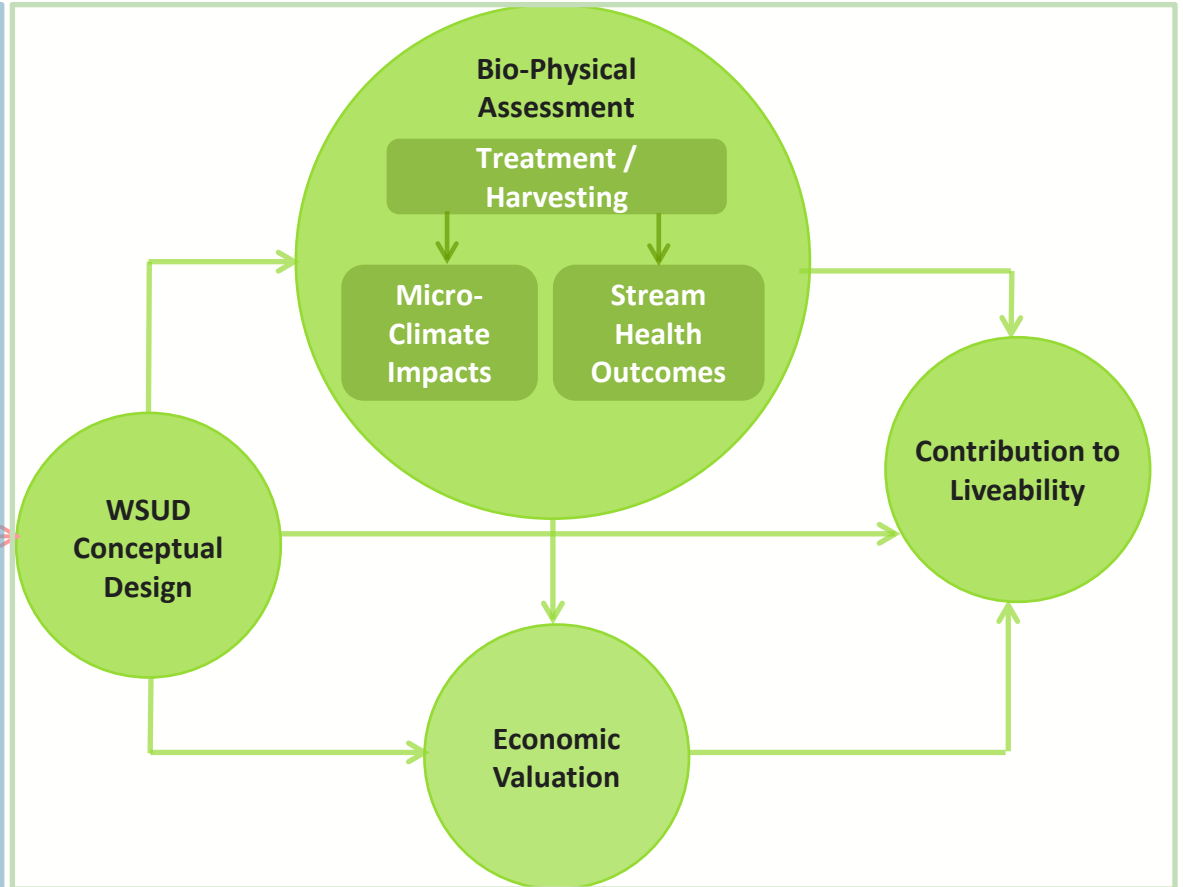
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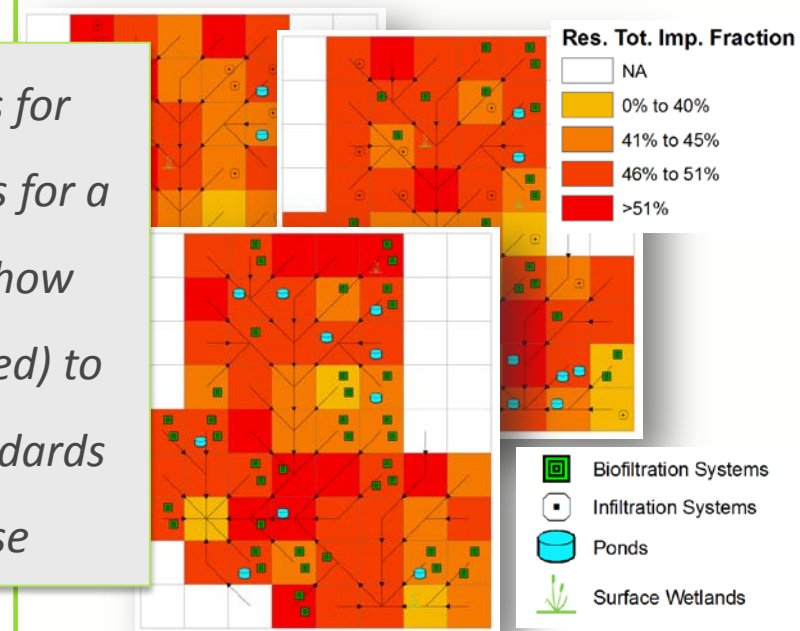


WSUD Conceptual Design

- UrbanBEATS explores and evaluates a range of decentralised water management configurations

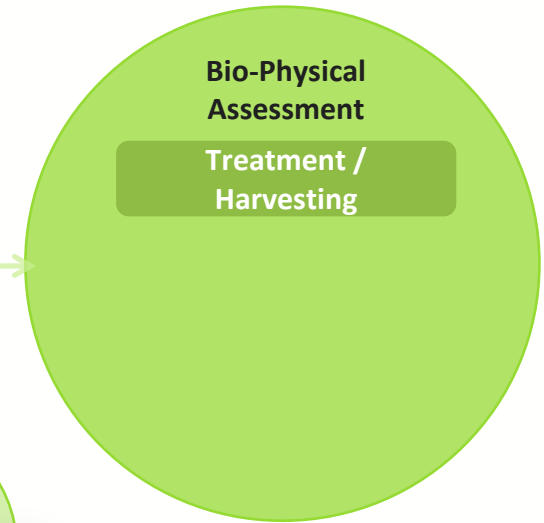
WSUD
Conceptual
Design

- Provide indicative conceptual designs for sustainable urban water technologies for a scenario (by determining where and how these could be preferably implemented) to meet required health and safety standards for potable and non-potable water use*

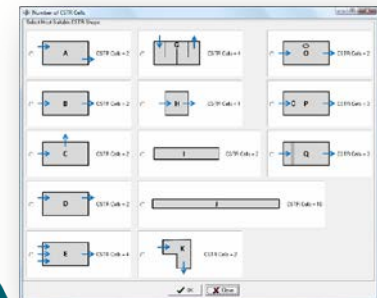
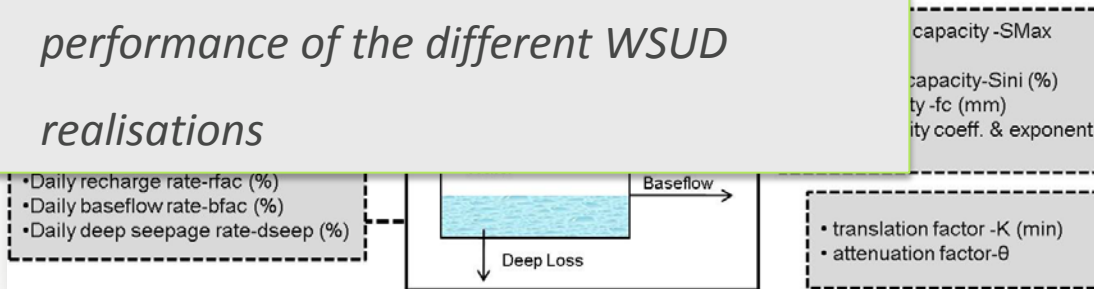


Treatment / Harvesting

- MUSIC (eWaterCRC, 2011) - Beta version
 - runoff from pervious and impervious surfaces
 - pollutant generation (stochastic approach)
 - treatment and harvesting efficiency (USTM)



- *evaluate the treatment and harvesting performance of the different WSUD realisations*



Micro-Climate Impacts

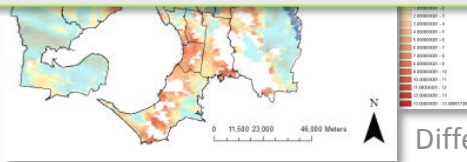
- air temperature reduction from mitigation strategies
- most appropriate scale for Human Thermal Comfort assessments

Thunderstorms Analogue images (Courtesy of Emma White & Nigel Tapper)

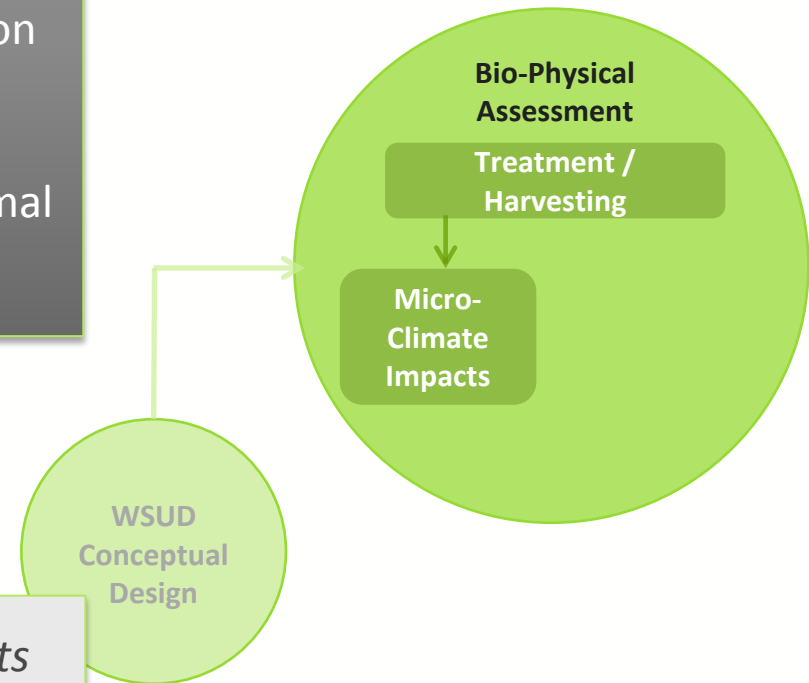
Land Surface Temperatures: 20/4/2010 & 22/4/2010



- *evaluate the urban micro-climate benefits of different WSUD configurations*



Difference
(22 April – 20 April)



Stream Health Outcomes

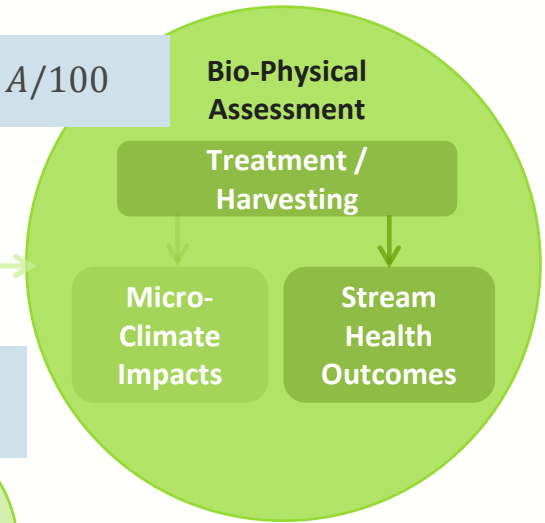
- Environmental Benefit Index (EBI - Little Stringybark Creek, 2012)

$$FF = (1 - \max\left(\frac{\text{FrequencyTreated} - \text{FrequencyPredevelop}}{\text{FrequencyUntreated} - \text{FrequencyPredevelop}}, 0\right)) \times A/100$$

- (i) reduction in flow frequency
- (ii) equivalence between the pre-urban volume of subsurface flows and filtered flows

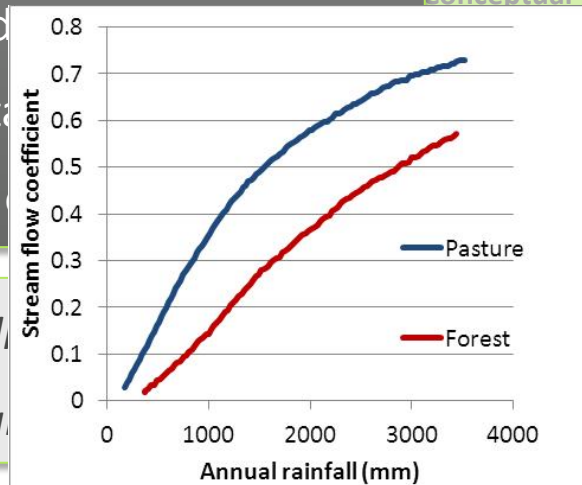
$$VR = (1 - \frac{V_e - V_c}{V_e}) \times A/100$$

- (iii) median concentrations of TSS, P and N in filtered
- (iv) reduction in total exported (used



WSUD Conceptual

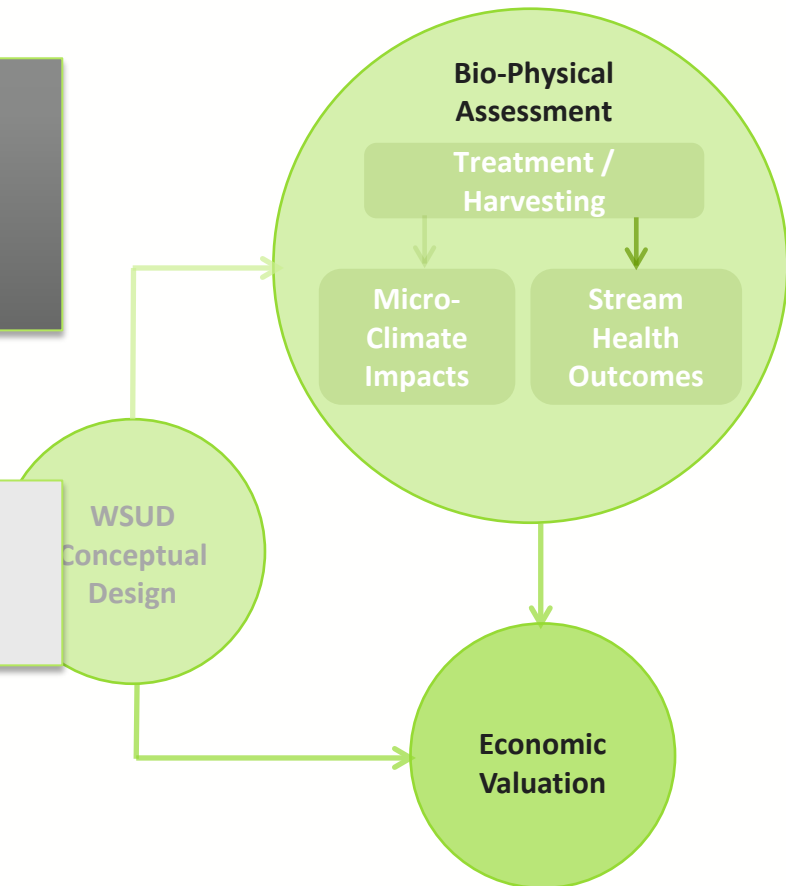
- assess the impacts of different configurations on stream



Economic Valuation

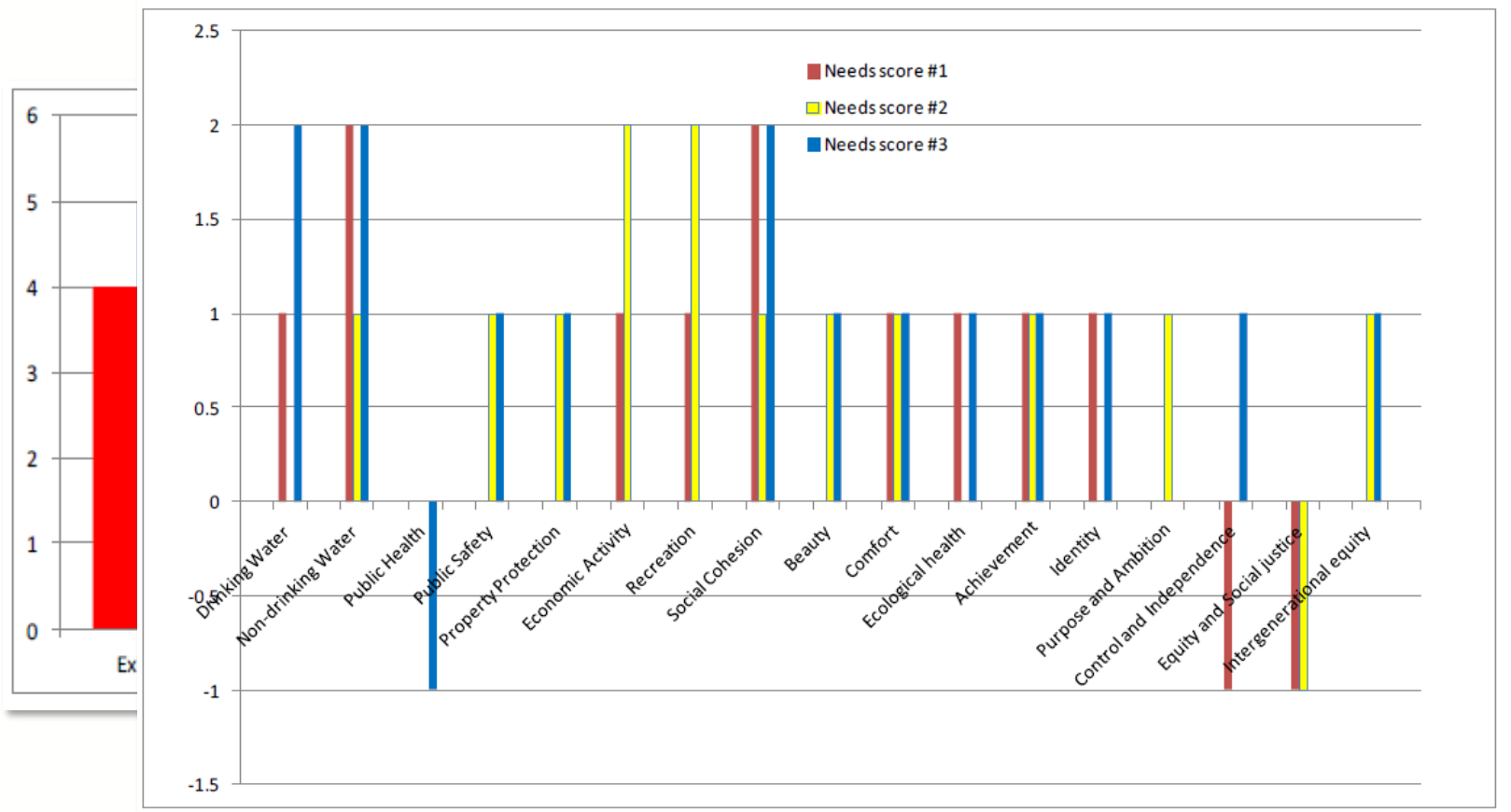
- economic valuations of a number of non-market benefits provided by WSUD technologies and practices

- *guide potential optimal investment in stormwater management technologies*



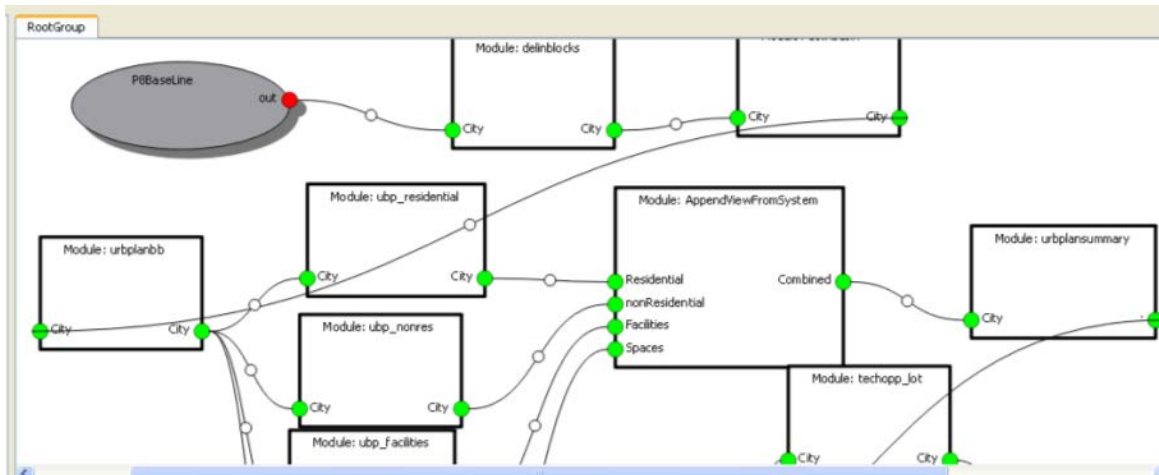
Contribution to Liveability

Simulation process



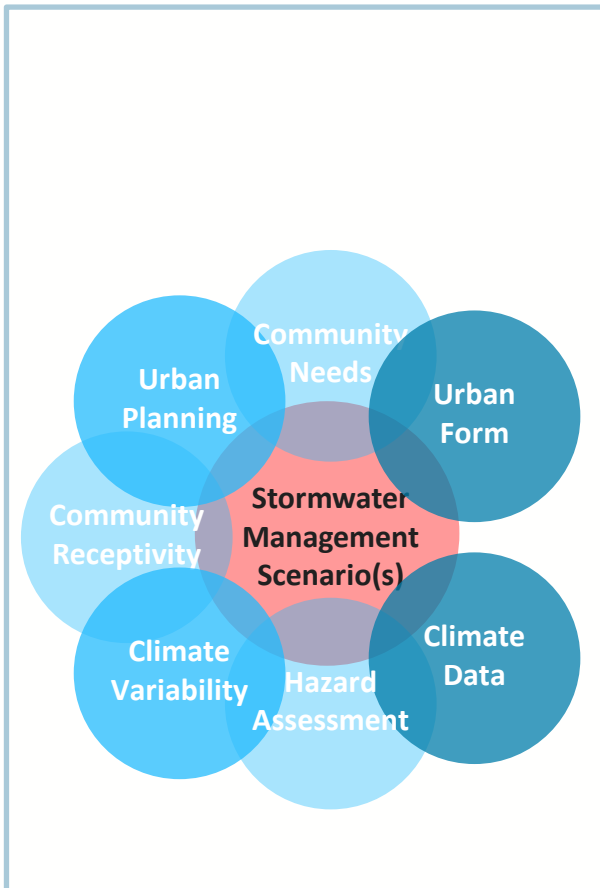
Where are we?

- *Finalizing beta version*
- *Collaboration with colleagues from University of Innsbruck*



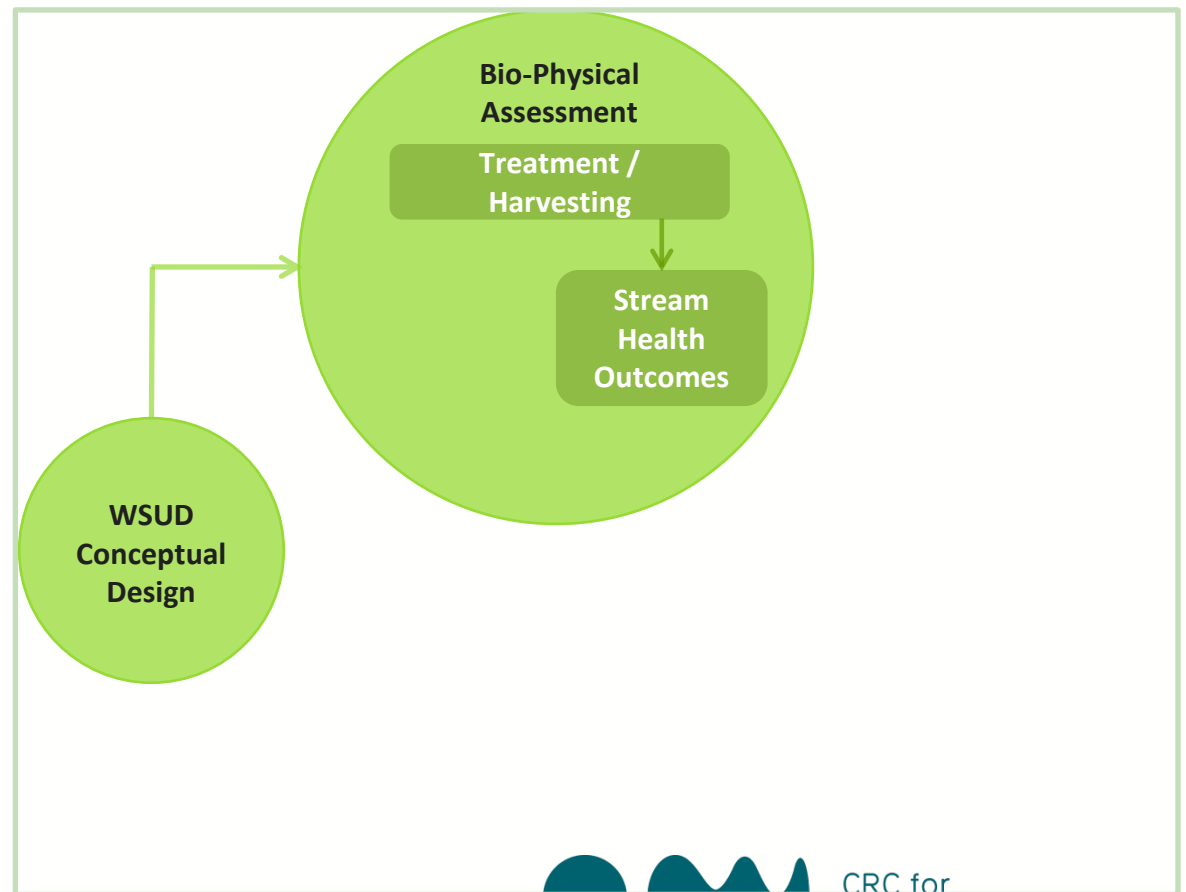
Where are we?

Scenario Generation



Where are we?

Scenario Assessment

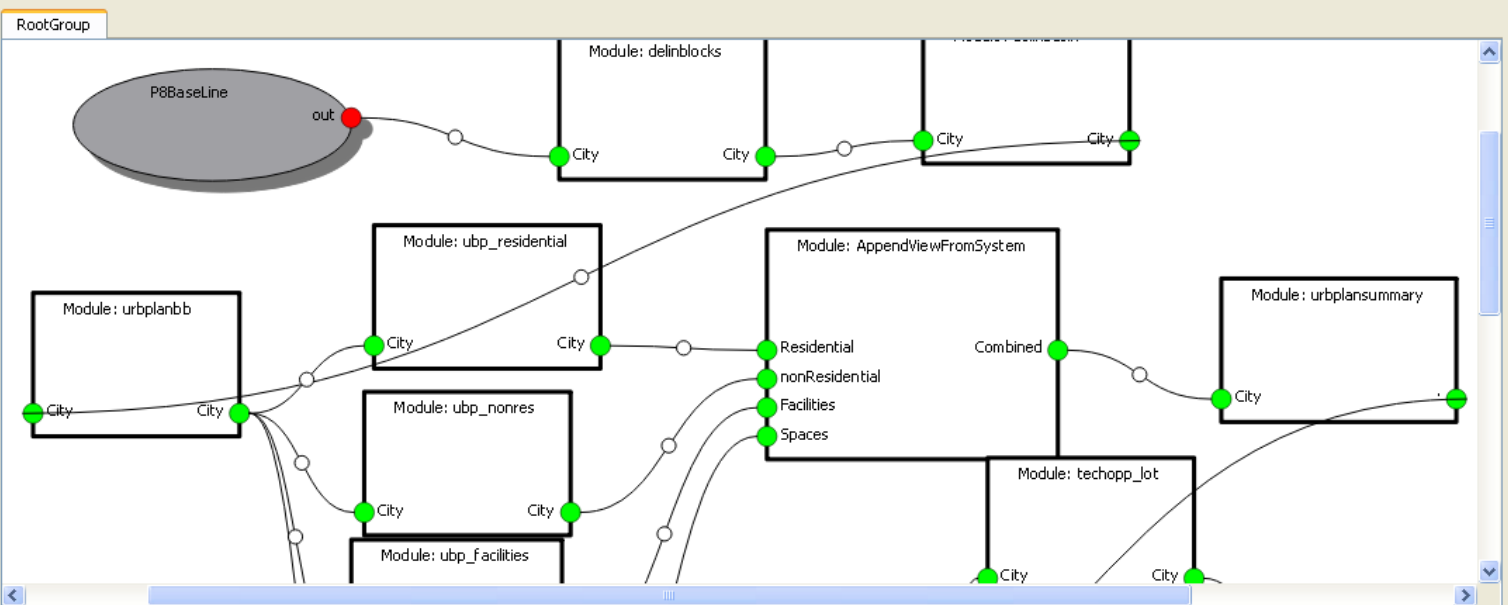
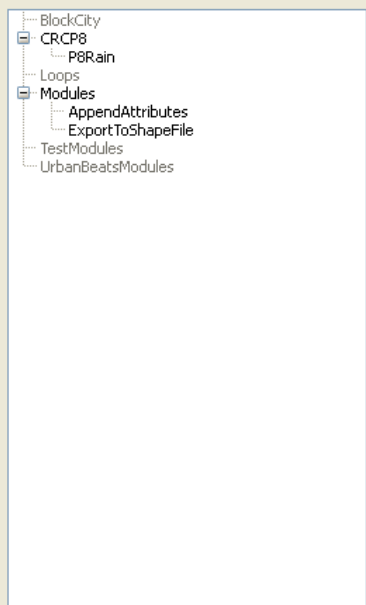


Future

- Outcomes from ongoing research
 - other aspects of water sensitive stormwater management (e.g. local flood protection)
 - different scales (e.g. micro-climate benefits at the street scale).



Questions



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